**School of Design and Built Environment**

# The assessment of the effectiveness of a private sector extension model for smallholder men and women in Papua New Guinea

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# DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

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# ABSTRACT

This study examines extension strategies in the Papua New Guinea (PNG) cocoa industry which is has been threatened by the incursion of Cocoa Pod Borer (CPB) (*Conopomorpha cramerella*) since 2006. CPB has spread throughout the cocoa growing provinces and has resulted in PNG cocoa exports dropping by 80% by 2012. CPB adds to existing industry challenges regarding low smallholder productivity, low yields, poor quality processing and low levels of technology adoption amongst farmers. With high input farming required to control CPB, it is very difficult for an ordinary smallholder farmer to control CPB. Effective management of CPB requires reforming the current extension approach to encourage cocoa farming households to continue with cocoa, increase farm inputs in production and to adopt more modern farming methods.

Traditional extension approaches, such as Training and Visit (T&V) have not been able to turn around the decline in smallholder production. However, within the main cocoa growing province of PNG, East New Britain Province (ENBP), a new private sector-smallholder partnership concept called the Private Sector Service Provider (PSSP) was initiated through a major cocoa exporter, New Guinea Islands Produce-Agmark (NGIP-Agmark). This extension model accommodates all aspects of extension service delivery all along the cocoa value chain that begins with planting materials through to marketing of cocoa produce. In addition, this extension model adopted an holistic approach by incorporating other simple livelihood awareness and trainings including agribusiness, livelihoods, health and hygiene, financial literacy, law and order and gender inclusiveness.

PSSP has been taken up by the industry through that National Department of Agriculture and Livestock (DAL) and Cocoa Board of Papua New Guinea (CB-PNG) and marketed to the World Bank for cocoa development funding. This study was conducted during the implementation of World Bank project titled Private Public Agriculture Project (PPAP) cocoa component which is a booster to the NGIP-Agmark and other private sector extension approaches to farmer groups or cooperatives and farmers. This project has greatly increased the number of farmers involved by forming

farmer groups or cooperatives with the aim of increasing cocoa production to improve livelihoods in CPB infested areas. Using a Sustainable Livelihood Approach (SLA) framework perspective, my study reveals how social capital was used to develop trusting relationships amongst the leadership chains along the private sector extension pathway to cocoa farming households. The PSSP approach used the linked leadership chain (private sector to farmer group leaders and to households), cocoa trainings along the cocoa value chain (planting materials, block management, processing and to marketing) integrated with holistic livelihood trainings for farmers. This approach proved successful with high adoption rates by farmers reflected in increasing cocoa production and livelihoods.

NGIP-Agmark's pro-activeness in management and leadership in facilitating improved cocoa support technologies, including farm inputs, transportation of crops, marketing and processing of cocoa have encouraged greater farmer participation. It has also shifted smallholders' attitudes and mindsets towards cocoa farming as a business. Participation rates have been high and improved cocoa farming practices have led to better household livelihoods with higher cocoa income.

Therefore, examining the NGIP-Agmark extension model and its integrated training approaches will contribute to the development of new holistic and integrated extension strategies. Likewise, the public-private partnership in cocoa extension gives the cocoa industry and the private sector greater potential to improve the dissemination of cocoa technologies to increase smallholder production. It will assist cocoa farmers as they slowly shift from traditional farming practices to more entrepreneurial farming approaches for sustainable cocoa production.

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| | |
|---|---|
| AAA | Agriculture Administration Adjustment |
| ACIAR | Australia Centre for International Agriculture Research |
| ADB | Asian Development Bank |
| AIC | Agriculture Investment Corporation |
| ARoB | Autonomous Region of Bougainville |
| ATM | Automated Teller Machine |
| BARD | Bachelor in Agriculture and Rural Development |
| BSP | Bank of the South Pacific |
| CB | Cocoa Board |
| CB-PNG | Cocoa Board of Papua New Guinea |
| CPB | Cocoa Pod Borer |
| CCIL | Cocoa Coconut Institute Limited |
| CCRI | Cocoa Coconut Research Institute |
| CIC | Coffee Industry Corporation |
| DAL | Department of Agriculture and Livestock |
| DASF | Department of Agriculture Stock and Fisheries |
| DPI | Department of Primary Industry |
| ENBP | East New Britain Province |
| ENBCPBRCC | East New Britain Cocoa Pod Borer Response Coordinating Committee |
| ENBDC | East New Britain Development Corporation |
| ENBWYiA | East New Britain Women and Youth in Agriculture |
| FAO | Food and Agriculture Organisation |

| | |
|---|---|
| FDG | Farmer Discussion Group |
| FER | Functional Expenditure Review |
| FFS | Farmer Field School |
| GoPNG | Government of Papua New Guinea |
| HREC | Human Research Ethics Committee |
| IATP | Integrated Agricultural Training Program |
| IFAD | International Fund for Agriculture Development |
| IPA | Investment Development Program |
| IPDM | Integrated Pest and Disease management |
| KBFG | Kadaulung Butam Farmer Group |
| KIK | Kokosas Indastri Koporesen |
| KILG | Kairak Integrated Land Group |
| LAES | Lowland Agricultural Experimental Station |
| LCD | Livestock Development Corporation |
| LLG | Local Level Government |
| LSS | Land Settlement Scheme |
| MDSP | Medium Development Strategic Plan |
| NARI | National Agriculture Research Institute |
| NARS | National Agricultural Research Systems |
| NAQIA | National Agricultural Quarantine Inspection Authority |
| NEC | National Executive Council |
| NGIP | New Guinea Island Produce |
| NGO | Non-Government Organisations |
| OLPG | Organic Law on Provincial Government |
| OLPLLG | Organic Law on Provincial and Local Level Government |

| | |
|---|---|
| OPIC | Oil Palm Industry Corporation |
| PAR | Participatory Action Research |
| PMU | Project Management Unit |
| PNG | Papua New Guinea |
| PNG-CCEA | PNG Cocoa Coconut Extension Agency |
| PNGSDP | PNG Sustainable Development Program |
| PNG UNRE | University of Natural Resources and Environment |
| PPP | Public Private Policy |
| PPAP | Public Private Agriculture Project |
| SERU | Socio Economic Research Unit |
| SIB | Spice Industry Board |
| SLA | Sustainable Livelihood Approach |
| SSSP | Smallholder Support Services Project |
| T&V | Training and Visit |
| VEW | Village Extension Workers |
| WWII | World War II |

# CHAPTER ONE

# INTRODUCTION

## 1.1 Introduction

Cocoa is one of the main cash crops in PNG and is grown in more than 15 provinces. Over 2.5 million families are heavily dependent on it as their main source of income for their daily livelihoods. The cocoa industry 'traditionally' was the major employer of remote villagers in cocoa growing provinces, including ENBP, until the arrival of CPB in 2006. The Papua New Guinea (PNG) cocoa industry has been under threat by the incursion of Cocoa Pod Borer (CPB) (*Conopomorpha cramerella*) since 2006. Its spread throughout the cocoa growing provinces resulted in PNG cocoa exports dropping by 80% by 2012. The presence of CPB adds to already existing challenges within the cocoa industry regarding low smallholder productivity, low yields, poor quality processing and low levels of technology adoption among smallholders. Amongst all these cocoa farming challenges, CPB has been the most damaging to the cocoa income of smallholder farmers. However, in the main cocoa growing province of PNG, East New Britain Province (ENBP) (Figure 1.1), the geographical focus of this study, was a new private sector-smallholder partnership concept called the Private Sector Service Provider (PSSP), initiated through a major cocoa exporter, New Guinea Islands Produce-Agmark (NGIP-Agmark). This extension model accommodates all aspects of extension service delivery along the cocoa value chain from planting materials to marketing of cocoa produce. This approach has proven to be successful where it has been adopted effectively by farmers increasing their cocoa production as they overcome CPB.

The new extension model has caught the attention of other private and public sector organisations in ENBP and in other provinces and has been used as a method to train extension officers on CPB best management practices. The model being taken up the World Bank Cocoa and Coffee project titled: 'Private Public Agriculture Project' (PPAP) to control CPB and Coffee Berry Borer (CBB) in PNG.

The purpose of this study is to examine the socioeconomic and cultural factors explaining the success of this new extension approach, in particular the effectiveness of the NGIP-Agmark extension model. It will do this by firstly investigating the private sector's measures of controlling the CPB. It will include their holistic extension training and support approach along the value chain. Secondly, it will elaborate on the benefits incurred from the new extension approach to cocoa smallholder farmers. The types of benefits discussed consist of impact on cocoa management, smallholder responses to the extension approach, farmer group criteria for extension delivery, gender inclusion and the incorporation of livelihood and agribusiness training programs. Also, it will examine briefly both private and public sector extension approaches and their impacts on cocoa production and on smallholders' livelihoods in remote villages.

The evaluation of the NGIP-Agmark extension model will begin by examining the role of leadership among key players such as the model's management team that includes the business principles and ethics displayed by its leaders and extension officers down to the FDGs or cooperative leaders, as well as household leadership amongst individual cocoa farming families. Also, my thesis will examine the extension and support to strategic areas along the value chain which have contributed to the success of the approach. The holistic extension approach taken by the NGIP-Agmark model will also be examined in terms of the incorporation of livelihood and agribusiness related training programs, such as book and record keeping, gender and youth inclusion, leadership and management training, health and law and order training and awareness programs, and farmers' interactions with extension officers from NGIP-Agmark and other service providers. Changes in farmers' attitudes and approaches towards cocoa farming as a result of the extension model will be discussed. This research will lay the foundations for an extension model that will be able to respond to many environmental challenges affecting smallholder production. Perhaps, it will set a new direction for smallholders to effectively approach cocoa farming as a business and switch to a more sustainable cocoa farming system.

### 1.2 Background

Agriculture is the main source of livelihood for over 70% of the rural population in PNG (Caven and McKillop, 2001; Curry *et al*., 2007). The sector is dominated by food

and cash crop production. Commercial agriculture is dominated by export tree crops such as palm oil, coffee, cocoa and coconut. Cocoa is the third largest contributor to national export revenue of over K250 million annually, of which more than 80% is generated by smallholders (Simitab, 2007; Curry *et al*., 2007).

Cocoa was first introduced into the Pacific region by German traders in the early 1900s (Curry *et al.,* 2007). In the early 1970s, cocoa planting among village households in PNG grew rapidly during a period of good cocoa prices and, as a means of meeting their cash needs and longer-term material aspirations (Curry *et al*., 2007). Today, cocoa remains a significant contributor to the livelihoods of rural households, especially in the coastal regions of the country.

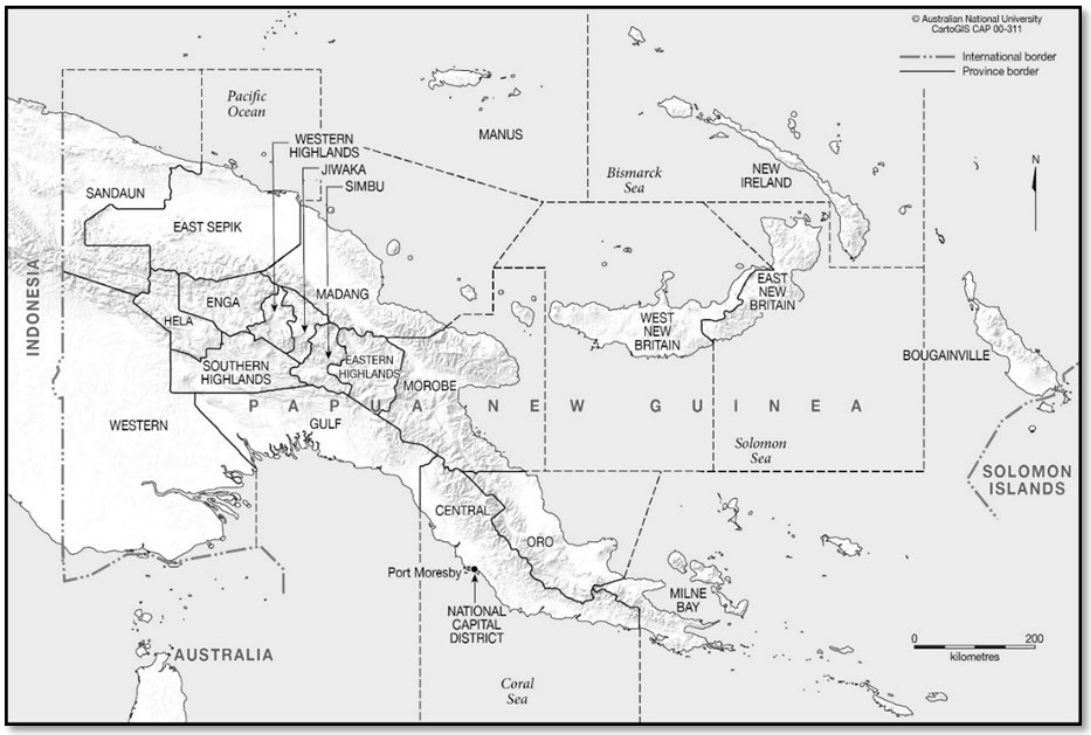


Figure 1.1: Map of Papua New Guinea (Source: CartoGIS Services, 2013).

Cocoa production in the country has not reached its full potential and growth has stagnated since the mid-1970s (Simitab, 2007; Ghodake *et al*., 1995; Godbold, 2010; Sitapai, 2012). One reason for this has been the lack of an effective extension model capable of enhancing productivity at the household level (Simitab, 2007; Sitapai, 2012). This has contributed to the low level of adoption of cocoa technologies, especially improved management practices and new planting materials.

Today, a mixture of extension models is being used in most developing countries to provide agricultural services to smallholders, comprising of public institutions, NGOs and private sector service providers (Eicher, 2007). Before 1975, PNG's agricultural extension was mainly facilitated by the public sector. With increasing complexity in nature, decentralisation of extension, extension agencies adopted a single crop focus, based on the main export tree crops which became firmly established as major smallholder crops. However, inconsistency in public funding over the years has led to a decline in the delivery of publicly funded extension services at the smallholder level (Caven and McKillop, 2001; Sitapai, 2012). Currently, the vacuum left by the government in terms of provision of extension services is being filled by various development and donor organisations especially international donors such as the World Bank, the private sector and NGOs, as part of their broader developmental projects in the country (Caven and McKillop, 2001). However, it is common in PNG that extension models used are not always suitable for smallholders and their way of life (Sengere, 2016).

The PNG cocoa industry was caught by surprise when the destructive pest, CPB, was first discovered in ENBP in 2006. Cocoa farmers were not prepared technically to control the pest which resulted in their livelihoods being thrown into disorder and confusion (Curry *et al*., 2015). The massive decline in cocoa production that CPB caused resulted in a large reduction in smallholder household incomes (Curry *et al.,* 2009). There was no choice for farmers, but to improve their level of farm management to control the pest, while in the short run, they tried to maintain household cash needs and food security by pursuing alternative income opportunities such as food gardening. Only a few farmers applied the necessary CPB management practices. According to Richard *et al.,* (2011), cooperation among families to control the pest was difficult to manage and it was even more so given that CPB requires high inputs of labour to control the pest. However, the greatest cultural challenge to CPB cocoa block management is that, cocoa farmers are semi-subsistence households and are not fully commercially-oriented farmers. In addition, poor leadership, mismanagement of funds and the absence of a policy framework for CPB hampered efforts to address the problem.

Recent data have confirmed that smallholder cocoa production in the ENBP is slowly recovering, but production levels are still much lower than in the period prior to the CPB (Curry *et al.*, 2015). Thus, cocoa households have not been able attain their former standards of living prior to the CPB incursion, especially given the increased costs of goods and services, such as school fees, since 2006. Most cocoa households were not able to adopt CPB management techniques necessary to control the pest. As Curry *et al.,* (2009) pointed out soon after CPB arrived in ENB, smallholder cocoa extension in the context of the CPB environment, will be insufficient for tackling CPB unless new approaches are developed, such as extension partnerships between commercial organisations, NGOs and cocoa farmers. One partnership approach has been pioneered by one of PNG's largest private cocoa exporters, NGIP-Agmark. The model provides extension services to contact farmers along the cocoa value chain. NGIP-Agmark's pro-activeness in management and leadership is facilitating improved cocoa technologies, including farm inputs, transportation, marketing and processing of cocoa and other agricultural products. It has shifted smallholders' attitudes and mindset towards cocoa farming. Participation rates have been high and their farming and socioeconomic needs are being addressed. However, past studies on PNG's cocoa and coffee cooperatives have revealed that management and poor leadership are major constraints on their success and sustainability (Garnevska *et al.*, 2014).

Evaluating the NGIP-Agmark extension model will contribute to the development of new extension strategies for the CB-PNG and the private sector to improve the dissemination of technologies to increase smallholder production. It will assist farmers as the farming system slowly shifts from the shifting and traditional cultivation practices to a more entrepreneurial approaches towards cocoa farming.

### *1.2.1 The Agmark extension model*

The Agmark extension model comprises of the following:

- Cocoa extension and awareness (CPB and cocoa block sanitation)
- Cocoa seedling support program
- Credit support (farm inputs and seedlings)
- Transport support (seedlings, farm inputs and cocoa produce)
- Post-harvest support and training
- Marketing (cocoa, wet bean and dry bean)

- ❖ Socio-cultural support programs for schools, churches, aid posts and cocoa farming communities.

It is a partnership approach built on the supply and demand concept between the private sector and FDGs or cooperatives. The model's aim is to deliver relevant cocoa farming information, demonstrate CPB management practices and encourage farmers to treat cocoa farming as a business activity for sustainable farming over the long-term.

The main focus areas of my study include:

1. How Agmark's management and leadership role that is based on trust, honesty and loyalty contributes to the model's success. It will assess how leadership principles are being transferred from the NGIP-Agmark management level to its extension arms, then to FDG leaders and finally to farm households and their family units. In addition, out sourcing of leadership and management training was coordinated by NGIP-Agmark to enhance farmers' leadership capacities.
2. The regular extension training and support services all along the cocoa value chain provided to smallholders and their families.
3. The approach and change of farming attitudes towards CPB management practices and family participation. That has been enhanced by the training criteria and targeted on farmer groups and households and not just male household heads.
4. Economic benefits of the partnership for both NGIP-Agmark and smallholders. This has been triggered by the inspiration of the sustainable livelihood, leadership and management training programs. It is an 'holistic' extension approach, enabling relevant livelihood and farming enriching training programs that improve livelihoods and sustain cocoa farming systems.

### 1.3 Study aims and objectives

The aim of this study is to examine the new model's extension training and support services at all stages of the cocoa production process to explain the success of the private sector smallholder partnership in ENBP. The main objectives of this study are to:

a. Review government and private sector agricultural extension in PNG, particularly in cocoa since the incursion of CPB;
b. Identify the economic benefits of the NGIP-Agmark extension model for smallholders, especially women;
c. Identify and describe the key socioeconomic and cultural factors that explain the success of the extension model;
d. Provide recommendations for extension strategies that include the key principles for improving the uptake of farm technologies to improve production, cocoa quality and economic opportunities for households all along the cocoa value chain.

### 1.4 Significance of this research

Until the arrival of CPB in ENBP, cocoa was the main income source for about 73% of the population and it accounted for nearly half the value of the province's exports (Curry *et al*., 2007). With the arrival of CPB in 2006 production fell rapidly as smallholders abandoned their cocoa blocks due to lack of knowledge and technologies available for effective management of the pest. Since then, cocoa production in ENBP has declined from 16,930 tonnes in 2007 to 5,392 tonnes by 2017/18 (CB-PNG, 2018).

With the falling and a limited range of income sources, smallholders desperately needed a workable extension model to sustain and advance cocoa farming practices. Cocoa extension by the private sector has stimulated smallholders' interests in cocoa farming after the CPB devastation, but very little research on this extension model has been done. Furthermore, scientific impacts will emerge from a greater understanding of how socio-cultural factors interact with livelihoods to affect men and women's participation in cocoa production. To date, there has been little research in this area.

### 1.5 Thesis rationale

The problems of extension service delivery in PNG, especially by the public sector, have been documented for a long time. Extension problems that have been documented include poor quality extension services, irregular extension training programs, insufficient market support facilities, lack of infrastructural support to smallholders and limited reinvestment approaches by cocoa farming households in their cocoa blocks (Omuru *et al.,* 2001; Ghodake *et al.*, 1995; Sitapai, 2012; Curry *et al*., 2007;

Apis *et al*., 2013; Curry *et al*., 2009). However, the recent emergence of the private sector extension approach ventured into addressing most of these extension issues and highlighted the need for research and understanding of the socio-economic factors affecting farmers' livelihoods and cocoa farming practices. A closer examination of the structure and coordination of the holistic extension training and support model along the cocoa value chain for cocoa farming households is vital for our understanding of the effectiveness of the NGIP-Agmark model. Such studies may explain why cocoa smallholders have not reached their full potential.

### 1.6 Organisation of thesis

Chapters 2 to 8 provide detailed background, discussions and interpretations of the overall thesis. Chapter 2 provides a critical review of the literature that lays the foundation for the thesis. It gives a broader perspective of the agriculture extension strategies from the colonial administration to the new nation, called PNG. Overall, it describes the enabling policies that cocoa extension training services delivered to smallholders mainly by the public sector. Then, it considers the recent emergence of the private sector and NGOs extension training programs for smallholders.

Chapter 3 presents an overview of my position in relation to the socio-economic research within the PNG cocoa industry. Then a general background to the study sites and research approaches is provided. It also discusses the research approaches used and applied during fieldwork including data analysis. A mixed method approach was used. Chapter 3 also highlights the three data collection targeted areas which include smallholders (n=54), extension officers (n=15) and managers (n=7), but with greater emphasis on the challenges and socio-economic benefits on smallholders' livelihoods.

Chapter 4 provides an overview of the cocoa industry's history and development relating to governments' responses through research and extension services for farmers. Secondly, it discusses the impacts of the CPB on cocoa farming. It investigates farmers' responses and adaptation strategies to extension training programs and research technologies being delivered to them.

Chapter 5 examines private sector extension training and support programs for smallholder farmer groups to address CPB. It further investigates the CPB and cocoa

training and support programs along the cocoa value chain together with the socio-cultural support programs provided to cocoa farming communities.

Chapter 6 discusses the benefits as results gained from the study. It examines farmers' responses to block management and effective training and support programs by the private sector, the training criteria of establishing farmer groups and the degree of inclusion of women and of livelihood and agribusiness training programs. It provides a brief comparison of private and public extension programs in addressing CPB to improve cocoa production.

Next, Chapter 7 explains why the private sector extension model is being effective and successful in improving farmers' cocoa production. It investigates the contributing elements such as the leadership at all levels along the extension pathway, extension training and support all along the cocoa value chain, holistic and integrated livelihood extension training approaches that enable a sustainable smallholder cocoa farming system. Finally, Chapter 8 provides a summary of the key findings of the thesis with recommendations for extension development and future studies.

# CHAPTER TWO

# AGRICULTURAL EXTENSION IN PNG

## 2.1 Introduction

Agriculture has been fundamental to the development of PNG where it provides sustenance to more than 80% of the population (Bourke and Harwood, 2009; Curry *et al.*, 2007). Agricultural extension by the public sector has been pivotal to extending agricultural technologies to rural smallholders and improving crop and livestock production across the country. As this Chapter shows, although agricultural extension in PNG has helped to improve rural livelihoods, there have also been many challenges and problems it has faced over the last 40 years.

This chapter has two aims. Firstly, it will provide a background to agricultural extension in Papua New Guinea. Secondly, it will present an overview of some of the challenges of providing effective extension and examine the emergence of private sector extension initiatives and the public-private partnership approach to extension. The Chapter shows that extension in PNG has encountered many challenges over the years. It is argued that the traditional extension approach that was introduced pre- and post-independence and which focused primarily on pure training and demonstration to farmers is no longer viable and effective in most areas of PNG. Instead, a more incorporated and holistic extension package that includes recognition of the value chain of crops and private-public sector partnerships is needed (Caven and McKillop, 2001).

## 2.2 History of agriculture and extension

Civilizations across the globe have brought to light new technologies and agricultural systems to enhance lives. With so many technologies being developed, a vehicle to promote these technologies to rural communities was necessary. The information dissemination process was termed *'extension'*. A simple way to understand its meaning is by breaking the word down to its Latin roots whereby *'ex'* means *'out'* and tension meaning 'broaden-out' Godbold (2010) following Adams (1982). Extension has expanded its definition to refer also to services being provided to communities.

The quote below gives a definition of extension as a:

> *service system which assists farm people through educational procedures in improving farm methods and techniques, increasing production efficiency and income generation, bettering levels of living and lifting the social and educational standards of rural life* (Godbold, 2010 p.10).

Thus, extension is both an economic tool for enhancement of agrarian production and for improving rural livelihoods and communities. According to Godbold (2010) and echoing Adams (1982) "*extension*" was initiated by Cambridge University in 1873. Its focus was to expand education that was confined to a university teaching system to surrounding rural communities to enhance their knowledge (Swanson *et al.*, 1997). Thus, extension initially was the process of transferring information to farmers outside the university's normal teaching system. Its success and positive impacts among the surrounding communities resulted in its adoption by other community-related sectors such as health and education. The rapid growth of agriculture and new technologies in the late 19$^{th}$ and earlier 20$^{th}$ century spurred the expansion of various forms of extension approaches for easier information transfer to rural communities. Agricultural extension became popular in the United States in the early 1900s incorporating agricultural education and training (Godbold, 2010).

The initial extension approach that was developed by the agricultural research organisations was very effective because of the huge demand by farming communities for new agricultural information to improve their farming methods for the growing population. This led to framing an approach and structure for extension information to be transferred to farmers (Swanson *et al.,* 1997). The extension approach adopted focussed on three main characteristics including the pool of knowledge to be transferred (research institutions), the receiving end (farmers) and the facilitating extension agents (extension officers) (Godbold, 2010). The model's success depended on information transferability and the adoption abilities among farmers in the communities.

Most countries have valued agricultural extension as a mode of transferring technologies from researchers to farmers to improve their farming practices and livelihoods (Ayogu *et al*., 2015). The impact of extension often depends on a good

examination and understanding of smallholders farming needs and livelihoods and the creation of suitable strategies to meet the needs of farmers (Mortiss, 1988). The increase in agricultural production among smallholders signifies the level of adoption rates of improved farming technologies that stimulate the local economy in rural communities (Caven and McKillop, 2001).

## 2.3 Historical background of agriculture extension in PNG

In the discussion below PNG's agricultural extension approaches are categorised into two time periods: pre-independence and post-independence. The agricultural extension approaches in PNG have been mainly funded and carried out by the public sector. However, various challenges and opportunities within the past 10-15 years have resulted in the emergence of the private sector and NGOs in providing agricultural extension approaches.

### *2.3.1 Pre-Independence agricultural extension*

After World War II (WWII) the Australian colonial administration in the Territory of Papua and New Guinea focused on economic development and empowerment of the indigenous people (Godbold, 2010). Agriculture was a focus, which saw the creation of primary industry institutions and the introduction and expansion of plantations by the colonial administration. The institutions worked to develop networks from the administration centres to the rural indigenous communities expanding through the decentralisation concept at that time (Godbold, 2010). Their primary aim was to introduce a modified Australian farming system that suited the indigenous and tropical farming systems of PNG. Thus, the administration introduced tropical cash crops (such as cocoa, rubber and coffee) to various regions of New Guinea with the objective of building the economic base of the local indigenous population (Godbold, 2010). For example, coffee and tea were extended to the highlands region due to the favourable climatic conditions whilst cocoa, coconut and oil palm were prioritised in the coastal and the island regions (Godbold, 2010). The expatriate-ran plantations at the time provided a form of training to the indigenous labourers on crop management. Locals working as plantation labourers were also encouraged to plant cash crops on their own customary land and sell to the company for export. This can be considered the initial phase of extension in PNG (Godbold, 2010). The improvement of technologies

accompanied by better market access also stimulated adoption amongst smallholders (Caven and McKillop, 2001).

Prior to independence agricultural research and extension in PNG had a huge impact on indigenous farming systems, crop improvement, and villagers socio-economic livelihoods. From the early 1950s, it was solely the government sector that was responsible for agricultural extension services reaching rural communities (Sitapai, 2012). As part of this goal, to expand cash cropping and introduce new and improved food crops, colonial powers through the Department of Agriculture Stock and Fisheries (DASF) established a network of agriculture experimental stations at several regional locations in PNG. These stations were established in East New Britain, Central, Morobe, Eastern Highlands and Western Highland provinces (Sitapai, 2012).

The established research experimental stations were strategically positioned to carry out research experiments on crops suitable to the region's climatic conditions. Additionally, these centres were hubs of information and housed certified stock and planting materials for farmers. The strategy also served as a means of extending extension to surrounding farming districts through the creation by DASF of extension centres. The extension centres acted as distribution centres to release improved planting materials to farmers. These district extension centres were also regarded as training and information dissemination centres for farmers (Sitapai, 2012). In the 1960s, DASF also established agricultural colleges throughout the country. These provided training of extension officers on a range of technical skills and farming practices. The goal of the colleges was to ensure effective delivery of agricultural demonstration training to local farmers (Sitapai, 2012).

The transition period into independence in 1975 saw many challenges in service delivery in the agriculture sector. Many of the agriculture reforms introduced were viewed to be beneficial at the administrative levels but were not effective in improving extension to rural communities (Sitapai, 2012; Kagena, 2000). As highlighted by Sitapai (2012), the factors identified for explaining the ineffectiveness of extension were: lack of mission and vision for the industry, poor funding support, incompetent staff, poor infrastructure and extension planning.

### *2.3.2 Post-Independence extension*

After PNG gained its independence in 1975, extension support services to smallholders in PNG became the full responsibility of the new government through the Department of Agriculture and Livestock (DAL). Importantly, its administration had laid a well-planned structure, linking regional research hubs to district extension centres for extension support training and information dissemination to the local farmers (Godbold, 2010). However, the provision of extension encountered many difficulties in providing smallholders with effective training and new information to establish and improve their farming systems. As cocoa being a lowland cash crop, its research and extension emerged out of the Lowland Agricultural Experimentation Station (LAES) in Kerevat as it was a regional centre for lowlands agricultural crops. The station was linked to other coastal lowland provinces and districts whereby agricultural information and technologies were extended to interested farmers in the nearby communities (Godbold, 2010; Sitapai, 2012). Nevertheless, extension was not effectively implemented due to reasons such as funding constraints, lack of logistical support, poor infrastructural support to remote villages and limited market opportunities.

As a result, agricultural research and extension programs later underwent a set of reforms to improve the effectiveness and efficiency of services to growers. Many of these reforms aligned with international extension or agricultural policies popular at the time. These reforms were also part of the wider restructuring and reforms taking place in other public institutions following the country gaining its independence (Caven and McKillop, 2001; Godbold, 2010). Agriculture extension was amongst the first and most significant reforms related to the decentralisation of government sectoral activities.

## 2.4 Centralisation to decentralisation

The decentralisation policies initially implemented by the colonial administration were transferred and adapted by the new Government of PNG after independence. It was supported by a new policy which emerged in 1976: Organic Law on Provincial Government (OLPG). The goal of the new policy was to strengthen provincial governments and their administration and development planning roles (Sitapai, 2012).

Agricultural extension was one of the targeted areas of the OLPG policy, but there was no clear demarcation of its functions from national agencies (Sitapai, 2012).

Without proper plans and resource allocation to enact the OLPG, the decentralisation of extension services from the national government to the 19 provincial governments faced many challenges. Further reformation of the government structure led to more decentralization with the introduction of the Organic Law on Provincial and Local Level Government (OLPLLG). This added greater challenges and undesirable effects on extension services (Sitapai, 2012; Manning, 2000).

According to Kagena (2000), the decentralisation of extension services was mostly carried out through the T&V programs. At nearly all provincial levels T&V programs struggled to provide an efficient and regular extension service to farmers. The major challenges to decentralisation identified by Kagena, (2000) and the World Bank (2019) included:

- inefficient financial support for extension operational activities
- employment of unqualified officers
- poor governance and management capacities at provincial and district levels
- lack of coordination amongst farmers and stakeholders in remote areas.

Further extension development within the public sector extension resulted in the partnership extension approach between the national and provincial government extension arms working in collaboration on agricultural projects, such as cocoa extension initiatives. Their tasks and responsibilities were equally shared. However, management and coordination were fully taken up by the national government whilst extension implementation was delegated to the provincial and districts' agriculture extension branches (Kagena, 2000). Overall, this system had some positive impacts on extension support, coordination and extension delivery by the public sector (Godbold, 2010; Sitapai, 2012). It enhanced a better understanding of the extension needs of farmers and opportunities at the smallholder level.

Despite these benefits, there were several problems associated with the coordination and resources support at various government levels and even from the respective commodity board levels towards the extension approach (World Bank, 2019). Some

of the identified disadvantages were unsustainable and insufficient funding support, lack of capacity building for officers and limited consultation input from agricultural stakeholders in the planning extending to the implementation of the extension projects to smallholders (Sitapai, 2012; Curry *et al.,* 2007). These issues were reflected in the poor level of farmers' adoption rates as well as negative perceptions by extension officers of effective future extension services.

### *2.4.1 Decentralisation of cocoa extension by public sector*

The decentralisation reforms that took place in cocoa extension had several benefits at the administration level. However, it created many challenges for cocoa extension implementation to cocoa farmers. Resource allocation to the provinces and to districts declined in the 1980s and 1990s and funding remained unsustainable for many years. This affected the provincial cocoa extension programs (Sitapai, 2012; Kagena, 2000; Curry *et al.*, 2007). Other problems highlighted by Sitapai (2012) that had directly contributed to the ineffectiveness of extension programs to farmers were:

- Lack of mission and vision for agricultural sector industries
- Poor funding support
- Incompetent staff
- Poor structure and plans for effective extension delivery
- Limited cocoa extension research
- Low market accessibility and
- Poor rural infrastructure.

All the above affected both the quantity and quality of smallholder cocoa production.

## 2.5 Corporatization policy

Whilst the decentralization policy enabled public extension offices to be stationed at their respective districts and LLGs, their functions gradually deteriorated due to the decline in funding support by the government (World Bank, 2019; Sitapai, 2012). As a result, as part of DAL's policy reforms, the formation of commodity boards was enacted. The commodity boards were to be implementers of research and extension with support from the provincial and districts agricultural extension officers.

These commodity boards were created under the corporatization policy adopted by the government in the 1990s (Sitapai, 2012). Their priorities were to be accountable and responsible to their stakeholders in research and extension development initiatives. Under the corporatization policy, commodity boards were established for coffee, cocoa, coconuts and oil palm. Commodity boards began prioritising extension for their respective commodities. These corporate organisations created their own provincial and district extension branches and relied solely on government funding.

For example, cocoa extension programs were corporatized under the PNG Cocoa Coconut Extension Agency (PNGCCEA) as a cocoa extension organisation fully responsible for extension services to cocoa smallholders in the country. It was the government's aim through CCEA to target and sustain cocoa extension services to the smallholders in PNG (Sitapai, 2012). Its functions and operations were heavily dependent on continuous government support (Godbold, 2010).

In 2003, PNGCCEA merged with PNG Cocoa Coconut Research Institute (CCRI), which then formed the PNG Cocoa Coconut Institute Limited (CCIL). Recently in 2017, there were further reforms of cocoa and coconut research and extension functions, resulting in dissolving CCIL and transferring its research and extension functions back to the mother boards namely Cocoa Board of PNG (CB-PNG) and Kokonas Indastri Koporesen (KIK). As a result, cocoa research and extension development are now under CB-PNG whilst the coconut research and extension are directly under KIK management.

The delivery of extension service programs from provincial and district centres as well as commodity boards did not improve under the corporatisation policy. The poor state of extension not only reflected the negligible resources and financial support needed to effectively sustain the extension operational activities (Kegane, 2000), but there were other factors contributing to the decline in effectiveness of extension delivery to farming communities. The main problems included:

- employment of unqualified extension officers
- poor governance and accountability
- lack of organisational leadership and management, and
- poor extension coordination and with government organisations.

Both Sitapai (2012) and the World Bank (2019) have argued that the post-independence agricultural reforms did not positively impact on smallholder production across PNG. According to Bourke (2009), it was the sector reforms that were partly responsible for the decline in extension service delivery to rural farmers. For example, the 1995 reforms to the Organic Law for Provincial Government and Local Level Government (OLPGLLG) created confusion among the sectors of the specific roles and functions of local and provincial government in providing extension to their targeted farmers, while lack of coordination and communication resulted in mismanagement of extension. Also, the appointment of underqualified personnel to key important positions based on political interest led to further mismanagement of extension services making it difficult for policy implementations and development to be effective (World Bank, 2019). The real issues were the lack of proper leadership, coordination and management of extension programs.

During the 1990s and 2000s, extension services continued to be largely funded by the government. During this time, public extension services were often driven through co-funded projects with additional funding resources from donors. However, unsustainable government funding support for extension activities remained the greatest challenge for sustainable and effective cocoa extension beyond most projects' timeframes (Sitapai, 2012; Manning, 2000). Further, poor coordination networks among levels of government and with commodity organisations had all contributed to the on-going gradual decline of public extension services to the rural populace (Curry *et al*., 2007; World Bank, 2019).

### 2.6 Recent reforms in the cocoa industry

It has been argued by Bourke (2009) that because of the complexity in the addressing agricultural socioeconomic issues in PNG, it is worthwhile to review and frame working policies to better link domestic production to international market standards and requirements. This has also been a recommendation by the recent Functional and Expenditure Review (FER) of Commodity Boards and Agencies for structural improvement (Bitto and Petit, 2016). The major objectives of the FER are to see growth in agricultural export production, increases in export volume, more rural employment opportunities, improvement to household income and food security, and to increase private sector investment in cocoa. The 33 recommendations in the FER

report led to the drafting of two bills brought before parliament through the DAL ministry. The two bills were the '*Agriculture Administration Adjustment*' (AAA) policy recently passed in 2015 and the '*Agriculture Investment Corporation'* (AIC) Bill that is yet to be passed in parliament (Bitto and Petit, 2016).

The AAA policy aims to create better coordination and monitoring of stakeholders and commodity boards to link resources for a more effective extension delivery system. Whilst the AIC Bill will be responsible for managing any investment opportunities with the aim of developing a more sustainable environment for the agricultural sector with greater emphasis on private sector investment in the agriculture production value chain (Bitto and Petit, 2016). Despite the most recent FER review and the many reorganisations and restructuring of the agricultural sector and export commodity boards, the deterioration of extension to farming communities continues (World Bank, 2019).

### 2.7 Private sector and NGOs extension approach

The AIC Bill recognises that the direction in which extension should be moving is towards greater emphasis on the private sector in the delivery of extension to increase agricultural production and boost agricultural activities. For example, Australia is now focussing on how the private sector can take on more agricultural extension (Marsh and Pannell, 2014), and several other countries, including Pakistan are also breaking away from a public sector extension approach to promoting more private sector influence in providing agricultural extension services to farmers (Davidson and Ahmad, 2002). However, only a few private sector organisations in PNG have taken the initiative to provide their own extension services to famers along the value chain to improve production and promote quality for exports (Curry *et al.*, 2007; Hamago 2019; Sengere 2016).

Both private and NGO extension approaches in PNG were initially and mostly initiated by international donors. The main objectives have been to promote newly released extension technological packages and innovations to smallholder groups (Sitapai, 2012). Creating alternative extension approaches to the declining public extension service was also a goal of the donors, particularly to empower the private sector to address rural farmers' needs through agricultural extension training and

demonstrations (Sitapai, 2012). The two initial donor funded projects that cultivated this extension approach in PNG were:

### *2.7.1 Contract-based extension services*

The initiation of contract-based extension which involved the private sector and NGOs was to address the decline and ineffectiveness of public extension delivery to farmers, despite the reforms that had taken place post-independence. This enabled new extension approaches to be tested and implemented through donor projects. Contracting was one of the extension approaches piloted by the Smallholder Support Services Project (SSSP) under DAL and funded by the Asian Development Bank (ADB) (Hunt, 2000). In this approach, farmers were heavily involved in the training through a bottom-up approach whereby their input influenced the design and carrying out of the project, including the evaluation of the programs (Hunt, 2000). The following formed the basis of SSSP functions:

- Surveys were conducted to identify smallholders' extension needs
- Extension needs were transformed into extension needs proposal
- Proposals were submitted into tender processes and contracts were awarded
- Contract payments were made on achievements of project goals
- Monitoring and evaluation of extension activities (SSP, 2007).

This extension approach permitted farmers to identify their farming needs and problems and be part of the discussions for possible solutions. It also helped with capacity building of community leaders as they took a lead in discussions on identifying solutions.

Under this type of contract-based extension approach by the private sector, there was a higher level of transparency, accountability and management than that found in the public sector (ADB, 2013). According to Sitapai (2012), the project was administered by the public sector and contracts were given out to the private sector and Village Extension Workers (VEW) under strict terms of references and rigid monitoring and evaluation processes.

### *2.7.2 Market oriented extension*

A relevant example of the 'market-oriented extension approach' was the New Zealand Government Aid funded project to PNG that started in 2006. It was managed by Bris Kada Inc Experience and piloted in the Huon District of Morobe Province (Sitapai, 2012). Its main objective was to improve income generation and alleviate poverty amongst the remote farmers of Morobe province. The private sector extension initiatives were used to identify smallholder challenges along the production chain and draw up appropriate solutions. Project interventions related mainly to enhancing market access and providing crop husbandry training for rural smallholders. The market-orientated extension approach was a forerunner of the public private partnership policy that is now operating across all government sectors (World Bank, 2019).

The decline in public funded extension support for farmers has triggered more private sector organisations to venture into providing extension services in PNG over the past 10-20 years. Currently, the vacuum left by the government in terms of provision of effective extension services, is being partly filled with various development agents, especially by external development agencies such as the World Bank, the private sector and NGOs (such as CARE International and World Vision), as part of their broader developmental projects in the country (Caven and McKillop, 2001). For example, PNG's major cocoa exporter, NGIP-Agmark initiated cocoa extension services in the early 2000s to established farmer groups within the boundary settings of its cocoa plantations in ENB (Curry *et al.*, 2009; Curry *et al.*, 2015). This gave farmers access to an alternative and better extension system (see Chapter 5).

The private sector extension approach is driven by commercial interests and returns upon investment strategy. It has created opportunities for smallholders who have been neglected over the past 30 years by government extension services to access agricultural extension training programs needed to improve their farming systems. Private sector extension is tailored to business plans and it is often implemented with sound management by qualified officers with leadership qualities as required by most companies (World Bank, 2019). As discussed further in Chapter 5, a cocoa extension partnership between NGIP-Agmark and cocoa farming groups has proven to be an

effective approach creating benefits for smallholders, especially after CPB initially arrived in ENB.

The private sector focus is now a focus of most agricultural institutions in PNG, just as in other developed and developing countries. Attention to supporting formal linkages between the private sector and farmers through partnership arrangements is seen as one way to improve the standard of extension delivery (Marsh and Pannell, 2014). As highlighted above, agricultural extension services to PNG farmers have been heavily dominated and implemented by the public sector but have been ineffective in improving smallholder production and income. That has led to extension service delivery being increasingly questioned in terms of its performance and competency in serving farmers and stakeholders. For example, many farmers have lost trust in the public extension system, in many developing counties, including PNG (Davidson and Ahmad, 2002). Therefore, the intervention of private sector extension provides an alternative extension service to farmers to improve their production and enhance their livelihoods (Sitapai, 2012).

Alternatively, the NGO extension approach is a type of extension service taken up by non-profit organisations to the farming communities. This initiative is common among church organisations in PNG (Kagena, 2000), and recently enhanced by CARE International and World Vision, through donor funded projects. These projects have provided extension services to coffee and cocoa farmers respectively in PNG. However, overall NGO involvement in extension has been limited in the cocoa, coffee and oil palm farming areas of PNG. A major constraint on NGO extension is their extension capacity as their work is often constrained by the limited available resources to fund their work (Caven and McKillop, 2001).

### 2.8 Cocoa extension approaches in PNG

Extension has been a key driving force in establishing the cocoa industry and expanding cocoa production to the rural population over the past 50 years. However, cocoa production in the country has not reached its full potential and growth has stagnated since the mid-1970s (Curry *et al*., 2009). One reason for this has been the lack of an effective extension models capable of enhancing productivity at the household level (Simitab, 2007). This has contributed to the low level of adoption of

cocoa technologies, especially management practices and improved planting materials. Further, since the 1990s, cocoa extension services have been heavily affected by limited government financial support and the continuous restructuring of government statutory bodies.

The colonial administration had established a structure and networks for agricultural extension and its information dissemination services to expand to regional centres, provincial centres, districts and to villagers. The rapid expansion of cocoa in villages was enhanced by these initial decentralisation policies. The T&V extension approach was the main extension program used among cocoa smallholders during this time. It was initially a promotional and awareness approach to identifying suitable land to establish cocoa plantations and for setting up plantation estates (Sitapai, 2012). Moreover T&V was primarily concerned with transferring approved cocoa technologies to farmers. Trained extension officers were well equipped with all aspects of agriculture during the colonial administration days. Their major extension training task was to visit farmers and assist them with the farming challenges to expand and improve cocoa production (Sitapai, 2012). The T&V program fostered new cocoa farming systems among smallholders on the Gazelle Peninsula. Extension impact was largely measured against area of planted cash crops and exported volumes (Sitapai, 2012).

From the mid-sixties throughout the 1970s, cocoa planting among village households grew rapidly when there was a period of good cocoa prices and cocoa provided villages with a means of meeting their cash needs and longer-term material aspirations (Curry *et al*., 2007; Bourke, 2009). Most cocoa farmers on the Gazelle Peninsula had been influenced by the colonial cocoa training programs and were applying their new skills on their cocoa blocks well before independence (Bourke, 2009).

The cocoa industry has experienced a lot of restructuring over the last 30 years but its extension approaches to most rural areas continue to decline and be largely ineffective (Sitapai, 2012). This is shown in the stagnant growth of smallholder production and very low productivity levels of smallholders that have persisted for decades. Kagena (2000) and the World Bank (2019) argue that poor extension training programs managed by provincial and district centres has been the result of the following:

- Negligible resources and financial support to boost extension operational activities.
- Employment of unqualified extension officers
- Poor governance and accountability and
- Lack of organisational leadership and management
- Poor extension coordination and with government organisations and
- Low uptake of technologies by smallholders

However, it can be argued that other government sectors were maybe equally responsible for the ineffectiveness of agriculture extension initiatives since independence. For example, lack of accessible roads in rural areas not only affects extension services and the ability of extension officers to reach farmers, but at the same time it's a lot more difficult for farmers to move perishable crops to markets (World Bank, 2019; Curry *et al.*, 2007; Sitapai, 2012). As identified by the World Bank (2019), some of the major constraints on improving rural livelihoods in PNG include:

- Lack of accessible infrastructure for efficient transport services to rural areas
- Low productivity trend by youth (urban drift)
- Lack of affordable financial services to rural farmers for investment opportunities
- Limited market access by rural farmers to sell their agricultural products
- Law and order problems
- Exclusion of women in agricultural extension initiatives.

Many of the issues identified by the World Bank are directly relevant to cocoa. Over the past 10-20 years, there has been a decline in the number of cocoa extension officers to provide extension services. In the mid-2000s, the cocoa extension officer to grower ratio in ENB was at 1:3833 (Curry *et al*., 2015). Similar extension officer to cocoa grower ratios were in most of the cocoa growing provinces. This has been the greatest challenge to constantly promote effective extension training to remote villages across PNG.

The enactment of Public Private Policy (PPP) in 2003 by the Government was in-line with the then vision for structural reforms and improvement to service delivery to key

sectors of the economy (Papua New Guinea Institute of National Affairs, 2012; Singh, 2008). That gave a roadmap to DAL to venture into agricultural project initiatives that involved both private and public sectors. The World Bank funded PPAP cocoa project is a primary example of such an initiative that has brought cocoa-based public and private organisations to collaborate in delivering extension training and support programs to farmer groups. Hence, the PPAP has instigated two extension approaches namely: value chain training and support approach and holistic extension training (see Chapters 6 and 7). Extension delivery is being coordinated mostly by the public sector, whilst the private sector organisations concentrate on the implementation of cocoa and livelihood extension training and support programs to their respective registered farming groups.

### 2.9 Major challenges of the cocoa industry

As outlined in Chapter 1 the cocoa industry is now under threat with the alarming spread of the insect pest Cocoa Pod Borer (CPB) *(Conopomorpha cramerella)* to most of the cocoa growing provinces. CPB was initially detected in 2006 on the north coast of Gazelle Peninsula in ENBP. It has resulted in a major decline in cocoa production in the country (Curry *et al.,* 2009; Curry *et al.*, 2015). With the huge existing extension constraints that were evident prior to CPB, its impact has been disastrous on farmers and local economies. CPB has caused hardship to cocoa farming households by cutting off their main income source, depriving them of their capacity to earn a living and to meet their basic livelihood needs in education and health. An initial challenge for smallholders and extension service providers was to fully understand the CPB, its life cycle, and how it could be effectively managed. This was necessary to design suitable CPB training resources and farm management guidelines before regular farm visits and demonstrations could take place and other external livelihood support programs be provided to enhance smallholders' response to CPB.

However, as Bitto and Petit (2016) highlight, and outlined in Table 2.1, CBP is not the only challenge faced by the cocoa industry. Whilst opportunities exist that address some of the challenges, the industry remains very vulnerable to further decline if the challenges are not addressed appropriately. Limited access to cocoa extension and resource support remains the greatest challenges to developing a viable cocoa farming system (Sitapai, 2012; Curry *et al.*, 2009; Curry *et al.*, 2015). There are many

challenges and contributing factors explaining the poor level of effective extension currently for cocoa smallholders. The main extension challenges identified are unsustainable financial and resource support, weakness in leadership and management, limited extension research including monitoring and evaluation, limited gender inclusion in training, and lack of holistic support and livelihood and cocoa training along the value chain. Each challenge is discussed briefly below.

Table 2.1: Challenges and opportunities within the cocoa industry.

| **Challenges** | **Opportunities.** |
|---|---|
| Stagnant and low smallholder productivity. | A well-established Research & Development institute. |
| Age and senility of current cocoa plantings. | Availability of high yielding and CPB-tolerant cocoa planting materials. |
| Cocoa Pod Borer (CPB) infestation and the risk of exporting it. | Integrated pest and disease management technology (IPDM). |
| Smoke tainted cocoa beans. | Availability of extension teams in almost all cocoa growing provinces. |
| Poor access to credit facilities by smallholder producers. | Resilient smallholder farmers. |
| Poor post-harvest handling equipment such as cocoa bean fermentaries and driers. | Private sector actors showing signs of their willingness to mobilise growers to improve productivity and production. |
| Farmers not treating cocoa as a business. | Collaboration with international donor agencies. |
| Poor roads, transport and market infrastructure. | |
| Shortage of skilled manpower and capital along the value chain. | |

(Source: adapted from Bitto and Petit, 2016, p. 54).

Firstly, lack of sustainable financial and resource support for cocoa extension by the government. This has limited the ability to undertake capacity building and recruitment of extension officers to boost the effectiveness of extension delivery to rural smallholders. For example, the low cocoa extension officer to grower ratio of 1:3833 in ENB has presented the greatest challenge to provide effective cocoa extension to cocoa smallholders in the province to overcome CPB. The poor capacity of extension services has only accelerated the spread of CPB causing many rural cocoa farmers to divert their labour to other livelihood income generating activities (Curry *et al*., 2015). Thus, efficient extension service and support is greatly needed in agricultural development in most rural cocoa communities in PNG.

Second, weakness in leadership and management in the public sector extension machinery is another barrier to sustainable and effective extension delivery in rural areas. As emphasised by Bitto and Petit (2016) the lack of coordination and management of the extension networking system in the country can be linked to the mismanagement and poor leadership at PNGCCIL. The lack of coordination among leaders at government levels and also within the commodity board has negatively affected extension delivery and created a poor environment to work with cocoa smallholders and cooperatives societies.

Third, there has been very little in-depth research into cocoa extension programs including its monitoring and evaluation processes. Within the field of agricultural extension, there are complex problems in delivering extension programs to remote villages and there needs to be regular research input when reviewing and monitoring extension services for sustainable and effective extension. Further, as outlined by Sitapai (2012) the cocoa industry needs a more holistic research model that is integrated into extension approaches that would capture value chain extension, livelihoods and agribusiness principles (Sitapai, 2012). In addition, systemic and regular monitoring of cocoa extension would be able to discover information gaps that could then help design more effective extension programs for rural smallholders.

Fourth, much cocoa extension lacks gender and youth inclusion in cocoa extension training and demonstrations (Hamago, 2019). Cocoa is a cash crop that is produced by households and benefits households. Yet, a common practice observed in most cocoa growing areas in PNG is that men are mostly targeted and attend extension training. Men also control most of the cocoa income while women are allocated very little from the cocoa sales (Curry *et al.*, 2007). This has been a contributing factor for women's limited participation in household cocoa production and management activities. However, recent studies have revealed that women's inclusion in extension and livelihood training improves both the quantity and quality of crops for export (Hamago, 2019; World Bank, 2019).

Finally, there has been lack of training focussing all along the cocoa value chain by public extension services. Over the last 30 years the primary focus has only been on crop management as part of T&V to smallholders (Bourke, 2009). However, the T&V extension approach is no longer viable for smallholder cocoa to remain sustainable.

More effort is needed to improve farmers and farmer groups to increase production and access markets by both the public and private sectors. Furthermore, because of the low cocoa farming knowledge capacity and low literacy levels among smallholders only a few farmers have been able to benefit from extension (Curry *et al.*, 2009). This has been a challenge to the industry in expanding export production in PNG. Currently, the World Bank funded PPAP cocoa project has tapped into this area and has engaged in providing smallholders with financial literacy and livelihood training (World Bank, 2019) (see Chapter 5). A T&V extension approach had neglected these constraints in the past. However, the lack of capacity and resources of government extension services remains a challenge in broadening their regular extension assistance to address wider issues, such as poor literacy and livelihood training (World Bank, 2019). Thus, developing a comprehensive extension model and support programs to achieve higher smallholder production remains a constraint on the industry.

Apart from the need for a more diverse extension approach, there remain difficulties in establishing an effective extension system due to the ongoing problems of poor planning, structural constraints, poor management and leadership capacities at the extension and smallholder level and the low uptake of technologies by smallholders. Thus, a more viable cocoa farming system requires a new extension approach that suits both the commercial context and supports farmers' livelihoods and the socio-economic context of village life.

The initiation of the public-private partnership extension framework by the government is one option for the agriculture sector, and cocoa in particular. This partnership framework set the basis for the World Bank funded PPAP cocoa project initiated in 2011 to address the devastating impact of CPB on rural farmers. The World Bank funded PPAP cocoa project, later described in Chapter 5, is a practical example of the public-private partnership policy that has supported closer coordination and management of the private sector with farmer groups to address CPB. The project strengthens the link between the private sector and smallholders to provide farmers with regular extension and CPB training. The project also gives farmers, including women, access to livelihood training, infrastructure development, financial training and links them with financial institutions and better market access (World Bank, 2019).

Through the PPAP project to date, 36 private sector organisations are partners in this project to serve various farmer groups or cooperatives with extension training and support. For example, NGIP-Agmark, East New Britain Development Corporation (ENBDC) and East New Britain Women and Youth in Agriculture (ENBWYiA) are some of the private sector organisations that have been recipients of PPAP cocoa project funding. The PPAP model was very challenging initially in terms of administering the extension approach, but it is now regarded by smallholders (see Chapter 6) as an effective and transparent concept in cocoa extension service delivery channelled through the private sector to farmer groups.

Before the PPAP cocoa project, NGIP-Agmark was successfully managing CPB on its plantation and extending its CPB management programs to its farmer groups they had established in early 2005 (Curry *et al*., 2009). Prior to CPB, NGIP-Agmark demonstrated the value of commercial sector partnerships with smallholders in assisting smallholders to transform their cocoa management practices to improve their cocoa production. This was achieved through regular extension training and supporting them with planting materials and assisting them to improve processing and access to markets.

However, cocoa smallholders have still been unable to reach their former standards of living prior to CPB incursion. Most smallholders have been unable to adopt the CPB management techniques necessary to control the pest. As Curry *et al.*, (2009) pointed out that, soon after CPB arrived in ENB, smallholder cocoa extension under the CPB environment was insufficient for tackling CPB. New extension approaches were necessary to adapt to the new situation, such as extension partnerships between commercial organisations, NGOs and cocoa farmers. As discussed further in Chapter 5, NGIP-Agmark pioneered the extension partnership approach with cocoa smallholders well before the CPB infestation in 2006. Now, with CPB and external resource support from donors like the World Bank funded PPAP cocoa project it has expanded its extension services to smallholders. It has proven to be successful compared with the public extension approach. This is because its cocoa extension approach is diverse and holistic and focusses on many parts of the value chain. The NGIP-Agmark model provides:

- CPB extension support and training programs

- Cocoa seedling support program
- Credit support initiatives to farm inputs and seedlings
- Transport support service to seedlings, farm inputs and cocoa produce
- Marketing of cocoa produce that includes wet bean and dry beans
- Other basic livelihood training

NGIP-Agmark's primary focus is to promote both the quality and quantity of cocoa produced by smallholders to enhance the livelihoods of the rural smallholders. Thus, its extension model and partnership arrangements with smallholder communities goes beyond providing extension training. The extension model provides extension and support for smallholders beginning with seedling training and support through to market access for smallholder communities (Curry *et al*, 2007). The NGIP-Agmark extension support to farmer groups and cooperatives is outlined in more detail in Chapter 5.

The current trend in recent extension approaches to partner with farmer groups and focus on more parts of the cocoa value chain is more complex compared with past extension approaches. A commercial partnership with smallholder groups is one of the approaches that is gathering momentum in the country (Sitapai, 2012; Curry *et al.*, 2009). Other incorporated agricultural extension training approaches emerging include: commodity marketing, environmental science, livelihood training, agri-business training and health awareness programmes (Gar and McNally, 2020). However, these incorporated training areas remain absent in the public sector cocoa extension initiatives in PNG.

## 2.10 Conclusion

This chapter has given some background to agricultural extension and examined some of the constraints and challenges in the delivery of extension services by agriculture stakeholders in PNG. Agricultural extension services to rural communities in PNG come with many diverse challenges. Some of these challenges have added to the ongoing decline in public extension services to rural smallholders. The common challenges and constraints on providing effective extension programs in PNG are poor infrastructures, lack of sound planning, co-ordination, management and leadership,

very low extension officer to farmer ratios, lack of market access, the neglect of female farmers in extension, and law and orders issues.

The Chapter has highlighted some of the agricultural extension reforms and restructuring in PNG before and after independence, and the current problems and uncertainties faced by the cocoa industry, especially resulting from the impact of CPB on cocoa stakeholders and smallholders. Some of these issues are discussed further in Chapters 4 to 7. First is an outline of the fieldwork and methods in Chapter 3.

# CHAPTER THREE

# METHODOLOGY AND DATA

## 3.1 Introduction

This chapter describes the research methods and the collection and analysis of the research data. An overview of the three study sites is also provided. The study employs the Sustainable Livelihood Approach (SLA) as a methodological framework to examine the use of extension services by cocoa farmers and to identify the benefits and challenges faced by farmers receiving agricultural extension from public and private sector extension agencies.

## 3.2 Background and study sites

The research was carried out on the Gazelle peninsula, East New Britain Province (ENB) as shown on Figure 3.1. ENB is in the eastern part of New Britain island. The province has a land area of 15,816 square kilometres and in the 2011 census, it had a population of 328,369 (National Statistical Office, 2015). Between 2000 and 2011, ENB's annual population growth rate averaged 3.6% which made it one the fastest growing provinces in the country (National Statistical Office, 2015). Various factors explain the rapid increase in population. The PNG National Assessment Report (Tameo *et al*., 2005) stated that improvement in life expectancy and a fall in infant mortality rates were largely responsible for the population growth rate in ENB. Furthermore, migration to ENB has also contributed to population increase. Cocoa and coconut plantations in ENB have been the main pull factors for migrants to the province since the 1960s (May, 1977). The early colonial labour scheme paved the way for sourcing plantation labourers from mainland PNG (May, 1977). Many of these settlers have remained in the province and established their own families.

Figure 3.1: Study location in Papua New Guinea. (Source: www:geology.com)

Between 1940 and 1965, the Gazelle Peninsula became one of the most sought-after arable areas for tropical cash crops (cocoa and coconut) in PNG (Bourke, 2009). Cocoa was introduced in the early 1940s by the German colonial settlers (Vos *et al*., 2003; Curry *et al*., 2007; Yen *et al.*, 2009). Cocoa was first a plantation crop, but in the 1950s smallholders adopted cocoa and by the 1970s they dominated production (Curry *et al*., 2007). Smallholder dominance of production increased further as the plantation sector declined following PNG's political independence in 1975. ENB has approximately 23,000 smallholders and prior to the arrival of Cocoa Pod Borer (CPB) *(Conomorpha cramerella)* in 2006, the province accounted for 70% of national production (Curry *et al*., 2009). Since CPB, its share of national production has fallen to 16% (CB-PNG, 2018).

Several recent disasters have affected ENB's farming community. These events have disrupted agricultural practices and required adaptation responses from farmers to minimise the impacts on their livelihoods (Curry *et al*., 2015). Recent disasters have included volcanic eruptions (1994 to early 1995 and in 2007), drought (1997) and CPB (2006). Most smallholders have been able to adapt to these livelihood challenges. However, the 2006 outbreak of CPB in ENB which devastated cocoa production has proved to be very difficult to address by farmers and by extension providers (Curry *et al*., 2011). The methods to explore the capacity of extension to address CPB are discussed below.

### 3.3 The emergence of the NGIP-Agmark extension model

In 2007, New Guinea Island Produce Agmark (NGIP-Agmark)[1] was the cocoa company in ENB, that was at the forefront of successfully managing CPB on its plantations and ventured into extension training to surrounding smallholders. The emergence of CPB was a massive threat to the viability of NGIP-Agmark as it was the main cocoa exporter and producer in PNG. However, with the sharing of information from other stakeholders[2] during the rolling out of the CPB eradication exercise, the company was able to successfully apply CPB management practices to its plantations. Fruitful outcomes of those practices in the plantations were then extended by the company's training and advisory services unit to its surrounding cluster farmer groups which were called 'Famer Discussion Groups' (FDG).

In 2010, a World Bank-funded Agriculture Project called the Public Private Agriculture Project (PPAP) was implemented to address the devastation of CPB on cocoa production in PNG. It focused on effective extension delivery models to cocoa farmers. The NGIP-Agmark CPB extension model was assessed by the World Bank's technical team in terms of its impact on smallholders during its project initiation stage. NGIP-Agmark extension model had some impact on PPAP's decision to focus on private sector extension and to boost their capacities in facilitating and delivering cocoa extension and training to farmers and supplying planting materials and farming tools to local farmers. Private sector organisations specialising in cocoa production and extension were encouraged to submit smallholder cocoa development proposals to PPAP's Project Management Unit (PMU) operated under the PNG Cocoa Board. Approved projects encouraged private sector organisations to become lead partners in cocoa extension training to various FDGs and cooperatives. This research focusses on NGIP-Agmark and other private sector organisations to examine how effective they were in creating partnerships with smallholders for cocoa support and extension activities.

[1] NGIP Agmark is an agricultural based company and PNG's largest cocoa exporter of more than 60% of PNG cocoa. Over time, the company has diversified into other sectors but maintains its agribusiness arms such as plantations, marketing and agricultural supplies based in PNG (www.agmark.com.pg ).

[2] Cocoa Board of Papua New Guinea (CB-PNG), Cocoa Coconut Institute Limited (CCIL), Department of Primary Industry (DPI), PNG University of Natural Resources and Environment (UNRE), UNRE Integrated Agricultural Training Program (IATP), National Agricultural Research Institute (NARI), National Agricultural Quarantine Inspection Authority (NAQIA) and PNG Growers Association.

### 3.4 Selection of study sites

The evaluation dissemination pathways of extension information and its impact on smallholders' livelihoods is a primary objective of this study. Therefore, the identification of the relevant private sector organisations and where they were operating were significant factors in site selection. The primary focus for my study is the NGIP-Agmark extension model in addressing CPB. Some attention is given to other private sector organisations such as ENB Women and Youth in Agriculture (ENBWYiA) to see how these extension models evolved and were being implemented.

Public sector extension providers, especially extension officers and managers, were also interviewed to understand their experiences in regard to extension leadership, resource support and extension implementation processes. However, the major research focus is on the effectiveness of the NGIP-Agmark extension model, which initially was implemented before the PPAP cocoa project intervention in 2012 to address CPB.

To evaluate the NGIP-Agmark model three farmer groups/cooperatives within the Gazelle Peninsula of ENB were selected. These were:

i. Kadaulung Butam Farmer Group (KBFG) located in Kadaulung #2 Village. It is attached to NGIP-Agmark as its lead cocoa extension service provider under the World Bank funded PPAP cocoa project.
ii. Sandaon Cooperative Society is within the Burit council ward and within Sandaon Village. It is a women's farmer group that is attached to ENBWYiA Cooperative Society, also under the World Bank funded PPAP cocoa project.
iii. Suina Cooperative Society is within Karo Village. It is attached to the ENBWYiA as their lead partner which is their cocoa extension lead partner under World Bank funded PPAP cocoa project. Interestingly, surrounding this study site there are cooperative societies that are linked to other private sector lead partners such as NGIP-Agmark and East New Britain Development Cooperation (ENBDC). This study was able to capture some smallholders from these other cooperative societies.

These three sites were selected for the following reasons:

1. All experienced high rates of CPB infestations on smallholders' cocoa blocks.
2. Cocoa was the main source of household income.
3. All had been organised into farmer groups or cooperative societies.
4. Agricultural private sector service providers had partnered with these farmer groups or cooperative societies to deliver training and support to the households.

### 3.5 Background and descriptions of study villages

At each study site, interviews were done among randomly selected smallholders belonging to the farmer groups and cooperatives and with extension officers and extension managers from both the private and public sectors. Smallholder surveys were also carried out formally and informally in the three rural sites. This was in accordance with the study objectives (Chapter 1) that focused on evaluating the effectiveness of the private sector extension approaches to male and female smallholders in the CPB environment. Negotiations for survey work were done prior to starting fieldwork, while I was still employed as a full-time social scientist with CCIL.

Traditionally, smallholders in the study villages were heavily dependent on subsistence gardening activities for their livelihoods and had limited involvement in the cash economy. Kadaulung #2, Sandaon and Karo are villages that have missed out for many years on government services like agricultural extension, road infrastructure, and basic health and education services. This partly explains the poor cocoa farming practices in these villages. In addition, these villages consist of both indigenous landowners and local 'settlers'. The local settlers are the *Tolai* [3] people, who settled in the area and 'bought' land from the indigenous landowners - *Bainings*. The inland movement of people in the Gazelle Peninsula was common in the early 1900s. This movement was caused by the Rabaul volcanic eruptions instigating the Tolai people to migrate inland. However, further migration inland continued afterwards and the population gradually increased leading to land pressure issues within the Gazelle Peninsula (Allen, 2013). All three study sites were occupied mostly by local Tolai

[3] Tolai refers to the indigenous people of the Gazelle Peninsula of New Britain. In the 18th century Tolai migrated from Duke of York islands and New Ireland to the Gazelle Peninsula displacing the native indigenous (Baining) people who were pushed further westward inland (Allen, 2013).

settlers who are active in subsistence farming and cash crop production, mainly cocoa and coconuts.

All three study sites experienced high CPB infestation rates which have had a tremendous impact on cocoa farming practices and left farmers confused with many abandoning their cocoa blocks (Curry *et al*., 2009; Peter *et al*., 2017). Some smallholders have responded to the new situation of CPB and have tried to minimise its impacts on their livelihoods by resorting to alternative livelihood activities to support their families. Few farmers have been able to control CPB, effectively. Since CPB emerged and destroyed their cocoa production, food gardening has provided the main alternative income source for farmers (see also Curry *et al*., 2009; Curry *et al*., 2015; Peter *et al*., 2017). Even though food gardening and local marketing and other economic activities have played vital roles in sustaining rural household livelihoods since CPB, income from them is well below that once earned from cocoa (Curry *et al*., 2009; Peter *et al*., 2017). In this difficult situation, farmers were very keen to access cocoa extension with CPB information and attempt to apply the new farming techniques.

A brief description of each of the three villages follows.

### *3.5.1 Kadaulung #2 Village*

Within the Inland Baining (Local Level Government) LLG is Kadaulung #2 Village. It is situated below the Gaulim Baining Range. It consists of a community of indigenous landowners and local mainland settlers with four ethnic groups: Butam, Tolai, Baining and Taulil. It is claimed by Allen (2013) and verbally by H. Luak, (lead farmer, pers. comm., 2019) that the indigenous landowners in this area are the Bainings but their land mass was taken over by the Butams, whose ancestors settled in the area in the early19th century from southern New Ireland and the Duke of York islands. The Butams are ethnically different from the Tolai who also migrated from other parts of New Ireland. Kadaulung # 2 Village has a population of 152 households (National Statistical Office, 2015).

Cocoa and coconuts are their primary cash crops. Production of both crops has declined over the years due to poor extension services and a decline in marketing infrastructure. The recent interventions to address CPB by the PPAP cocoa project

focussing on established farmer groups in the area has attracted NGIP-Agmark and PNG Growers Association as lead partners in cocoa support and training for smallholders.


Plate 3.1: Extension transport support and market services provided to cocoa famers by PNG Growers Association and sold to NGIP-Agmark for export.

*3.5.2 Sandaon Village*

The Sandaon community is comprised solely of local settlers who 'purchased' customary land from the indigenous landowners, the Baining. Most are Tolai who migrated inland from the Rabaul area and Watom Island in the early 1900s (Allen, 2013). This community is within the Inland Baining LLG, Gazelle District. According to the 2011 PNG National Census report (National Statistical Office, 2015), Burit Ward was constituted of 116 households. Coconut and other palm crops like betel nut are grown in the area but have been severely affected by rhinoceros beetle (*Dynastinae*). The area is highly suitable for cocoa cultivation, and a variety of fruit trees and garden vegetables. As cocoa was the main income for smallholders, CPB was a livelihood disaster for smallholder households in the initial years of the infestation. Cocoa smallholders did not know how to control the pest and were unable to finance the high input management costs required to control the pest. Most farmers abandoned their cocoa blocks and resorted to other income generation activities to sustain their family livelihoods. Earlier CPB livelihood studies on cocoa farmers in the

Gazelle Peninsula discovered similar household livelihood responses to CPB (Curry *et al*., 2009; Curry *et al*., 2015; Peter *et al*., 2017). Reviving their cocoa blocks on their own was their greatest challenge for several years after the arrival of CPB. This was due to lack of CPB technical capacity as well as being reluctant to use technologies on their own accord without adequate extension advice. It was only after private sector extension became available to them with regular CPB training and support, that they began to control CPB.

Plate 3.2: Interviewing a cocoa farmer (single mother) at Sandaon Village in Gazelle, ENB.

### *3.5.3 Karo Village*

Karo Village and its surrounding communities are located on the north-western area of the Gazelle Peninsula. They are located within the Lasul Baining rural LLG on the Gazelle District (Figure 3.1). Cocoa and coconuts were introduced to this area by the colonial administration in the 1960s through the establishment of cocoa and coconut plantations (Godbold, 2010; May, 1977). This study site is more remote than Sandaon and Kadaulung # 2 Village. Some local Tolai settlers have migrated into the area and reside mostly along the coastline while the indigenous Baining landowners have moved further inland. Recently, the coastal rural communities of Tolai settlers have been targeted by several private sector extension service providers under the World

Bank funded PPAP cocoa project. Cocoa extension service providers working in Karo and surrounding villages include NGIP-Agmark, ENBWYiA and ENBDC. The private sector extension concept has revived cocoa production and other economic livelihoods initiatives in this rural community.

## 3.6 Fieldwork

Fieldwork was carried in two phases. Phase 1: January to March, 2019 and Phase 2: January, 2020. The main fieldwork was carried out in Phase 1 and data were collected at the three field sites during January and February 2019, while extension officers and managers were interviewed in March 2019. Phase 2 (January, 2020) focussed on updating information and filling in gaps from Phase 1 fieldwork. There were three interrelated questionnaires designed for the research suiting the three focus areas of extension delivery. The three areas of extension included leadership and management, coordination and training support, and resource support and implementation at the smallholder levels. The questionnaires were designed to capture the impacts of CPB on smallholder livelihoods and assess the transitional phases of extension approaches driven by the private sector for sustainable cocoa farming practices.

### *3.6.1 Phase 1*

Prior to my Phase 1 fieldwork, I arranged for accommodation and field assistants at each study site, which enabled me to live in each village for one week. Within the Phase 1 at these field sites I conducted socioeconomic interviews, observations and informal discussions with the farmers and their cooperative leaders. Secondly, I had arranged with extension officers and managers to be visited and interviewed at their workplaces, offices and training venues. I also had informal discussions with them while observing some of their farmer training and demonstration sessions at their respective work localities.

### *3.6.2 Phase 2*

The shorter Phase 2 fieldwork trip had focused mainly on updating information and filling in gaps from Phase 1 fieldwork. The data generated from Phase 2 fieldwork focussed on:

- the perceptions of smallholders of the current extension approaches delivered by private sector and on-going public sector extension services;
- shifts in farming practices;
- socioeconomic factors in current cocoa farming practices;
- emerging changes in extension model delivery approaches and their impacts;

Phase 2 information was collected through informal meetings and interviews with selected smallholders, officers and managers that were initially part of Phase 1 data collection.

Fieldwork arrangements for both phases had all went well for several reasons that include: my long-term research collaboration with NGIP-Agmark, especially its Agriculture Division officers and other private sector organisations; my background local knowledge of the study sites; and my personal relationships with village leaders and farmers within most remote areas in the Gazelle Peninsula.

## 3.7 Sample selection

Three core groups were selected for this study and they were: smallholders (n=54), extension officers (n=15) and extension managers (n=7). The initial sample size of 45 smallholders increased to 54 because my research generated much interest among village farmers and because my long-term personal relationships with the farmers and field officers had encouraged their participation.

### *3.7.1 Smallholders*

Selection of smallholders for this study was done randomly and was assisted by farmer group leaders at each study site. We went through farmer group lists and randomly selected twenty farmers at each site in accordance with my selection criteria for samples to include males, females, young farmers and a spread of their residential locations across each community. Random sampling methods are commonly used to minimise bias in research (O'Byrne, 2007). The 54 smallholders selected were drawn in equal proportions from amongst the three communities. At each study site, fifteen smallholders were selected per farmer group with an additional five smallholders as reserves to fill places of farmers who might be absent for various reasons during the interview period. Each farmer participated in one-on-one qualitative interviews and

quantitative questionnaires surveys. Virtually, all smallholders selected for interview keenly participated in the interview while I resided with them in the community. Across the three study sites, smallholders were very enthusiastic for such research in their community. The 54 smallholders willingly described their farming experiences, livelihood struggles and their coping strategies to meet the challenges of CPB.

Residing with the cocoa farming communities for the duration of data collection brought a wealth of knowledge to my understanding of the socio-economic factors affecting cocoa production as well as family livelihoods. More informal discussions with community members and leaders took place in the evenings and early in the mornings. Interesting discussions were held with villagers about the history of people's movements, farming patterns and other alternative cash crops, government services, household livelihood experiences, cocoa farming and training and commercial farming practices. Moreover, out of curiosity, they were also keen to know more about my life experience in Australia and its development status. A few educated farmers raised issues relating to the decline of public sector cocoa support and extension to smallholders. It was all along a life sharing experience which I enjoyed. The language barrier with the Baining farmers was overcome by translations by local family members and the local research assistant.

Plate 3.3: Interviewing a cocoa farmer at Kadaulung # 2 Village.

The survey period was scheduled when wet weather conditions arrived. Due to heavy rain, flooding and poor road conditions during my fieldwork period, some adjustments had to be made to my field plans. It was very challenging doing the surveys at Karo Village. That resulted in survey plan adjustments that caused me to concentrate on the coastal Tolai and a few Baining farmers rather than solely on the inland and upland farmers. Flooded rivers had caused me to travel into the area by boat rather than on the vehicle.

### *3.7.2 Extension officers*

The common medium of extension delivery in PNG is via face–to–face visits from extension officers from the various organisations (Sitapai, 2012). Interviewing these officers in my study was important because it enabled a better understanding of the extension process and the benefits, constraints and challenges of extension dissemination. Officers were initially notified through the study's information sheets and consent forms that I prepared prior to fieldwork and permission was granted by themselves and their managers. The 15 respondents were selected from among private and public sector agricultural extension organisations in ENB. However, NGIP-Agmark and ENBWYiA extension officers were given priority for the one-on-one qualitative interviews due to their heavy involvement in extension provision in the study area. A random selection of extension officers was made by meeting them at their offices as well as meeting them during their farmer training and demonstrations at their designated communities.

### *3.7.3 Extension managers*

To identify and assess the challenges facing extension institutions since the incursion of CPB, it was necessary to carry out one-on-one interviews with extension managers. Interviews focused on their perceptions of the cocoa extension programs to address CPB. At this level, senior supervisors and managers from government and private agricultural organisations were identified and informed about the purpose of the study through the information sheets and consent forms. Initially, five managers enlisted for the one-on-one qualitative interviews, but two more interested managers volunteered to be interviewed as they thought that their contribution to such research would be

significant for influencing future directions for agricultural extension in the country. A total of seven managers were interviewed.

Plate 3.4: Interviewing Mr Graham McNally, NGIP-Agmark Agricultural Divisional Manager, Talina Head Office in Kokopo, East New Britain Province.

Plate 3.5: Interviewing Mrs Kiteni Kurika, ENBWYiA Manageress, UNRE IATP office, East New Britain Province.

### *3.7.4 Positionality*

The positionality of the researcher involved in village fieldwork can have a large influence on data collection and the success of fieldwork. Thus, in this section I outline my background as a researcher and as a young PNG man from the Tolai community in ENBP. Soon after obtaining a Diploma certificate in Tropical Agriculture in 2004 at the Papua New Guinea University of Natural Resources and Environment (PNG UNRE), I was employed by PNG Cocoa Coconut Institute Limited (CCIL) in ENB. CCIL is the main research institute for cocoa and coconut crops in PNG. I was attached with the Socio-economic Research Unit (SERU) as a junior project officer mainly tasked to carry out socio-economic livelihood studies specifically on Australia Centre for International Agriculture Research (ACIAR) projects among cocoa and coconut smallholders in PNG. Capacity building within this research institute was prioritised, enhancing the skills of research officers. In 2011, I was given the honour of pursuing two years of further studies in Agriculture at the PNG University of Technology in Lae, on a flexible mode. I graduated in early 2014 with a Bachelor of Agriculture and Rural Development (BARD) and continued with socio-economic research with CCIL. Being under SERU[4] which was later renamed as the Enabling Environment Program (EEP), I worked full-time as a researcher on several ACIAR[5] funded socioeconomic projects. Much of the research I conducted was at the village level working with cocoa farmers. It was very challenging but at the same time the duties strengthened my research experience and shaped my leadership roles in fieldwork coordination tasks. Successful ACIAR cocoa socio-economic projects contributed to the success of my application for further studies under the ACIAR, John Allright Fellowship. In mid-2018 I enrolled in a Masters in Philosophy, Curtin University, Australia.

### *3.7.5 Establishing personal relations*

My involvement in cocoa socio-economic research often meant working closely with NGIP-Agmark and other private sector organisations on the Gazelle Peninsula. This

[4] SERU - Socio Economic Research Unit then and now Enabling Environment Program (EEP), is one of the research units within the Papua New Guinea Cocoa Coconut Research Institute (PNGCCI) at its Tavilo headquarters, East New Britain Province, Papua New Guinea.

[5] ACIAR - Australia Centre for International Agricultural Research has created an ongoing working collaboration by international researchers with PNGCCI researchers on socio-economic studies over the years.

experience has enhanced this study. This is because of their well-established extension networks with farmer groups and their experience of extension delivery over many years. My established relationships in the communities facilitated negotiation for access to sites to conduct fieldwork. I was welcomed into the selected communities to do my fieldwork. Additionally, I ensured I was fair and neutral when choosing a community place and negotiating accommodation during my fieldwork within all three study sites.

At the end of my fieldwork in each of the study sites, a token of appreciation in cash of about $100.00 each was given to the three communities for their assistance with accommodation and other support. A research assistant was engaged for the duration of my fieldwork at each site, and he provided local knowledge and other information as required. All my fieldwork costs were covered by CCIL under the ACIAR Women in Agribusiness project. Since completing fieldwork and returning to Australia to complete the thesis, I have maintained relationships with farmer group leaders and extension managers via mobile phone, emails and social media which have helped me during my data analysis and thesis writing process. Maintaining good relationships with the study communities has enabled data verification and allowed me to obtain additional data related to my study.

### *3.7.6 Helpful community and farmer group leaders*

The reflective attitude of community leaders and farmers is mainly determined by the researcher's own conduct and approaches during the initial stages of fieldwork. With my research experience, I was able to gain the confidence and respect of the communities and in return leaders and farmers were very helpful in the consultation period and during fieldwork. Establishing a common understanding avoided unrealistic expectations from respondents. Also, the strong relationships established between smallholders and extension officers has been an advantage for my research data collection because most farmers are now witnessing the beneficial impacts of such an extension approach (see Chapter 5). This has made farmers more supportive and willing to participate in my research.

### *3.7.7 Being a member of the Tolai community*

Being part of the Tolai community, its cultural background and local language and carrying out my fieldwork in ENB, has added to gaining an understanding of the research topic. Also, my local knowledge of extension and familiarisation of the three study sites minimises the research problems that likely might have occurred. However, codes of research ethics were paramount in my fieldwork to avoid biasness in doing research in my homeland. The local vernacular (Kuanua) played a significant role in my research with farmers and the local communities. This allowed a deeper understanding of the topics discussed during the conversations with farmers and even extension officers. Although, Melanesian Pidgin is used widely on the Gazelle Peninsula, most people prefer communicating in their local Kuanua language. It indicates identity, ownership and it ignites the interest in conversations. I used Kuanua for introductory conversations and informal discussions, while interviews were conducted in the Melanesian Pidgin for recording purposes.

## 3.8 Ethical issues

My research ethics was submitted to and approved by the Curtin University Human Research Ethics Committee (HREC) (referenced approval number: HRE2018-0759). My research ethics outlines all the guidelines and procedures for conducting my fieldwork through to data analysis and thesis writing.

The focus of my research and fieldwork was cocoa smallholders, extension officers and managers from mainly the private sector and a few from public sector extension agencies. Prior to commencing my fieldwork, I visited and briefed private and public sector extension managers and field officers. Each organisation was given research information sheets and consent forms and I was granted their approval. Smallholder consent forms and information sheets were issued and explained to them individually during my first day in each community, while their consent was taken before being interviewed individually. Then, a research fieldwork itinerary was drawn up and delivered to the organisations and communities to assist with logistical support during my fieldwork. It was the strong collaboration with farmer groups and cooperatives that enabled the information regarding my research to reach them prior to visiting the selected farmer groups. Upon visiting the selected community, farmer group leaders, who were aware of my visit, were issued with information on the research and consent

forms. In addition, they had organised a research assistant to be with me and prepared my accommodation. At each village I was warmly welcomed by the leaders and briefed of people's general living in the community. My first day of fieldwork residing in each of the study sites was spent explaining the nature of the research, its importance and how the information they provided would be kept confidential. Then, the consent forms for their participation were presented for their signatures if they were willing to participate.

All research participants were advised that they were able to withdraw from the interview at any stage. Signing their consent forms did not restrict their ethical rights to withdraw their participation if they wished to do so. No participants declined to consent to be interviewed.

### 3.9 Methodological framework

Research methodology is the way in which a scientific study is conducted focusing on the investigative process and how data are collected and analysed (Creswell, 2009). The major methodological framework used in this study was the SLA developed by Chambers and Conway (1992). As Chambers and Conway (1992) elaborate, the framework of the SLA is concerned with the inter-linked concepts of capabilities, equity and sustainability. The SLA is an assessment method used to assess peoples' lives and changing patterns in a society. Those changing patterns come with opportunities, challenges and resources that contribute to livelihood transformation. During livelihood transitions, there is often high levels of cooperation, participation and decision-making among leaders towards building development initiatives in their communities (Farrell and McDonagh, 2012; Whitehead, 2002). In the study scenario, it is the working collaborations between extension service providers and leaders of farmer groups and cooperatives that has potential to improve cocoa farming households' living standards. Good working relationships between farmers and service providers for socioeconomic development attract external resources which boost service deliveries through projects. The World Bank funded PPAP cocoa project in ENB is an example of such partnership arrangements for effective extension implementation. By examining the partnership interactions between farmers and the service providers, enabled me to investigate the role of leadership, participation

interactions and resource utilisation contributing to greater socioeconomic outcomes for smallholders and service providers.

The SLA has different types of capital. This study is focusing on the livelihood driving forces which encompass the following types of capital: natural, physical, human, financial and social (Odero 2014; Chambers and Conway 1992; Tham-Agyemkun 2015). By investigating these SLA pillars, the livelihood strengths, weaknesses and livelihood strategies in my study communities can be identified and later provide policy ideas for possible development purposes (Tham-Agyemkun, 2015). Figure 3.2 illustrates the SLA framework structure that guided my study.

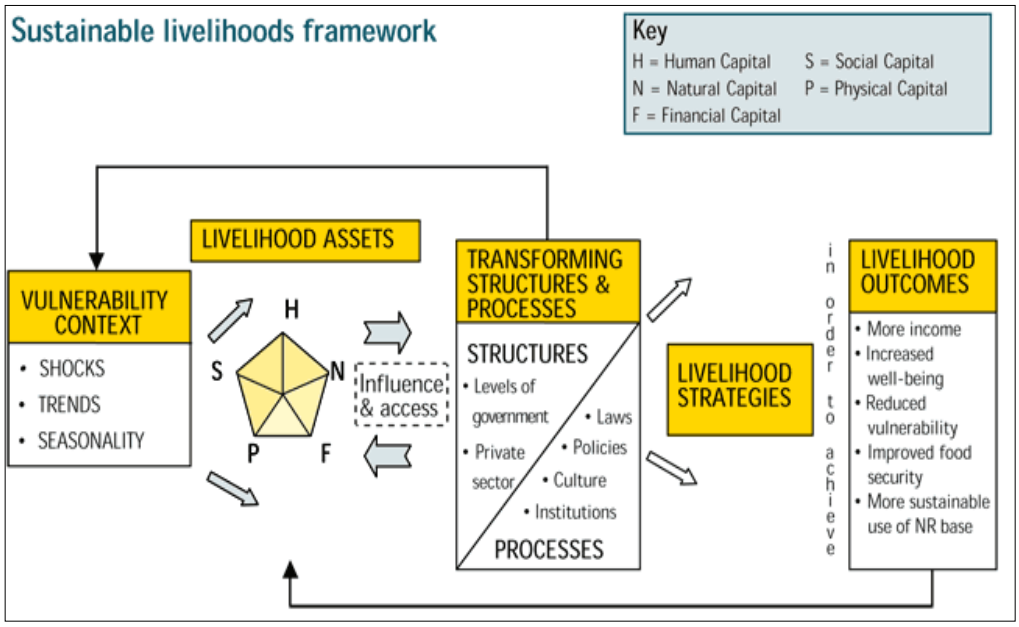

Figure 3.2: Sustainable Livelihood Framework. (Source: Odero, 2014, p. 4)

The SLA used in my study recognises the diverse contexts of rural communities in my study and the role of men and women in decision-making in relation to economic and agricultural initiatives in their communities. However, households have different levels of access to resources and assets and this affects their capacity to develop livelihoods (Curry *et al.*, 2007).

I identified some key attributes of the SLA which made it an appropriate framework for my study. They have been adapted from Curry *et al.*, (2007). My methodology was aimed at:

- Emphasising that smallholders are the focus of the research as their participation in extension partnerships initiatives is vital;
- Acknowledging decision-making processes regarding livelihood strategies occur in the context of diverse socio-cultural backgrounds;
- Understanding livelihood opportunities vary by gender and generation;
- Identifying the constraints and benefits of teamwork, cooperation, management and leadership capacities within cooperatives and extension service providers;
- Understanding the multiple factors that influence cocoa farming approaches such as government policies, socio-cultural factors, efficiency of extension, market accessibility and livelihoods trainings;
- Understanding the application of commercial farming practices by smallholders for sustainable cocoa farming on their blocks.

In PNG, social capital has been shown to be very important and highly influential in most business successes. Also, it has been highlighted that good leadership and networks are important for robust and sustainable growth in any organisation (Sengere, 2016). Therefore, social capital was especially relevant to explore in this study.

### *3.9.3 Brief overview of research method approaches*

The investigative process of research methods is comprised of two main approaches: qualitative and quantitative, both of which were used in this study.

### *3.9.4 Qualitative and quantitative research approaches*

Qualitative research is a broad approach that embraces a range of techniques for acquiring research information (Mason, 2002). Qualitative methods of data collection focus on open-ended and semi-structured questionnaires. According to Creswell (2009), qualitative research is widely used by social science researchers and often relies on semi-structured surveys, observations, online surveys and informal interviews and discussions. It is difficult to quantify its data, especially when based on personal views, attitudes, opinions, pictures and videos. Yet, the qualitative method has many advantages, such as giving a broader context to the research problem and often more depth. It can also provide ideas for guiding quantitative research. From

qualitative data, quantitative methods can be employed to quantify categorised sets of attitudes, opinions and livelihood patterns research (Creswell, 2009).

Quantitative research methods provide standardised measurements, mainly in the form of numerical statistical data (Maxwell, 2016). It provides less interpretation or explanation of data than does by qualitative research (Adato, 2011). Qualitative research is often used to explain the findings of quantitative research. Quantitative research data collection procedures are more defined, uniform and structured than qualitative techniques. Examples of the different types of research suitable for the qualitative and quantitative research methods are listed in Table 3.1.

Table 3.1: Summary of quantitative and qualitative research methods

| **Quantitative methods** | **Qualitative methods** |
|---|---|
| Household demographics | Processes in households, communities, and organizations |
| Statistical descriptions of data such as measures of central tendency and spread of scores. | Beliefs, norms, values, attitudes and social relationships |
| Participation rates (for example, in training or services) | Gender relations and women's status |
| Impacts (for example, on production, income, expenditure, employment, education, health, or nutrition) | Experiences with institutions, for example, government agencies, banks, and hospitals |
| Intra-household decision-making such as daily farming activities and family member's tasks allocation. | Institutional and political dynamics, for example, interdepartmental cooperation, conflict, and patronage |
| Service quality (for example, waiting times, availability of supplies, accuracy of rations, staff absenteeism) | Service delivery, for example, care practices and attitudes of service providers toward beneficiaries |
| Test scores | Local satisfaction with program design, targeting, and administration |

(Source: Adapted from Adato, 2011, p. 3).

*3.9 5 Mixed method research approach*

The mixed method research approach involves the collection and analysis of both qualitative and quantitative data (Maxwell, 2016; Hanson *et al*., 2005). The combination of qualitative and quantitative data in research brings different perspectives to a research topic or question and can produce more detailed knowledge of a topic.

Mixed methods research has a long history. As Maxwell (2016) points out, mixed methods research can be traced back to the 1950s in social science research. Since then, other disciplines have adopted both qualitative and quantitative methods (Hanson *et al.*, 2005).

There are advantages and disadvantages to mixed method research (Table 3.2). Integrating qualitative and quantitative methods can provide many advantages over using a single method in research (O'Byrne, 2007). For example, mixed methods are appropriate to use when examining complex social issues. This is because a mixed methods approach brings together multiple interpretations of data with diverse views of the topic being investigated (Koohi, 2015; Hanson *et al*., 2005; Johnson and Onwuegbuzie, 2004).

Table 3.2: Summary of the strengths and weaknesses of mixed method research

| Strengths | Weaknesses |
|---|---|
| • Words, pictures, and narrative can be used to add meaning to numbers.<br>• Numbers can be used to add precision to words, pictures, and narrative.<br>• The strength of an approach can compensate for the weakness of another in specific areas.<br>• Researcher can generate and test a grounded theory.<br>• Can answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach.<br>• A researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both in a research study.<br>• Can provide stronger evidence for a conclusion through convergence and corroboration of findings.<br>• Can add insights and understanding that might be missed when only a single method is used. | • Researcher must learn about multiple methods and approaches and understand how to mix them appropriately.<br>• Methodological purists contend that one should always work within either a qualitative or a quantitative paradigm.<br>• More time-consuming.<br>• Some of the details of mixed research remain to be worked out fully by research methodologists. |

| | |
|---|---|
| • Can be used to increase the generalizability of the results. | |

(Source: Adapted from Johnson and Onwuegbuzie, 2004, p. 9).

The early development stages of mixed methods research faced some criticisms (Bazeley, 2004) and the process of integrating mixed methods research data has created doubts and confusion amongst some researchers. Therefore, it is very important to have clear objectives and guidelines when using quantitative and qualitative approaches. Well-defined research objectives and methodology guidelines are basic principles of using a mixed methods approach (O'Byrne, 2007). My employment and involvement with CCI socio-economic research programs among smallholders alerted me to the complex nature of smallholder production and this also explains why I am employing the mix methods approach in the study. In addition, my experiences have given me confidence to accomplish my study using the mixed methods approach.

## 3.10 Data collection

The types of information gathered were under the two approaches as are summarised below.

### *3.10.1 Primary data*

The primary data captured during Phase 1 of fieldwork consisted of one-on-one interviews, questionnaire surveys, focus group informal discussions and observations. Each of these data collection methods was divided into the following:

- A: comprised of quantitative questions for cocoa smallholders and qualitative semi-structured interviews which were audio-recorded.
- B: comprised of quantitative questions for cocoa private and public extension officers and qualitative semi-structured questions that were audio-recorded.
- C: comprised of quantitative surveys for agricultural private and public extension officers and qualitative semi-structured interviews that were audio-recorded.
- D: consisted of qualitative informal questions with answers written down during the informal meetings/discussions and training observations.

*a) Qualitative data*

Qualitative data were generated through smallholders' formal interviews, farmer meetings, CPB training observations, and informal discussions with villagers when I lived in their community. Qualitative data were also captured in some of the quantitative survey questions on investment decisions; CPB impacts; extension status; leadership initiatives in cooperatives; law and order issues; youth and women involvement; cultural influences; household livelihood status; community participation; and, smallholders' perceptions of livelihood and CPB training packages.

Extension officers' and managers' qualitative questions were designed to capture extension delivery status, leadership and management roles, experience status, training coordination, extension constraints and opportunities, CPB extension approaches, monitoring and evaluation mechanisms, decision-making development evolving from the traditional extension approach to the business blended extension model.

Observations of smallholders' training and informal discussion meetings also provided qualitative data. My field training observations provided an opportunity to observe interpersonal interactions, attitudes and capture first-hand knowledge, from the participants, of the settings and institutional processes and procedures during their training activities. Much of this qualitative information was written in notebooks, audio-recorded and captured during the informal focus group discussion meetings and cocoa training observations. The primary purpose of the focus groups was to understand community leadership, farmers' behaviours and how social capital was understood in terms of moral obligations and relationships which lead to change and development in the community (Ricketts, 2009). Qualitative data were categorised into common themes for analysis.

*b) Quantitative data*

Quantitative data were collected from smallholders, extension officers and managers. Quantitative data were captured through questionnaire surveys with smallholders. Information collected included demographic details such as education levels, age, gender, marital status, employment and leadership histories. Other quantitative data collected covered cocoa production status, farming history, number of cocoa blocks, extension accessibility status, training information and the impact of CPB on production.

*3.10.2 Secondary data*

Secondary data were drawn from:

*a)* CCI Socio-economic reports

*b)* Relevant websites: Agmark (www.agmark.com.pg); National Statistical Office (www.nso.gov.pg); Cocoa Board (www.cocoaboard.org.pg); PPAP (www.agriculture.gov.pg/projects/ppap) and The Department of Agriculture and Livestock (www.agriculture.gove.pg).

Table 3.3 below summarises the quantitative and qualitative data collected among smallholders, extension officers and extension managers during Phase 1 fieldwork – the main data collection period.

Table 3.3: Summary of fieldwork and data collection

| **Activities and Data collected** | **Location** | **Date** | **Sample size (HHs)** | **Type of information collected** |
|---|---|---|---|---|
| Visited research sites - explained consent forms & information sheets; conducted farmer interviews | Smallholders – Kadaulung #2 | 14th – 27th January, 2019 | 21 | Farmers' educational background; cocoa farming; CPB management; cocoa extension experiences; leadership in farmer group; farmer groups' structure and organisations |
| | Smallholders – Vunamarita (Lasul rural) | 11th – 24th February, 2019 | 20 | |
| | Smallholders – Sandaon/ Burit | 13th – 24th March, 2019 | 13 | |
| Visited research sites - explained consent forms and information sheets; conducted interviews with officers and then Managers | Private sector - NGIP Agmark; ENBWYiA; UNRE IATP Kairak; and PNG Growers Managers and extension officers | 25 February – 5 March, 2019. | 15 | Education backgrounds; leadership and coordination roles; general extension approaches; CPB extension approaches; extension linkages to farmer groups<br>Educational backgrounds; Leadership and management experiences; extension challenges and opportunities; M and E framework to extension; leadership pillars to extension |
| | Public sector extension officers and managers - DPI, DAL, CB, KIK and CCI | 6-8 February and 25-27 March, 2019 | 7 | |
| | Total | | 76 | |
| Observed several cocoa farmer training and farmer group meetings | NGIP Agmark and ENBWYiA | 26th January, 2019<br>7th February, 2019 | Observed farmer training.<br>Observed farmers | Delivery of agricultural information to farmers; cocoa extension training approaches; CPB |

| | | | | |
|---|---|---|---|---|
| | | | meeting with PSSP | management; best practices |

### 3.11 Data analysis procedures

The two major sets of data were entered in Microsoft Excel and analysed. Quantitative data were analysed and tabulated using Excel to create various pivot tables, graphs and percentages. Qualitative data were transcribed into formulated Excel sheets based on themes and sub-themes related to the guiding questions used with smallholders, extension officers and managers. These were open-ended questions, and some of the respondents provided quite extensive responses and were concerned about their cocoa farming and livelihoods, extension and leadership experiences. They provided much valuable information.

During the initial analysis phase of data collection, completed questionnaire forms were checked for missing information before being coded and scanned during fieldwork. Thus, missing data information was verified through phone calls via lead farmers at each site but it was a very minor issue. Moreover, summary interview transcriptions based on the audio recordings of all 76 interviewees were entered into Microsoft Excel sheets to distinguish the themes and sub-themes. The audio transcriptions, questionnaire responses together with observation field notes were all crossed-checked and reconciled for validity of the research data collected.

Qualitative data analysis was done under various categories (Smallholders, Extension officers/Supervisors and Extension Managers and even Private and Public sector), and common themes and sub-themes were identified. Where possible, some qualitative data were quantified. For example, the proportions of respondents relating to certain issues were calculated to give statistical and graphical summary results of the data.

### 3.12 Limitations

Despite, the successful progress of my fieldwork, there were minor disruptions faced while collecting data. The major issue was the unusually rainy wet season from January to March 2019 in ENB. It was a very difficult situation while I was residing in the three study sites carrying out the smallholder surveys, climbing mountains and crossing flooded rivers. Rivers in flood meant I became stranded during my fieldwork and I had to extend my stay in the two villages. Time constraints meant that I had to

travel by sea transport to proceed with the interviews of extension officers and managers.

There were also minor socio-cultural constraints to my fieldwork that included: illness among some smallholders, mortuary ceremonies and community communal activities in schools and church grounds. However, it was all manageable with a common understanding and participation with community leaders and smallholders. On the other hand, extension managers were difficult to locate despite being informed in advance. This was due to their leadership roles and being involved in various meetings and workshops in and out of the provinces during my fieldwork. However, I was able to interview other managers who were also part of the CPB cocoa extension programs.

### 3.13 Conclusion

This chapter has described my field sites and methods employed to collect data. It has described the three smallholder study sites and outlined my methodological framework. Likewise, the methods used in interviewing extension officers and managers from both private and public sectors who were directly involved in CPB extension approaches were also described. The SLA research framework was used to guide research design and my research approach. Significantly, social capital stood out from the livelihood assets structure and was the primary focus of this study.

Logistical support from CCI with the local knowledge of the study areas accompanied by good personal relations with community members and respondents in this research approach were the pillars of successful Phase 1 fieldwork. Although, there were minor natural limitations, fieldwork ended on time as planned.

Chapter 4 will briefly discuss an overview of smallholder cocoa farming practices and outline CPB and its impacts on cocoa farming and on smallholders' livelihoods.

# CHAPTER FOUR

# SMALLHOLDER COCOA FARMING SYSTEMS AND CPB

> Researchers and extension agents need to understand cocoa farmers' concern, and how they perceive the importance of cocoa production among other livelihood activities, if they hope to create industry change. It is important to recognise the attributes of farmers' socio-cultural systems in which the smallholder farmers carry out cocoa production, and to understand the nature of farmers' livelihoods, as PNG smallholder cocoa production is embedded within a broad set of cultural systems…. Recent thinking on the nature of socio-cultural system and smallholder farmers' livelihoods is based on the view of livelihood diversification as a survival strategy of rural household in developing countries…. This allowed a focus on understanding of smallholder farmers' environment settings, their livelihood strategies and other socio-cultural issues to identify the range of factors that may influence cocoa production (Kerua and Glyde, 2016, 1).

## 4.1. Introduction

This chapter discusses the smallholder cocoa farming and livelihood system in PNG, especially within the lowland regions. It will consider how the traditional subsistence farming approach evolved to accommodate a semi-commercial farming system. It discusses the diversity of household income sources, including subsistence, customary and community activities and domestic household undertakings. These all form family livelihoods in rural communities.

Then the chapter discusses smallholder cocoa farming practices in ENB. It examines how cocoa farming practices were modelled on traditional cultivation practices, and considers other smallholder challenges related to low smallholder productivity and poor management practices, despite having access to extension and the latest cocoa technologies and planting materials. Moreover, it explores the smallholder cocoa farming system through investigating the relationships amongst labour supply, cocoa production, block management and harvesting known as the "*Foraging production*

*strategy*" (Curry *et al.,* 2007). Examining this model helps us to understand how farmers took up cocoa farming as an additional task to their other livelihood activities.

Then the CPB life cycle is outlined and how it causes severe impacts on smallholder cocoa production. In ENB, CPB has destroyed smallholders' main income source and constrained their livelihood income opportunities (Curry *et al.,* 2015; Nailina *et al*., 2017: Peter *et al*., 2017). For cocoa farmers, it was a 'new normal' living and farming cocoa with CPB using their limited resources and extension support. Smallholders' responses and efforts have been directed towards sustaining individual household livelihoods in terms of food security, household basic needs and minimising their spending priorities.

This chapter also discusses the main smallholder livelihood coping strategies in response to CPB. At the industry level, it discusses the Government response to the CPB disaster by initiating CPB eradication programs, monitoring and surveillance programs in the cocoa growing provinces. In addition, the cocoa industry also facilitated donor and government cocoa projects through CPB research and extension programs for smallholders. Significantly, it briefly discusses the intervention by the private sector into cocoa and CPB extension programs through established farmer groups or cooperatives with extension training programs and resource support all along the cocoa value chain. This chapter argues that a holistic farming and training approach is needed for effective smallholder cocoa production into the future.

### 4.2 Smallholder cocoa farming livelihood system

To understand the impact of CPB on smallholders it is first necessary to understand the smallholder cocoa livelihood system and cocoa farming practices. In ENB, agriculture remains the economic base for the province and its people. In the Gazelle district, rural households earn most of their income from the sale of garden food, cocoa, coconut, betel nut and fish. Other important income generating activities include trade stores, PMV businesses, cocoa fermentaries and wage labour (Hanson *et al*., 2001). However, households must maintain a flexible farming system to be able to cope with environmental and economic changes (Curry *et al*., 2007; Curry *et al*., 2015; Kerua and Glyde, 2016; Nailina *et al*., 2017; Yalu *et al*., 2018). For example, external factors such as cocoa prices influence household decision-making such as choices of

what income sources to pursue. The income opportunities to pursue can be either farm or non-farm activities depending on local circumstances in the village and other external factors such as prices, pests and diseases, and weather (Figure 4.1).

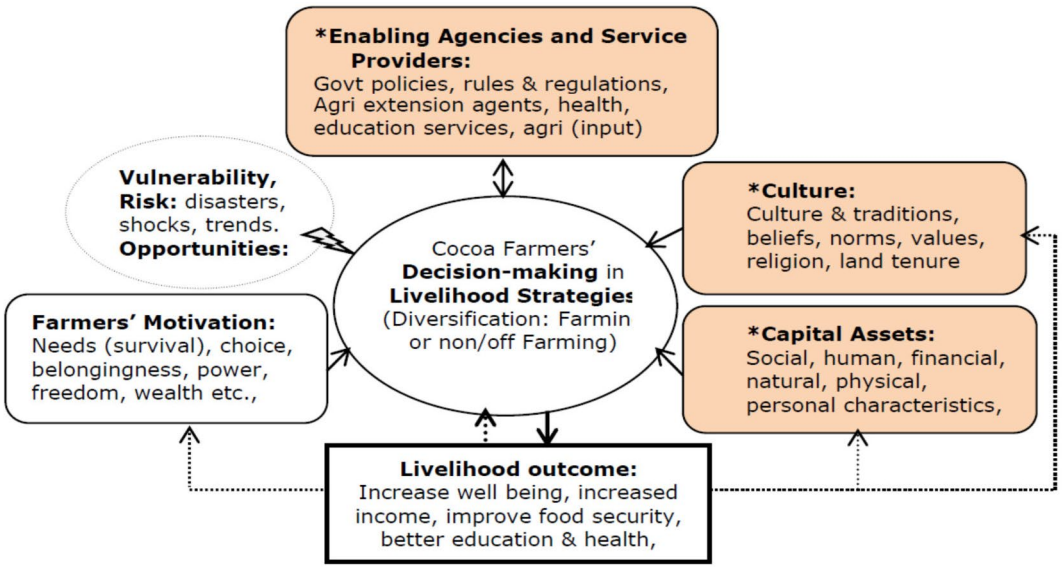


Figure 4.1: Factors that trigger livelihood decision-making and livelihood outcomes amongst cocoa smallholder families. Source: adapted from Kerua and Glyde (2016, p. 4).

Research on smallholder livelihoods has been important for identifying constraints on smallholder cocoa production. Kerua and Glyde, (2016) stressed that smallholder cocoa farming activities are not of a high enough standard for effective block management and production. This is because households do not put enough time and effort into their cocoa as they are heavily involved in a diverse range of livelihood activities. Household activities encompass cash income activities, subsistence, church and socio-cultural activities (Figure 4.2). By maintaining a range of household income sources, smallholders have a form of insurance because when disaster strikes one component of their farming system, they can expand another livelihood activity to compensate. CPB constraints only add to the existing cocoa farming challenges over the years by the farmers.

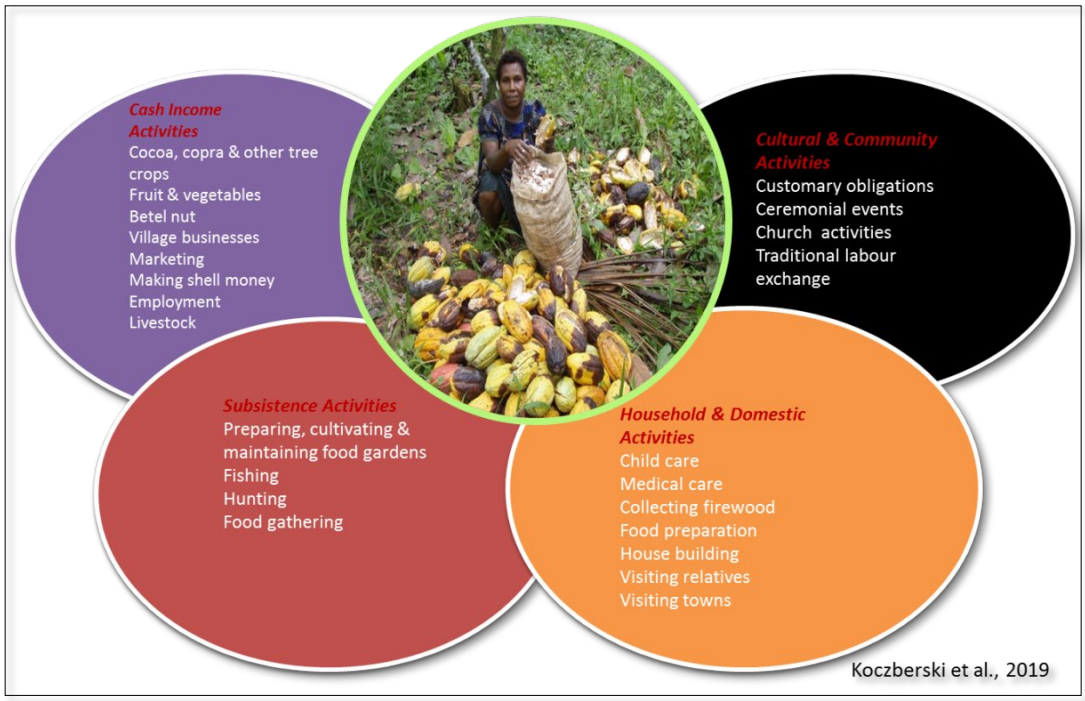


Figure 4.2: Key components of the livelihood system amongst cocoa smallholders in PNG.

### 4.3 Diverse cash income activities

The fertile volcanic soils and warm tropical climate of the Gazelle Peninsula have been very favourable for most tropical crops. Traditionally, cocoa and copra production were mainly for cash income benefits, whereas fruit and garden crops were largely subsistence crops for household consumption. However, the introduction and expansion of local marketing networks has made the selling and buying of fruits and garden produce using cash and traditional shell money much more important amongst villagers and settlers on the Gazelle Peninsula.

In addition, an introduced business culture has had a great influence on rural villages and many have established small village businesses and marketing of traditional money in ENB (Kerua and Glyde, 2016; Koczberski *et al*., 2019). Importantly, basic government services such as health, education and a general improvement of basic village livelihoods have triggered income making opportunities amongst households. Educated villagers have had off-farm employment opportunities in urban centres, which have added to the diverse range of income opportunities on-farm such as cocoa, coconut, fruits and garden crops farming.

### 4.4 Subsistence income activities

Smallholder studies amongst smallholders within the Gazelle Peninsula have revealed that households allocate their labour to a diverse range of farming and non-farming activities (Omuru *et al*., 2001; Curry *et al*., 2007; Kerua and Glyde, 2016; Koczberski *et al*., 2019). These local subsistence income activities include establishment, cultivating and managing food gardens, preparing fishing gear and fishing, bush hunting and food gathering (Peter *et al*., 2017; Koczberski *et al*., 2019). Household subsistence gardening has been a livelihood activity for thousands of years. However, it has changed significantly in the period since colonisation, the introduction of cash and the adoption of export cash crops in the plantation and smallholder sectors. However, while subsistence garden production has changed a great deal since the start of the colonial period, it remains centrally important for most rural households. People fall back on it during difficult times, such as during periods of low cocoa prices.

### 4.5 Customary and community activities

The diverse cultural backgrounds amongst Papua New Guinean tribes, clans and villages have had enormous impact on households' obligatory commitments and contributions to their various activities. The Tolai people across the Gazelle Peninsula have different cultural backgrounds but have similar customary obligations and clan cultural activities. Koczberski *et al*., (2019) identified their main customary and community activities as customary obligations, ceremonial events, church activities and traditional labour exchange. Customary obligations now accommodate modern store items and cash. For example, instead of garden food crop contributions to a funeral feast, rice or other store goods and cash are frequently contributed. Modern lifestyles have blended well with cultural activities and the associated socio-cultural obligations.

Church activities also take much of household and community time and resources. They depend on members' contributions of cash, resources and time. Weekly cash contributions are required either on Saturdays or Sundays in terms of voluntary offerings and Christian obligatory tithes on individual earnings. Churches' organisational structures have departments that have their own programs and activities for their members. They have their own obligations and activities that require members' time and resources. For example, despite the livelihood challenges under

CPB, 17% per cent of smallholders were still striving to meet financial social and cultural obligations that include church related activities while 61% claimed to have stopped supporting their extended families (CCIL, 2014). Thus, farmers' livelihoods do not affect only the material aspects of life quality, but also the quality of life that is associated with traditional cultural activities and practices in the villages of PNG.

The Tolai people have a distinct culture and tradition that they preserve with great respect and dignity within clans, families and communities. Those traditions have been integrated into modern ways of living and household farming systems. The socio-cultural relationships between families, households and community members have brought benefits to individual households by enriching livelihoods. This is most evident in how households are able to draw on the labour of other households and relatives through traditional exchange mechanisms. For example, Koczberski *et al*., (2019) and Curry *et al*., (2007) reported that traditional labour exchanges amongst farmer groups and households (men and women) have been very important in cocoa, gardening and other household tasks. These labour networks reflect the caring and supporting attitude of people towards each other but can be very demanding in terms of time and resources, and may detract from a household's own livelihood activities.

### 4.6 Household and domestic activities

Essentially, household and domestic activities are everyday priorities for individual families. Koczberski *et al*., 2019 highlighted the time demands of household routines such as child-care, medical care, fire-wood collection, food preparation, fetching water, house building and maintenance. In addition, sociocultural relations are not foregone when labour demands are high. They are important for building social capital and often involve visiting extended families and friends in the communities or elsewhere or even visits to town or local markets. These do not follow regular routines, but they do reduce the time for other income-generating activities.

Socio-cultural activities coexist with cocoa and other household agricultural farming activities. But the main point discussed above is that they draw smallholders' labour and cash away from cocoa; this has been documented on the Gazelle, ENB, Tinputz, ARB and Misima, Milne Bay Province (Peter *et al*., 2017; Koczberski *et al*., 2019).

### 4.7 Cocoa farming practices in ENB

Most cocoa smallholdings within the Gazelle Peninsula are relatively low yielding with an average of 300-400 kg dry beans per hectare per annum (Curry *et al*., 2007), which is well below potential yields of 2,500 kg dry bean per hectare (Lummani, 2006). In general, the low production per ha reflects the diverse livelihood system of smallholder farmers (Figure 4.2). Cocoa planted on land under varying forms of land tenure is also a major factor in ENB because land disputes are common and cocoa production can be disrupted. Through time, there has been a gradual decline in smallholder cocoa production productivity despite Government support of cocoa research and extension. Kerua and Glyde (2016) highlight how livelihood activities can lead to low productivity on the Gazelle Peninsula of ENB:

> '*Tolai'* farmers are subsistence based and not profit oriented. They engage in various livelihood activities, sharing their scarce resources and predominantly adverse to risk. The capitalised based approach of research and extension in PNG is appreciated, but may not be appropriate for many farmers given such a socio-cultural background. Consequently, farmers' socio-cultural factors need to be integrated in the development of future programmes (Kerua and Glyde, 2016, 9).

A major characteristic of cocoa production in PNG is the high variability in yields (Table 4.1). Curry *et al*., (2011) indicated that smallholder cocoa yields vary according to the level of block management. Other factors affecting yields include poor weather like drought, soil status, stress related status to cocoa flush periods and aging of trees which all contribute to the declining status of smallholder production.

Table 4.1: Yields of smallholder cocoa producers in PNG (tonnes/ha dry bean)

| **Area surveyed** | **1974** | **1989** | **1994** | **1998** | **1999** | **2007** |
|---|---|---|---|---|---|---|
| Gazelle Peninsula | 0.296 | 0.320 | 0.356 | 0.401 | 0.620 | 0.366 |
| Bougainville | 0.332 | n.a | n.a | n.a | n.a | n.a |
| Madang (NCR) | 0.250 | 0.100 | n.a | n.a | n.a | n.a |
| Madang (Karkar) | n.a | 0.080 | n.a | n.a | n.a | n.a |
| East Sepik Province | n.a | 0.170 | n.a | n.a | n.a | n.a |
| Oro | n.a | 0.320 | n.a | n.a | n.a | n.a |

Source: Adapted from Curry *et al*., 2011, p. 13.

Several studies have examined the main constraints on smallholder production to explain the consistently low yield over time, despite the availability of high yielding varieties of cocoa. Most studies concluded that the five main interrelated constraints on smallholder cocoa productivity on the Gazelle Peninsula (Ghodake *et al.,* 1995; Lummani and Nailina, 2001; Omuru *et al*., 2001; and Curry *et al.,* 2007) were:

- Insufficient inputs of labour
- Poor husbandry and management practices
- Land tenure disputes
- Low cocoa prices (which may be an outcome of poor quality beans)
- Pests and diseases

### 4.8 Lack of labour investment

The pattern of labour investment in household agricultural activities is similar across most rural areas of PNG. The subsistence affluence argument suggests that limited labour input to cocoa production reflects the abundance of food in the villages and the limited economic pressures on households. Thus, cocoa has been referred to as an ATM by rural households in PNG. Smallholder research has consistently shown that low smallholder productivity is explained by limited labour and capital investment (Curry *et al*., 2007). However, reciprocal labour arrangements for cocoa activities in ENB can help to overcome labour shortages when there is economic pressure such as costs of health, education and socio-cultural obligations. Curry *et al*., (2007) has reported that labour shortages can also occur because of a lack of cooperation amongst family members, very large cocoa blocks and a reluctance or inability to hire labour. Cocoa harvesting is a laborious task and some households will hire labour (Omuru *et al*., 2001; Curry *et al*., 2007).

### 4.9 Poor husbandry and management practices

The traditional agriculture shifting cultivation method and management system of food crops in PNG had had a great influence on the cocoa farming approaches of smallholders. Despite the introduction of new cocoa varieties and block management techniques, smallholders have yet to implement these management techniques to realise the full production potential and benefits. However, the question posed by Curry *et al*., (2007): *"why smallholders do not apply basic cocoa pruning and shade*

*control measures?"* remains a critical question for the industry. Adoption and implementation of block management inputs remains a great challenge.

However, with limited labour investments in cocoa, general maintenance tasks such as weed control, pest and disease management, basic pruning and shade control are neglected (Ghodake *et al*., 1995; Omuru *et al*., 2001; Curry *et al*., 2007). When basic cocoa management practices are ignored, the blocks can become choked with weeds, cocoa and shade branches interlock causing blocks to become more susceptible to pest and diseases which eventually limits production. Before CPB, approximately one third of cocoa pods were lost to pests and diseases (Curry *et al*., 2007). Maintaining social capital and kinship relationships often have more priority for smallholders than labour investments in agricultural activities such as cocoa, coconut and gardening (Curry *et al*., 2007; Kerua and Glyde, 2016).

Omuru *et al*., (2001) has argued that the newly released hybrid clones by the then CCRI had the potential to significantly increased cocoa production in late 1999 to 2000 but had not really benefited smallholders. High cocoa production was not sustained because of poor adoption and implementation of the latest technologies. However, these latest cocoa technologies and varieties were ultimately beneficial to the plantation sector. This is because the plantation sector invests much on labour and sustainable cocoa management practices and therefore can obtain high yields with a reduced susceptibility to pest and diseases because of good management.

Similarly, the high input and management requirements of the latest cocoa hybrid cloned varieties were not adopted by smallholders. The transition from low to high cocoa management aspects is a very difficult transition for smallholders to make. It was already too much for ordinary farmers to bear in the absence of effective, basic and simple agribusiness training incorporated into cocoa management practices. In reality, the smallholder sector faced a gradual decline over time partly due to farmers' ignorance about the high input requirements for the new cocoa varieties. Most farmers still prefer old hybrids that require less input and can still produce in less managed blocks

### 4.10 Land tenure issues

Land tenure security has been a major livelihood issues for people within the Gazelle Peninsula as population increases over time (Kerua and Glyde, 2016). Secure land tenure gives confidence to smallholders to invest in cash crop production. Therefore, crop investment decisions are dependent on smallholder heads with extensive networks of relatives being able to secure land before investing in agricultural or other household activities on the land. Curry *et al*., (2007) highlighted four land tenure types used by the people of ENB. These include:

1. Customary tenure
2. Reserve land
3. Purchase Land
4. State Agriculture Leasehold Land

Customary land tenure is the most widely used form of land tenure on the Gazelle Peninsula. Customary land '*madapai'* is automatically clan property regardless of the clan member who is using it or residing on it. Its control and use is authorised by the elders of the clan '*vunatarai'* (local language). According to Curry *et al*., (2007), the clans within the Gazelle Peninsula follow the family tree with attachment of the customary land to the women's side by matrilineal birthright principles. The greatest challenge faced on customary land dealings in ENB has always been the difficulty of sustaining any household development initiatives on the land:

> A family may plant, harvest and manage cocoa planted on matrilineal land belonging to the male household head (father), if alive, or the female household head (mother). Cocoa planted on matrilineal customary land is typically inherited by a man's sisters' children, and not his own children. His own children have land tenure rights in the natal clan of his wife, that is, their mother's clan. In practice deviations from this matrilineal ideal are common, even as early as the 1950s ….. and matrilineal inheritance rules are not always straightforward. Claims on cocoa blocks may be exercised by individuals (especially children) who have invested considerable time and labour in the cocoa block. Typically, these claims and disputes over cocoa planted on customary land arise following the death of the father (Curry *et al*., 2007, 36)

Customary land tenure within ENB traditional societies has led to most customary land being undeveloped. As I am from ENB, I have witnessed a high proportion of

customary land being left idle for years due to in-clan land disputes. Land disputes amongst leaders and clan members have led to undeveloped customary lands and triggered people to purchase land from the indigenous '*Baining'* or men moving to live on their wives' land. Purchased land makes it easier for the sons to inherit land rights whilst an advantage for their daughters on mothers' land to avoid disputes after parents had passed on in the future (Kerua and Glyde, 2016).

Reserve land is land under Freehold title previously owned by colonial administrations or missions set aside for future special developmental purposes. Curry *et al.,* (2007) elaborated that such land had been given cheaply or gifted through local clan chiefs during the late Nineteenth Century. However, these Freehold land titles had been automatically transferred to the state since independence in 1975 but most missions kept their titles. Many landowners are still in negotiations with the government to free up the land titles while some have purchased back the land and subdivided it amongst clan members. However, population pressure has caused disputes over this land tenure type which can disrupt agricultural and economic activities by smallholders.

On the other hand, 'purchased land' is common and available for development. This land tenure type is the customary land which has been treated as a commodity, not sold transparently with 'sales' through clan leaders either from the local indigenous *'Baining'* people or within the Tolai clans. To avoid future disputes, purchased lands are witnessed and registered through the ward council, LLG and finalised at the provincial lands office. However, land disputes amongst family members do happen as family size expands and family members compete over the usage of resources on the purchased land can act as a constraint on smallholder cocoa farming activities. Another form of land tenure is the 'State Agriculture Leasehold Land' whereby the agriculture blocks are leased for 99 years to households through a tender process and their farming activities are guided by certain conditions set by the government. This lease type poses few challenges to smallholder farming activities on the land, as long as all conditions are met annually. However, Curry *et al*., (2007) has argued that leasehold transfers can cause a lot of disputes between brothers and sisters. It has brought much confusion because women have argued that since the land is in ENB, lease transfers must follow traditional matrilineal land ownership principle. In contrast, men often maintain that as fathers they can pass the land lease to an elder son

in the family as its state land and not customary land. Contested transfers of leases can severely affect cocoa and other agricultural activities on lease blocks after both parents have died which often left sons and daughters disputing ownership. In most cases such lease blocks are forfeited back to the state. Eventually, a lease tender is drawn up leaving whoever on the block displaced.

### 4.11 Market oriented smallholders – low cocoa market prices and infrastructure

Cocoa smallholders are responsive to cocoa prices and economic pressure. Prices can determine management levels, labour and farm inputs and time commitment to cocoa. Low cocoa prices have adverse impacts on smallholder cocoa blocks' management and production. In addition, during periods of low prices, most resort to wet bean sales and forego processing (Curry *et al*., 2007). Those cocoa smallholders are market driven to a point, but only a few farmers are business minded 'modern' farmers that sustain their cocoa management and production regardless of price fluctuations.

The diversity of income alternatives amongst cocoa smallholders means that they can shift out of cocoa when they think the returns to labour are too low (Curry *et al*., 2007). Natural disasters such as volcanic eruptions, earthquakes, drought and CPB infestations in the Gazelle Peninsula, mean that villagers' livelihoods are vulnerable and they need to be able to adapt to alternative means of income to sustain family livelihoods (Curry *et al*., 2007). Natural disasters and fluctuating cocoa prices mean that farmers must have flexible approaches and are able to resort to alternative income generating activities.

Accessible and remote cocoa growing areas face different problems. Although, remote cocoa farmers have the potential to produce large volumes of quality cocoa, it is the absence of market infrastructure, poor transport infrastructure such as roads, sea links, bridges, poor processing facilities that demoralise and discourage cocoa farming amongst these farmers. Transport costs can be very high so that remote farmers earn very little from cocoa. Often alternative income opportunities provide better returns than cocoa. The record vanilla boom is an example, where high value to weight and volume ratios mean that farmers can earn a reasonable return on their labour.

### 4.12 Cocoa pests and diseases

Cocoa is vulnerable to pests and diseases. Cocoa pests and diseases have had a large impact on smallholder cocoa production in ENBP (Ghodake *et al*., 1995). Cocoa pests and diseases are an even greater threat in PNG simply because farmers generally do not control them (Ghodake *et al*., 1995 and Curry *et al*., 2007). Before CPB the common cocoa pests and diseases included: *Pantorhytes*, mirids (*Helopeltis* and *Pseudodoniella*), Trunk longicorn (*Glenea* sp.), caterpillars, Black Pod (*Phytophora* sp.) and Vascular Streak Disease (*Oncobasidium theobromae*). The economic losses, estimated to be one-third of total pods, to these pests had rarely been understood and taken into consideration by cocoa smallholders (Curry *et al.*, 2007). Despite frequent training in the use of chemical controls for these pests and diseases, very few farmers have purchased these chemicals. Ghodake *et al*., (1995) stressed that more research is required on pest control measures such as biological control, crop rotations and cocoa varieties including inter-planting to manage the high infestations of such pests. The major cocoa pest constraints are associated with limited follow-up on cocoa extension training programs, high cost of chemicals, inappropriate application and ignorance by farmers, and also the diverse daily household labour commitments which have all contributed to ineffective cocoa pest management practices.

### 4.13 Farming or foraging?

ENB smallholder cocoa farming strategies and their implications for productivity can be understood by the cocoa farming or foraging model developed by Curry *et al*., (2007). The model suggests that as cocoa blocks age and in the absence of pruning and shade control, they become overgrown and labour investments decline through time and pest and disease rates increase. A vicious cycle ensues in which high pest and disease rates, low productivity discourage labour investments leading to even lower productivity of the block. The shade tree, *Gliricidia*, has been promoted by the colonial DPIs and is still being promoted by the post-independence DPIs and CCIL as one of the best shade trees for cocoa. Shade contributes more to the development and productivity of the cocoa trees from seedling to maturity. Hence, some degree of shade control is paramount mainly through the pruning and thinning process purposely to achieve the desired shade required that favours cocoa growth and production.

The effect of shade on cocoa trees is very complex and is associated with the level of solar radiation and sunlight penetration that cocoa trees can use in the process of photosynthesis. Importantly, it provides a microclimate environment to the cocoa blocks that influences air circulation and relative humidity. Well managed cocoa blocks require a lot of pruning and thinning to prevent over-shading, but only a few smallholders are willing to perform this work, thereby exacerbating pests and disease problems on the blocks. Mature cocoa trees under heavy shade with limited ventilation and sunlight are very susceptible to pests and diseases that will lower yields (CCIL, 2002; Curry *et al*., 2007; Curry *et al*., 2011; CCIL, 2017). Limited cocoa technical knowledge amongst most farmers has occasionally been the constraint to better manage their cocoa blocks. Also, low labour inputs and other investments in their block results in heavy infestations of pests and diseases causing low cocoa production. With better returns on alternative income sources, farmers often limit their labour inputs into cocoa.

Cocoa blocks pass through three distinct stages that are reflected in their structural characteristics and productivity (Table 4.2). Additionally, Curry *et al.,* (2007) added the five significant aspects that distinctively occur simultaneously along the growth stages of the cocoa trees. These include incidences of pests and diseases, labour responses, ease of harvesting, availability of quality mature and ripe cocoa pods for harvesting and the labour harvesting strategies influenced by the quality and quantity of cocoa pods that can either end up as wet or dry bean produced for marketing. In addition, the three stages related to cocoa age influence cocoa smallholder management and production strategies including inputs of labour, technical resources and land tenure systems in PNG (Curry *et al*., 2007). As stated in Table 4.2, the three cocoa development stages (immature, mature and senile) are further discussed below.

Table 4.2: Smallholder cocoa development stages along with level of production and pest and disease incidences.

| Cocoa Growth stages and categories | Cocoa age range | Pests and diseases incidences with Productivity |
|---|---|---|
| Stage 1 - Immature | Less than 3 years | Healthy young cocoa trees that begin to produce, minimal shade coverage and low levels of pests and diseases. |
| Stage 2 - Mature | Between 3-8 years | Reaches the peak in production, adequate shade but slowly |

| | | |
|---|---|---|
| | | overlapping branches. Pests and disease levels increasing. |
| Stage 3 - Senile | More than 8 years | Decline in production, limited labour input leads to more over-shading that increases the incidences of pests and diseases in the block |

Source: Adapted from Curry *et al*., 2007, p. 90.

**Stage 1 – Immature cocoa trees**

During cocoa block rehabilitation or when planting new areas, cocoa seedlings are encouraged to be planted under the shade tree, *Gliricidia*, or other leguminous shade trees. Newly planted cocoa trees occupy very little space, so there is sufficient space between the juvenile cocoa trees to plant food crops to supress weeds and to also sustain livelihoods (Ghodake *et al*., 1995). Ghodake *et al*., (1995) stated that blocks in this stage have 'fair' block management rated at 81%. The intercropping with food crops ensures blocks are well maintained.

During Stage 1, production is rising as trees are slowly reaching maturity. Pests and diseases are at relatively low levels. The vulnerability of income sources and food security by smallholders encourages them to utilise the spaces in their cocoa blocks to grow some food crops and fruits trees. Such intercropping initiatives with food crops keeps weeds low but at the same time encourages farmers to frequently visit the blocks, leading to better maintenance. Generally, cocoa blocks at this stage are not overshaded, there is space between trees for ventilation, and shorter trees means harvesting is easier. At this stage the harvest quantity is still insufficient to be processed into dry been, so most households, especially wives and children harvest the few ripe pods to sell them as wet bean.

**Stage 2 – Mature cocoa trees**

Mature cocoa trees are categorised between 3 and 8 years (Curry *et al*., 2007; CCIL, 2017). This is the peak production period for cocoa trees. During this stage, the canopies of cocoa and shade trees are closing and reaching each other thereby creating less space for food gardens. If pruning is not regularly applied, overshading will result and become an immediate challenge to smallholders. Curry *et al*., (2007) stressed that smallholders' focus at this stage is being more on cocoa production than the block

management aspects such as pest and disease control, cocoa and shade management except for regular slashing of ground vegetation for easier harvesting accessibility. However, pest and disease levels are not too high because shade levels are not excessive.

In contrast, The shifting from wet bean to dry bean is because more cocoa is being produced and harvested. More men become involved in harvesting and processing and there is usually more women, youths and some hired labour in the harvesting process at this stage. Labour may be recruited from the extended family through reciprocal labour arrangements or, more rarely, hired labour may be recruited (Curry *et al*., 2007). In some instances, during flush periods, relatives are called upon by their family members in rural areas to send their children over during holidays to assist with slashing and harvesting. In return, some cocoa harvesting rounds of their holiday harvests are often given to the visiting family to assist with school fees. But there is not much cocoa pruning and shade control in Stage 2 which accelerates the transition into Stage 3. All these contribute to the decline in cocoa production from individual cocoa trees as the block becomes denser, over-shaded with an increased incidence of pests and diseases.

**Stage 3 – Senile cocoa trees**

According to Curry *et al*., (2007) Stage 3 cocoa trees are aging beyond eight years. At this stage, cocoa blocks are characterised as overgrown with interlocking branches of shade trees, cocoa trees and other fruit or timber trees. The vegetation is very dense and dark (Ghodake *et al*., 1995; Curry *et al*., 2007). When the block enters this stage, smallholders have a low level of commitment and investment to their blocks. Little labour and time allocated to the block trigger the decline in production caused by increased pests and diseases.

With the decline in cocoa production, dry bean processing ceases and smallholders return to wet bean selling due to a limited supply of mature healthy pods. The household head's labour commitment to the cocoa block declines and the block generates much less income for the family. Yet, to sustain the household with basic necessities, women and children are prompted to continue harvesting and selling small quantities of wet bean (Curry *et al*., 2007). Similarly, hired labour and cooperative

labour support are normally excluded from cocoa activities at Stage 3. In extreme situations, portions of such blocks might be cleared to make new family gardens.

The lack of regular extension training that incorporates simple business and savings training programs means that smallholders rarely reinvest and maintain Stage 3 blocks. This has been a major factor contributing to declining smallholder production. Smallholder studies within the Gazelle Peninsula have indicated that very little savings are invested in cocoa maintenance and rehabilitation programs. For example, Omuru *et al.,* (2001) has revealed that less than 10% of people's time is spent on crop management and rehabilitation (Figure 4.3).

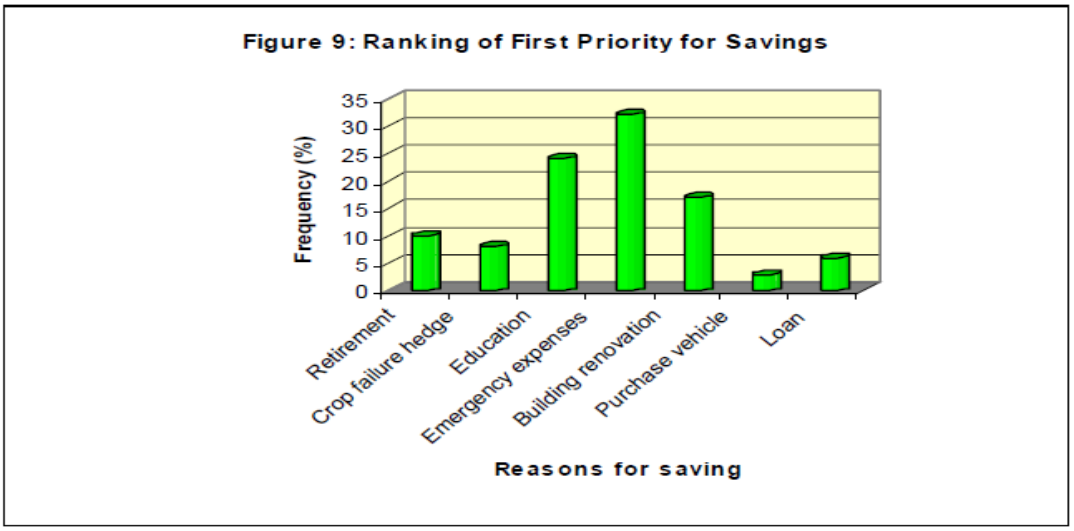


Figure 4.3 ENB smallholders' savings patterns identified by Omuru *et al.*, (2001, p. 22)

### 4.14 What is Cocoa Pod Borer?

As noted in Chapter 1, CPB arrived in ENB in 2006. It then quickly spread through ENB and to other provinces. The pest is native to Southeast Asia and is a very serious pest. Its estimated crop losses are at 20-50 per cent under average cocoa block management (Ngim *et al*., 2016) but losses can be much higher in poorly maintained blocks. In PNG cocoa production at a national level has fallen by 80% (CB-PNG Market Report, 2017) (Figure 4.4).


Plate 4.1: Cocoa pods Photo (1) Healthy non-CPB infested pods before CPB; (2) CPB-infested pods in ENB.

The CPB reproductive stage commences with mating and the laying of eggs by the female moth on the cocoa plant or other host plants. Eggs are laid close to the food source and egg develop into larvae then pupa. The destructive stage of its life cycle is the larva: it bores into the immature cocoa pod and feeds on the placenta (Curry *et al.,* 2015; Ngim *et al*., 2016). When it enters the pod, it disturbs and distorts the cocoa beans' development causing hardness to the cocoa beans. Eventually, infested pods show uneven and premature ripening symptoms. Thereafter, it becomes a serious issue by both reducing the quality and quantity of the cocoa beans.

On average a female moth can lay up to 200 eggs within its month-long life cycle, which may equate to eleven generations in a year. This is a major threat to the cocoa industry and much worse than other cocoa pests and diseases (Ngim *et al*., 2016).

### 4.15 CPB impact on smallholder livelihoods and cocoa production in ENB

Prior to the CPB infestation in PNG, ENB was the leading cocoa producer. Cocoa was the major income earning activity for over 23,000 households or 73 per cent of households in the province (Curry *et al*., 2011). Following the detection of the CPB at Kerevat in 2006, it spread throughout the province within two years, despite a government eradication program. The movement of people and belongings had been the major factors that caused the spread of CPB in ENB and to other cocoa growing provinces despite the erection of quarantine check points at strategic locations.

Smallholders on the Gazelle Peninsula saw almost an 80 per cent drop in their cocoa production after 2006. Provincial cocoa production fell from 22,000 tonnes in 2008 to about 4,000 tonnes in 2012. To date, cocoa has not fully recovered and in 2018 cocoa production was 5,392 tonnes (CB-PNG Market Report, 2017). The fall in production was a disaster for smallholders' livelihoods (Curry *et al*., 2009; Pearce, 2016). The income loss left most families unable to afford basic family needs such as school fees, medical expenses, or transport to town (Curry *et al*., 2011). Most smallholders abandoned their cocoa which forced them to seek alternative income opportunities. CPB remains a major threat to the livelihoods of tens of thousands of families in ENB and in other lowland provinces of PNG. The CPB outbreak took the industry, stakeholders and smallholders by surprise as most were not prepared technically and/or financially to overcome the outbreak.

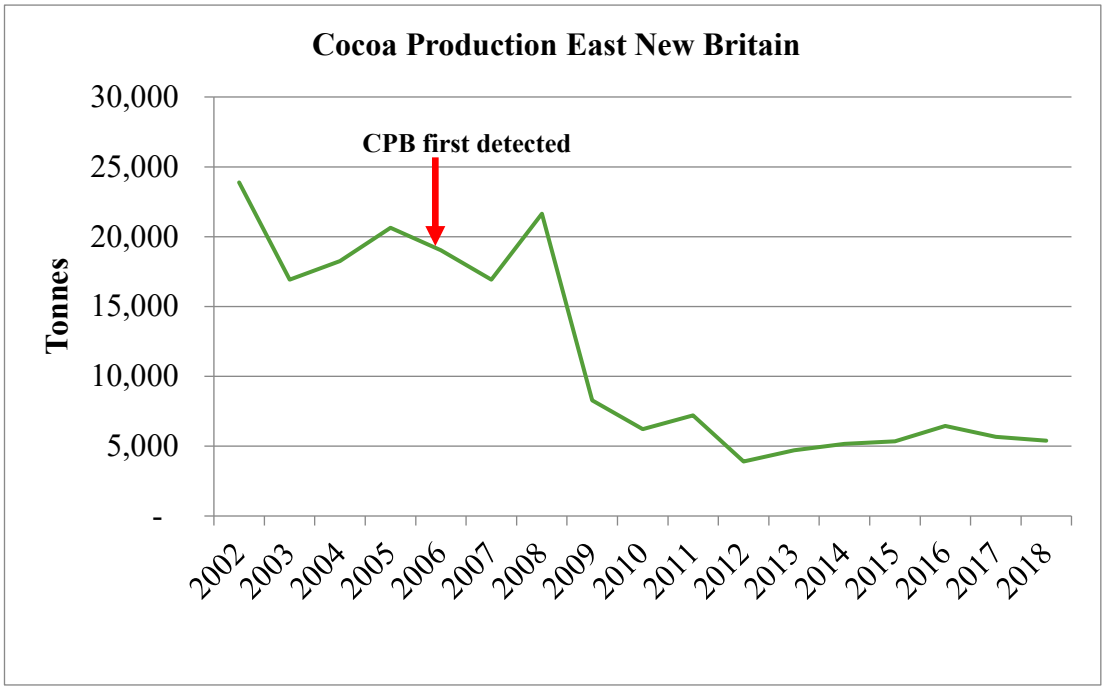


Figure 4.4: Graph showing the collapse of the ENB cocoa production caused by CPB. Source: Curry *et al*., 2019.

The severe impact of CPB on smallholders' cocoa production had little relationship to farmers' technical knowledge of managing the pest and more to do with their cocoa farm management approach. That is, they invested little time, resources and capital in their smallholder cocoa blocks (Curry *et al*., 2011; Ngim *et al*., 2016). Alternatively, high input requirements to manage CPB had been the huge barrier to controlling CPB, which was addressed by the NGIP-Agmark extension support approach to its contact

farmers. For example, the private sector (NGIP-Agmark has responded positively to the smallholders' high input challenges in managing CPB.

> By 2010, cocoa production in East New Britain province fell by 80% to around 5,000 tonnes … Because CPB requires high-input management strategies for its control, it was important to ascertain the extent to which NGIP-Agmark-supported farmers were able to make the transition to high-input farming and to determine the impacts on their broader livelihood activities. (Apis *et al*., 2013. p 37).

### 4.16 Farmers' responses to CPB

With the loss of income because of CPB, smallholders' immediate response was to expand production of food gardens. Many smallholders cleared portions of their cocoa blocks to plant garden crops. They commenced gardening activities and were selling their garden produce to meet household needs. The vulnerability effects caused by stress on their normal living standards due to CPB, led them to instigate multiple actions for alternative and affordable resources to sustain their living (Chambers and Conway, 1992). For example, Curry *et al.,* (2011) and Curry *et al.,* (2015) pointed out that, livelihood responses to CPB required critical decision-making to weigh up possible alternative income opportunities to try and recoup some of the lost cocoa income.

ENB cocoa smallholders were shocked by the level and impact of CPB and most were not aware of control management practices for the pest and how severe the pest would be on their production. The responses of smallholders can be categorised into seven main areas (Table 4.3).

Table 4.3: Household adaptive responses to the impact of CPB in ENB.

| Category | Coping or adaptive livelihood responses |
|---|---|
| Cocoa farm management practices | ***a. Abandoned or partially abandoned cocoa blocks*** |
| | Switched to wet-bean sales (no dry bean processing) |
| | Reduced area under cocoa |
| | Rehabilitation of cocoa holdings |
| | Adoption of more intensive cocoa management practices and new technologies |
| | Replanting of old cocoa with new high yielding hybrid clones |
| Household expenditure patterns | ***b. Reduction in purchases of store foods, especially protein (greater consumption of household garden foods)*** |
| | Decreased consumption of store-bought alcohol by men |
| | Greater reliance on credit to purchase store foods and other goods |
| | Drawing down of household savings |
| | Reduced expenditure on healthcare, education and travel |
| | Reduced financial support to kin |
| Land-use Change | ***c. Expansion of food gardens*** |
| | Diversification of food garden crops for marketing. |
| | Partial replacement of cocoa with other cash crops (e.g. balsa and oil palm) and garden foods. |
| Income activities | ***d. Sales of garden foods become the main source of household income*** |
| | Diversification of income activities |
| | Greater reliance on the sale of coconut products, such as copra and green and dry coconuts |
| | Smaller & more affordable quantities of store goods sold in village trade stores |
| | Increase in road-side marketing of store goods and fresh and cooked garden foods |
| | More formal employment |
| | Increased labour migration |
| Social and kinship networks | ***e. Greater reliance on remittances from relatives*** |
| | Harvesting of cocoa belonging to relatives residing in non-CPB affected areas |
| | Formation of village farmer groups/co-operatives |
| | Mobilisation at the ward level for collective action |
| Skills development | ***f. Training on CPB management practices*** |
| | Training and awareness on alternative income opportunities |
| Partnership in CPB extension criteria | ***g. CPB extension partnership criteria*** |
| | Formation of village farmer groups or cooperatives to access cocoa, CPB and other livelihood training programs from service providers. As farmer groups, gender and household have been part of CPB partnership in extension criteria. |

Source: Curry *et al*., 2016.

### 4.17 Household adaptive responses to the livelihood impact of CPB in ENB

***a. Cocoa blocks abandoned***

The severity and lack of CPB management practices pushed smallholders to fully or partly abandon their cocoa blocks. Because CPB was so aggressive and rapid, and smallholders were not aware of CPB management methods, many left their blocks unattended. Those farmers who only partly abandoned the blocks faced reductions in yields and most switched to wet bean selling. The abandonment of cocoa blocks was associated with the lack of CPB technical knowledge, high input requirement to effectively manage CPB and the availability of alternative income sources that most farmers had resorted to, to sustain their family livelihoods.

***b. Household expenditure patterns reduced***

CPB changed household expenditure patterns as income fell. For example, there was an immediate reduction in purchases of store foods, especially protein with greater supplements of garden foods. Studies have revealed that 48% of households had reduced their consumption of store food within the Gazelle Peninsula (Curry *et al*., 2011; Peter *et al*., 2017). Also, as men's main income source had been affected, there was also decreased consumption of store-bought alcohol by men (Curry *et al*., 2011; Curry *et al*., 2016). Other interrelated household purchasing responses included greater reliance on credit to purchase store foods and other goods, drawing down of household savings, and reduced expenditure on healthcare, education and travel (Curry *et al*., 2011).

***c. Expansion of food gardens***

CPB has changed land use by individual households within the Gazelle Peninsula. For instance, one of the most common livelihood responses was the expansion of food gardens for household consumption and sale at local markets. They also diversified the types of food garden crops for sale at local markets, especially by women. Also, DPI promoted balsa and coffee to smallholders as an economic response to CPB. However, realising the limited benefits of balsa, most famers later responded by removing balsa and planting CPB-tolerant clones after they were released in 2013 (Peter *et al*., 2017). Since 2012, oil palm planting has expanded dramatically on the outskirts of the Gazelle Peninsula through Special Agriculture and Business Leases (SABL) linked to the developer (Tzen Niugini)

and the Kairak Integrated Land Group (KILG), an indigenous (Baining) land group. Consequently, more remote cocoa smallholders began freeing up their cocoa land to plant oil palm, which is still an expanding crop within the Gazelle Peninsula (Nailina *et al*., 2017).

### *d. Expanding household income sources in the villages*

Another livelihood response to the decline in cocoa has been an expansion in household income sources. For example, during the CPB infestation period, there was an escalation in income activities such as tailoring, bakeries, poultry, road-side marketing, and repackaging store items in smaller quantities for sale. Also, more garden foods and betel nut were transported to neighbouring provinces and mine sites for sale (Curry *et al.,* 2015; Peter *et al*., 2017; Koczberski *et al*., 2019). These livelihood strategies were initiated by the ENB cocoa farming communities after the initial stages of the CPB outbreak (Figure 4.5).

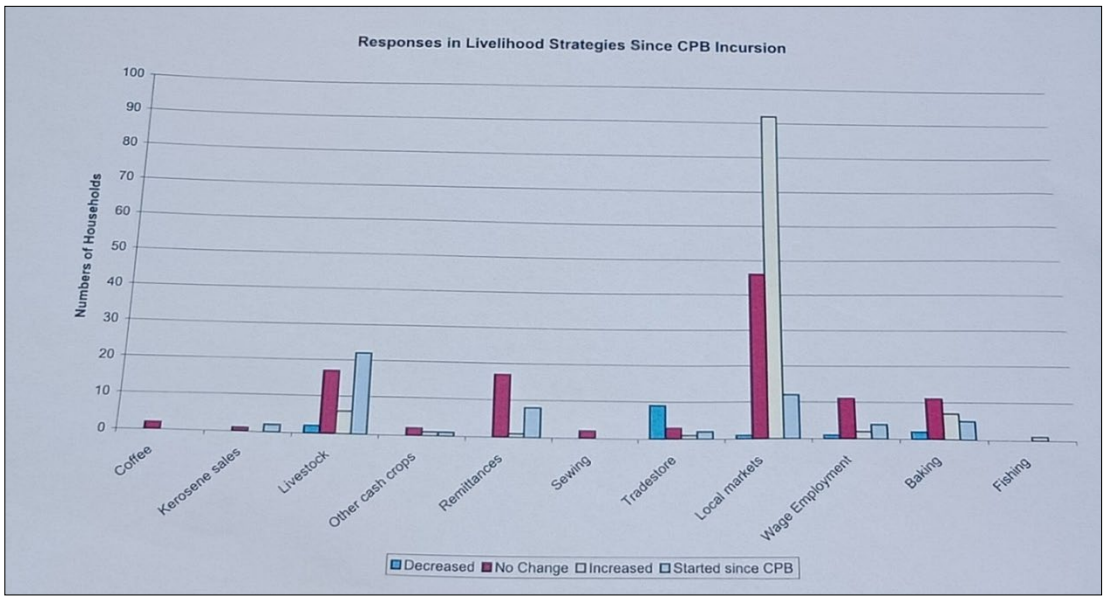


Figure 4.5: The immediate cocoa livelihood responses of smallholders to the CPB incursion. Source: adapted from Curry *et al*., 2011, p. 56.

However, CPB caused a massive social and economic disruption for smallholders but as the months and years passed without an adequate and constructive response to the pest by the Government, cocoa households flooded the local markets with garden food, betel nut and cooked food. There was also an increase in the sale of coconut products, such as copra, fresh and dry coconuts, brooms and woven

baskets (Curry *et al*., 2011). Some households sought formal employment at nearby towns or travelled to their relatives in other provinces to find work. In addition, the latest livelihood research by Koczberski *et al*., (2019) indicated that sales of garden food at the main markets and roadside markets became a substitute for cocoa income in ENB, Milne Bay Province and Autonomous Region of Bougainville (AROB). However, market sales of food crops did not fully compensate for the loss of cocoa income.

***e. Greater reliance on social and kinship networks***

In the initial stages of the CPB outbreak, many affected households relied on their social and kinship networks to maintain their household income. For example, within the initial CPB phases, farmers visited their relatives in CPB-free areas who assisted them financially with food and gave them cocoa harvesting rounds (Peter *et al*., 2017). Similarly, most have become more dependent on remittances from relatives in formal employment and living in urban centres. Therefore, kinship relationships amongst families had been involved with the practice of transporting household goods and agricultural planting materials that inevitably led to the spread of CPB within the Gazelle Peninsula.

Kinship ties are very strong in the Melanesian culture and they create security among extended families. However, such extended family relationships and obligations have disadvantages too. The word *'wantok'* is commonly used as a form of belonging, ethnicity or having a common language or from the same locality. Kerua and Glyde, (2016) emphasised that there are always high expectations of households within the buffer zone of wantok when others need help. For example, the CPB affected households expected their wantoks or relatives to assist them with cash or food but at the same time CPB-free relatives of CPB-affected wantoks will not let them suffer alone (Curry *et al*., 2009; Kerua and Glyde, 2016). Rather, any assistance rendered for a disaster, cultural events such as a death ceremony, or bride price payments, would be later reciprocated. It is an inherited culture that signifies respect, love and care for each other in the communities or tribes. Nonetheless, Kerua and Glyde, (2016, p. 5) revealed the terrible negative consequences of this interdependence:

> Conversely, the 'wantok system' can also have detrimental effects on peoples' livelihood if they become too dependent on others with less reciprocity as one interviewee revealed: …*this wantok system that is making people to become lazy and depending on others. Those who work hard, have to share with lazy family members. We are too much dependent on others.*

Despite the western influences in economic and socio-cultural development in education, religion and through international marriages, indigenous culture exerts a strong influence on behaviour. This in-built culture of communal obligations towards each other has taken roots amongst famers, public servants, private sector employees and leaders. It has triggered laziness, incompetency, corruption, and mismanagement.

***f. Seeking out the latest cocoa varieties and CPB training***

After the initial shock of CPB and farmers realising that they could not control CPB, many responded by seeking out training to develop new skills to manage the pest. According to CCIL (2014), during the initial stages of CPB in the Gazelle Peninsula, over 70 per cent of smallholders attended CPB training programmes. However, of those who attended training, only a small proportion has successfully adapted their cocoa farming system to the new conditions of cocoa production. This was a clear indication that the extension approach available to smallholders was not able to transfer effectively the new skills required to control the pest.

***g. Formation of village farmer groups and cooperatives***

Another response of local communities to combat the CPB spread was to form village farmer groups or co-operatives. This avenue was initiated by village leaders to capture CPB extension resources and training from both the public and private sectors. Villages were encouraged by private sector extension services to form groups for cheaper and more effective extension support to the villages. Farmer group formation was also a mobilisation initiative at the ward level enforced by the public sector to enhance CPB and other general awareness and training to cocoa farming communities.

### 4.18 Government responses, post CPB

Livelihood shocks and stresses amongst rural communities that severely affect lives occur frequently and often instigate adaptive responses by households drawing on their social and human assets to mitigate extreme impacts (Chambers and Conway, 1992; Lashen *et al*., 2010). Responsible National Government had taken immediate action by resourcing their respective departments in response to disasters; likewise, the ENB provincial government had done so after the initial detection of CPB in the province in early 2006.

### 4.19 CPB eradication response

The immediate National Government response to CPB was the establishment of the ENBCPB Response Coordinating Committee (ENBCPBRCC) coordinated out of the then CCIL headquarters in ENB, today known as Cocoa Board Research and Development Station. The ENBCPBRCC was comprised of public and private sector representatives including public agriculture institutions in ENB such as NARI, UNRE and NAQIA. The ENBCPBRCC had taken two phases of the CPB response after the initial response failed on the eradication objective (Curry *et al.,* 2011).

The initial Phase One CPB eradication program was targeted on CPB zones in ENB, especially within the Gazelle district zone. Phase One ended in January 2007 and CPB re-appeared in patches beyond the Gazelle district eradication zones and spread throughout ENB (Curry *et al.,* 2011). Not long after it was also detected in major cocoa growing provinces like Sepik and Madang which was a clear indication that the eradication program had failed.

Phase Two CPB response by the ENBCPBRCC resulted from the adjustments to the Phase One CPB response programs and the outbreaks in other provinces. Phase Two focused on CPB monitoring and management aspects and emphasised CPB training and demonstrations of the best CPB cultural management practices for smallholders. Cocoa research teams were also sent to various cocoa growing provinces to do CPB surveillance. Concurrently, a collective effort into CPB research and trials of CPB best cultural management practices by private and public research institutions were being undertaken in ENB.

### 4.20 The best CPB cultural management practices

Curry *et al*., (2011) has elaborated on CCIL CPB research outcomes and recommendations for smallholder while the NGIP-Agmark has a simplified version of it (Figure 4.6). Ultimately, both CPB management strategies were effective for controlling the pest. However, the simplification of the CPB management package and effective extension training approach had been an advantage towards the NGIP-Agmark in relation to CCIL CPB extension approach.

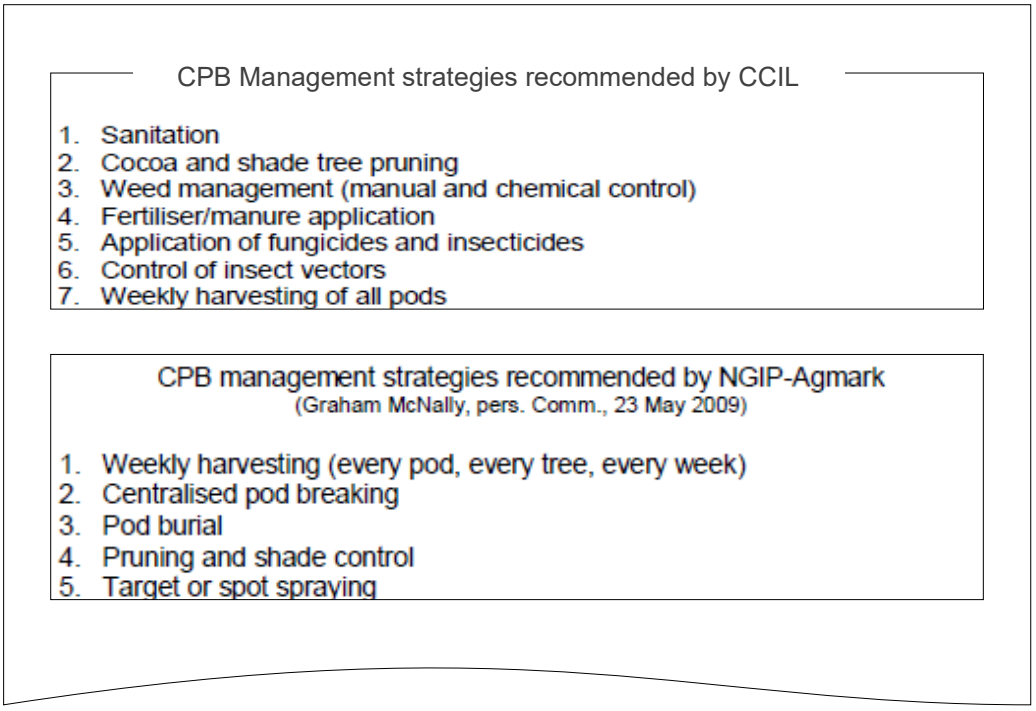


Figure 4.6: CPB management strategies developed by CCIL and NGIP-Agmark in ENB. (Source: Curry *et al*., 2011, p. 42).

Eventually, the six best CPB cultural management practices were identified (CCIL, 2017) and training was rolled out to smallholders within the Gazelle Peninsula. Different extension approaches were taken mainly by public and private sectors depending on resource availability, content of CPB training packages and approaches to smallholders. The six best CPB management cultural practices include regular harvesting, infected and waste pod burial, proper sanitation, regular cocoa pruning, shade reduction and target spraying on mature cocoa pods.

Following principles of sustainable farming, extension training and awareness of alternative income opportunities were other responses to CPB encouraged by both

public and private sectors. This included promoting cocoa integrated farming systems by intercropping cocoa with garden food crops. However, NGIP-Agmark had taken a different cocoa rehabilitation approach by introducing rotational planting of cocoa amongst its established farmer groups at Tavilo. They recommended holdings be reduced to a more manageable size of 1 ha for an average household to effectively manage CPB (Curry *et al*., 2011). It has proved to be an effective approach for managing CPB and maintaining cocoa production. Smallholders have testified that it addresses labour constraints and food security, and enables alternative income sources to be pursued while maintaining cocoa production. The rotational planting approach has expanded to other smallholder groups not to address not only CPB but other livelihood priorities such as food security, labour shortages and soil fertility retention management.

### 4.21 CPB Research and extension Projects

Two recent extension link projects were the Farmer Field School (FFS) research and extension training concept that targeted CPB-affected smallholder groups and Participatory Action Research (PAR) and extension training concept focused on selected Integrated Pest and Disease Management (IPDM) for smallholders. Additionally, greater consultation and involvement of DPI extension officers and village cocoa model smallholders engaged as trainers to enhance FFS and IPDM trainings within cocoa farming communities were emphasised (Sitapai, 2012; CCIL, 2017; Ngim *et al*., 2016; Pearce, 2016). These research and extension training concepts were trialled amongst cocoa smallholders to improve their level of block management using IPDM block management options against pests and diseases (Sitapai, 2012; CCIL, 2017). Comparably, FFS training concept was more towards community peer adult education with greater focus on livelihood impacts by CPB and community enrichment. Meanwhile, PAR focuses purely on IPDM research and training concept based on selected 12 ‘disciples’ smallholders within targeted communities. Training and demonstrations were based on the five IPDM block management options from low to high input strategies with the inclusion of CPB management approach (Richard *et al*., 2011). Moreover, its primary aim has been to demonstrate the investment return opportunities from increased inputs in production to smallholders. In contrast, greater emphasis and expectations was placed on trained households to apply the best cocoa management approach to improve their family

livelihoods against the CPB and other cocoa pest and diseases infestations (Curry *et al*., 2011; Richard *et al*., 2011; Konam *et al*., 2011; Pearce, 2016; CCIL, 2017).

Both research and extension approaches have broadened and strengthened smallholders' choices for effective block investments that would increase production. According to Konam *et al*., (2011), research has proven that there are achievable outcomes from effective implementation of the CPB-IPDM management strategies. These include:

- Improved cocoa tree health,
- Improved cooperation amongst cocoa farming communities,
- Develop an unfriendly environment for diseases,
- Maximise cocoa production.
- Improved general livelihoods of cocoa farming households

### 4.22 Cocoa breeding research for CPB-resistant varieties

In addition, the CCIL cocoa breeding research program has been one of the pillars of the country's cocoa industry. CPB research has been a very challenging field for cocoa breeders and their research partners, but they have achieved some promising results for the cocoa industry. CPB cocoa breeding research drew much attention from donors and GoPNG. For example, the CCIL (2014) report indicated that there are four Government and donor supported CPB cocoa breeding projects. They are:

- Trial 177: Regional breeding trial on CPB resistance project from 2008 to 2012 funded by the World Cocoa Foundation,
- Trial 178: Field screening and testing for CPB tolerance in ENB from 2010 to 2012 and funded by MARS,
- Trial 179: Host plant resistance for sustainable cocoa pod management from 2008 to 2011, funded by CFC/ICCO; and
- CPB Project: Prospecting for CPB resistance was funded by GoPNG.

The above CPB cocoa breeding projects have all led to the release of ten CPB tolerant clonal varieties by 2013 by the cocoa industry (CCIL, 2017).

### 4.23 Cocoa rehabilitation projects

The latest cocoa smallholder rehabilitation project against CPB has been the Public Private Agricultural Partnership (PPAP) cocoa project component funded by the World Bank. It has been enhanced through the Public Private Partnership (PPP) Government policy (GoPNG, 2009). The Government has embarked on a PPP policy to deliver effective extension development amongst different agricultural commodities. For example, it has been used to address CPB in cocoa and CBB in coffee. It has boosted the cocoa industry's extension training programs and supported CPB-affected smallholders to rehabilitate their blocks. However, the PPAP is driving a new extension approach of resource support, livelihood training and CPB and other cocoa training all along the cocoa value chain. It is being delivered through private sector partnerships with established farmer groups. This approach has been in line with the NGIP-Agmark's smallholder cocoa extension during the pre and post CPB periods (Curry *et al*., 2009; Curry *et al*., 2015). The PPAP cocoa component of NGIP-Agmark smallholder extension has been in association with established cooperatives and FDGs. NGIP-Agmark's smallholder extension approach fully supports a holistic and integrated livelihood training programs with cocoa extension training and support all along the value chain. This is the subject of the next chapter.

### 4.24 Conclusion

The growth and development of the PNG cocoa industry has been heavily dependent on its research and extension that was initiated by the colonial administration and adopted after independence and remains in place today. Despite a lot of extension training, smallholder cocoa farms are challenged by diverse socio-cultural factors and livelihood strategies. Creating a better understanding of the smallholder farming and livelihood system within a locality may lead to better approaches to extension that are designed to improve cocoa farming for smallholders. So, for example, smallholder livelihood activities such as alternative cash income activities, subsistence activities, customary and community obligations and household and domestic daily activities could be better accommodated within a cocoa smallholder farming system. These strategies include consideration of the relationship between labour supply and resource availability to individual households. This will enhance appropriate extension

approaches to sustainably increase production with positive impacts on rural livelihoods.

For some farmers, CPB has initiated better cocoa management practices and led them to consider cocoa as an economic crop rather than a traditional crop. CPB was an overwhelming issue for smallholders during the initial infestation period because they were not practising good management practices and their labour time was split between many livelihood activities that left little time for cocoa farming.

This chapter examined smallholder responses to CPB including the abandonment of cocoa blocks, reductions in household expenditure, the greater reliance on garden foods, more sales of garden crops and repackaging of store goods for reselling, seeking remittances from relatives, pursuing CPB training programs and formation of farmer groups to enhance cocoa training and support from service providers. Also, by exploring the different extension responses to CPB, the chapter revealed the initial constraints and then progress for the cocoa industry. Cocoa technologies will not improve cocoa production on their own, unless livelihood training is incorporated.

Regarding the Government's response to CPB, this chapter has also elaborated on major cocoa research and cocoa extension priorities for both public and private cocoa extension service providers. The PPAP cocoa project has been channelled through DAL via CB-PNG facilitated by its Project Management Unit (PMU) to the private sector as extension and support implementers. Using the private sector in partnership with government signifies a sustainable production approach and livelihood improvement. Such an extension and support approach directly linked to smallholders has been a long term dream of most rural smallholders.

The next chapter discusses the response to CPB by the private sector (NGIP-Agmark). The chapter considers NGIP-Agmark's smallholder extension history and the way it has been addressing CPB and improving livelihoods of its contact farmer groups. The NGIP model has captured much attention amongst rural smallholders who are keen to participate as they had witnessed regular visits and extension training done in an holistic approach that includes farming resource support, providing market linkages and incorporating sustainable livelihood training programs. These had been the missing links in cocoa extension by the public sector. Cocoa extension approaches

taken to address CPB had indicated some anticipated possibilities for private sector extension and its capacity to contribute towards the sustainability of the cocoa industry in PNG.

# CHAPTER FIVE

# RESPONSE TO COCOA POD BORER BY THE PRIVATE SECTOR

## 5.1 Introduction

This chapter discusses the impact of the NGIP-Agmark extension model on smallholders' ability to successfully respond to CPB and manage cocoa along the value chain. As the main cocoa exporter in PNG, NGIP-Agmark witnessed the gradual decline in smallholder cocoa production resulting from CPB and the abandonment of cocoa blocks as farmers ventured into alternative income sources. This caused a further collapse in smallholder dry bean production. This loss of production was the main factor that had driven NGIP-Agmark to re-model its services to cocoa farmers and to introduce CPB extension training for farmers. The chapter argues that the NGIP-Agmark training programs and technical knowledge delivered to farmers helped them to better manage their cocoa extension model. For most farmers, this knowledge was new, even though they had been cultivating cocoa all their lives. Smallholders recognised the importance of training to improve their livelihood security and to effectively respond to the farming insecurities in a CPB environment.

## 5.2 Background to the NGIP-Agmark extension model

The NGIP-Agmark extension model first emerged at Stockholm Plantation within the north-west outskirts of the Lasul Bay area, ENB in early 2005 (CCIL, 2014). The extension approach was based on developing a partnership with the indigenous cocoa farming communities surrounding the company plantation. This remote area had very limited access to public sector agricultural extension services. Neither was there regular and reliable shipping or transport for smallholders to sell their cocoa. As part of the extension model, the smallholder partnership with NGIP-Agmark comprised of purchasing cocoa dry bean from farmers and providing them with sea-freighted assistance to the company's export branch in Rabaul. Additional to its extension cocoa training programs, farmers also received land transport (tractor) assistance, seedling support and other livelihood services. The company had regular shipping services to Stockholm to service its own cocoa and coconut plantations within this remote area in

terms of produce and farming materials. Not only did cocoa and coconut smallholders have their produce sea freighted to town, but on the return trip to Stockholm, the ship would carry store goods for local village retailers and other items (such as house building supplies) ordered by the smallholders (Curry *et al*., 2009). The NGIP-Agmark model shared similar extension components with the Nucleus Estate (NE) model operating in the oil palm industry of PNG (Koczberski *et al*., 2001).

The NGIP-Agmark extension model at Stockholm was driven by numerous inter-related factors such as:

- lack of public agricultural extension services for farmers in remote areas
- lack of market accessibility for farmers
- training demands by the remote cocoa smallholders within the vicinity of the company's cocoa and coconut plantations
- the recognition of the growth of PNG's smallholder production to total cocoa production for PNG, and
- the need to improve and maintain cocoa quality and sustain production into the future.

In PNG, the plantation sector now accounts for only 2% of total production. Thus, smallholders account for the bulk of production (CB-PNG Market Report 2018). Being the major cocoa exporter, it was economically critical and beneficial to work in partnership with the smallholders to foster sustainability. NGIP-Agmark previously exported more than 60 per cent of PNG's cocoa to international chocolate manufacturers (www.agmark.com.pg). However, with the recent increase in the number of exporters, the company's share has decreased to 35 per cent of total cocoa exports (CB-PNG Market Report, 2018).

Following a scaling down of the company's operations and production at Lasul Bay, and with the outbreak of CPB on the Gazelle Peninsula in 2006, the NGIP-Agmark concentrated its attention on their plantations and the smallholder producers in the Kerevat area on the Gazelle where easier accessibility by road existed. In particular, the company concentrated on their Tokiala cocoa plantation on the outskirts of Kerevat. The smallholder extension model was introduced to interested farming communities surrounding the Tokiala plantation. In the preliminary stages, the NGIP-

Agmark smallholder extension model at Tokiala operated under 'Trading and Advisory Services' and Tokiala plantation management (Curry *et al.,* 2011). The extension approach evolved overtime, and with the arrival of CPB in 2006, it captured more interest and participation of cocoa smallholders in the surrounding rural villages.

To meet smallholder demand, the extension approach was tailored and targeted to the establishment of farmer groups rather than to individual farmers. It encouraged interested farmers to form farmer groups as an eligible criterion to be part of the extension approach. These groups were called Farmer Discussion Groups (FDGs). They had regular weekly or fortnightly meetings and discussions by members focussed on cocoa training and identifying priority areas for extension training and support (CCIL, 2014). Positive results began to be seen. There was an improvement in smallholder cocoa block management practices and this triggered a steady increase in cocoa production among some smallholders (CCIL, 2014). As a FDG became more established in a village, most would end up having their meetings on a quarterly or irregular basis depending on the cocoa training and support needed. Occasionally these meetings were attended by NGIP-Agmark extension officers, other invited and interested extension service providers, and farmers and village leaders who were not members of the FDG and cooperatives. The FDG meetings allowed farmers to raise common issues affecting their cocoa farming and livelihoods. Farmers were encouraged to discuss the constraints on their cocoa farming and their experiences of overcoming the common challenges of controlling CPB. Discussions of CPB extension training programs were the main highlight at farmer group meetings (Plate 5.1).


Plate 5.1: Farmer group meetings with the extension officers and commercial agronomists at different settings. Photo (1) NGIP-Agmark training farmers in the village. Photo (2) ENBWYiA training cooperative leaders at UNRE IATP conference room.

FDG meetings helped the company meet cocoa farmers' needs and facilitated cocoa training programs based on farmer driven initiatives and interests. This bottom-up approach built mutual relationships of trust between the company and surrounding cocoa farming communities (Curry *et al*., 2011). Such an extension approach had not been practised by the public sector in PNG.

The extension model was expanded across the Gazelle Peninsula following the arrival of CPB in 2006. Both smallholders and the company were puzzled by the sudden impact of CPB on cocoa and, as outlined in Chapter 4, the pest caused enormous income losses for smallholders. It was also a disaster for NGIP-Agmark whose core business was cocoa. It took several months for the industry, public agricultural institutions, the private sector and smallholders to identify the most effective CPB management practices. NGIP-Agmark implemented its own CPB management practices on its cocoa plantation at Tokiala, and there they tested strategies for CPB control. The results were promising and slowly its CPB cultural management practices were ultimately packaged and linked to extension training programs for FDGs in late 2007. The re-packaging of NGIP-Agmark extension programs for smallholders also incorporated CPB best cultural management practices from CCIL and other collaborating stakeholders. With the established relationships and networks in place with its FDGs, it made it easier for the company to introduce CPB and cocoa rehabilitation training programs for farmers across the Gazelle Peninsula. Thus, the

NGIP-Agmark extension model switched to a greater emphasis on cocoa block rehabilitation and training on CPB management practices amongst the FDGs (Curry *et al.,* 2011). Cocoa rehabilitation training programs were initiated to effectively control CPB and to generate cash income to boost smallholder livelihoods and to improve farmers' purchasing power to buy appropriate tools for cocoa.

NGIP-Agmark's CPB slogan was "*every pod, every tree, every week*". This reflected the core of their training practice. As a major cocoa exporter in PNG, the company also took on the responsibility of CPB awareness to the cocoa growing communities in parallel with its extension and support programs. Their massive CPB awareness initiatives to the public were conducted through printed shirts, caps, vehicles, pamphlets, billboards, as well as the use of local radio, newspapers and television (Plate 5.2). The awareness created more demand from more cocoa growing communities for NGIP-Agmark cocoa extension services.


Plate 5.2: Examples of the CPB management awareness initiatives on vehicles and t-shirts.

The demand for training on CPB best cultural management practices within the Gazelle Peninsula gave momentum to the company's extension services, and soon demand was coming from other parts of ENB and other CPB affected provinces in PNG (CCIL, 2014). As cocoa households began to feel the severe impact of CPB across most cocoa growing provinces in PNG, there was increased demand for training in effective management practices as smallholders waited for CPB tolerant planting materials to be released by CCIL. All eyes were on NGIP-Agmark, due to its initial successful CPB training approach with smallholders on the Gazelle Peninsula. Also,

there was interest amongst other private and public sector extension organisations for their officers and smallholders to be trained in CPB management practices by NGIP-Agmark.

For example, East Sepik Province and the Autonomous Region of Bougainville (ARoB) sent their Department of Primary Industries (DPI) officers and 'model' cocoa farmers to ENB to be trained at Tokiala by NGIP-Agmark (CCIL, 2014). Their government financial commitment signified the value of cocoa to household livelihoods in these two provinces. The CPB training program scheduled two weeks theory and practical CPB management training demonstrations. Increasingly, farmers from several districts within ENB also attended the two-week CPB training management practices at NGIP-Agmark's Tokiala training centre (Pirpir, 2013). The CPB training had the added advantage of creating better working collaborations among smallholders and their respective local DPI officers (CCIL, 2014). All the NGIP-Agmark trained smallholders and officers who graduated received certificates in CPB best management practice.

Although it was proving to be a successful extension approach, its funding capacity for sustainable operation was limited. This was an initial challenge for the company as extension demand rapidly grew amongst local farmer groups and cooperatives. Further expansion of the extension model was made possible in 2012 through accessing external funding from the PNG Sustainable Development Program (PNGSDP) to build a training dormitory and training facility within the Tokiala plantation area and to support farmer training costs. This enhanced the formal training programs on CPB management and other cocoa husbandry practices along the value chain. Later in 2014, NGIP-Agmark was successful in gaining more funds to be a lead partner in a World Bank funded PPAP cocoa project. This cemented its extension approach with its established network of FDGs and cooperatives in ENB. Under the PPAP cocoa project NGIP-Agmark also extended its extension to other provinces such as ARoB and Morobe Provinces to provide CPB management training and other livelihood training programs (Gar and McNally, 2020). This gave the opportunity for remote smallholder farmers to be trained and have access to the latest cocoa technologies that they did not have before to effectively manage their cocoa blocks under the CPB environment. Likewise, the training helped build and extend farmers'

relationships with other farmers and cooperatives within their local areas and provinces.

### 5.3 The NGIP-Agmark extension model

This section outlines the extension model in detail. The cocoa extension training and support programs provided by NGIP-Agmark to FDGs motivated farmer groups to maintain an interest in managing their cocoa. CPB had led to a disinterest in farming cocoa amongst smallholders and this dramatically affected cocoa production in ENB and elsewhere. In ENB the majority of cocoa smallholders and their households gave up producing cocoa during the initial CPB infestation period because the traditional public-sector extension approach was not effective under a CPB environment (Curry *et al*., 2011). The lack of public sector extension and support services to rural cocoa smallholders had been the major drawback to smallholders maintaining cocoa production and their interest in farming. The initiation of the extension and support programs by NGIP-Agmark had opened a space for smallholders to return to managing their cocoa effectively. Below are the main components of the NGIP-Agmark extension model delivered to FDGs and cooperatives.

a. Cocoa block rehabilitation training programs (CPB and block management)
b. Cocoa seedling support program
c. Credit support (farm inputs and seedlings)
d. Transport support (seedlings, farm inputs and produce)
e. Post-harvest support initiative (drying and processing materials)
f. Marketing (wet bean and dry bean produce)
g. Socio-cultural support programs (schools, churches, aid posts etc.) and
h. Livelihood programs

Each extension training and support component is briefly outlined below.

#### *5.3.1 Cocoa block rehabilitation and CPB training programs*

Training programs with FDGs or co-operatives are carried out either at the village level and/or at Tokiala plantation. The cocoa rehabilitation training programs are comprehensive and begin with shade establishment. Shade establishment training is recommended for both the rehabilitation and new planting approaches linked to soil preparation and seedling planting techniques. Each cocoa development stage is

linked to training and visit programs until the tree reaches its productive stage. The cocoa training is then targeted to include pruning techniques, sanitation practices, cultural weed control practices, soil care and management, IPDM management training and shade control.

The CPB management training is the main focus of the training programs by the NGIP-Agmark. There is an option for nominated leaders or lead farmers of each FDG or cooperative to visit Tokiala plantation for field walk visits and cocoa block management demonstration activities. Such initiatives were introduced for FDG leaders and farmers to see first-hand the impact of various cocoa best management practices on respective growth stages of cocoa and CPB control. The field walks give farmers exposure to better managed cocoa blocks as well as exposure to demonstrations of suitable CPB management approaches to apply to new plantings, newly bearing cocoa trees, mature cocoa trees, shade management and harvesting.

The training draws on both CCIL's cocoa research into the best management practices for CPB control[6] and the company's own trialling of and applying best management practices to its cocoa plantations. The CPB cultural management practices, as part of the smallholder training to control CPB, included five key components (Curry *et al.*, 2011; CCIL, 2014):

1. ***Regular (weekly) harvesting***. It consisted of complete harvesting of healthy ripe and pest and disease affected cocoa pods on a weekly basis. This had been recognised as the key to control CPB by disturbing its life cycle. The removal and on-block burial of CPB-infested and black pods was also recommended.
2. ***Pod burial***. Cocoa farmers were instructed to dig rubbish pit holes within their cocoa blocks to bury all the cocoa shells, placenta and infected pods after harvesting. Pod burial killed the CPB moth or larvae on the cocoa shells and had to be done after each day of cocoa harvesting.

[6] CCIL through its team of cocoa scientists developed a blended CPB cultural management strategy which expanded on the NGIP-Agmark version. This was officially recognised and released by the cocoa industry to the smallholders and extension service providers. It was termed the best CPB cultural management options and was incorporated within the IPDM package in 2013 for CPB management practices by smallholders (CCIL Cocoa Handbook, 2017; Konam *et al*., 2011).

3. ***Cocoa pruning and sanitation***. Appropriate cocoa pruning and general block sanitation was promoted to allow for more sunlight penetration and air flow into the block as it makes the micro-environment less hospitable to CPB.
4. ***Shade reduction***. Heavily shaded cocoa blocks are proven to be susceptible to CPB. Heavy shade is also conducive to high levels of other pests and diseases (Curry *et al*., 2007). Smallholders are trained to reduce shade to an average of 50 per cent of sunlight into their cocoa blocks.
5. ***Target spraying***. Fortnightly target spraying of insecticides to heavily infested cocoa blocks was recommended. However, farmers were advised to only apply target spraying on mature pods and the underside of cocoa branches as the last resort option for the pest. Smallholders learnt health safety measures and mixing procedures of chemicals during CPB training sessions.

Despite numerous smallholders completing training on CPB management, not all were able or willing to put the training into practice. It had long been acknowledged that very few smallholders fully applied the appropriate techniques such as weeding, pruning, shade control and pest and disease control in managing their cocoa blocks even prior to CPB (Omuru *et al*., 2001; Curry *et al*., 2007).

The four main reasons many smallholders said why they did not or were unable to adopt and apply the released CPB management practices were:

- First, some cocoa household heads or spouses have formal employment either part or full time. They have a stable and regular income and CPB has only minor impact on their livelihoods.
- Second, some smallholders were fully engaged with subsistence activities and meeting household, community and tribal obligations. This left little time for them to control CPB. Such people value the time spent on these non-cocoa activities and most were unwilling to reduce time committed to such important tasks. They value cocoa as a second priority to subsistence activities and cultural activities. Hence, as outlined in Chapter 4, when their blocks were infested with CPB, many of these smallholders

abandoned their cocoa blocks and resorted to other alternative income sources.

- Third, households could not afford to apply expensive CPB control measures. Such cocoa farmers had the desire to revive their cocoa blocks, but limited savings and cash was a major constraint.
- Lastly, some smallholders had several and scattered unmanaged cocoa blocks and due to labour shortages could not regularly visit all of their blocks to effectively manage them for CPB. Curry *et al.*, (2007) found cocoa blocks closer to farmers' homes were better managed then the more distant blocks. Nearby blocks were more likely to be well managed with effective application of the CPB management practices such as weekly harvesting, shade control and sanitation. For smallholders with scattered blocks and experiencing labour shortages, a crop diversification approach was encouraged by NGIP-Agmark, instead of continuing with cocoa. This approach helped prevent CPB from surviving and breeding on unmanaged cocoa blocks.

### *5.3.2 Cocoa seedling support, propagation training and nursery establishment*

A cocoa replanting and block rehabilitation and training program amongst smallholders was one of the key priorities of the NGIP-Agmark extension approach to tackle CPB. This was made up of supplying seeds to farmers and later propagation training. The training and cocoa rehabilitation and replanting programs were well supported by both smallholders and the industry as a means of reviving cocoa blocks and increasing smallholder production.

Old cocoa trees and unplanned rehabilitation programs amongst smallholders had been major production issues that CPB had exposed. Recent studies on the Gazelle Peninsula had indicated that most of the cocoa trees were over 15 years of age, which is well over their peak productive age (Curry *et al*., 2007). Omuru *et al*., (2001) reported that among farmers there was little interest and low savings levels for them to actively invest in their cocoa blocks to rehabilitate old cocoa trees to improve and sustain production. Also, many farmers had only limited knowledge to develop rehabilitation plans and most did not have the essential cocoa farming tools or applied

appropriate cocoa management practices to improve production through replanting (Omuru *et al*., 2001; Curry *et al*., 2007).

Initially, the cocoa seedling support program for smallholders had been to supply cocoa seedlings and other relevant farm inputs on a credit basis. A percentage of the purchase cost was deducted when farmers sold their cocoa to the company. The cocoa seedling support program enabled farmers to purchase 200 cocoa seedlings at one time at a discounted price (50 per cent discount). The demand was high. By June 2014, over 200,000 seedlings had been delivered to farmers on the Gazelle (CCIL, 2014). However, the seedling support program by the company was soon exhausted on the Gazelle Peninsula, as there was high demand and interest for such extension support.

Once it became beyond the company's capacity to produce and supply cocoa seedlings to meet the demands of farmers, it forced NGIP-Agmark and its extension officers to pursue a seedling propagation training program as well as the establishment of satellite cocoa nurseries and budwood gardens in the villages of the respective FDGs. Clan leaders willingly freed up land for cocoa nurseries and budwood gardens to be established in their communities (Plate 5.3). The establishment of the satellite cocoa nurseries and budwood gardens was under the guidance and certification of the cocoa industry through its Research and Development Division formally CCIL at Tavilo in ENB.

Plate 5.3: Satellite cocoa nursery being established by NGIP-Agmark for the Kadaulung Butam FDG at Kadaulung 2 Village.

The propagation training program and nursery support helped ease the shortfall of seedlings. A prime objective was for smallholders to acquire the technology and skills to propagate their own cocoa seedlings from the released planting materials for rehabilitation and further planting. In addition, the nurseries were used for both training purposes and to supply FDG members with seedlings. The company's initial arrangement has been for smallholders to raise their root stalks within their satellite nurseries while bud sticks for propagation were to be bought from NGIP-Agmark Tokiala plantation budwood garden. Each FDG group covered the costs to establish their own cocoa nursery, but were also assisted by the company with fair prices and donations of some materials. This had been the arrangement prior to the establishment of budwood gardens amongst individual FDGs and cooperatives.

The program continued, but it was difficult for the company alone to sustain it due to problems with financially supporting the nursery operations over the long term and the limited management capacities amongst the village smallholders. However, NGIP-Agmark's seedling and nursery extension support to FDGs was enhanced by the World Bank's PPAP cocoa project. It helped fund cocoa seedling and nurseries resource support to many established farmer groups (Table 5.1).

Table 5.1: NGIP-Agmark PPAP extension support on cocoa seedlings, budwood and nursery establishment amongst ENB smallholders and farmer groups.

| PPAP NGIP-Agmark Project areas | Number of FDGs and Cooperatives | Number of farmers | Number of cocoa seedlings supplied | Budwood gardens and nurseries established consist of all the 2013 released cocoa varieties. |
|---|---|---|---|---|
| Tokiala Cluster | 11 | 559 | 111,800 | 5 |
| Kerevat Cluster | 17 | 599 | 119,800 | 5 |
| Rabaul Cluster | 13 | 305 | 61,000 | 2 |
| Warangoi Cluster | 10 | 428 | 85,600 | 4 |
| Kokopo Cluster | 18 | 654 | 130,800 | 5 |
| Grand total | 69 | 2545 | 509,000 | 21 |

Source: Gar and McNally (2020)

*5.3.3 Credit support for farm inputs and facilities and sweat equity contributions*

Several studies have shown a shortage of tools among cocoa smallholders as a factor in explaining the low production among cocoa farmers in ENB (Curry *et al*., 2007; Curry *et al*., 2011). The lack of appropriate CPB farm tools and the poor saving levels

amongst smallholders were addressed by the company through their credit facility set up for smallholders to purchase tools. Effective management of CPB needs special attention and appropriate farm tools to control CPB. For example, cocoa pruning, harvesting and insecticide spraying, need specific tools which most smallholders lack. Most only have bush knives, spades and other multi-purpose farming tools (Curry *et al*., 2007; Omuru *et al*., 2001). The assistance of CPB management tools to smallholders aimed to increase labour efficiency in block management to better manage CPB.

The credit arrangements for smallholders operated out of NGIP-Agmark hardware store at its Tokiala planation area. Only the registered smallholders under the company FDGs or cooperatives were eligible to access farming tools and materials on credit, as agreed under the extension training partnership with the FDGs and cooperatives. The agreement set a monetary ceiling amount that each farmer could reach on tools' credit, but repayment rates were up to individual farmers and their capacity to pay. Similar to the seedling credit program repayments, credit for tools was deducted from the farmers' sales of cocoa to NGIP-Agmark. The credit support program for tools together with that for seedlings, helped smallholders to effectively rehabilitate their ageing cocoa trees, improve block management, and better manage CPB regardless of farmers' limited financial resources.

Furthermore, during the data collection phase of this study, NGIP-Agmark and other PSSPs introduced sweat equity to the cooperative members as eligibility criteria to the PPAP cocoa project. The sweat equity contribution of each smallholder has been 10%, that is equivalent to K103.30 for respective PSSPs or lead partners to collect as required under the PPAP cocoa project implementation guidelines. The sweat equity initiative was introduced to encourage ownership of the project by participating farmers. It was also a criterion for smallholders' eligibility to access cocoa and livelihood training programs and to receive support for tools, cocoa and galip nut seedlings.

### *5.3.4 Transport support service - seedlings, farm inputs and cocoa produce*

Transport support for smallholders was one of NGIP-Agmark's initial extension services to its surrounding FDG members who lived near Tokiala plantation and who

could be reached by its tractors (CCIL, 2014). Inefficient accessibility to vehicles by the smallholders to sell cocoa and to deliver farm tools, seedlings and other farm equipment has been a constraint on cocoa production in the remote villages. Also, what transport is available is expensive. For NGIP-Agmark, the collection of both wet and dry cocoa bean from smallholder villages was the main priority of the transport service (Plate 5.4 and Plate 5.5). Smallholders were charged a transport fee of K5.00 per dry bean bag. This was much cheaper than the normal public transport rate of K20.00 per dry bean bag. The transport costs were deducted from smallholder sales at Tokiala sales point.

As the CPB infestation spread, dry bean sales were greatly affected as there was a fall in production and the regular weekly harvesting promoted by NGIP-Agmark, as a CPB control measure meant less beans for fermentation. Thus in 2009 smallholders were encouraged to sell most of their crop as wet bean. The wet bean was collected by the company. The implementation of a weekly harvesting strategy was later confirmed by the smallholders to be an effective method of controlling CPB. Also, the sale of wet bean allowed the company to better address cocoa quality standards as they had more control over the processing of wet bean.

Transport support to smallholders near Tokiala also extended to the transportation of:

- Cocoa seedlings from the company's cocoa nursery site to smallholder blocks
- Cocoa farming tools, and
- Processing materials from the company's hardware store.

These important extension support services had been overlooked in the past by both the private sector and public extension service. Later, similar private sector transport assistance services to smallholders were introduced into the World-Bank-funded PPAP cocoa project to enhance the implementation and rollout of the projects. Through the PPAP project, the company also received assistance to purchase a long-base truck to assist its transport support program to its various FDGs and cooperatives.

Plate 5.4: Transport support service provided by NGIP-Agmark to Kadaulung Butam farmer group

Plate 5.5: Cocoa processing materials provided by ENBWYiA to farmer groups. These kiln pipes were for the Lasul Baining cooperatives and farmers covered in this study. Photo by Kiteni Kurika

*5.3.5 Post-harvest training and support*

NGIP-Agmark offered its FDGs post-harvest training and assistance to fermentary owners within the group to rehabilitate their cocoa drying facilities. The aim was to improve cocoa quality. One of the NGIP-Agmark's objectives in its smallholders' extension approach was to minimise smoke tainted cocoa at the smallholder level. This was done through giving emphasis to cocoa quality training and resource support to owners of cocoa processing and drying facilities as well as FDGs and cooperatives (Gar and McNally, 2020). Thus, the enhancement of cocoa quality was addressed by NGIP-Agmark all along the cocoa value chain, ending with post-harvest processing, before marketing and export.

Quality is important to satisfy international buyers and chocolate manufacturers. The PNG cocoa industry governs and regulates cocoa quality through the cocoa exporting companies and all along the cocoa value chain (CCIL, 2002). However, poor quality smoke-tainted cocoa from the smallholder sector has been a major problem for the industry and exporters for several years. The PNG cocoa industry has a fine flavour quality of 99.3 per cent but it is yet to overcome the tainted quality or residue flavour of 0.7 per cent amongst its exported cocoa beans (CB-PNG market report, 2017). Consistently, there had been progressive cocoa post-harvest research by CB-PNG (formally CCIL) cocoa scientists on cocoa fermentation processes and drying techniques to eliminate the tainted smoke quality. But with an under-funded public sector extension training support program for farmers, smoke-tainted cocoa has been an ongoing problem for the industry.

Post-harvest training included harvesting, cocoa fermentation, drying procedures, bagging and storage. Training also focussed on the facilities used (such as fermentaries), timing and resource inputs to process fine quality cocoa before marketing.

Addressing and improving cocoa quality standards has enabled the company to encourage communal cocoa post-harvest processing and drying amongst FDGs and cooperatives. This assistance to smallholders helped improve fermentation and drying facilities that not only improved the quality of processed cocoa beans but also added economic value to the cocoa through higher returns to farmers. The ENBWYiA which

worked closely with NGIP and was a lead partner to the cooperatives in the PPAP project also ventured into a similar approach by outsourcing the post-harvest training to the then CCIL (now CB-PNG).

Plate 5.6: Cocoa post-harvest training by CCIL post-harvest scientists coordinated by the ENBWYiA. Photo by Kiteni Kurika

NGIP-Agmark later expanded its post-harvest training and support to a wider group of growers through the World Bank's PPAP cocoa project. Within the later stage of the PPAP cocoa project in 2019, the company assisted seven FDGs to build new fermentaries and 33 FDGs received kiln pipes and other needed materials for fermentary maintenance and reliability (Table 5.2) (Gar and McNally, 2020). Alternatively, fermentary owners and FDG smallholders received cocoa quality support all along the cocoa post-harvest processing chain such as fermentation, drying, bagging and storage before marketing. Addressing and improving cocoa quality standards has enabled the company to encourage communal cocoa post-harvest processing and drying amongst FDG or cooperative smallholders.

Table 5.2: NGIP-Agmark PPAP cocoa processing facility support initiative to farmer groups within the Gazelle Peninsula in 2019/20.

| PPAP NGIP-Agmark Project areas | FDGs and Cooperatives | Number of farmers | Fermentary built (support) | Support with stainless steel kiln pipe |
|---|---|---|---|---|
| Tokiala Cluster | 11 | 559 | 2 | 9 |
| Kerevat Cluster | 17 | 599 | 0 | 3 |
| Rabaul Cluster | 13 | 305 | 1 | 7 |
| Warangoi Cluster | 10 | 428 | 2 | 9 |
| Kokopo Cluster | 18 | 654 | 2 | 5 |
| Grand total | 69 | 2545 | 7 | 33 |

Adapted from Gar and McNally (2020)

*5.3.6 Marketing assistance*

To assist smallholders with selling their cocoa, NGIP-Agmark created a community base partnership with local business partners for cocoa buying facilities or agents in cocoa marketing partnership arrangements. The local feeder cocoa buying facilities and agents are all linked to the main cocoa processing and storage facilities within the major cocoa growing provinces namely Talina (Kokopo), Rabaul, Buka, Kimbe, Kavieng, Lae, Madang, Wewak and Popondetta (www.agmark.com.pg).

Within the Gazelle Peninsula, NGIP-Agmark strategically placed its major cocoa wet and dry bean buying station at the four major townships and the provincial capital. These towns include Talina buying station within Kokopo city, Rabaul, Kerevat and Warangoi buying stations. These marketing or buying stations are more efficient for farmers within their locality, providing easy market access closer to their farm gates. Furthermore, these stations had hardware houses that provide and sell all cocoa farming equipment and tools, which are also helpful to the farmers.

Moving further inland into the remote villages a different arrangement was put in place regarding cocoa market assistance to the growers. This is where agents or small agriculture or cocoa businesses are identified and eventually a dialogue is initiated with the company for these businesses to become cocoa buying agents in these remote communities. However, sustainable operations of these cocoa buying agents has remained a challenge to the company over the years (Gar and McNally, 2020). With

this in mind, management, governance and leadership training has been incorporated into the PPAP cocoa project to boost the lead farmers and cooperatives leaders that are presumed to be small PSSPs in the communities to embrace market access as well.

All PSSPs approach market assistance to the smallholders differently. As the ENBWYiA Manageress had mentioned during an interview:

> *... the ENBWYiA had not yet established its buying stations, yet it has taken a different approach that has been helping its farmers to fetch better price. ENBWYiA creates volume from its cooperatives and bargains with the major cocoa exporter in the province such as NGIP-Agmark, Outspan, and ENBDC. At the end cocoa bags are sold to the exporter offering to pay higher price per bag, a cheque is drawn to ENBWYiA then members of each cooperative are called in to get their money. This has been the cocoa marketing assistance by ENBWYiA, which hopefully has plans to export directly in the future when all things work out well with the association. –K. Kurika Manageress, ENBWYiA, ENB, 11th March, 2019.*

## 5.4 Socio-cultural and sustainable livelihood support programs

Initially, NGIP-Agmark's extension approach on socio-cultural support was restricted to communities, churches, Aid Posts and included simple bookkeeping training programs to the FDG village communities (CCIL, 2014). The sustainable livelihood training program was introduced later and has been part of the holistic extension approach by NGIP-Agmark that was enhanced through the implementation of the PPAP cocoa project. Also, specialised trainers on sustainable livelihoods and other farming enrichment programs were significant to enlightening households on sustainable cocoa farming systems. Furthermore, the PPAP cocoa project had broadened the concept by involving specialised service providers to deliver livelihood training and other training programs from both the public and private sectors to FDGs and cooperatives.

### *5.4.1 Socio-cultural and economic support to communities*

*Community Social Services*

Prior to the CPB infestation and the World Bank PPAP cocoa project interventions, NGIP-Agmark extension training and support had been established at Lassul Bay and included extension support to community social services such as schools, clinics and churches. These initiatives by NGIP-Agmark plantation management were aimed at

building good working relationships with the surrounding communities. Support had been mainly with additional building materials for classrooms and clinics and even a few church buildings (CCIL, 2014). For example, the company initiated an agreement in early 2005 with the management of a nearby primary school for the company to assist them to develop their 2-hectare reserve land with cocoa planting materials and technical support to provide an income stream for the school. This primary school and several elementary schools benefited greatly from the NGIP-Agmark through its Tokiala plantation management. According to a CCIL report (2014), support initiatives by NGIP-Agmark to surrounding schools and their communities included:

- Support with skilled labour to make classroom repairs and maintenance. This has been at no cost to the school administration.
- Discounted prices on building materials through the company's hardware store.
- Transport assistance with building materials of cocoa farmer materials to the school and cocoa farm.

For a long time, the company has also been supporting the nearby Health Clinic that provides health services to its employees as well as to the surrounding communities. NGIP-Agmark provided the land where the Health Clinic was built and assisted with its construction (CCIL, 2014). Such support to surrounding communities has drawn smallholders' attention to the company for technical assistance and support to better manage CPB on their cocoa blocks. To most smallholders, it was the pathway towards establishing farmer groups that would enable the establishment of extension partnerships with the company. Thus, all these initiatives have contributed to the NGIP-Agmark extension model of today. However, as the extension model extends out to more smallholders within the Gazelle Peninsula, the company has emphasised support to areas such as cocoa nurseries, transport, cocoa processing and marketing and resource centres.

### *5.4.2 Resource centre support*

More recently the company provided assistance to smallholders through building resource centres for FDGs and cooperatives (Plate 5.7). According to Gar and McNally (2020), 12 resource centres have been built and many more are under construction by

the NGIP-Agmark extension program funded by the World Bank PPAP cocoa project. These resource centres are to house the executive offices and provide meeting places for FDGs and cooperatives and their members. The establishment of the resource centres has given greater confidence to the smallholders of the cocoa extension and partnership approach for sustainable cocoa production into the future. The resource centres are evidence that there has been progressive transformation witnessed within the extension approaches taken by the NGIP-Agmark company from informal meeting places to more formal meeting places provided in the resource centres. This cocoa extension support approach has been enhanced by the recent PPAP cocoa project that had expanded the establishment of FDGs or cooperative resource centres in remote villages for farmers to easily access the cocoa and livelihood training and support programs (World Bank, 2018; Gar and McNally, 2020).

Plate 5.7: A farmer group resource centre under construction by NGIP-Agmark through the PPAP cocoa project

## 5.5 Household socioeconomic training programs

### *5.5.1 Agribusiness training program*

Cocoa household livelihood training has been prioritised within the NGIP-Agmark extension approach to smallholders. It has been enhanced through the PPAP cocoa project as a project requirement to be implemented by the lead partners. It was

outsourced to specialised trainers facilitated by the respective lead partners, such as UNRE IATP. The IATP are specialists in providing sustainable livelihood training, basic book and record keeping training modules to smallholders (Gar and McNally, 2020).

In addition to what the UNRE IATP was delivering to farmers, financial training programs were initiated by the Bank of South Pacific (BSP) to provide their own financial literacy training programs to established farmer groups attached to NGIP-Agmark. It was an interesting scenario seeing the BSP bank and other financial institutions in the province reaching out to the remote areas with their training and other banking services to emphasise to farmers the importance of having a savings culture as a means of developing a more sustainable smallholder farming system. From the training, cocoa block investments were encouraged to enable farmers to gain better returns from their cocoa and for livelihood improvement. Savings and farm investments have been two of the missing links within the traditional smallholder cocoa farming system. As NGIP-Agmark Agriculture Division Manager stated during an interview:

> *The agribusiness training and the financial literacy training have seen many individual farmers and cooperatives opening accounts specifically for cocoa business operations. Amongst the NGIP-Agmark farmer group members, that attended the training on financial literacy training by BSP and UNRE Kairak IATP, about 73 lead farmers were further selected to participate in the Small Medium Enterprise (SME) training by the Commerce Department in ENB," – G McNally, NGIP-Agmark Agriculture Division Manager, ENB, 21st March, 2019.*

Moreover, the delivery of training on financial literacy, savings and record keeping triggered more interest amongst smallholders to implement these new skills in their cocoa farming and in other small business activities in the village. It is giving smallholders a clearer perspective of family budgeting and assisting them to make more informed decisions about expenditures. The training has led to a large number of participants opening new bank accounts with local financial institutions.

Interestingly, the impact of CPB on smallholders has indirectly led them to better manage their cocoa blocks as well as to shift from traditional farming system to an agribusiness farming system for sustainable farming outcomes. This has been achieved through better record keeping strategies and adopting routine savings

approaches to maintain cocoa farming as well as to prepare for adverse farm challenges in the future.

### *5.5.2 Leadership, governance and management training*

NGIP-Agmark also coordinated leadership, governance and management training for its lead farmers and village cocoa model farmers. Such training covered simple agribusiness methods, sustainable livelihoods and basic bookkeeping training programs. During this study, NGIP-Agmark coordinated 33 lead and model cocoa farmers for training in this area within the Gazelle Peninsula (Gar and McNally, 2020). The training aimed to equip lead farmers and model farmers with the knowledge to improve their leadership and management skills within their FDGs and cooperatives. Also, by providing the training to lead farmers, it gave the company more confidence that the partnership extension approach with their farmer group leaders would continue following the end of the PPAP cocoa project. According to Sitapai (2012), one of the problems with many previous smallholder donor-funded cocoa projects was that few were sustainable following the end of the project due to a lack of future plans to foster cocoa development. This concern has been partly addressed through the arrangement of sustainable livelihood and agribusiness training initiatives among farmers.

Targeting the leadership and management aspects within the cooperatives helps ensure continued interest in cocoa farming in remote communities. Interviews with farmer groups, revealed that the leadership and management knowledge gained from the training, led two cooperatives to proceed with formal registration of their farmer groups with Investment Promotion Authority (IPA) within Kokopo city. In addition, they opened business bank accounts for their cocoa nurseries and other commercial activities to foster sound management and financial transparency.

### *5.5.3 Gender inclusion and livelihood training*

The holistic cocoa extension package pays attention to gender, largely though the 'family team training program[7] (Plate 5.8). The ENB smallholders were part of this

[7] *This is the reason for the PNG Family Farm Teams manual. As men, women and youth work together to build a family farm team, each family will find their own modern PNG way of being an equitable, effective and sustainable team. Together they can then build their farm activities into a small family farm business,* - Pamphilon, Mikhailovich and Gwatirisa (2017).

training program, which is now part of the overall cocoa training program. It is often referred to as the gender training program. The gender inclusion training has been outsourced to the UNRE IATP livelihood trainers. Such training has broken some traditional ideas about training in certain farming areas that prevented men and women from being trained together. The family team training embraces the idea that extension should be directed towards all household members, not just men as it had been in the past. Involving household members in discussions, planning and implementation of household cocoa farming activities is strongly emphasised in the training as it is recognised that the active involvement of all household members working together in cooperation in cocoa farming activities is a key factor for controlling CPB and developing sustainable cocoa production for all household members to enjoy. It has been increasingly recognised that the greatest constraint on sustainable farming systems at the household level has been the lack of sound leadership and active involvement of women and youth in decision-making processes (Hamago, 2019). Gaining such training will better equip family members to understand their role in family daily activities.

Plate 5.8: Gender inclusion training: women attending cocoa training by NGIP-Agmark.

This study was able to witness the final day of a one-week training program on gender inclusion (family team), sustainable livelihoods, basic bookkeeping, nutrition and best

management practices in cocoa farming delivered by the UNRE IATP trainers to the Burit cooperative at Burit Village/ward within the Inland Baining LLG. It was facilitated by ENBWYiA (Plate 5.9). Similar training programs have been conducted in other villages on the Gazelle and in the Inland Baining LLG area.

During this study, NGIP-Agmark successfully coordinated 28 cooperatives to be trained on gender inclusion by UNRE IATP livelihood training program. In total 137 men and 95 women had fully participated in the gender training programs, and additional training was being planned during my fieldwork (Gar and McNally, 2020).

Plate 5.9: Members of the Burit cooperative after a week-long training on gender, basic bookkeeping and livelihood facilitated by ENBWYiA. Photo by Kiteni Kurika

Also, under the PPAP cocoa project, NGIP-Agmark arranged a total of 39 lead farmers to be trained to take up their roles as 'Train the Trainers' on gender and livelihood enrichment training programs. Gar and McNally (2020) claimed that gender inclusion training had assisted many households to plan and allocate labour in cocoa block management which was slowly being reflected in higher smallholder production. In summary, the holistic extension package that NGIP-Agmark initiated and which has been gradually applied by various PSSPs (Plate 5.8) through the smallholder private sector partnership extension approach appears to be meeting smallholder needs.

## 5.6 Conclusion

This chapter provided an outline of the main components of the NGIP-Agmark extension model that was introduced to respond to the need for better management of CPB by smallholders. It showed the different extension approaches and support the private sector offered smallholders compared with public-sector extension which has been under-funded and weak for many years (Chapter 2). As outlined, the training under the NGIP-Agmark extension model has not been on cocoa alone, but includes training on gender inclusion, sustainable management of farmer groups as well as enriching farmers' livelihoods This more comprehensive and holistic approach has been welcomed by smallholders. It is likely that the without this more holistic approach towards CPB management by NGIP-Agmark, smallholder cocoa production would have remained unsustainable. Furthermore, the company's cocoa extension programs have been modified and enhanced through the PPAP cocoa project.

The next chapter examines the benefits that smallholders gained from the NGIP-Agmark cocoa extension model.

# CHAPTER SIX

# FARMERS' PERCEPTIONS OF THE PRIVATE SECTOR EXTENSION PROGRAMS: STUDY RESULTS

## 6.1 Introduction

This chapter presents an assessment of the benefits smallholders and FDGs gained from their partnership with NGIP-Agmark. The results are based mainly on interview and survey data I collected from farmers and therefore the assessment is from the perspective of the farmers themselves. Additional information was collected from extension officers working with the farmers (see Chapter 3). As outlined in Chapter 4, CPB triggered sociocultural and economic turmoil amongst cocoa farmers and cocoa farming systems in PNG. Despite the aggressiveness of CPB, it has had a positive impact in terms of strengthening the partnerships between public and private sector cocoa organisations and smallholders to effectively work together to regain confidence among cocoa farmers to return to cocoa farming, processing and selling quality cocoa in PNG.

The results described in this chapter indicate that public-private partnerships have been an effective approach for extension training and support to smallholders to tackle CPB. Such programs have boosted community development in remote villages through providing suitable cocoa smallholder extension and support programs to address CPB. As discussed later in the chapter, part of the reason why the approach has been of benefit to farmers is the success of the FDG and cooperatives that were established as part of the partnership. Recent cocoa smallholder studies within the Gazelle Peninsula have highlighted potential benefits through farmer group partnership approaches in cocoa extension and support projects.

The benefits for growers, their families and their communities as outlined by (Curry *et al*., 2007, p. 121) include:

- Enhanced market access

- Lower costs of production, particularly for transport and processing
- Improved quality of product
- Higher productivity
- Improved and more carefully targeted extension services and training
- Access to quality planting material
- Improved access to credit
- Increase in household incomes
- More employment and business opportunities for smallholders
- Mechanism for financing community development activities
- Greater participation of women and youth in export cash crop production

The study suggests that the NGIP-Agmark model has displayed the most potential benefits to cocoa smallholders through its extension and support approach to overcome CPB infestations. The partnership approach with cocoa FDGs and cooperatives has provided many benefits to farmers which indicate the successful impact of the model. In this chapter the benefits are categorised into three main areas:

- Economic benefits
- Social benefits
- Cultural benefits

Each benefit is further discussed below.

### 6.2 Economic benefits

The economic benefits smallholders experienced from their partnership with NGIP-Agmark are demonstrated by their improved cocoa production and improved block maintenance following training. Prior to farmers going into partnership with NGIP-Agmark, farmers had abandoned their cocoa blocks as they did not have the skills and tools to manage the pests (Chapter 4). In most of the study sites farmers had abandoned their cocoa blocks for two to five-years (Figure 6.1).

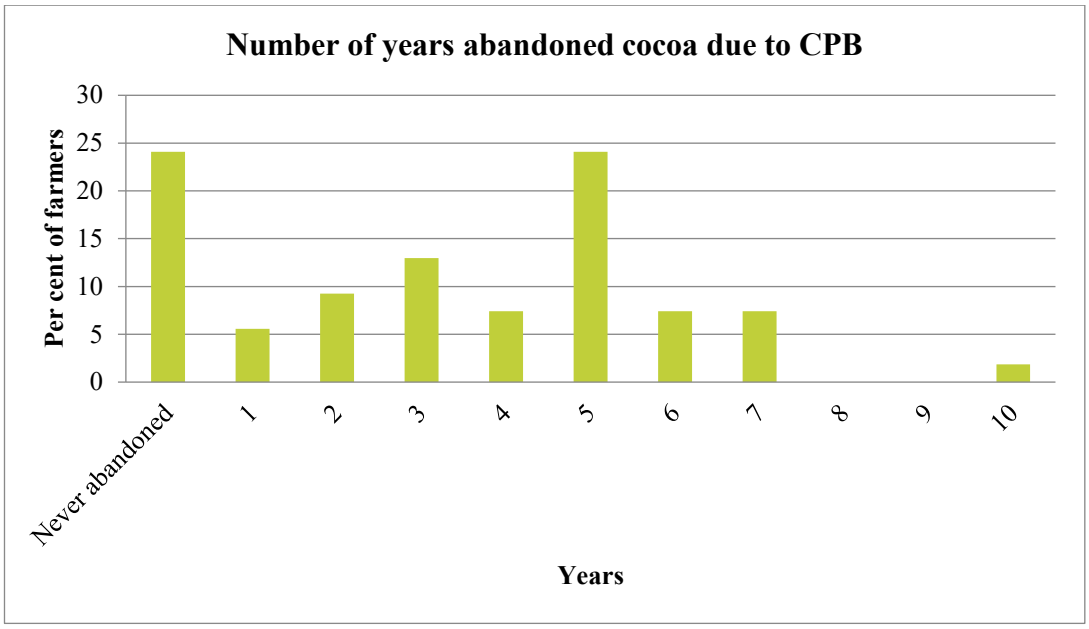

Figure 6.1: Length of time (years) village farmers had abandoned their cocoa blocks due to CPB infestations within the three remote villages (n=54).

Figure 6.1 shows that only 24% of the village farmers in the three remote villages captured in this study claimed not to have abandoned their cocoa blocks after CPB arrived. Most of these farmers and FDG members were in partnership with NGIP-Agmark in the early stages of the company's work with smallholders when CPB arrived. This influenced their on-going block management despite CPB.

A further 24% of farmers, mostly living in remote villages, claimed that they had abandoned their cocoa blocks for approximately five years. These farmers sought alternative income sources outside of cocoa, but many of these were unsustainable and many smallholders eventually returned to cocoa when they saw that CPB management technology was being widely circulated amongst local farmers. They were able to access the NGIP-Agmark's training through peer or family-related farmers in their village. A similar scenario lies with the 13% of farmers who claimed to have abandoned their blocks for approximately three years. Economic stress in the family and the availability of CPB technology through the company partnership were the main factors that had driven farmers back to their cocoa blocks. The minority of famers who abandoned their cocoa blocks for around 10 years reflect those farmers in remote villages that received no public or private extension services until the recent extension programs by NGIP-Agmark and other PSSPs. Thus, for villagers especially those in remote villages the NGIP-Agmark extension training restored cocoa production which

had been long abandoned due to the absence of effective extension. As one farmer explained:

> *Recalling my childhood days (10-11 years old) around 1969 when we were still under the Australian government that was when I saw the effective agricultural extension services by the DPI. Their extension officers used to regularly visit the farmers in the villages and often stay with them unlike our current DPI extension officers. For example, since CPB devastated the cocoa industry in 2006, we've never seen or received any cocoa training from the DPI officers and I'm the ward council/member here speaking. Instead, just recently the private sector through their extension officers are now training and supporting us with cocoa best management practices. Initially with CPB, most farmers abandoned their cocoa blocks. Most were doing what they could in their own ways to manage their cocoa blocks. Currently, we are happy with the private sector extension approach that has equipped us with more technical knowledge to better manage cocoa, support us with tools and seedlings and has helped us to work together as a group and community to bring back cocoa as our main livelihood source. Such extension service has triggered off other socioeconomic activities within our remote village to help our families." –Farmer S034 from Suina/Naviu cooperative, ENB (19th Feb, 2019).*

Meanwhile, another farmer pointed out:

> *Realistically, there's never been any kind of extension training as such, equipping us with cocoa knowledge ... For example, prior to such extension training, our basic knowledge of cocoa was on just one type of cocoa but today we have been enlightened to learn that there are more than 10 varieties and which ones are the best in production and quality despite CPB. Also, we learnt cocoa quality begins with seedling preferences. Previously we thought quality started at harvesting through to processing". –Farmer S029 from Suina cooperative, ENB (18th Feb, 2019).*

### *6.2.1 Production and income gains*

Whilst almost 70% of farmers said they had experienced a large drop in cocoa production before the partnership their production was gradually recovering. At the time of fieldwork, many smallholders were rehabilitating their blocks and were beginning to overcome the impact of CPB on their production. As shown in Figure 6.2 production of dry bean was slowly increasing. Figure 6.2 excludes the regular selling of wet bean by women and therefore does not show total household production.

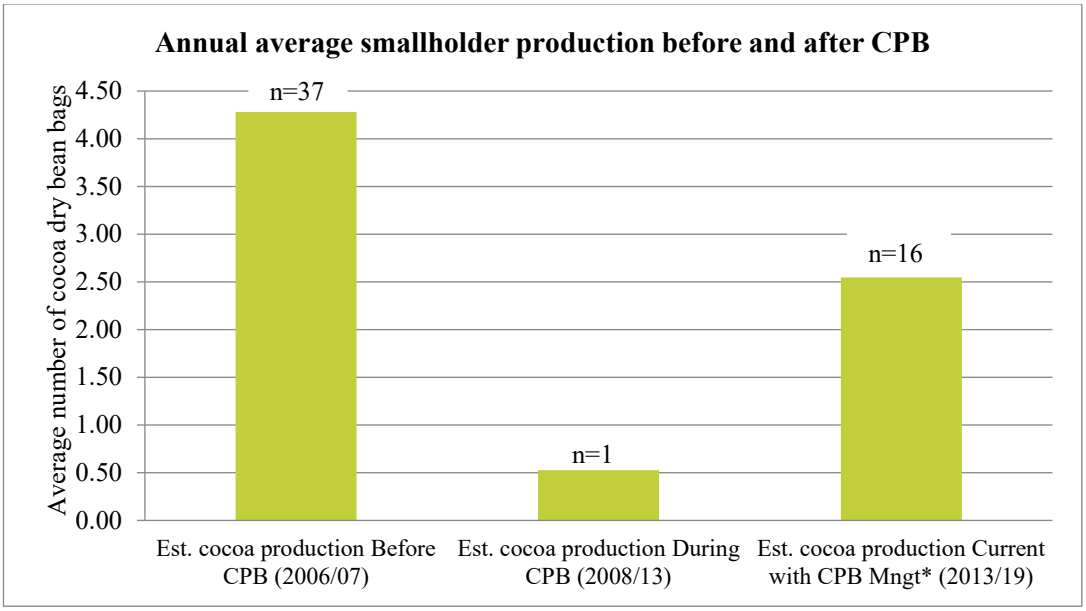


Figure 6.2: Farmers' cocoa production in relation to the three phases (n=54).
*Note:* *Many blocks were just coming into production at the time of the survey.

The production and income gains were slow, but they helped farmers overcome the financial hardship resulting from CPB. In some villages, many blocks were just coming into production when data were collected. The majority of interviewed farmers claimed that their cocoa production was slowly increasing. The return to cocoa farming and the steady increase in production demonstrates that farmers benefited from the CPB training to help them partly recover from the large infestations of CPB in their blocks.

The steady increase in production was a result of farmers' better block management and more regular harvesting (Figure 6.3). Regular cocoa harvesting had been prescribed as one of the major CPB management aspects for farmers to use to control CPB and improve production (see Chapter 5).

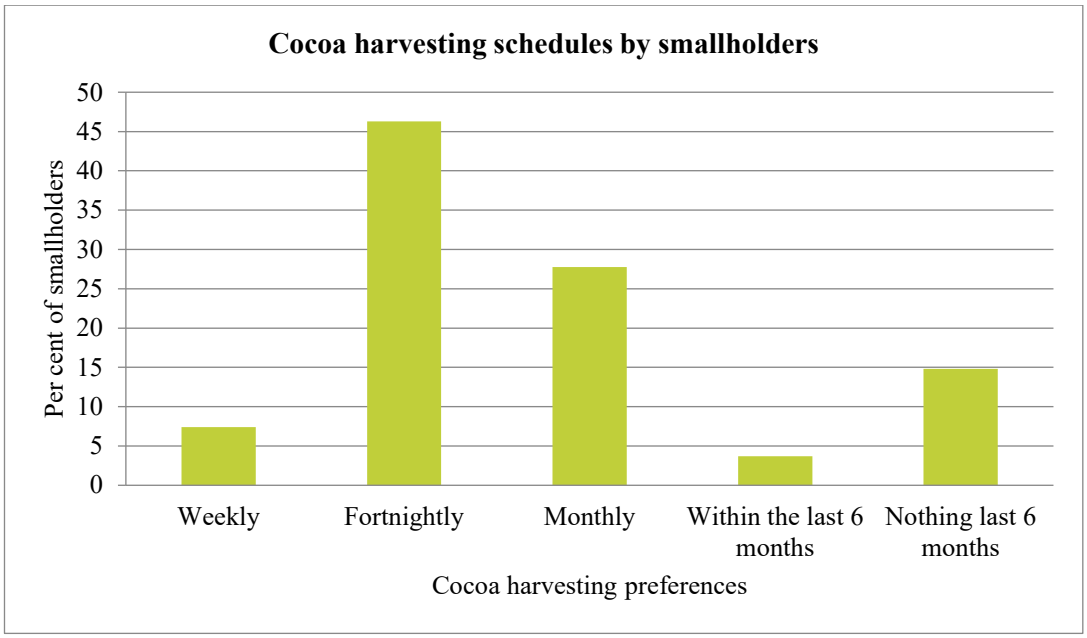


Figure 6.3: Farmers' responses to their cocoa harvesting patterns in regard to CPB management practices (n=54).

Whilst only a small proportion of farmers followed weekly harvesting, 46% of the interviewed farmers (n=52) harvested fortnightly and 28% harvested monthly. The fortnightly or less regular harvesting patterns portray the diverse livelihood activities especially subsistence food gardening, among villagers. These diverse household daily activities influence the amount of time farmers can devote to cocoa and other economic activities (Kerua and Glyde, 2016; Peter *et al*., 2017). Also, as farmers have gained more confidence in controlling CPB, some were working out the most suitable patterns of harvesting that fitted into their wider livelihood activities. As one farmer mentioned:

> *I have approached harvesting differently, but I have proven it also addresses CPB infestations management as we've been instructed by NGIP-Agmark. Based on my observations, I prefer fortnightly harvesting as it gives more ripe pods compared to the weekly harvesting. Also, it saves us time to do other things the following week. I engage family labour, especially my children during fortnightly weekends to harvest. I often instruct my children to harvest and I place our weighing scale and weigh the harvested wet beans, which I pay for the beans at a low price to cater for their labour. So, it motivates them to harvest more clean beans to earn more. Such initiatives keep them busy and helps them to participate in cocoa management –Famer S015, Kadaulung Cooperative, ENB. (14th Feb, 1019).*

It should be noted that 15% of farmers indicated they had not harvested cocoa during the previous six months, whilst 4% of farmers had harvested cocoa over the last six

months but not on a regular basis. These farmers had recently planted their cocoa and had yet to start bearing.

Box 6.1 gives a few examples of what a selection of farmers said about the rise and fall of their cocoa production due to CPB and the extension training programs. Similar comments were expressed by many of the farmers interviewed in this study.

Box 6.1: Farmers' perceptions of the extension received in terms of their improved cocoa production.

- *"It was through the ENBWYiA under the PPAP cocoa training program, my family were able to apply the training and currently we are able to reach a ceiling of 4-5 bags of dry bean. The most recently planted cocoa trees have not reached their bearing stages as yet." –Farmer SO44, Sandaon Cooperative, ENB (26th Feb, 2019).*

- *"Without NGIP-Agmark extension, I am sure we the farmers won't be farming cocoa today because DPI wasn't here and an effective extension service was not really here for us. I really appreciate the intervention of NGIP-Agmark extension initiative to the remote villages. Cocoa production is picking up from nothing. Now I recently sold two bags. It is an impact of the NGIP-Agmark extension programs that has resulted in a lot of improvements to our cocoa blocks.*" *–Farmer SO16, Kadaulung Cooperative, ENB (14th Feb, 2019).*

- *"As you can witness the level my cocoa block management has improved a lot because I attended all the cocoa and CPB management practices by NGIP-Agmark. We have been trained to practise weekly and fortnightly harvesting, shade control strategies for light and major shade pruning and target insecticide spray application depending on the level of CPB infestations which I am doing. So, it has had an impact on the production and good pods are being harvested. As a result, my cocoa production is reaching four dry bean bags after my family had been just selling wet bean" –Farmer SO17, Kadaulung Cooperative, ENB (14th Feb, 2019).*

- *"Seeing cocoa back into production after being destroyed by CPB had triggered farmers to actively work on their cocoa blocks. As a result, just recently Sandaon cooperative alone sold 4 tonnes (64 bags) of dry been cocoa. That would give an estimate income of 64 bags x K350.00 = K22,400.00 earned by the Sandaon cooperative members. So, that shows the result of such cocoa training and support given by the private sector. It's a blessing to us after our main income was destroyed" -Farmer SO44, Sandaon cooperative, ENB (26th Feb, 2019).*

The effectiveness of the training is shown in Figure 6.4. With the exception of pod burials, the important block maintenance tasks such as shade control, block sanitation or weed control and target spraying are carried out regularly by the majority of farmers. Given the minimal labour input typical of farmers, the training has helped farmers move from a 'foraging' approach to a 'farming' strategy to deal with CPB.

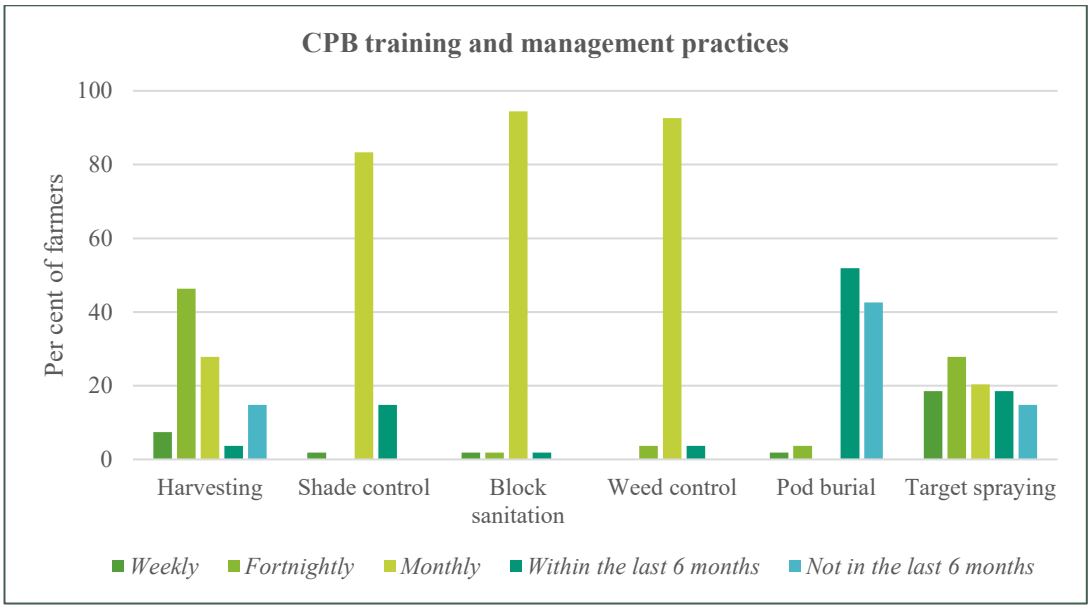


Figure 6.4: CPB management practices applied by smallholders to revive their cocoa blocks (n=54).

### 6.3 Improved cocoa block maintenance

The shift to a semi-commercial farming approach by smallholders with regular block management was a major objective of the NGIP-Agmark model. Through the extension and support program, greater labour, time and resource investment by farmers was encouraged to improve their cocoa blocks as a means to minimise the CPB population and increase cocoa yields. Achieving such an aim has been difficult as smallholders were still practising traditional cocoa farming that comprised of minimal labour input, poor cocoa block management, and irregular harvesting, when they first went into partnership with NGIP-Agmark (Curry *et al*., 2007). The adoption by farmers of more intensive cocoa block management practices under the NGIP-Agmark extension approach was a challenge for the company as farmers were constrained by labour shortages, low levels of financial savings, lack of proper cocoa

farming tools, and many had lost interest in cocoa farming (CCIL, 2014; Peter *et al*., 2017). However, the NGIP-Agmark extension model helped motivate smallholders to change their farm management practices, especially through its regular CPB management training and other farming support initiatives such as the tools and seedling credit support scheme outlined in Chapter 5. The training and credit support helped farmers to carry out CPB management practices and better manage and maintain their cocoa blocks.

Unlike the traditional extension approach, NGIP-Agmark extension was based on regular extension training and visits to smallholders within FDGs or cooperatives. Such an approach created bonds between extension officers and farmers and their common relationship help farmers better understand the need for CPB management practices to increase their cocoa production and improve livelihoods. When study farmers (n=54) were asked to rank the effectiveness of the training 100% said it was very effective (also see Figure 6.4).

When farmers were asked about what mode of learning was most effective, all (n=54) indicated that training by demonstration was the best way to understand how to control CPB and improve production (Figure 6.5). Individual farmers and their families practising regular harvesting and applying better block management could see how the new techniques stimulated production. Most famers are still illiterate, especially in the remote areas of the Gazelle Peninsula, and therefore such training must be simple and demonstrated repeatedly to farmers so they can easily adapt and apply on their respective blocks.

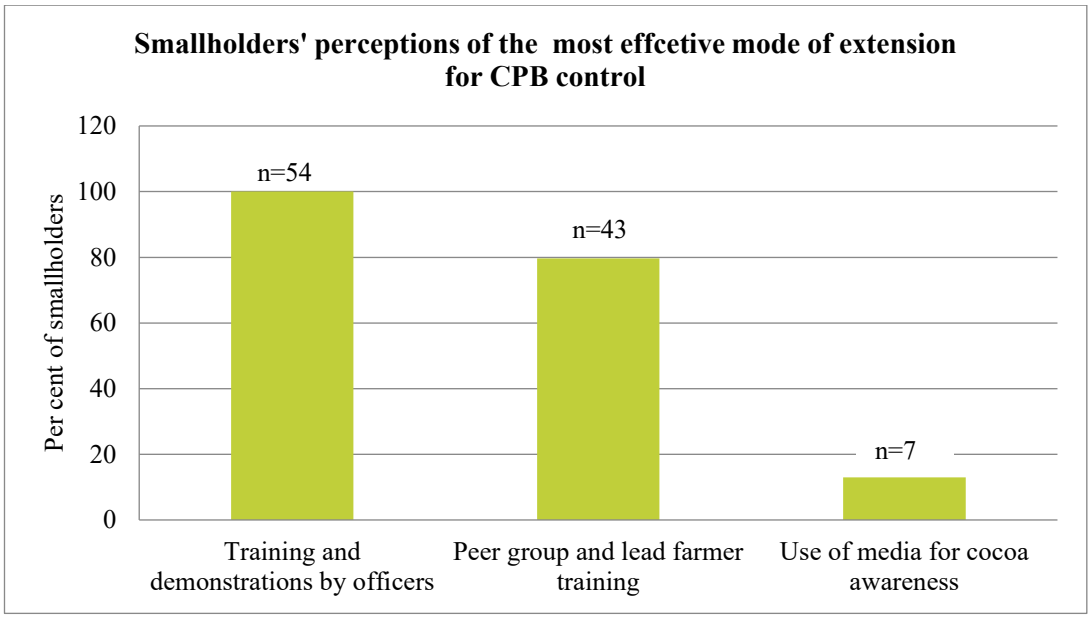


Figure 6.5: Farmers' perceptions of cocoa training modes and adaptation for effective application on the blocks (n=54).

NGIP-Agmark also introduced the concept of creating and identifying smallholder "model blocks" (Plate 6.1) and "lead farmers" to conduct training. This helped simplify the learning of new management techniques for farmers to understand better. Visiting a 'model block' for training made it easier for farmers to observe and understand the new techniques. This allowed the training to be later explained to other village farmers in their local languages by peer farmers and lead farmers. As Figure 6.5 illustrates, 80% of the farmers (n=54) learnt a lot about CPB and cocoa block management practices via their own peer farmers and lead farmers by visiting their blocks in the villages. Only 13% of the interviewed farmers (n=54) indicated that apart from NGIP-Agmark training programs, they also gained the latest cocoa technical knowledge from other media platforms that had helped them to transform their cocoa blocks.

Plate 6.1: An example of a well-managed '*model block'* in the Sandaon Village, ENB.

### 6.4 New household labour strategies

The new management practices adopted by smallholders led many to introduce new labour strategies to adjust to the higher workload to free their blocks of CPB. As mentioned earlier in the thesis, labour shortages have long been identified as a constraint on smallholder production. In the past, smallholders rarely took steps to overcome these labour constraints. With greater motivation to manage their cocoa and control CPB, most farmers introduced labour strategies as part of their new cocoa farming approach (Figure 6.6). Many of these new labour strategies focussed on improving the involvement of all family members in cocoa production and providing incentives for them to co-operate. The family team training (see Chapter 5) led some men and women farmers to adopt a more co-operative household labour approach.

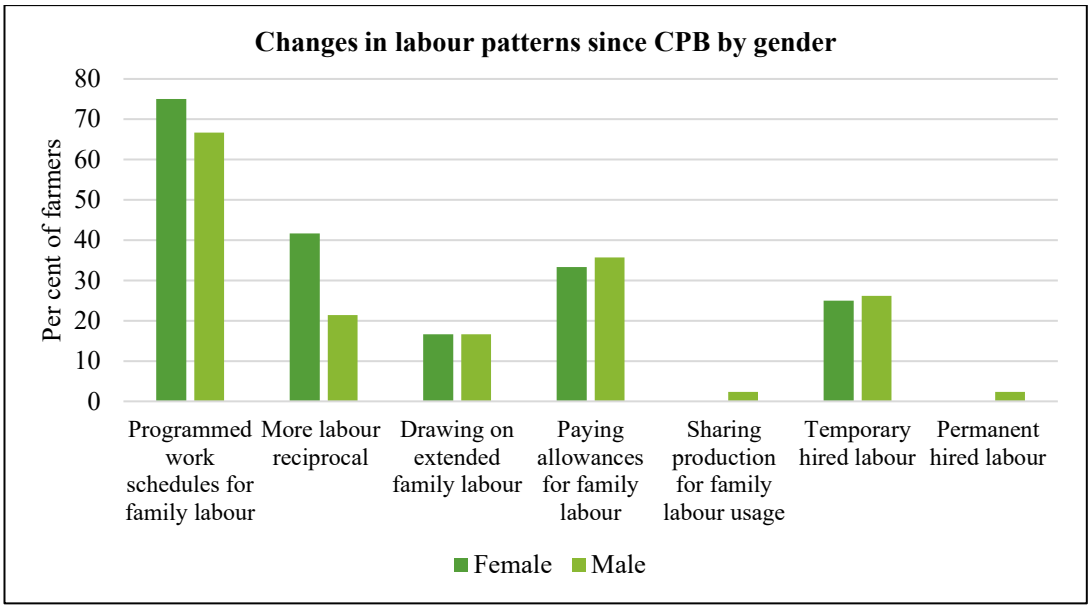


Figure 6.6: Patterns of labour allocation to address CPB by households (n1 females=13; n2 males=41).

*6.4.1 Structured family work schedules*

The most common labour strategy, at the household level, was the introduction of a programmed work schedule for family labour to undertake various tasks in the block (Figure 6.6). Seventy-five per cent and 67% of female and male farmers respectively, claimed that CPB training had motivated them to shift their family labour from an unstructured relaxed mode to a more structured and programmed schedule for cocoa activities to be allocated to individual family members. It clearly shows the gender and household inclusion criteria by the NGIP-Agmark model under its extension approach with the FDGs and cooperatives has helped influence a change in cocoa production work by farming households

To motivate and maintain the interests of family members to work the cocoa block, some families paid allowances to family members (Figure 6.6). An average of 35% of male and female farmers had ventured into providing allowances for family members. This was not a common practice in pre-CPB days and led many wives to only spend a small amount of time harvesting wet bean for immediate sale (Curry *et al*., 2019). Most women did not perform many other cocoa maintenance tasks at this time and children's contribution was also irregular. The greater sharing of the household cocoa income encouraged more co-operative work patterns among cocoa smallholder households and this has benefitted women. This has also helped cocoa production.

When family labour shortages emerged, some families engaged hired labour. Again, this was not commonly practised prior to CPB and training (Curry *et al*., 2007). Approximately 25% of women and 26% of men occasionally engaged temporary hired labour (Figure 6.6). Other emerging labour patterns included increasing the use of reciprocal labour, drawing from extended family labour, sharing of production income and employing permanent labour.

### *6.4.2 Reciprocal labour*

Villagers interviewed claimed they used more reciprocal labour support to address the labour demands of CPB management. It is considered by most farmers, a social obligation to help each other in the community by regrouping and participating in reciprocal labour tasks to get on top of CPB. For example, within their FDGs and cooperatives small cluster groups of families have been formed to enhance reciprocal labour support targeting heavier block activities such as slashing, harvesting and shade pruning. This was not very common in the past and was mostly limited to subsistence food gardening activities not cocoa.

Plate 6.2: A female farmer pruning cocoa at Sandaon Village

Forty-two per cent of women engaged in reciprocal labour support whilst around 21% of male farmers practised reciprocal labour approach (Figure 6.6). Box 6.2 provides brief examples of the different labour strategies farmers have used since attending training. The range of labour strategies introduced by smallholders has encouraged

more cooperative labour strategies within and among families, and more sharing of the income within a family and within the community to ensure the benefits of cocoa production are spread widely. Also, the different strategies adopted by families show how farmers are now more organised and willing to deal with household labour shortages.

Box 6.2: Farmers' responses to CPB management through labour strategies.

- *"Occasionally I hire labour especially for slashing in the cocoa block so my family can concentrate on other cocoa tasks. My approach is to hire labour at K10 per allocated activity. Once I have arranged and confirmed a labourer, I mark out the area to be slashed so it's up to the hired labourer to complete the tasks at his own timing but as long as the task is completed which can take a few days" –Farmer SO9, Kadaulung Cooperative, ENB (13th Feb, 2019).*

- *"Currently I approach labour differently to the pre-CPB days. A management strategy which I developed from the CPB training was to harvest regularly to disturb the CPB breeding cycle. My approach to labour for harvesting is: I place a day and a rate that for every 10 kg wet bean harvested and brought to the processing area from the block, is worth K5.00. So, my family are happy about it. Likewise, upon the sales of dry bean bags I often give allowances to my family members that range from K20.00 to K50.00 per family member. I am not into hiring labour but instead use my family" –Farmer SO45, Sandaon cooperative. ENB (20th Feb, 2019).*

- *"Too enable all the cocoa, CPB and other household activities within my family, I organise my family labour on various tasks that need attention. Within the cooperative and community we've formed smaller cluster groups purposely to address labour shortages amongst other families especially on a reciprocal labour basis. Both labour strategies work well in the community and I have experienced that it saves time for other household activities. The reciprocal labour support is normally rewarded with food by the host family mainly after the day's work; it is not like allowances for hired labour" – Lead Farmer SO35, Suina Cooperative, Lasul, ENB (19th Feb, 2019).*

- *"I have realised that CPB has shifted our approach to managing our cocoa blocks. However, labour is one of the constraints within most families in our community. For my family, I normally hire temporary labour especially for slashing but at the same time we have a small group that my young boy is part of. The group provide reciprocal labour support to group members and that doesn't restrict them to cocoa tasks only, but other household activities too. So, when my son's turn comes, they sometimes help out with slashing in our cocoa block, and I provide them with food at the end. Other cocoa management practices such as punning, harvesting and CPB insecticide spraying are done by me and my son and we apply according to NGIP-Agmark's training to better manage our cocoa trees" –Farmer SO13, Kadaulung cooperative, ENB (14th Feb, 2019).*

## 6.5 Improved planting material

Farmers also benefited economically through gaining access to new planting material through the seedling support program. One of NGIP-Agmark's first extension priorities in 2005 was on assistance to individual FDGs and cooperatives to access cocoa seedlings on credit and to establish their own nurseries (see Chapter 5). Smallholders were trained in precise cocoa seedling selection, and cocoa variety identification. All smallholders interviewed in the study said in the past they mostly planted their own open pollinated seedlings that often resulted in very unproductive cocoa trees. It was not until training did they realise the problems with this. Smallholders were unaware of the significance of different cocoa clones, hybrids and the varieties available to improve production. As discussed in Chapter 5, many farmers benefitted from NGIP-Agmark's seedling support program and the establishment of nurseries. These initiatives have helped farmers re-establish their cocoa holdings following the devastation of CPB and gradually increase their incomes and livelihoods. As one farmer said:

> *There is already a great impact on reducing CPB from the cocoa training and support for tools and seedlings to us in the community. The skills gained, I have transferred to my family members and we are collectively managing and harvesting from our existing hybrid cocoa block while at the same time managing the recently planted 600 seedlings supplied by ENBWYiA. Today, I can say that I am a happy farmer. Just last month I sold 8 bags (dry bean) mostly from our hybrid block while my new plantings have yet to reach their full bearing stage. I am now slowly able to meet my family dream plans and support my family livelihoods. I hope this extension approach continues and extends to other villages as well so we all can restore cocoa and our families' livelihoods. –Farmer SO49, Sandaon cooperative, ENB (27th Feb, 2019).*

### *6.5.1 Greater household and community economic security*

One of the main economic benefits of the partnership with NGIP-Agmark, from the perspective of farmers, is that it has restored cocoa as the main household income source. When FDGs and cooperative members were asked to identify the main economic benefits they gained from the partnership with NGIP-Agmark, 83% said that it had helped bring cocoa back as the main income source for families in the villages and it relieved them of the income stress they experienced as a result of CPB (Figure 6.7).

As one farmer expressed it:

> *School fees and medical expenses were my greatest challenge due to CPB. For school fees I had to ask my son in-law to assist me with school fees for two years for my son at the technical college. The worst time for my family was when my son had an accident and broke his arm, and was admitted to hospital for a month. There were costs for medical fees, transport and visits, but I thank God for my family's generosity that they came to help out during those challenging times. The only source of our family income was cocoa and this was badly affected by CPB for the last seven years. CPB was just like an atomic bomb that took us (farmers) by surprise just like the bomb that blasted the Hiroshima and Nagasaki during the World War II. My livelihood was a disaster. Currently, with the cocoa and livelihood extension training and support with tools, seedlings and processing facilities by ENBWYiA, I am able to start selling dry bean cocoa again, which I had recently sold six bags. –Famer SO49, Sandaon cooperative, ENB (27th Feb, 2019).*

Many farmers mentioned that the NGIP-Agmark extension model triggered an interest amongst farmers and their families to go back to cocoa farming based on training and support programs. The partnership not only helped increase cash flow in the village but gave farmers more secure market access, which previously was not available to them as indicated on Figure.6.7.

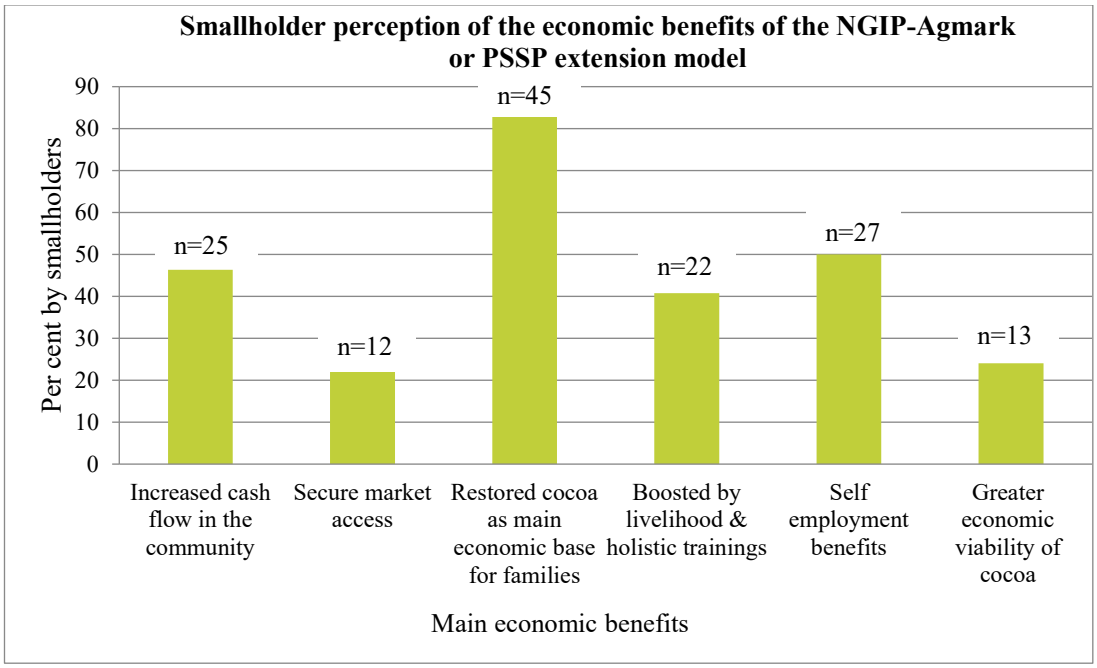


Figure 6.7: The gained economic benefits to smallholders by the NGIP-Agmark extension model (n=54).

The extension support and secure market access has given confidence to many farmers especially in remote areas to continue farming cocoa in their communities. As a female farmer from a remote community stated:

> *Being in a remote village, we are so grateful to the leadership capacity of our group and the extension approach by the private sector. It has brought us (farmers) together, and cocoa is important to our livelihood. It* [the partnership] *has increased cooperation and labour assistance amongst families' especially for heavier cocoa block management activities. Such extension interventions have restored our desire to work in our cocoa blocks, as cocoa has been our main income source in the village. Now, we are looking forward to seeing the positive economic results when we start selling our produce, which the private sector will continue to assist us with. Importantly, the private sector extension approach has also linked us to livelihood training programs such, financial literacy, baking, soap making, etc., that is so helpful to us mothers. – Farmer SO29, Suina cooperative, ENB (18th Feb, 2019).*

Another farmer commented:

> *From my observation and the little experience I have is that our greatest economic benefit from this private sector extension program has been the incorporation of the sustainable livelihood training programs and extension support especially with tools and seedlings. I felt that it has improved our cocoa farming approach and helped our families to maintain a more sustainable livelihood system in our remote village. I am glad that I have received such training, which I am currently applying to our cocoa trees although they have yet to fully produce. – Farmer SO20, Kadaulung cooperative, ENB (14th Feb, 2019).*

For remote farmers, cocoa is more economically viable compared with other agricultural crops such as vegetables, which are perishable and costly to transport to market. Families in remote villages claim they receive better returns for cocoa than other economic activities.

The socioeconomic stresses on households' income caused by CPB have left smallholders, especially in remote areas, in despair. Despite resorting to alternative income opportunities, they did not match the cocoa income previously earned by smallholders prior to CPB. This left many smallholders hoping they could eventually revive their cocoa holdings. The NGIP-Agmark cocoa extension approach with both training and seedling and tools support provided the opportunity for them to transform their cocoa blocks.

## 6.6 Social benefits

Interviews with members of FDGs and co-operatives revealed the partnership with NGIP-Agmark had brought many social benefits to the villages. Among the main social benefits identified by farmers were:

1. Greater leadership in the village, through the establishment of FDG and co-operatives
2. More social cohesion and co-operation among villagers
3. More women involved in cocoa production and FDG/Co-operatives
4. More youth involved in cocoa production

### *6.6.1 Leadership through FDGs and Co-operatives*

A major strength of the NGIP-Agmark model and the benefits to farmers was the establishment of FDGs and cooperatives in the villages and inclusion of women and youth in extension training programs. The FDGs and cooperatives have proven to be a very popular and constructive way for farmers to work together in the village and receive extension training. During the early stages of establishing the extension model in the villages, NGIP-Agmark encouraged genuinely interested farmers to volunteer to form farmer groups to enable them to access cocoa trainings and other related programs. They encouraged households to cooperate with each other and commit to the cocoa extension and support partnership approach headed by company. The approach then promoted was based on trust, honesty and loyalty and it was expected that each FDGs and cooperative would embrace these principles. The groups have been successful in motivating other village farmers to commit to working regularly on their blocks and put into practice the training and partnership principles that were encouraged through the FDGs and cooperatives. One significant way the FDGs and cooperatives have benefited growers has been through providing leadership in the tough and uncertain CPB environment.

Farmers were asked to express their opinion on the level and quality of leadership in their FDG or co-operative. As indicated on Figure 6.8, most farmers had positive comments on the type of leadership in their group. They saw their leaders as fair and honest and showing effective leadership qualities.


Figure 6.8: Farmers' perception of leadership through the NGIP-Agmark extension model (n=54).

There had been no negative comments except for the 13% of farmers who mentioned that some leaders of cooperatives were not very effective. The graph also shows that people recognised that the leaders of the FDGs helped encourage and motivate co-operation amongst members to commit to cocoa. As some farmers said:

> *For so long there was an attitude problem in the community which resulted in less respect shown amongst the villagers. At times there was little cooperation and commitment towards community and household activities. But the leadership with our FDG and extension service provider has turned that around. There is now more co-operation and commitment by villagers to extension training programs and individual cocoa tasks – Farmer SO34, Suina/Naviu cooperative, Lasul, ENB (19th Feb, 2019).*

> *Such an extension training approach has enhanced FDGs members to take ownership of the blocks to improve cocoa production. Change of attitude towards farming with the inclusion of other livelihood training programs, evidence of respect. Generally, there is improvement to families' livelihoods in the remote villages –Lead Farmer SO35, Suina/Naviu cooperative, ENB (19th Feb, 2019).*

> *Fair and honest leadership is observed among the group leaders. It is a great motivation to us (*farmers*) and we are committed to our cocoa*

*activities to benefit our families –Farmer SO9, Kadaulung cooperative, ENB (13th Feb, 2019).*

*We* [Farmers] *are happy with our FDG leaders for their continuous engagement with the NGIP-Agmark extension officers. They occasionally speak for us and all along they have been fighting for us to benefit through cocoa and livelihood training and the support all along the value chain –Farmer SO18, Kadaulung cooperative, ENB (13th Feb, 2019).*

*My perception of such extension approach by the private sector is that it is much better and more effective compared with the traditional extension. There is regular cocoa training and farm visits with support of tools and seedlings. As an elder, I initiated the formation of the cooperative and invited members in the community to be members, which most responded to. But being at this age restricts my active role in leadership but I always stand back and support the young people to take a lead to benefit their family livelihoods. I had ensured that this cooperative was registered to bring extension services to the community. However, there is still some minor attitude problems amongst farmers – Farmer SO52, Sandaon cooperative, ENB (27th Feb, 2019).*

Whilst some farmers viewed their FDG leaders as ineffective (Figure 6.8), many believed the quality of leadership by the FDG leaders helped reduce some of the social problems in the village. One farmer claimed:

*Through this NGIP-Agmark extension approach, it has created a range of leadership within the FDGs that has contributed to minimising law and order problems. Changing attitudes and generally most families including youths are now busy with cocoa farming activities. – Farmer SO49, Sandaon cooperative, ENB (27th Feb, 2019).*

An extension officer also observed that:

*I see extension training and its socioeconomic benefits to the remote farmers of Lasul area. Today, as I speak majority of the former drug users and cultivators are now leaders of the cooperatives and active cocoa farmers. They can really advocate for cocoa and other agricultural activities, which they have been missing over the years. This extension approach has turned their social problems into social and economic benefits for them and their families. From whatever little knowledge we have given farmers, it has meant a lot and they have*

*embraced it and applied it. Now they are beginning to see the results. Socially, the cocoa extension approach has pulled farmers together to discuss and share ideas. –Extension assistant XO5, ENBWYiA, ENB (13th Mar, 2019).*

### *6.6.2 Greater social interactions and co-operation*

The FDG's also helped to encourage social interactions and co-operation among families through giving farmers a forum where they can openly discuss farming issues such as CPB management training and their primary needs (Figure 6.10).

Plate 6.3: A lead farmer with his cooperative members in an open discussion about cocoa farming and production.

This was important in the uncertain economic situation of CPB as expressed by some farmers in Box 6.3. Almost all farmers believed that the establishment of regular training and visit programs created an open communication channel amongst them and the NGIP-Agmark extension officers enabled bottom-up discussions and decision-making processes to take place when meetings were held.

This approach gave emphasis to listening to farmers, and they could openly express their training needs. Eighty-nine per cent of the farmers (n=54) claimed that this bottom-up approach instead of top-down information dissemination had a positive impact on farmer groups' cooperation, and their discussions and decision-making regarding cocoa extension. Almost 30% of farmers identified the open discussions of FDG meetings among the list of social benefits emerging from the private sector

partnership and NGIP-Agmark model (Figure 6.9). Bottom-up approaches were rarely used in extension strategies in the traditional extension approach received by farmers in the past.

Box 6.3: Farmers and their families' social interactions instigated by the cocoa extension partnerships with NGIP-Agmark and other PSSPs.

*"I think it was the best approach for extension training programs to be delivered through our established cooperative societies as it has forced us as a group to openly discuss concerns, share ideas and participate together in cocoa. I have realised that we were very good working together in other non-economic or socio-cultural activities, but not in cocoa or other agricultural activities. The establishment of FDGs or cooperatives and even sub-groups within our cooperative have motivated farmers and families to help and support each other in peer training and in cocoa activities in a reciprocal labour approach or 'sundei wok". –Farmer SO15, Kadaulung cooperative, ENB.*

*"Despite the minor challenges we've been facing amongst our group, we are thankful that this was formed to give us access to such cocoa training and support services. Currently, our group is not that effective but farmers within our little area have been open to each other, sharing ideas and practising reciprocal labour practices especially by the youths. Generally, farmers are busy working on their cocoa blocks". –Farmer SO44, Sandaon cooperative, ENB (26th Feb, 2019).*

*Being the leader within our cooperative, I see that fixing the main source of income by the private sector extension initiative, has also fixed other social problems and brought the farmers and families together to work on cocoa. Being a new approach to our remote village, it has triggered a huge interest amongst famers that has led them to openly discuss cocoa and good cooperation in extension programs in the cooperative. Also, I have noticed the extension program is slowly boosting economic benefits and that will trigger a lot of socioeconomic services within the community". –Lead Farmer SO35, Suina/Naviu cooperative, ENB (19th Feb, 2019).*

*6.6.3 Women's benefits incurred through the PSSP extension services*

Another major benefit of the NGIP-Agmark model for the farming communities has been the greater emphasis on including women in FDGs and training programs. Previously traditional extension rarely involved women in cocoa extension training. Cocoa was treated like a 'man's crop' with men being the target of extension training and services. In contrast, NGIP-Agmark's cocoa extension and other livelihood training programs such as the family team training, have targeted and encouraged household participation in cocoa training, and not just male household heads as it has been in the past. Previously, traditional extension in PNG focussed on men's involvement in cash crops farming activities whilst spouses were left to concentrate on gardening and other household activities (Curry *et al*., 2019). This had been a common gender barrier in cash crop production in PNG (Hamago, 2019). However, the NGIP-Agmark extension training criteria towards household training, helped erode gender barriers in their cocoa farming training programs. In interviews, many women mentioned they were included in the cocoa training and were provided with the cocoa technical knowledge and extension support for tools to improve their capacity and labour input to manage CPB on their family cocoa blocks (Plate 6.3).

Plate 6.4: Women and youths attending a cocoa training session at Burit Village.

The photo (Plate 6.4) was taken during fieldwork on cocoa training observations by private sectors, which the lead farmers under the ENBWYiA were doing their schedule

cocoa training with the Burit cooperative members within the remote Inland Baining LLG.

Apart from the cocoa training, many women attended the livelihood training programs. They valued greatly the training because it introduced them to new ideas and skills that previously were not available to them and helped them and their families through the difficulties caused by CPB. Some of the benefits women gained from the partnership are expressed in the following extracts from interviews I conducted among women.

1. *It is through the extension partnership with the Sandaon cooperative that I am a member, that I have achieved a lot and currently experiencing many benefits for my family. My husband is working and I am the only one managing the block, my husband only assist at weekends. With the extension training and support, it has helped me to better manage the block. We abandoned the block in 2006, and in 2014 when the cooperative was registered, we began to attend CPB and cocoa training. As a result, I recently sold four dry bean bags. Also, attending the other livelihood, leadership, financial literacy, bookkeeping, and household management training programs has given me the strength to continue with cocoa. Generally, I see that more women in our cooperative are participating in training and management of their family blocks, which hardly was the case in the past under the traditional extension system. – Farmer SO42, Sandaon cooperative, ENB (25th Feb, 2019).*

2. *Life in the remote village has been forever challenging, and we are so grateful to our cooperative leadership, and the extension approaches by the private sector that has not only trained us on cocoa but has incorporated tools and seedling support plus livelihood training programs. Livelihood and genders training programs have benefitted most of us women. The livelihood training delivered to us includes baking, financial literacy training, soap making, gender inclusion and record keeping. Likewise, the extension target to the household rather than men has encouraged women to get involved in training programs and has enabled us (women) to assist our male partners to manage our cocoa blocks. – Farmer SO29, Suina Cooperative, ENB (18th Feb, 2019).*

3. *CPB caused a huge burden on the women especially as families were heavily relying on garden food for their livelihoods. Rice planting*

> *emerged in the community as DPI was supplying the seeds. It was planted by the farmers, milled and we were selling it in the community. However, rice farming wasn't sustainable because of various issues amongst the villagers. The current extension approach by NGIP-Agmark is an eye opener to a sustainable cocoa farming system. It has covered areas such as, extension training and support all along the value chain, livelihood training, gender inclusion training, financial literacy training, health and law and order awareness. I have now seen greater participation of women in cocoa training meeting discussions and cocoa farming practices. My perceptions on why women are active today in cocoa are because they had gained the technical knowledge, not like before and secondly they had felt the challenges caused by CPB to their families, which had been the whole reason to mean business with cocoa to relieve them from such household economic pressure. – Farmer SO13, Kadaulung cooperative, ENB (14th Feb, 2019).*

The establishment of FDGs and cooperatives with the inclusion of women into cocoa extension training programs has been considered by the villagers as very important in bringing the community together in the difficult environment of CPB. In interviews several farmers talked about how prior to the partnership, households in the village were acting individually to solve their economic hardships caused by CPB and families, and women especially were struggling. The partnership has helped bring families together to co-operate and unite to rebuild their households and their community through reviving their cocoa. Without the inclusion of women, this would have been very difficult to achieve. When men and women were asked to identify the main social benefits they gained from the partnership, many responses related to greater social cohesion and co-operation among families in the village. The positive social benefits and increased sense of community resulting from the partnership are shown in Figure 6.9.

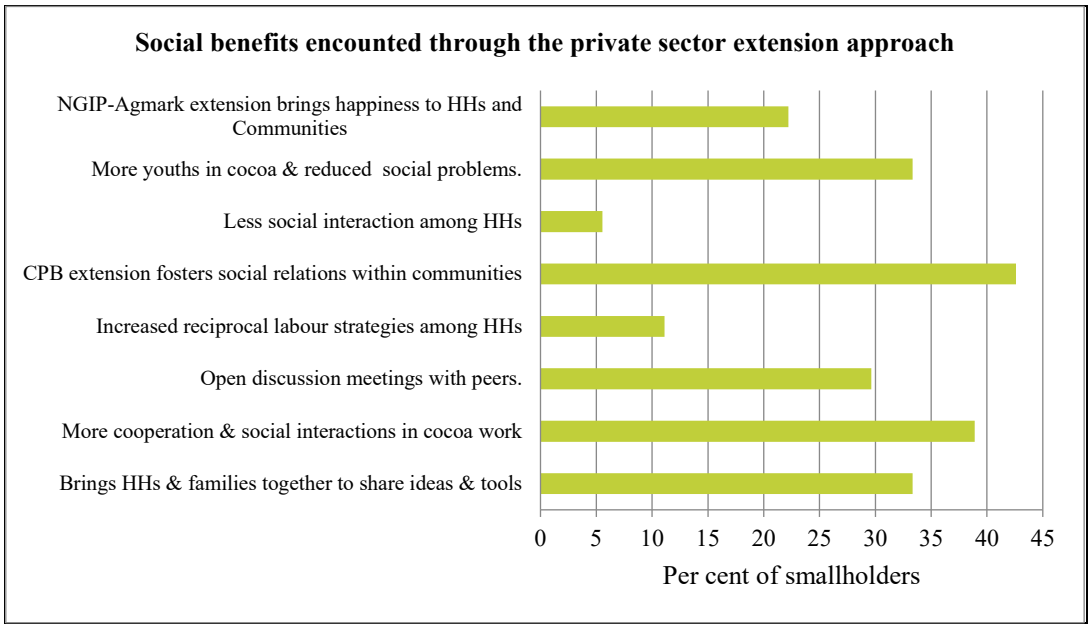


Figure 6.9: Social benefits experienced by smallholders from the extension partnership (n=54).

Another social benefit identified by men and women has been the inclusion of youth in the training and farmer meetings (see also Figure 6.10). Many youth themselves have shown an interest, although in some villages only a small proportion have shown and interest, or are engaged in other activities that prevent them from joining FDGs or co-operatives. However, overall, several villagers in interviews mentioned the benefits of the partnership in involving youth and the gains experienced in the village. As a few farmers observed:

> *The current extension training criteria of household inclusion and not just males has benefited the community and families. With more youths and farmers fully engaged in the cocoa training programs and management of their cocoa blocks, it was noticed that there were less law and order issues in the communities. – Farmer SO34, Naviu/Suina cooperative, ENB (19th Feb, 2019).*

> *This extension approach has meant so must to our youths in the villages; their participation and interest is something beyond our expectations, we have not seen such interest in them in the past. Today, not a single youth (boys or girls) can be seen roaming aimlessly up and down the road, they are all busy on their family cocoa blocks or their individual block compared to the past before ENBWYiA came with the extension training approach here. It is encouraging to us (parents) seeing our youths approach cocoa that way. It has also triggered us (mothers/women) to effectively assist our spouses and family members with cocoa activities. – Farmer SO44, Sandaon cooperative, ENB (26th Feb, 2019).*

Other social benefits farmers identified with the NGIP-Agmark model have been greater unity amongst families in training and more feelings of 'happiness' in the community as people shared ideas and knowledge about new cocoa management and livelihoods amongst themselves (Figure 6.10). Some also claimed that the extension approach had reduced petty law and order problems in their villages as more youth were involved in cocoa training and farming activities (Figure 6.9).

### 6.7 Cultural benefits

The NGIP-Agmark with other PSSPs that are currently into cocoa extension partnership with the smallholders is addressing the core income source of many smallholders that are heavily dependent on cocoa to sustain their livelihoods. Following the infestation of CPB, household economic priorities shifted because of the gradual decline of smallholders' cocoa income. Despite smallholders seeking other alternative income sources, household incomes had remained low. As a result, cultural activities that relied on cash income were affected. Villagers said that common cultural activities that had been affected on the Gazelle Peninsula include death ceremonies, traditional bride price and wedding ceremonies, major church events, traditional clan feasts, initiation ceremonies and household events such as blessing of houses and birthday celebrations. Many of these cultural activities were suspended or postponed as the major source of income, cocoa which usually funded cultural activities had been devastated by CPB. However, the NGIP-Agmark and other PSSPs cocoa extension training and support had helped revive many of the affected cultural activities. Just over 30% of the farmers interviewed identified that cultural, church and community activities were active again following the partnership with NGIP/PSSP. Also, the majority of farmers 50% (n=54) had indicated that the outcome of the extension approach was an increase in cocoa production that led to better quality cocoa. The higher income enabled farming families to participate in cultural activities again. As a few farmers claimed:

> *The general livelihoods of the household revolve around agriculture, which cocoa supports over 90% of our livelihoods. This includes our cultural activities such as tribal feast, death ceremonies, bride prices and major church activities. Most of these cultural activities were suspended and post-ponded due to cocoa being affected by CPB. However, as cocoa production increases people begin planning and having cultural activities especially church obligations, death and*

*bride price ceremonies in the villages. – Farmers SO16 and SO14, Kadaulung cooperative, ENB (14th Feb, 2019).*

*The cocoa extension training and support programs by the NGIP-Agmark and other PSSP in the community had benefited my family. It enabled my family to effectively participate in our clan's cultural activities again, unlike the time when CPB had devastated our cocoa blocks. Similar experience we had towards church major offerings, which my family hardly contributed to, but now we are able with the little we have mostly from cocoa. – Farmer SO51 Sandaon cooperative, ENB (27th Feb, 2019).*

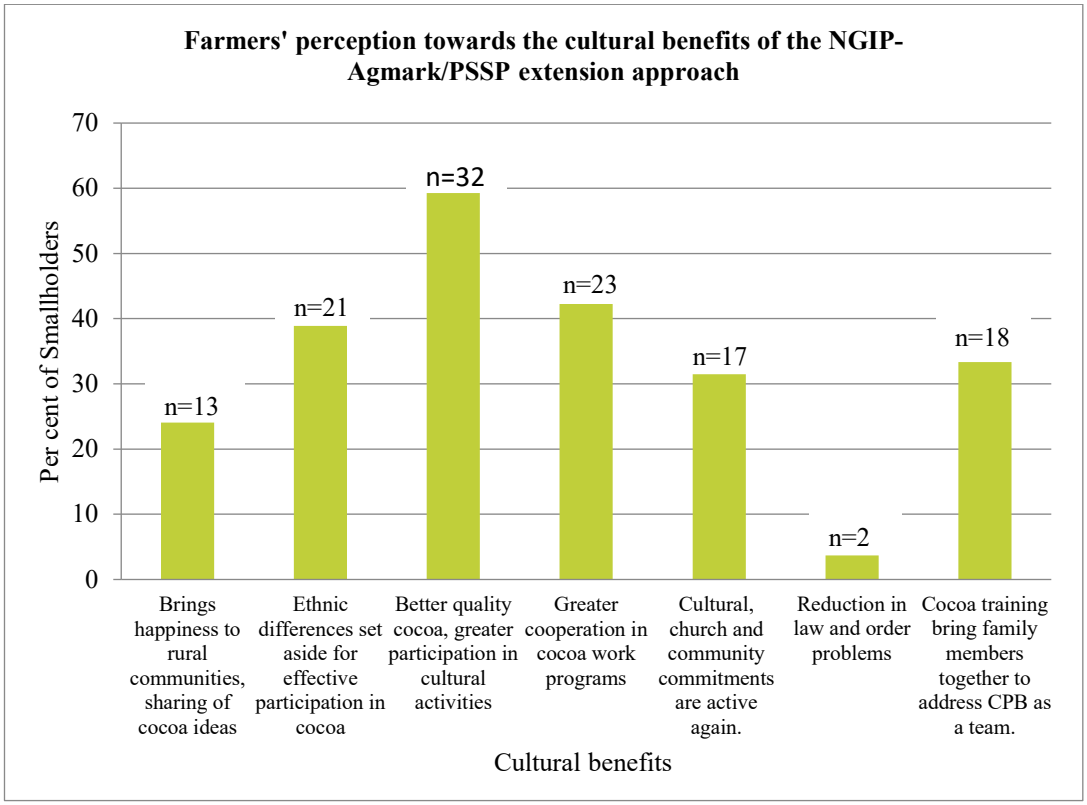


Figure 6.10: Farmers' response to the cultural benefits of the private sector extension approach (n=54).

Furthermore, the extension approach was considered by 43% of farmers as having revived the spirit of cooperation among farmers. Thirty-nine per cent interviewed believed ethnicity barriers and differences were set aside in some villages and this improved the participation of households in cocoa and livelihood training programs.

## 6.8 Conclusion

This chapter argued that targeting both men and women in cocoa households, with a more holistic extension approach than the traditional extension is very well suited to the smallholder cocoa farming livelihood system. As some farmers themselves recognised, the NGIP-Agmark cocoa extension approach towards CPB management would have remained unsustainable if it had not been approached in an holistic fashion. The minimal extension approach by the public sector was ineffective in the CPB environment that placed enormous economic and social pressures on farmers.

The company's broad extension approach has proven to have brought many benefits to farmers. The NGIP-Agmark's pre-CPB extension programs were incorporated into the World Bank's PPAP cocoa project strategies that supported private sector-smallholder extension and support partnerships with established cooperatives. Such an extension approach is seen to be in a sustainable direction as it provides an environment for farmers to fully understand cocoa farming all along the value chain and this will help sustain their cocoa production. Strengthening the leadership and management capacities amongst cooperatives and households is equally important for sustainable cocoa production. As farmers themselves recognise the leadership and management training programs that they received have given them the confidence to manage their small farmer organisations within their remote communities, and smallholders will be willing to help grow the cooperatives.

The next chapter discusses the reasons for the success of the NGIP-Agmark or PSSP cocoa extension model.

# CHAPTER SEVEN

# EXPLAINING THE SUCCESS OF THE PRIVATE SECTOR EXTENSION MODEL

## 7.1 Introduction

As pointed out in Chapter 6, the NGIP-Agmark extension model did not focus solely on cocoa training; it also provided extension support all along the cocoa value chain that incorporated holistic livelihood training for smallholders in cooperatives or FDGs. The focus group and lead partner criteria encouraged greater acceptance of responsibilities among leaders in the delivery and adoption of cocoa and livelihood training by training service providers.

This chapter has five sections that explain the model's success and its positive impacts on smallholder production and livelihoods. First, I examine the leadership factors along the value chain from the private sector processor and exporters to the leaders of the linked FDGs and cooperatives as well as household leadership of family units. Leadership effectiveness is reflected by improved smallholder capacity to respond to CPB and to implement livelihood training programs. Secondly, it examines the various extension training approaches at neglected points along the cocoa value chain. Thirdly, I investigate how the training programs have positively enhanced smallholders' capacity to effectively improve and sustain cocoa production. Fourth, I examine how broader household livelihoods have been enhanced by women and youth's inclusion into cocoa training and by the elevation of the women's cooperative societies such as the ENBWYiA under the PPAP cocoa project initiatives. Lastly, I briefly compare the accomplishments of the private-sector extension approach with the traditional extension approach operated mainly by the public-sector.

## 7.2 Leadership through extension partnerships

> *What is leadership? It seems to be one of those qualities that you know when you see it, but is difficult to describe. There are almost as many definitions as there are commentators. Many associate leadership with one person leading. Four things stand out in this respect. First, to lead involves influencing others. Second, where there are leaders there are followers.*

> *Third, leaders seem to come to the fore when there is a crisis or special problem. In other words, they often become visible when an innovative response is needed. Fourth, leaders are people who have a clear idea of what they want to achieve and why.* (Zamani and Karami, 2006 p. 229)

The NGIP-Agmark extension model has been effective simply because of its focus on strengthening leadership at different points along its extension networks and pathways. These include the company's leadership and extension implementation strategies, farmer group leadership and management and leadership at the household level. Household units are regarded as the production base and importantly they are the receivers of the training and support programs delivered by the PSSPs. Leadership outcomes at these three levels are reflected in the improved cocoa operations of households and communities as increased volumes of cocoa production.

In addition, establishing relationships with farmer groups, smallholders and community leaders builds a solid foundation for efficient extension delivery to remote villagers. Social capital is important here for strengthening relationships built on trust and commitment by all leaders.

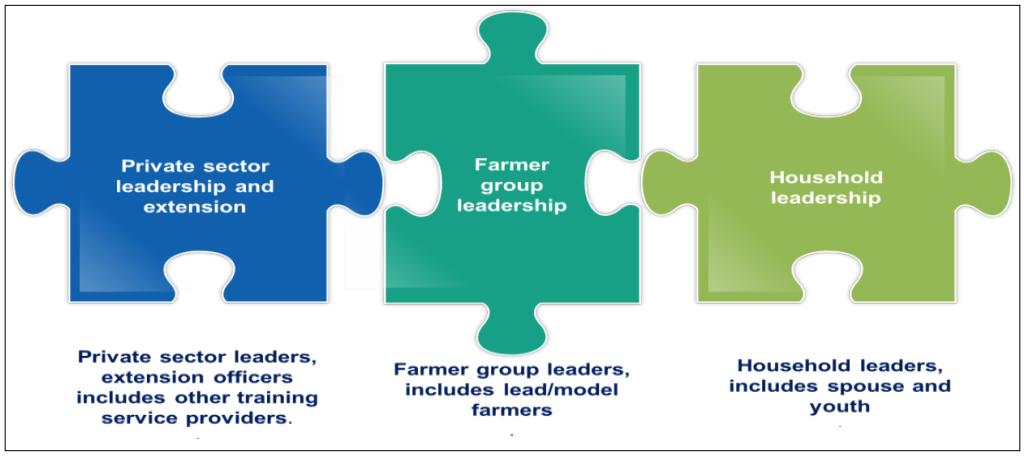


Figure 7.1: The three main leadership categories of the NGIP-Agmark or PSSP cocoa extension partnership with cocoa smallholders.

### *7.2.1 Private sector leadership and extension training coordination*

The private sector NGIP-Agmark leadership and management strategies inform extension officers and commercial agronomists' methods of implementing cocoa and livelihood training programs for cooperatives and smallholders. The focal vision of the extension partnership between the private and public institutions under the PPAP

cocoa project had been to elevate and empower leadership and emphasize commercial oriented concepts to FDGs and cooperatives to enhance sustainable production by smallholders (European Commission, 2019). Mini versions of the NGIP-Agmark model established with the FDGs and cooperatives in remote villages have exploded in number within the Gazelle Peninsula since 2004 (Chapter 5, Table 5.1).

*Commercial and ethical principles*

The business and ethical principles of the NGIP-Agmark model were developed within cooperatives and at the household level to advance extension partnerships and improve production. The fundamental core of the model and reason for its success has been through building a common working partnership based on increasing production and improving livelihoods of smallholders and the company. For example, the company's extension partnership with its FDGs and cooperatives has always been based on trust, honesty and loyalty (CCIL, 2014). Previous negative experiences with traditional extension approaches has made farmers aware of the better extension services of NGIP-Agmark and other companies to improve their cocoa and address the rising cost of living. Understanding the traditional farming systems has enabled NGIP-Agmark to commit to its extension approach in a holistic fashion to help cocoa smallholders to shift from traditional farming into semi-commercial farming of cocoa.

The NGIP-Agmark extension training and support program was a package initiated by the company to address CPB and to alleviate livelihood stress amongst smallholders. The approach has proven to be an effective extension approach for cocoa smallholders and the industry (Chapter 5). Its leadership, management and holistic extension approaches have all been adopted as core strategies of the PPAP cocoa project which has been rolled out largely by the private sector with funding by the World Bank since 2011. This large-scale roll out of the model is testimony of the success of the NGIP-Agmark model.

### *7.2.2 Cooperatives and farmer groups' leadership*

> *Agricultural development can only be sustained over the long-term if there are motivated and committed rural leaders who keep the momentum going. One of the responsibilities of agricultural extension agents is to empower the rural leaders and develop their leadership competencies. Although leadership was considered to be important in agricultural development under "modernization"*

> *paradigm and transfer of technology model, it is an essential ingredient for achieving sustainable agriculture.* (Zamani and Karami, 2006 p. 228)

Empowering farmer group leaders and farmers with the leadership and management skills motivates them to improve their leadership skills further and work towards sustaining production in remote villages. The NGIP-Agmark extension concept has enhanced the leadership and management capacities of individual FDGs and cooperatives (Chapter 5). The partnership principles espoused by NGIP-Agmark, are being taken up by the cooperatives and FDGs to benefit smallholders through more effective leadership (see Section 5b of Chapter 5 and Figure 6.8 of Chapter 6). Within the PNG context, an absence of effective leadership and governance in cocoa cooperatives (and other agricultural cooperatives) has been a major constraint on the development of the industry (Garnevska *et al.,* 2014). In contrast to public extension approaches, the partnership approach has also stimulated positive development aspirations for farmers' livelihoods in remote communities as well.

### *7.2.3 Business-to-business concept (B2B)*

> *Cooperatives having a long history and stories of their success in terms of contribution to economic and social development can be found in every country around the world. The cooperative movement in Papua New Guinea has a dynamic history and has significantly contributed to the country's development in the last few decades. Despite some cooperative failures, the government of PNG in 2000 tried to revitalize cooperatives and implemented a reformed cooperative policy for economic recovery and growth, empowerment of the people, poverty alleviation and infrastructure development* (Garnevska *et al*., 2014 p.419).

The extension training Objective 10 of the NGIP-Agmark strategy aims to enhance cooperative management and governance training for its FDGs and cooperative leaders through a business-to-business framework. The aim is to enrich and build a better foundation for the cooperative leaders with the management, leadership and governance skills to efficiently manage their small groups' organisations in the remote villages. This has been coordinated by NGIP-Agmark and out-sourced to UNRE IATP trainers to train the cooperative leaders (Gar and McNally, 2020). Attendees at such training programs have been the leaders of FDGs and cooperatives as well as village lead farmers or trainers from remote villages. For example, NGIP-Agmark Agriculture Division Manager, Graham McNally, said during the interview:

> *... our smallholder extension partnership is to maintain our new commercial arrangement whereby extension officers will be named as commercial agronomists (CA), and their extension will be costed out. We opted not to be nice to the farmers but approach extension on business terms. We will work with them on a business-to-business basis or B2B approach. Our extension approach is primarily targeting the increase of the commodity supply to the business, as well as to increase sale of input supplies and we train those farmers to use those input supplies to increase their production and supply the company but at the same time award better prices for their produce. But our coordination of leadership and management training is to equip cooperative leaders to understand the business context of the partnership and sustain their group.* Graham McNally, NGIP-Agmark (21st March 2019).

Building the extension network with the established FDGs and cooperatives has been a significant new approach for the private sector. This is bridging the gap for efficient extension delivery to smallholders, and it is also fostering a togetherness culture amongst smallholders which gives them a collective voice in the model of extension training. Moreover, it has enabled cooperative leaders to take ownership of the extension approach by making sure the extension service is fully implemented by NGIP-Agmark and other service providers. Also, cooperative leaders and lead farmers are encouraged to work with villagers to ensure cocoa and livelihood training programs are adopted effectively and applied by households. This is in accordance with the development goals of re-introducing a new form of cooperative development in PNG. The primary objective of this private sector — cooperative partnership model has been to mobilise and strengthen economically depressed farmers and their families through farmer training and efficient farming participation to improve agricultural production and their economic status. Secondly, it is seen to be a delivery mechanism for goods and services to the bulk of farmers in remote villages (Garnevska *et al*., 2014), a role highly valued by farmers. Regarding the sustainability of the model, of the Manager Agriculture Division of NGIP-Agmark stated that the company's extension partnership with the smallholders was:

> *The sustainability of our partnership with the FDGs and the smallholders is purely based on the commercial arrangements. Firstly, it is the CA's tasks to locate the genuine source (cocoa) commodity supply base and to increase the source of supply. Secondly, increase the volume of supply of farm input supplies such as tools, equipment, chemicals, fertilisers and planting materials to smallholders. Thirdly, is to train and support the farmers on how to*

> *use the farm inputs. Fourthly, is to promote and market our NGIP-Agmark cocoa as cocoa exporting agribusiness of choice for the farmers. The company creates a pathway that is fair and will surely benefit the company and the farmers at the end.* (Graham McNally, NGIP-Agmark, 21st March 2019).

### 7.3 Farmers' household leadership and gender inclusion

The sustainability of the cooperatives or FDGs was a great challenge within the traditional extension era simply because they did not have T&V extension programs (Sengere, 2016; Sitapai, 2012) and no equipping of leaders with basic management and leadership skills. The unavailability and limited leadership and management training programs under traditional extension approaches left farmer groups and households vulnerable to problems that emerged in the cocoa farming system.

A priority of the NGIP-Agmark extension model has been to nurture the production base of cocoa, which at its centre is the cocoa farming family. Cocoa is a family crop and family units become the focus for extension training programs (Chapter 4). Moreover, driving the agribusiness and leadership concepts into rundown farming scene (because of CPB) stimulated discussions, planning and shared responsibilities amongst household members, regardless of gender. Under the NGIP-Agmark model, household leadership is gender inclusive with an emphasis on a fair involvement of women and youth in family cocoa farming and management, planning and decision-making processes. This has been a core aim of the NGIP-Agmark cocoa extension approach that explains the success of the model. More involvement of women and other family members added to the sustainability of cocoa production.

Before CPB, cocoa farming and management had been dominated by men, like other cash crops in PNG, whereas women tended to be heavily involved in food gardening activities. The approach of the NGIP-Agmark extension towards households in all aspects of cocoa training was initially a culture shock to many farmers but it was soon recognised as a great opportunity for women to actively participate and benefit from cocoa farming. CPB requires more labour to revive cocoa production, and this increased need for labour means that women are well-placed to negotiate better returns on their labour in cocoa.

The livelihood and simple agribusiness training programs enhanced leadership and promoted a business culture in cocoa farming by families. It has enabled them to see and approach cocoa farming as a business rather than just a crop that would be harvested whenever people needed some cash. For example, households are now reinvesting more in their cocoa farms, developing new ways to create financial incentives for family labour to engage in cocoa production, including by opening savings accounts (Chapter 6, Figure 6.7 on economic benefits to smallholders). All the training programs received had provided households with a foundation to approach cocoa as a business, and this is one reason for the appeal of this model of farming.

The extreme socio-economic stress caused by CPB on cocoa farming households had encouraged women to step up into cocoa training and block management. NGIP-Agmark's extension approach to FDGs was tailored to be inclusive of women and that has seen an increase in women's participation. Also, the registration of the ENBWYiA as an association in 2008 with responsibility for ENB women cooperatives in cocoa farming and other business activities further encouraged women's participation in cocoa production. It was formed under a government initiative on gender inclusion and youth empowerment through agriculture. This extension intervention coincided with NGIP-Agmark's extension focus on households rather than just men for cocoa and livelihood training. These extension interventions were both incorporated into the PPAP cocoa project that has seen NGOs and private sector organisation being recipients of cocoa extension and support delivered to families in cooperatives and FDGs in the Gazelle Peninsula.

Another reason for the model's success was that it offered better returns than the alternatives. With the arrival of CPB and without any other alternative income sources, most households reverted to food gardening to sustain their livelihoods. Women were at the forefront of producing garden food to the extent that local markets were flooded at times. It was a sure and quick way to generate income but it was not able to compensate fully for the loss of cocoa income (Curry *et al*., 2011). The economic gains from selling garden produce had been reduced by several factors such as fewer people buying, and uncertainty of income and lower prices because of an oversupply of garden food at the market. These were some of the main factors that had caused women and men to try and revive their family cocoa blocks affected by CPB. With NGIP-

Agmark's extension and other PSSPs increasing their commitment and active participation in cocoa extension training and support for families through FDGs and cooperatives, there was more reason for people to make more effort to revive their cocoa blocks.

In my interviews and discussions with farmers on the impacts of the improved access to training and support for cocoa production, many mentioned the following:

- Improved family diets as a result of greater purchasing power as cocoa began to produce good yields. Women began purchasing rice and protein.
- Families were once again able to send their children to school and to tertiary institutions. The CPB infestation and lack of extension support had led to most children being withdrawn from educational institutions because of education fee burdens upon families. The inability to pay education fees was commonly raised by farmers in interviews and discussions in remote villages.
- The impact of CPB had severely affected the cash flow in the villages resulting in the closedown of small businesses. Some economic activities were no longer viable in the CPB environment. Commonly affected household businesses were trade stores, bakeries and mini-fuel stations. One of the entrepreneurial activities well established in the village economies in PNG has been the trading of basic store goods in trade stores. The sustainability of village trade-store operations requires continuous injections of cash from sales of products to enable restocking (CCIL, 2014). In the cocoa growing villages of the Gazelle Peninsula, cocoa production had been the main economic activity that generated cash-flow into the villages to support and sustain the operations of the village trade stores. However, as villagers' household income and expenditure declined, many small village businesses slowly became unviable. Village trade store owners who remained operating had to modify their business practices to cater to the greatly reduced incomes of villagers. Therefore, a widespread practice of repackaging of commonly purchased items such as salt, sugar and washing powder, into smaller quantities allowed villagers to purchase small quantities.

  In contrast, the efficient cocoa training and support service provided by NGIP-Agmark and other PSSPs turned around the cocoa production and improved

the income levels amongst families in the remote villages. As a result, village trade stores, bakeries and mini-fuel stations began operating again as cash flow in the communities began to improve.

- The increase in income amongst smallholders accelerated the trend of small business diversification amongst most families. For example, people mentioned that with their improved cocoa income, they were able to use some of the money to purchase store goods for resale in their villages. This had been a common practice in the remote villages where accessibility to towns is difficult and expensive, but was now spreading on the Gazelle Peninsula.
- Less household income meant less participation or postponement of cultural and customary activities by families, clans and community leaders. This study had captured such challenges as it has been a common trend experienced by farmers during the post-CPB years as well as during other disasters experienced in ENB. ENB is prone to natural disasters and the ENB people have built a strong resilience to livelihood stress and a capacity to adapt to difficult situations. CPB was regarded as another natural disaster. Nevertheless despite a high degree of resilience and adaptive capacity, most farmers claimed that it was the private sector extension approach that had effectively increased cocoa production at the smallholder level. Most interviewees also claimed that within their communities more households had begun to participate again in cultural and customary activities because with the additional cash, they were now able to meet their cultural obligations. Cultural activities included traditional bride-price ceremonies, death ceremonies, tribal initiation ceremonies and tribal feasts that are all very important; with more cash flow they had been able to start again.

The current leadership and management in the extension approach of the NGIP-Agmark and other PSSPs include the management team and the extension officers or commercial agronomists. They are linked to cooperative leadership consisting of executives and lead farmers, who at the village level are connected to their member households. Households manage their own activities, including cocoa which is strengthened by leadership in families. Thus, successful cocoa development initiatives depend on effective leadership within families and the participation of women and

youth for effective discussions, planning and participation in cocoa block management and production.

Most women interviewed in remote areas of the Gazelle Peninsula claimed that cocoa was more important to households than garden produce from the remote areas of the Gazelle Peninsula. Women claimed that their involvement and experiences of private sector extension and livelihood training had been helpful to the development of their family livelihoods. Also, it gave them confidence to freely discuss and negotiate cocoa farming approaches and household livelihood matters with their husbands and other family members (see also Hamago, 2019). These aspects of the NGIP-Agmark extension model certainly improved its attractiveness to women.

### 7.4 Providing cocoa extension training all along the value chain

Another reason why the NGIP-Agmark extension model was successful was because the company's extension model captured cocoa training, demonstrations and resource support all along the cocoa value chain. This approach created much interest amongst households. The earlier public sector extension approach focused only on training in cocoa management practices and did not provide other support to farmers, especially rehabilitation of old cocoa blocks. It did not provide appropriate tools nor link farmers to markets.

Furthermore, the NGIP-Agmark's cocoa training priorities have been on both cocoa rehabilitation and CPB management practices. Cocoa block rehabilitation training comprised of all the general cocoa block management training and demonstrations across all growth stages of cocoa trees. CPB management training requires practical cocoa block demonstrations for smallholders to enhance their management capacities to effectively control CPB to improve production. Regular T&V programs strengthened the success of the extension approach (Chapter 5).

The expansion of the NGIP-Agmark extension model occurred due to the intense desire of farmers to access its Trading and Advisory Services (TAS) to assist them combat the CPB infestation and to access new planting materials and tools (CCIL, 2014; Curry *et al.*, 2007) (see also Chapter 5). During the earlier phase of the NGIP-Agmark extension model, the company formed a partnership with farmer groups within the vicinity of its Tokiala plantation. In this early phase, the company

established an extension programme by trial and error and fine-tuned it to where it is now, an extension model implemented by other NGIP-Agmark branches as well as other PSSPs entering into partnerships with smallholders. During my fieldwork, the extension partnership model was further refined and enhanced by the World Bank-funded PPAP cocoa project and rolled out by NGIP-Agmark and other PSSPs. According to CCIL (2014), the PSSP extension approach developed by NGIP-Agmark had addressed the missing links within the traditional extension system. The main missing links in extension consisted of:

- A focus on establishing farmer groups in remote villages
- Sustainable and regular training for and visits to FDGs
- Provision of appropriate tools and seedlings
- Resource support for farmers to meet and attend training
- Assistance for FDGs to develop their own cocoa nurseries and budwood gardens

NGIP-Agmark's post-CPB cocoa extension approach in partnership with smallholders through FDGs is illustrated below in Figure 7.2.


Figure 7.2: NGIP-Agmark post-CPB extension partnership with smallholders. (Source: CCIL, 2014).

This private sector extension approach to the cocoa farmers addressed missing links within the public sector extension programme. It was an holistic extension approach to enhance farmers' ability to adopt CPB management practices to increase cocoa production and restore their livelihoods.

NGIP-Agmark's extension approach received very positive responses from smallholders (see Chapter 5 and Chapter 6, Figure 6.8 and Box 6.3). Also, it gained the majority of farmers' full attention and participation in CPB control training and other livelihood training and support programs that were initially delivered by the NGIP-Agmark extension team. Curry *et al*., (2011) explained that the rising socio-economic stresses caused by CPB triggered farmers' interest in cocoa block rehabilitation and training programs headed by the company.

Plate 7.1: Field demonstration of shade establishment and seedling planting on a farmer's rehabilitated block by the NGIP-Agmark's commercial agronomists (extension officers) in ENB.

Another fundamental factor explaining the model's success relates to NGIP-Agmark's development and building of stronger working partnerships with smallholders. This stimulated an increase in production that enhanced family livelihoods (see Chapter 6, Figure 6.7 and Box 6.1). Moreover, the company's extension partnership with its FDGs and cooperatives has always been based on trust, honesty and loyalty. These were referred to as the building blocks of the partnership arrangements (CCIL, 2014). Undoubtedly, these led to cocoa farming households responding positively to the

NGIP-Agmark extension approach. Likewise, effective delivery of holistic extension training programs facilitated the uptake by smallholders and their families through the implementation of cocoa block management training and support programs.

The current smallholder training delivered by the NGIP-Agmark model and other emerging PSSPs has gone beyond cocoa to include training on enriching farming systems and household livelihoods. As outlined in Chapter 5, Section 4, the livelihood training programs consisted of health awareness, basic business training, law and order, gender inclusion, and leadership and governance (Gar and McNally, 2020). Training partnerships have involved other service providers such as UNRE IATP, BSP Bank, Mustard Seed Inc., and LLG community policing programs. This has substantially contributed to the success of the extension approach initiated by NGIP-Agmark and implemented by other PSSPs, because they are addressing the multiple needs of smallholders. Addressing such needs creates a better social environment for cocoa production. Furthermore, the basics of agribusiness and livelihood training initiatives have assisted cocoa farming communities to have a better understanding of the commercial aspects of cocoa farming. This is gradually improving the financial sustainability of cocoa production by smallholders and their families.

In addition, extension training and support all along the value chain by the PSSPs raises the benchmark of extension and is encouraging the public sector to adopt more holistic approaches to extension. The targeted training programs by the PPAP cocoa project are being out-sourced to both private and public training partners within the Gazelle Peninsula. Rarely has there been any constructive private and public extension partnerships arrangement since the country gained its political independence in September, 1975. The reforms in cocoa extension involving the private and public partnership initiatives have created a viable extension model that is cost efficient and effective for farmers in remote villages and farmers recognise these aspects of the new extension approach.

### 7.5 Village cocoa nurseries and budwood gardens

The establishment of village cocoa nurseries and budwood gardens has been a great achievement for remote cocoa farmers. Farmers were able to access quality certified planting material in their villages. Moreover, methods of nursery establishment and

seedling propagation techniques were also brought to the villages through training and demonstrations by the NGIP-Agmark extension officers. A similar approach has been taken by other PSSPs. This approach addresses farmers' very limited range of cocoa varieties and their special characteristics as well as variations in adaptability to pests and diseases. Generally, most farmers had assumed all cocoa was the same, a myth which the village nurseries and budwood gardens dispelled. This has been one of the great benefits that the NGIP-Agmark extension model brought to village farmers. Also, with such foundation knowledge farmers are now able to choose planting materials based on types of pest and disease resistance, production levels and, very importantly, maintenance requirements. For example, those farmers who are more commercially orientated and pursuing high input farming can choose high yielding cocoa varieties that require high input farming methods, while those farmers who have not made this transition can select varieties that are tougher and require less inputs for their survival.

Also, it is an efficient extension approach for nursery training and demonstrations on these nurseries, simply because more people can attend and there are no restrictions on who can attend. Women are strongly encouraged to attend cocoa training programs (refer to Figure 6.6 on Chapter 6).

### *7.5.1 Regular farmer T&V for cocoa and CPB training programs*

The adaption of cocoa and CPB management practices would not be successful without regular T&V programs delivered by the NGIP-Agmark to FDGs and cooperatives. Regular T&V enabled poorly educated remote smallholders to slowly adopt the new methods and apply them. Previously, much cocoa and cocoa training consisted of a lot of scientific information that few smallholders could understand and adopt. Therefore, this extension gap was filled by regular T&V programs to ensure farmers obtained their desired knowledge relevant for their cocoa block rehabilitation and CPB management. Regular T&V programs contributed to the success of the NGIP-Agmark extension model (see Chapter 6, Box 6.1 and 6.2 and Figure 6.9 and 6.10).

There were very few or no farmer groups established under the earlier traditional extension approaches that would have enabled constructive training programs with

regular visits through the T&V programs. Instead, massive cocoa training programs were done on open invitations and very occasionally. Those one-day cocoa training programs often included areas such as: shade types and establishment; both cocoa and shade pruning techniques; weed control by slashing and spraying techniques; pest and disease management training; soil management; and other cocoa agronomic management practices. These training programs were beyond poorly educated farmers' capacity to assimilate the information. Again, without creating a mutual partnership with the FDGs and cooperatives and regular farm visits it was difficult for farmers to take in the information and act on it.

The NGIP-Agmark's T&V approach was shaped by the seasonal cocoa cropping cycle from flowering to harvesting and processing on the Gazelle Peninsula. Konam *et al*., (2011) emphasised that cocoa management training should be aligned with the annual cocoa calendar and this was adopted by NGIP-Agmark and built into its cocoa training programs. The training content of T&V programs was matched and timed with the seasonal tasks of the cocoa calendar, so that training in areas such as pruning, shade control, pests and diseases, etc., could be put into practice on smallholder blocks straight after the training. At the same time, the removal of pest and disease affected pods was encouraged. Similar management approaches are applied to CPB training and practices by smallholders. An effective T&V program to targeted farmer groups brings more fruitful outcomes to the smallholders and the industry. Figure 7.3 outlines the cocoa cropping cycle and associated recommended management practices to be applied by farmers.

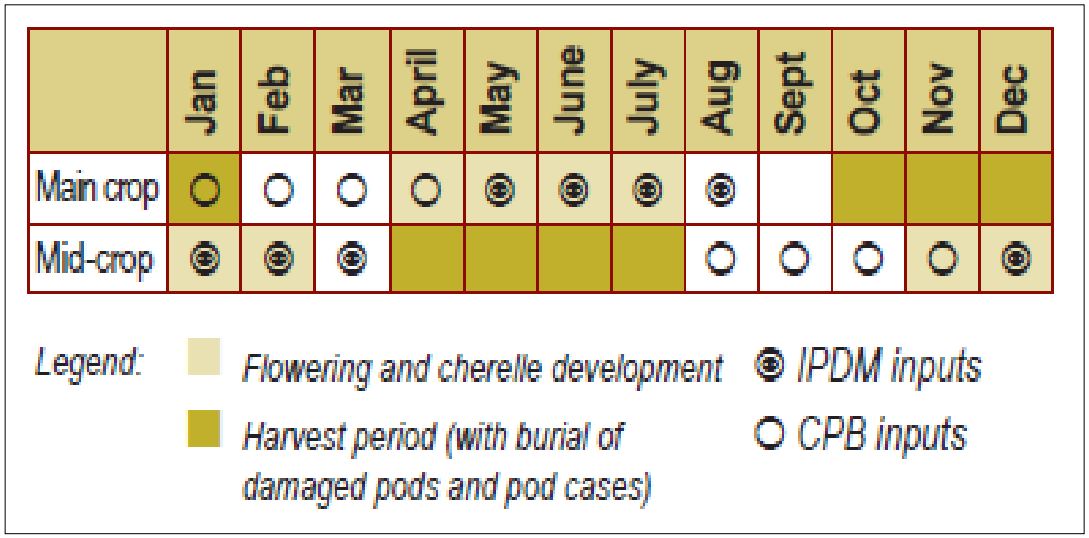


Figure 7.3: The cocoa cropping cycle based on PNG's environment and climatic conditions (Adapted from Konam *et al*., 2011 p. 9).

Increasing production from existing cocoa trees stimulated cash flow and interest in cocoa farming amongst farmers in remote villages. Also, by encouraging all farmers in the group to fully rehabilitate their cocoa blocks with new cocoa seedlings, a uniform rehabilitation of cocoa blocks across the community laid a platform for follow-up cocoa training and demonstrations or T&V into the community (Figure 6.5 and Figure 6.10). With farmers rehabilitating their cocoa simultaneously, they were applying the same cocoa management practices at each growth stage of the cocoa trees with the appropriate cocoa tools supplied for that stage. Thus, coordination of extension and training became easier and more efficient.

### 7.6 Resource support to extension officers or commercial agronomists (CA)

Resource assistance to the CAs has been a company priority to enhance their training programs within their target areas amongst the FDGs and cooperatives. Basic extension resources needed by the CAs have been cars and motor bikes for mobility as well as updated cocoa training materials. However, under the World Bank-funded PPAP cocoa extension partnership with the private sectors for smallholders, NGIP-Agmark was able to purchase five motorbikes for its five CAs for effective and regular T&V programs as well a 3-tonne 4WD flatbed truck to deliver the targeted extension support and training services to the cooperatives (Gar and McNally, 2020). Needless to say, transport assistance for farm supplies including nurseries, tools and crop pickups stimulated renewed interest in cocoa farming as did the resultant increased

cash flow in remote villages. Enhancing the mobility of extension officers with mobility resources was another missing link in the traditional extension system.

### *7.6.1 Support with appropriate cocoa block management tools*

Cocoa training for smallholders without them having access to or owning the appropriate cocoa tools is like a mission unaccomplished. Without the correct tools, it is very difficult for farmers to adopt the new cocoa technologies and maintain them efficiently. For example, CPB management requires knapsack insecticide sprayers but most remote farmers lack this equipment. So, most remote village cocoa farmers had not been able to apply CPB target spraying methods because there were no knapsack insecticide sprayers available until NGIP-Agmark provided them amongst other basic tools for CPB and general cocoa block management. This was a milestone achievement for smallholders. The provision of tools added to the positive outlook and benefit of the NGIP-Agmark extension model for smallholders and the industry.

### *7.6.2 Resource support for smallholders' processing facilities*

A long-term problem with smallholder processing has been smoke tainted cocoa beans from poorly maintained kiln pipes. Most fermentary owners cannot afford to maintain their dryers by replacing kiln pipes when holes rust in them. Secondly, CB-PNG does not have the capacity to carry out regular inspections of such a large number of processing facilities, especially in remote villages (CCIL, 2014).

This support initiative for cocoa post-harvest processing facilities to established FDGs and cooperatives was to foster cocoa quality to address industry concerns about smoke taint. The NGIP-Agmark's initial approach to post-harvest material assistance had been through its credit facility built on the company's extension principles of trust, honesty and loyalty within the extension partnership. The intervention of the PPAP cocoa extension approach boosted the capacity of the private sector to support smallholders and farmer groups with processing facilities. The farmer assistance with communal dryers and fermentation facilities has been a milestone achievement in remote villages. These initiatives encouraged the company to strongly emphasis cocoa quality in training, thus enabling farmers to learn and produce higher quality cocoa beans. Plate 7.2 shows a transformation of village processing facilities that will lead to a dramatic improvement in the quality of PNG cocoa beans for export.

Plate 7.2: The transformation of smallholder cocoa processing facilities by the NGIP-Agmark, ENBWYiA and other PSSPs to the remote farmer groups.

*7.6.3 Support initiatives for transport*

Transport assistance for cocoa farming households has been a great relief to them by overcoming transport and infrastructural constraints in remote villages of the Gazelle Peninsula. NGIP-Agmark farmers' transport assistance extended to transportation of farm tools and cocoa seedlings, while cocoa produce has been occasionally transported out from remote villages. In addition, transport assistance has also been provided to cart building materials to resource centres, cocoa 'satellite' nurseries, cocoa fermentaries and cocoa driers to FDGs and cooperatives. Collectively, transport assistance is currently playing a significant part of the holistic cocoa extension approach by the PSSPs. Again, this is a new extension intervention that was missing from the traditional extension approach which has been particularly welcomed by farmers.

*7.6.4 Assistance with resource centre buildings for farmer groups*

Establishing resource centres creates a concrete base for farmer groups in remote villages. These resource centre buildings have greatly enhanced farmers' interest in cocoa. For example, most famers said it had symbolised a mature bond between them and the PSSPs for sustainable partnership arrangements for cocoa farming and related training programs. Also, such initiatives promote collective ownership and unite the farmers in a common purpose in the remote communities. It also provides shelter for farmers' meetings, and houses the office spaces for the group's executives. Most farmers claimed they now have an established venue to meet, discuss and plan cocoa

or other livelihood training programs or projects that will bring tangible change to the lives of farmers and their communities. The resource centres have given greater confidence to the cocoa extension partnership approach amongst the PSSPs and the smallholders. It is a new approach that has not been used in past extension by the public sector.

### 7.7 Extension reflective of the diverse livelihoods of farmers and gender roles

The NGIP-Agmark extension model has approached cocoa extension training differently compared with traditional extension approaches by the public sector. Training under the NGIP-Agmark extension model has not been confined to cocoa, but includes training that enriches the livelihoods of cocoa households. The livelihood training programs consist of health awareness, basic business training, law and order, gender inclusion, leadership and management (Chapter 5).

Moreover, the inclusion of gender and livelihood training programs in cocoa and CPB training programs has enriched households' cocoa farming activities. It has enlightened and bonded the group for effective working collaborations in CPB management and cocoa farming activities to increase production and improve individual household livelihoods. Also, the extension focus for groups is inclusive of men, women and youth in training programmes and have eased the labour challenges related to CPB management tasks. For example, Curry *et al*., (2011) and Curry *et al*., (2015) explained that cocoa farming with CPB needs greater labour investments either from families or hired labour to raise production by overcoming CPB. Smallholder cocoa farming system in a CPB environment demands a shift from the traditional low input cocoa farming system to a higher input semi-commercial cocoa farming nature which includes increased labour investments to raise returns to labour. The inclusion of women and youth in cocoa training and sustainable livelihood training programs has strengthened pathways for farming families to transition to more commercialised cocoa production. Such training led to more frequent household planning and decision-making process regarding cocoa and other household activities. This study documented more family-oriented farming discussions and an increased commitment to cooperative household labour especially for cocoa block management tasks. This is reflective of the holistic extension approach that is well suited to the diverse livelihood system of cocoa farming households within the PNG cultural context.

The lifestyle of cocoa households, like other cash crop farmers in PNG, is surrounded by a complex of interrelated economic and social activities that all contribute to family livelihoods. For this reason, it is vitally important to incorporate gender and livelihood training initiatives into cocoa training programs to enhance sustainable cocoa farming and production by smallholders and their families. Relying solely on cocoa farming for livelihood improvement would not have been family centred and not taken account of the diversity of livelihood activities. So, addressing cocoa training holistically is more likely to create a sustainable and healthy cocoa farming system amongst cocoa farming communities, and therefore be more attractive to them.

### 7.8 Incorporated training programs that enhance farmers' livelihoods

> *While cocoa was by far the dominant source of household cash income prior to the CPB incursion, farmers spent very little time in their cocoa plots and pursued a range of livelihoods in addition to cocoa. Only during the main cocoa flush periods, or when cocoa prices were exceptionally high would they increase their labour inputs in cocoa. Occasionally smallholders engaged in more intensive harvesting to meet large expenses like school fees, indigenous exchange obligations like bride prices and mortuary payments or church fund-raising events. Instead, households devoted much time to food crop production and most households sold garden food crops at local markets as well as a range of fruits, nuts and dry coconuts* (Koczberski *et al.,* 2019 p.73).

The demonstration and incorporation of cocoa rotational planting methods improved food security amongst cocoa farmers (Gar and McNally, 2020; Curry *et al*., 2007). It allowed gardens to be planted in areas of newly replanted cocoa as part of a staged replanting programme where a proportion of the cocoa block was replanted every two years. Furthermore, linking and coordination of health training and awareness of common diseases in remote villages has promoted healthy living that improves household labour, especially for cocoa farming and other household activities. Improved health and food security have dramatically improved smallholder cocoa production but further research is required to confirm this claim. The PSSPs cocoa extension approach has provided the roadmap into these extension areas that were not covered in the past.

On the commercial side, the holistic approach of the NGIP-Agmark extension model has promoted sustainability in cocoa farming and production while generating shared

benefits for smallholders and the company. For example, assisting growers with quality cocoa seedlings and processing facilities all contributed to the improvement of cocoa quality as well as quantity at the farm gate. Training and support on cocoa nurseries and processing facilities answered the industry call for cocoa quality improvement. Their only way to ensure a future for cocoa in ENB was to venture into extension but holistically in ways that satisfied all players along the extension and production chain while meeting the diverse socio-economic needs of smallholder families.

Law and order has been rated a major constraint on development in remote areas of PNG. However, addressing law and order in the remote villages through awareness programs as a cross-cutting intervention by the PSSPs for cocoa farmers' livelihoods has created a safer environment for the villagers as well as for extension programs delivered in remote villages. Other outsourced livelihood enriching training programs consist of health and nutrition awareness, food security and law and order awareness and training programs. These are further discussed further below.

### *7.8.1 Health issues and Nutrition awareness and training*

The health status of smallholder farmers has been recognised as a significant factor on sustainable cocoa farming (Curry *et al*., 2007; World Bank, 2019). NGIP-Agmark has included health and HIV/AIDS awareness and training programs in its extension approach which has also been captured as one of the cross-cutting issues to be implemented by the lead partners during the implementation of PPAP cocoa project.

However, prior to the implementation of both the PNGSDP and the PPAP cocoa projects, NGIP-Agmark had been supporting a medical clinic at its Tokiala planation with limited support from the government (CCI, 2014). It was established initially to serve the plantation labourers but later it began serving surrounding villagers and other nearby organisations such as schools and agricultural institutes.

Furthermore, 23 selected trainees together with three CAs were trained by Mustard Seed Global (Hearth Service NGO) medical health officers. Basic health and HIV/AIDS outreached training programs were programmed and facilitated by NGIP-Agmark to respective trained team members with the Mustard Seed Global nursing officers. These medical outreach training programs targeted all established FDGs and

cooperatives under the NGIP-Agmark within the Gazelle Peninsula. A total of 15 medical training outreach programs were conducted which included 625 males and 585 females (Gar and McNally, 2020). The medical training comprised of awareness on HIV/AIDS, basic health and hygiene practices, gender, blood pressure testing and treatment of common illnesses amongst participants within the remote communities. The effectiveness of this initiative has captured by a reporting system from the medical NGO to NGIP-Agmark plus random positive feedbacks from the participating communities to the leaders (Gar and McNally, 2020).

Nutrition training funded by the Department of Health, Provincial DPI and CB-PNG was delivered through the NGIP-Agmark's extension partnership with farmer groups. The Word Bank Group (2019) described adequate nutrition to be vital for an effective smallholder agriculture farming system. The extent of adverse impacts of CPB is also related to the sociocultural and nutritional status amongst cocoa farming households. Smallholders with good nutrition are less prone to illness and so are able to afford more time on their livelihood activities (Curry *et al*., 2011; Curry *et al*., 2015). Significantly, the inclusion of nutritional training has enhanced the health status of cocoa smallholders despite the socioeconomic impact of CPB (World Bank, 2019). It is also reflected by the latest food security research on the impact of CPB that is related to the cocoa farming households, nutritional uptake and food security:

> *Approximately 151,000 families in PNG produce cocoa at very low levels of productivity which are even lower now in CPB-affected areas. One of the greatest and current threats to food and nutritional security among cocoa growers is the loss of income due to the rapid spread of the Cocoa Pod Borer which has caused a substantial fall in production in most cocoa growing provinces* (Koczberski *et al*., 2019 p.6).

*7.8.2 Cash crop diversification*

The diversification of cash crops and other income sources spreads the risks of fluctuating commodity prices and the impact of severe pests and diseases such as CPB. The NGIP-Agmark's extension approach has addressed this issue through cash crop diversification and cocoa rotational planting methods. This was to create a family income base and better food security. Smallholders' cocoa production as outlined in Chapter 4 is built around diverse income sources and livelihood strategies that influence how smallholders respond to new opportunities and threats (Curry *et al.,*

2011; Koczberski *et al*., 2019). Crop diversification and rotational planting training and demonstrations by the NGIP-Agmark have helped foster a sustainable smallholder cocoa farming system that also addresses two main livelihood concerns which have been food security and sustaining household income. Apart from coconut and other recommended cocoa shade trees, galip (*Canarium indicum*) has been endorsed by the cocoa industry as a cash crop and a shade tree for cocoa. Farmers received training from NGIP-Agmark on its integration and management with cocoa, and at the same time were supported with galip seedlings. These broader scale initiatives beyond cocoa have enhanced the attractiveness of the NGIP-Agmark model to smallholder families.

Plate 7.3: A farmer's cocoa block at Sandaon (Manapki) intercropped with galip trees (*Canarium indicum*).

*7.8.3 Law and order awareness programs*

Law and order issues have had much impact on the economic livelihoods of remote villagers. The PSSP cocoa extension approach has incorporated law and order awareness in its cocoa extension approach. NGIP-Agmark occasionally invites law and order agencies such as local police officers, community development officers and LLG peace officers to be part of its training awareness and meetings delivered to FDGs and cooperatives.

Being a cocoa socioeconomic researcher within the Gazelle Peninsula and other cocoa growing provinces prior to my study, I had witnessed NGIP-Agmark and other PSSPs being targeted by criminals in remote areas. For example, NGIP-Agmark trading

officers visiting remote areas to purchase cocoa were robbed several times. Low income opportunities amongst youth led to much illegal home brewing of alcohol which can be a factor in lawlessness, particularly domestic violence (Curry *et al*., 2011). Law and order problems in communities often reflects the lack of effective leadership within households, farmer groups, churches and communities. So, the intervention of a cocoa holistic extension approach has empowered community leaders and farming households to become better leaders and to guide their communities to become more socially stable and peaceful. Linking the LLG peace officers to make law and order awareness was welcomed by leaders in most remote communities.

### 7.9 Traditional extension approach versus the Holistic extension approach

CPB has been one of the most destructive cocoa pests and caused the province's cocoa production to fall by 80 per cent (Apis *et al*., 2013; Chapter 4). It devastated the livelihoods of smallholders and their extended families. Most farmers have resorted to other livelihoods to sustain their livelihoods whilst the cocoa industry and relevant stakeholders had been working hard to find solutions in CPB research and extension to revive the cocoa industry. NGIP-Agmark has proven successful with its extension approach and has contributed to improving the farmers' livelihoods. The PPAP cocoa project was initiated in 2012 and targeted private and public working collaborations to address CPB through extension and support programs that had been initiated initially by NGIP-Agmark. PPAP replicated the NGIP-Agmark extension model but broadened it out to other cocoa private companies as implementers targeting established cooperatives. This study had uncovered the key differences in strategies between the private sector and the traditional public sector in terms of sociocultural benefits and challenges for the two sectors. Figure 7.4 illustrates private and public extension approaches that are currently associated with smallholder cocoa extension in PNG.

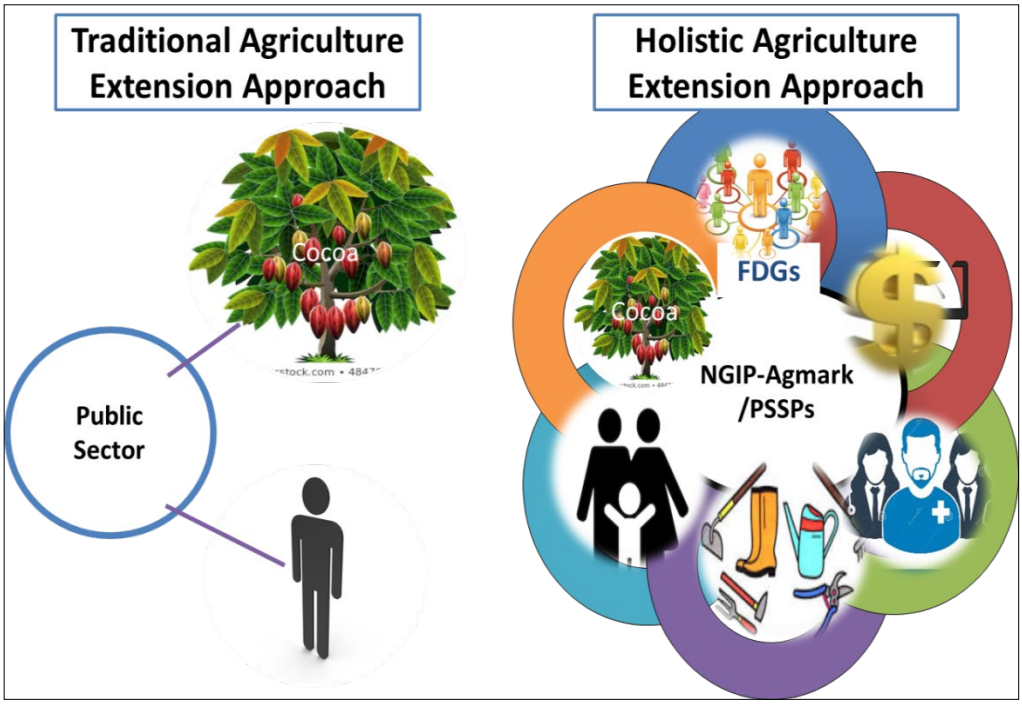

Figure 7.4: The different approaches taken by traditional extension and the PSSP holistic extension interventions in the cocoa industries of PNG.

In the past, many cooperatives faced challenges because of inadequate knowledge and skills in management and a lack of support or good relations with government institutions (Garnevska *et al*., 2014). This has changed with cooperative development training and extension initiatives delivered by the PSSPs who are now helping to alleviate constraints through extension support all along the value chain such as livelihood training, leadership and management training and improved access to farm inputs. The NGIP-Agmark extension model is an holistic agricultural extension approach that recognises the need to improve and sustain cocoa production within a broader livelihood system. This extension approach considers factors that go beyond cocoa such as:

- Agribusiness training - simple bookkeeping and management
- Cash crop diversification
- Health issues training and awareness
- Food security through rotational planting
- Financial training awareness – promotes savings culture
- Livelihood training - gender inclusion and household training
- Law and order awareness

My thesis has argued that this holistic approach to cocoa farming is very well suited to the smallholder cocoa farming livelihood system of ENB because it accommodates smallholders' cultural backgrounds and household priorities.

Furthermore, the NGIP-Agmark with other PSSPs have provided better marketing links to remote farmers through transport assistance and processing facility support that the majority of the smallholders could not afford due to lack of access to capital. Also, the approach has overcome the lack of trust that generally affects interactions between government public services with cocoa farmers that has negatively affected their participation in cocoa development initiatives by the public extension officers over the years.

However, ultimately, low literacy levels amongst the remote cocoa smallholders with limited management skills training support from government institutions has left most cooperatives unsustainable over the past years (Garnevska *et al*., 2014; European Commission, 2019). This study has revealed that the delivery of sustainable livelihood and management training skills to cooperative leaders and farmers has had a very positive influence on the sustainability of the FDGs and cooperatives operations. It has also created greater confidence amongst smallholders for their effective participation in the extension partnership with the PSSPs.

### 7.10 Conclusion

In summary, NGIP-Agmark cocoa extension approach for CPB management would likely have been unsustainable if it had not been an holistic approach. This was what the company addressed through its extension approach, which has proven to be effective and sustainable compared with traditional public sector single crop extension approaches (Curry *et al*., 2009; Curry *et al*., 2011; World Bank, 2018). The company's cocoa extension program was scaled-up and enhanced through the World Bank-funded PPAP cocoa project. The cocoa farming system is now in a smallholder business context which has enabled them to capitalise on resource investment opportunities to sustain their cocoa production and meet industry and market demands. Thus, NGIP-Agmark, with other participating PSSPs, has shown the road map to future cocoa extension approaches that will initiate a shift from traditional low input farming methods to more commercially focused systems of production.

This strengthening of leadership and management capacities amongst farmer groups and households was a very important factor in this success. The leadership and governance training programs have given confidence to leaders and households to better manage the affairs of their small organisations as well as providing access to other services within remote communities.

This thesis has highlighted that traditional smallholder cocoa farming methods were shaped by socio-cultural factors, not economic factors alone. This meant that traditional extension approaches that were focused on a single crop (cocoa), and also solely on men, did not correspond with the reality of smallholder production and livelihood systems; they were therefore inadequate in meeting the needs of farmers. Effective extension strategies depend on an holistic approach that takes into account the broader livelihood context of smallholders and their families and communities. Effective extension strategies that meet the needs of smallholder families must also accommodate the socio-cultural factors influencing smallholder cocoa production. The NGIP-Agmark model did this. The key factors explaining the success of the NGIP-Agmark model are:

- Enhancement of leadership roles through the extension partnership programs
- Effective extension training and support programs all along the value chain
- Extension reflective of livelihood systems and gender roles
- Household extension focus would enhance sustainable production for next generation of farmers
- Embrace the holistic extension approach package that includes sustainable livelihood, agribusiness, health and law and order training programs will all contributing towards more sustainable smallholder cocoa production and improved livelihoods.

The next chapter provides the conclusions and recommendations for the thesis.

# CHAPTER EIGHT

# CONCLUSIONS AND RECOMMENDATIONS

## 8.1 Introduction

This final chapter presents a general overview of the main research findings of this thesis and outlines some recommendations for PNG's agricultural extension service providers. The recommendations aim to improve extension delivery and contribute to the development of a more economically and socially sustainable cocoa farming system through the village farmer groups, especially for remote cocoa farmers.

The thesis has argued that the public sector cocoa extension service approach needs to understand that focussing on cocoa extension training alone has been ineffective in arresting the steady decline of cocoa production and quality, especially in villages. Shifting from the traditional narrow extension approach to a more holistic extension approach is one step towards addressing the public sector extension challenges. The NGIP-Agmark extension model is an example of holistic extension. It consists of not only cocoa management training but also support to farmers to advance their wider farming system and family livelihoods. The main components of the NGIP-Agmark livelihood and training approach were:

- Basic business concept training
- Basic leadership and management training
- Household and gender inclusion training
- Health issues training and awareness
- Crop diversification training and support, and
- Law and order awareness and training

These were regarded as the key elements towards developing a more sustainable smallholder cocoa and livelihood farming system. Thus, the NGIP-Agmark extension approach wasn't only targeting cocoa training but rather the general well-being of the smallholders through its extension support initiatives and livelihood training programs.

The NGIP-Agmark approach is based on the understanding that cocoa farming practices revolve around a diverse socio-cultural and livelihood system that has had both positive and negative impacts on smallholder cocoa farming systems in PNG (Koczberski *et al*, 2019; Kerua and Glyde, 2016).

The various components of this extension approach are targeted at family units and not solely at the male household head, as traditional extension did in the past in PNG. Furthermore, the focus of the NGIP-Agmark extension approach target is along the cocoa value chain, not just on farm management.

## 8.2 Significant findings

### *8.2.1 Cocoa farming livelihood system*

This study has revealed that cocoa farming and smallholder socio-cultural livelihood systems are not isolated from each other. Rather, they are closely integrated and part of the everyday lives of smallholders. Thus, it is important for extension training to acknowledge farmers' livelihood systems and adjust training so that the various livelihood components can be easily integrated into modern agribusiness cocoa farming training to enable more sustainable cocoa farming system to develop at the village level.

### *8.2.2 Leadership and Management*

An important factor explaining why the NGIP-Agmark extension model was effective and led to improved cocoa production among households was its emphasis on leadership. The focus on leadership was at all levels and consisted of leadership within extension agencies; leadership amongst community leaders and lead farmers in the farmer groups or cooperatives; and leadership within the family units. Much of the leadership and management training was targeted at farmer group leaders and households to encourage them to embrace leadership in managing and sustaining their farmer groups and family units to ensure the benefits of the program reached both farmers and their families (see Chapters 5 and 7). The training of farmer group leaders was an empowerment strategy to equip them with better leadership capacity to sustain operation of their cooperatives. The strong leadership and support from the leaders of the groups and cooperatives gave confidence to the cocoa farming communities to

adopt better cocoa farming practices and helped strengthen the cocoa extension partnership between the smallholders and service providers such as NGIP-Agmark.

Moreover, active leadership in the cooperatives was also about getting local farmers to take ownership of the cocoa extension programs and to eventually run them in a self-sustaining way, especially in remote communities where extension services are very limited. Likewise, household leadership also played a pivotal role in improving cocoa production by the family unit.

This study found that the training emphasis on leadership values led to a greater impact than public sector extension service where leadership was not emphasised, and this was reflected in higher rates of adoption by cocoa farming households of new technologies and farm management practices. This was evident amongst family units, especially in terms of improved block management, CPB control, and the increased allocation of labour to cocoa by family members, and resource investment in their family cocoa blocks. Ultimately, leadership at the farmer group and family level was reflected in the revival of cocoa production after the devastation of CPB.

The strong leadership shown at farmer group meetings and the inclusion of women in the training programs and discussions at farmer group meetings encouraged positive responses from households (men, women and youth) towards the formation and functions of FDGs and cooperatives. Leadership and coordination at the farmer group level also generated positive responses amongst farmers to attend training sessions provided by NGIP-Agmark and other extension service providers.

### *8.2.3 FDGs or Cooperatives formation*

Despite the past challenges in PNG whereby most agricultural cooperatives in remote villages were unable to sustain their operations (Garnevska *et al*., 2014), the new extension approach to delivering services to remote villages is causing a re-think of the effectiveness of cooperatives. The major private sector player within the cocoa industry, NGIP-Agmark, had examined cocoa cooperatives' operational weaknesses and as a result focussed on livelihood and leadership training for smallholders as part of its cocoa extension activities. The establishment of cooperatives has led to the following advantages:

- Enabled extension services to reach remote farmers
- A cheaper and more focussed extension approach
- Enabled the establishment of satellite cocoa nurseries in villages
- Provided a channel for effective leadership and executives to voice farmers' concerns
- Created a forum for regular meetings and discussions between farmers and extension service officers
- Enhanced group transport and marketing for price bargaining strategies

Cocoa block management training had been another major area of focus of both the public and private sectors. However, regular training and interactions with smallholders had been an effective approach by NGIP-Agmark and other PSSPs compared with public sector extension approaches. Cocoa block training programs had comprised of cocoa and shade pruning techniques, CPB and IPDM training and management demonstrations, soil management practices and other agronomic training practices that enhance cocoa production and quality. The CPB management training program was focused on cultural management practices that would be the easiest for remote village farmers to adopt and implement. The tools support initiative for farmers has also been a major highlight of the model. It was initiated through the company's credit facilities then with support from donor cocoa projects such as the PNGSDP cocoa project and the World Bank's PPAP cocoa project. The tools support program improved labour efficiency in cocoa block management and production and was complemented by the training programs.

*8.2.4 Cocoa post-harvest and processing training and support*

Cocoa quality is a priority for cocoa exporters, which NGIP-Agmark and other cocoa companies and extension service providers have been trying to address at the smallholder level for many years. Addressing market quality standards and consumer demands were factors that had driven exporters into developing post-harvest and processing training programs for smallholders. Similarly, the decline in cocoa quality caused by CPB has been of extreme concern to the industry as well to exporters. CPB led PSSPs to focus on smallholders' methods of harvesting and post-harvest processing. Cocoa post-harvest training delivered by NGIP-Agmark and the other

exporters has included harvesting methods, fermenting process, drying techniques, bagging and in-village storage facilities.

Assistance with post-harvest processing facilities was an immediate response by NGIP-Agmark and the PSSPs to improve quality. NGIP-Agmark initiated assistance with processing facilities through its credit facility (CCIL, 2014), and this approach was scaled up through the donor cocoa projects such as the PPAP cocoa project headed by the private sectors (Gar and McNally, 2020).

Besides the construction and support to fermentaries in the project areas, it was a legal requirement that fermentary owners complete a cocoa quality assessor's course for better understanding of the grading of cocoa at their fermentaries before they are issued with fermentary license to be cocoa dealers or processors. Interestingly, this training program was not included in the recent PPAP cocoa project procurement plan. However, NGIP-Agmark being lead partner and a major exporter was aware of the importance of such training programs to maintain its export business but as well protect the cocoa growers. As a result, it has been regularly sending its extension officers to cocoa quality training coordinated by the CB-PNG (Gar and McNally, 2020).

*8.2.5 Cocoa resource support and livelihood farmer household training*

Prior to the implementation of the NGIP-Agmark model, the practice of providing remote cocoa farming communities with material support for establishing resource centre buildings for cooperatives was uncommon. This initiative created greater motivation for farmers and encouraged them in cocoa farming and to address CPB. The establishment of resource centres symbolised trust and commitment towards extension partnership programs moving in the direction of sustainable cocoa production. Importantly, the resource centre buildings provided a venue for member meetings and office spaces for community leaders. Above all, the culture of unity in extension programs was illustrated through those resource centre buildings; they provided easy accessibility and contact points with extension service providers. Previous extension training initiatives had been frustrated by local politics and had never accomplished much, leaving farmers in despair. Therefore, the cooperatives and FDGs extension structural link to the PSSP together with its resource centre settings

created an alternative and affordable pathway for service delivery and development initiatives to remote villages.

Moreover, one of the greatest benefits of the PSSP extension interventions to the cocoa smallholders in remote villages has been the incorporation of relevant livelihood training programs into cocoa training and support programs. Again, such initiatives were not part of previous cocoa extension approaches. As shown in earlier chapters, reviving the cocoa industry from the CPB devastations would have not been possible without the inclusion of sustainable livelihood training programs. It was an extension intervention for sustainable cocoa farming driven by NGIP-Agmark and other cocoa private sector agencies as pointed out in chapters 5 and 6. However, this initiative has been improved by the World Bank-funded PPAP cocoa project in partnership with the private sector as lead partners to their respective cooperatives. Although, NGIP-Agmark was a major recipient and implementer with its established farmer groups, it incorporated the livelihood training programs as discussed in Chapter 7.

## 8.3 The smallholders' incurred benefits from the PSSP extension service

This study identified several benefits that smallholder farmers and their families gained from the NGIP-Agmark model. The benefits were categorised as economic, social and cultural related benefits.

### *8.3.1 Economic benefits*

For most smallholders, the gradual increase in cocoa income was identified as the major economic gain from the extension training. Many farmers indicated that such training encouraged them to return to cocoa farming despite the CPB challenges they faced. This was especially important for remote cocoa farming households where other income opportunities were scarce. The increase in cocoa production has also seen an increase in cash flow in the communities, resulting in the re-opening of small businesses such as trade stores, baking houses and fuel reselling outlets.

Furthermore, the livelihood training programs have been useful to cocoa households because they acquired the knowledge to budget their cocoa earnings and helped develop a savings culture among some households. This training encouraged household planning and decision-making regarding savings and other future household

goals. This was a very important area for smallholders who were faced with the challenge of adopting higher input farming (more farm inputs and budgeting) to tackle and overcome CPB.

Finally, the establishment of cocoa satellite nurseries in the villages greatly assisted village farmers with cocoa seedlings and greater technical knowledge derived from nursery demonstrations of cocoa seedling grafting, budwood establishment and other propagation methods. Likewise, cocoa variety identification training helped the farmers to select their own preferred varieties from the industry released clones. The approach of transferring such technical knowledge to remote village famers has enabled them to take greater ownership and control over their cocoa production into the future.

### *8.3.2 Social benefits*

The involvement of farmers in discussion meetings and decision-making encouraged farmers to take ownership of the extension program. The open discussions at meetings gave the company a better understanding of the diverse livelihoods of farmers and the cultural influences that shaped cocoa farming systems in remote villages. This contributed to better planning and structuring of the cocoa extension training and support programs to suit the everyday needs of farmers and helped develop good relationships between the company and smallholders that benefitted the communities.

The extension services provided to smallholders in this study were linked to several social benefits. The establishment of the farmer groups brought many social benefits to the community. The farmer groups also motivated families to plan and share labour responsibilities among households in managing family cocoa blocks. The co-operation among households in cocoa production was rarely practised by farmers prior to the high level of involvement of NGIP-Agmark extension training of smallholders.

Leaders of farmer groups encouraged the sharing of tools and other materials and this enhanced cocoa development activities within the cooperatives. A major benefit was that the extension partnership approach placed an emphasis on the involvement of women and youth. As outlined in Chapter 5 the inclusion of women and youth in cocoa extension and livelihood training programs encouraged family units to participate in

cocoa and livelihood training programs and in farmer group decision-making. This was a break from the past 'traditional' extension that focussed largely on men.

Under earlier traditional extension approaches men took primary responsibility for managing their family cocoa blocks with limited labour assistance from other family members. The exclusion of women meant there was a lack of cocoa technical knowledge among them and this was a barrier to households effectively managing their cocoa blocks. With the inclusion of women in the livelihood and cocoa training programs, cocoa farming became more of a family concern and helped overcome some of the labour shortages which had previously been one of the greatest challenges for CPB management.

Also, the inclusion of women enables more social interaction among cocoa farming households as well as in co-operatives. Other social benefits included:

- More cooperation in cocoa activities by family members and exchange of labour across cocoa farming households
- CPB extension developed social relations with remote cocoa farmers which gave farmers the confidence they could fight CPB
- More youth in cocoa and a reduction in social problems
- Open discussions in farmer meetings helped create a more unified farming community that was willing to work together to tackle CPB

*8.3.3 Cultural benefits*

The extension intervention has contributed to the cultural well-being of cocoa farming households, cooperatives, churches, clans and communities. The cultural benefits were related to increased cocoa production and incomes as the direct impacts of the NGIP-Agmark and PSSP extension services to remote cocoa farming households. Likewise, it has also stimulated greater cooperation amongst families and peer farmers in their cocoa work programs in the villages. Another cultural benefit was the greater family unity with more family members attending training programs and able to work effectively on their family cocoa blocks to address CPB. Also, in multicultural communities, the extension approach has worked across ethnic and cultural boundaries for greater participation in cocoa training programs, discussion meetings, assisting

each other in cocoa and other livelihood work programs. This study had taken place in a Melanesian society where sharing of ideas and objects used to be part of the everyday culture. However, these cultural attributes have been reinvigorated through the NGIP-Agmark extension training and support programs. Again, Chapter 6 elaborated that the NGIP-Agmark or PSSP extension program brought a higher level of happiness to the communities to the point that sharing of cocoa farming and livelihood ideas and farming tools became common. Traditional cultural obligations, church traditions and community commitments were active again after cocoa was revived through the NGIP-Agmark and PSSP extension approach. The household criteria for extension training and law and order awareness encouraged more youth to become active in cocoa farming which has resulted in a general reduction in law and order problems as stated in chapters 5 and 6.

### 8.4 Lessons learnt

The lessons learnt from the extension model surround strengthening sustainable cocoa production and improving farmers' livelihoods. Thus, sustainability of NGIP-Agmark extension model beyond the recent PPAP cocoa extension and support partnerships project is nothing new to the NGIP-Agmark simply as the project itself was built on NGIP-Agmark's extension work with the smallholders since 2005 and revised in 2008 due to CPB. This was seen as a requirement for the sustainability of its business and to mitigate the collapse in cocoa production, mostly at the smallholder level. Therefore, the major lessons learnt from the NGIP-Agmark extension model include:

- More resource support to Commercial Agronomists (extension officers)
- Networking through the cooperatives
- Enhanced leadership and management capacities amongst smallholder farmers
- Decentralized production of planting materials and distribution systems
- Attractive well-regulated small business model via sustainable livelihood training and agribusiness training.
- Encourage business minded farmers and agriculturally qualified entrepreneurs to adopt high input farming
- On-going technical support services to households all along the value chain
- Rotational replanting method that answers cocoa management and food security for cocoa farming households

- Increasing production and improved cocoa quality to improve farmers' livelihoods
- Managed crop collection system through transport assistance and marketing structure

The renaming of extension officers as commercial agronomists was well suited to commercialising the extension programs in the future. These commercial agronomists are stationed within the branch network of the business. They have their allocated designated territories, with routes and cluster farmer groups or cooperatives for sourcing and growing cocoa, selling input supplies, providing training and information to increase quantity and improve quality, whilst promoting the lead partner as the commodity exporter of choice to the farmers. This is done on a sustainable mutually beneficial B2B (business to business) basis.

## 8.5 Recommendations for long term extension strategies

Based on the effectiveness of the NGIP-Agmark extension approach, and smallholders' improved cocoa production and livelihoods in remote villages, this section provides some insights for facilitating the improvement of private sector cocoa extension to reduce the socio-economic impacts of CPB and other related cocoa farming issues. The following recommendations are made:

a) Create better links and build a solid extension network with farmer groups
b) Provide extension and support to farmers all along the cocoa value chain
c) Encourage extension to target the establishment of farmer groups
d) Encourage the incorporation of livelihood training programs into cocoa extension training
e) Improve working collaborations between public and private sector extension providers

### *8.5.1 Recommendation One: Create better links and build a solid extension network with farmer groups*

As discussed earlier in the chapter, farmer groups offer both farmers and extension providers many advantages. It is important that the cocoa industry considers the farmers' views and their farming cultural background when designing extension strategies. The public sector extension approach has been aligned closely to a top-

down approach that has left the adoption rate of new technologies and practices by farmers very low over many years. This top-down approach does not capture the diverse livelihoods of farmers, nor does it allow true participation by farmers. The NGIP-Agmark extension partnership with established farmer groups is a model that enables more structured and regular interactions between the company and smallholders. This bottom-up approach motivates farmer participation in cocoa production as the open discussions help address the farming needs and challenges faced by communities.

In addition, creating solid networks between extension providers and village-based cooperatives will enable a better understanding of the constraints and challenges farmers face and allow the development of more suitable and sound extension programs for farmers.

The study has identified significant constraints such as poor management and leadership capacity amongst most village-based cooperatives, which are being addressed through the cocoa training programs by NGIP-Agmark and other PSSPs. The sustainable extension partnerships with cooperatives are built upon strong management and leadership backgrounds amongst leaders of farmer groups. Likewise, similar management and leadership approaches are transferred to households for their sustainable cocoa farming practices as discussed in Chapter 7. Simple business training programs are encouraged for smallholders to shift their traditional farming methods to more commercial approaches (higher input farming) for sustainable production and to incur positive impact on their livelihoods.

### *8.5.2 Recommendation Two: Provide extension and support to farmers all along the cocoa value chain*

It is recommended that public sector extension agencies examine not only the progress of the NGIP-Agmark extension approach in reaching farmers in remote areas but also the impact on smallholder farming practices. There is a need to identify the major socio-economic benefits of the NGIP-Agmark training and their extension support all along the cocoa value chain. As outlined in Chapter 5, the cocoa training and support by NGIP-Agmark to smallholders focussed attention all along the value chain. This included planting material, nursery set up, block management and cocoa husbandry practices, IPDM and CPB management and post-harvest management training (CCIL,

2014; Curry *et al.,* 2011: Gar and McNally, 2020). Thus, the extension approach not only targeted cocoa block management practices but also supported smallholders and farmer groups with accessing seedlings, block management tools and processing facilities.

The lack of an extension focus on all stages of the value chain from seedling to market access has been a major missing link in the traditional extension approach. Smallholders' knowledge of cocoa all along the value chain has improved and enabled them to understand more about the importance of producing quality cocoa. Thus, public extension training and support should be targeted all along the value chain to sustain production and improve farmers' livelihoods. A lesson learnt from the NGIP-Agmark extension approach was that cocoa quality was not a finishing or post-harvest issue, but rather a 'beginning' issue with good seedlings that must be maintained through to post-harvest management practices.

### *8.5.3 Recommendation Three: Encourage extension to target the establishment of farmer groups*

Setting the benchmark with criteria for participation in the cocoa training programs was an effective and focussed strategy by the NGIP-Agmark. The two major extension strategies used were household focussed and through establishing cooperatives or FDGs. As discussed in chapters 6 and 7, part of the success of the NGIP-Agmark extension model, was that it delivered through cooperatives based on interest, with a very strong emphasis on all adult family members (men, women and youth) rather than only household heads, who were typically men. The household approach was overlooked by public sector extension and was probably one of the key reasons for its failings. Cocoa households through cooperatives need to be empowered and regularly engaged with extension training and support, not only with cocoa but other livelihood training that can effectively contribute to sustaining farm families' cocoa production.

### *8.5.4 Recommendation Four: Encourage the incorporation of livelihood training programs into cocoa extension training*

Smallholder agricultural farming systems in lowland PNG have never been fully mono-cropped farming systems; rather, they have tended to be diverse polycultures with flexible farming approaches able to respond to changing economic and environmental situations. The reality of diverse farming and livelihood systems of

cocoa smallholders, highlights the point that cocoa farming cannot be treated separately in extension from households' other livelihoods and daily work commitments. Farmers have food production tasks to complete each day and other social and economic activities that draw labour from cocoa. More recognition of the smallholder cocoa farming system and its relationship to household activities and other agriculture farming practices is needed in extension programs. The NGIP-Agmark extension model linked relevant livelihood training service providers to the company's cocoa training programs. Livelihood training programs in health and nutrition, crop diversification and simple agribusiness training have been incorporated into cocoa training by NGIP-Agmark. Such training initiatives have helped increase cocoa production and improve livelihoods: they should be considered in public sector extension programs. Furthermore, the focus on leadership management in NGIP-Agmark's livelihood training programs has strengthened household leadership which helped mobilise family labour and resources for cocoa farming.

### *8.5.5 Recommendation Five: Improve working collaborations between public and private sector extension providers*

This study discovered that shifting the approach of agricultural extension from the public sector to the private sector led to positive outcomes because it enhanced the business culture and cocoa management skills of smallholders. This has been demonstrated effectively by NGIP-Agmark through its holistic extension approach in partnership with smallholders. There is space for public sector extension to play a coordination role and to perform monitoring and evaluation of extension partnership projects implemented by the private sector. The PPAP cocoa and coffee extension projects have provided a road map for future extension interventions in PNG. However, further studies of the private sector extension approach are required to refine the model so that it can be applied in different contexts such as other cash crops in a range of diverse environments and cultural contexts.

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