BASELINE STUDY ON THE IDENTIFICATION OF LOCAL PRODUCTS IN LAUTEM, VIQUEQUE AND MANATUTO THAT HAVE THE POTENTIAL FOR EXPORT AND TO ATTRACT FOREIGN INVESTMENTS IN AGRICULTURE SECTOR

(*Third Phase*)

FINAL REPORT

Vicente de Paulo Correia
Decio R. Sarmento
Carlos da Conceicao
Oscar da Silva
Jorge Freitas
Duilio Marino G.A.da Silva

NATIONAL CENTER FOR SCIENTIFIC RESEARCH (CNIC) UNTL
AND TRADEINVEST TIMOR LESTE

Dili, 2020

ACKNOWLEDGEMENT

On behalf of the National Center for Scientific Research UNTL we would like to acknowledge the following parties for their valuable support:

- Rector of UNTL – Dr Francisco Miguel Martins
- Executive Director of TradeInvest Timor Leste – Mr Arcanjo da Silva
- Director of Export Promotion, TradeInvest – Mr Decio Sarmento
- Dean of Agriculture Faculty UNTL – Dr Carlito M. Araujo
- Director of the Department of Socio Economic – Mr Vitor Braganca
- MAP Directors of Lautem, Viqueque and Manatuto
- All CNIC staff and Researchers from Agriculture Faculty UNTL

Particular thanks go to our final year students and extension workers which spent most of their time in the field. Finally, our thanks go to stakeholders involve in this study for their guidance and support. This study is possible with the financial and technical supports from TradeInvest Timor-Leste.

RESEARCHERS AND ENUMERATORS

Researchers	Position	Institution
Vicente de Paulo Correia, Ph.D	Coordinator/researcher	CNIC-UNTL
Dr Carlos da Conceição	Researcher	Agriculture Faculty-UNTL
Oscar da Silva, MSc	Researcher	Agriculture Faculty-UNTL
Decio R. Sarmento, MPH	Researcher	TradeInvest
Jorge Freitas, MSc	Researcher	Agriculture Faculty-UNTL
Duilio Marino G.A.da Silva	Researcher	TradeInvest
José da Silva	Enumerator	Agriculture Faculty-UNTL
Walter Oliveira Soares	Enumerator	Agriculture Faculty-UNTL
Delfim da Costa	Enumerator	Agriculture Faculty-UNTL
Januário da Silva Belo	Enumerator	Agriculture Faculty-UNTL
Baltazar E.D.C. Soares	Enumerator	Agriculture Faculty-UNTL

TERMS AND ABBREVIATIONS

ADB	Asian Development Bank
ACIAR	Australian Center for International Agriculture Research
ACELDA	Name of Private firm
Cap	Capita
CNIC	Centro Nacional de Investigacao Cientifica
CLN	Centro Logistica Nacional
CCT	Cooperativa Cafe Timor
DGE	General Statistic Directorate
DNAH	Direção Nacional Agricultura e Horticultura
DNS	Direção Nacional Statistica
FGD	Focus Group Discussion
GDP	Gross Domestic Bruto
GoTL	Government of Timor-Leste
ha	Hectare
IMF	International Monetary Fund
Kg	Kilogram
MAEOT	Ministerio Administracao Estatal e Ordenamento Territorial
MAP	Ministerio Agricultura e Pescas
MAFF	Ministry of Agriculture, Fisheries and Forestry
MECAE	Ministry of State and Coordinator of Economic Affairs
MCIA	Ministerio Comercio, Industria e Meio Ambiente
MoF	Ministry of Finance
MT	Metric Ton
Na	Not available
NGO	Non Governamental Organization
RDTL	Republica Democratica de Timor-Leste
SPSS	Statistical Package for Social Science
TLHS	Timor Leste Household Survey
UNTL	Universidade Nacional de Timor Lorosa'e
VCO	Virgin Coconut Oil
%	Percentage
t	Ton
$	Dollar

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX

EXECUTIVE SUMMARY

As highlighted in the Strategic Development Plan 2011-2030, agriculture has an important role to play in reducing poverty, promoting rural development and assuring Timor-Leste's food security – both through food production and as a principal source of income for many of the rural poor.

The vast majority of agricultural activities in Lautem, Viqueque and Manatuto are small-scale, subsistence agriculture, with minimal inputs, resulting in very low yields. Similarly, there are many impediments to seeing agricultural markets emerge, including lack of financial institutions, poor quality roads, inconsistency of supply and quality, and lack of demand for produce.

Timor-Leste needs private sector agribusiness investment. Productivity levels in Timor-Leste are low by world standards and there is room for the private sector to play an important role in introducing new technologies, providing access to markets, and investing capital in the intensification of production.

The site of the study includes Lautem, Viqueque and Manatuto municipality. Respondents composed of MAP staff (directors, extension workers and others), lead farmers/head of farmer group, head of villages and sub villages, community leaders, lecturers, traders, buyers, agribusiness firm, national and international NGOs, and coordinator of MCIA.

The general objective of the study is to identify and collect information of local agriculture products and livestock in the municipality of Lautem, Viqueque and Manatuto that have potential for export and to attract more foreign investments in agriculture sector.

The existing agricultural crops grown in these municipalities are including food crops (e.g., maize, paddy rice, cassava, etc.), industrial crops (e.g., coconut, candlenut, etc.), horticulture (mustard, cabbage, tomato, etc.), forestry (teak and others), fisheries (fish pond) and livestock such as cattle, buffalos, goats and so on. Despite the existing crops grown by farmers, the study also found a number of new crops introduced by MAP and also agencies/NGOs which includes Konjak (Maek), Vanilla and Rambutan. These new crops are high value crops and grown well in some of these areas.

The study reveals there are eight local potential agriculture products and livestock in Lautem, Viqueque and Manatuto. These products are **Maize, Paddy rice, Coconut, Cattle, Candlenut, Banana, Cassava** and **Tangerine**.

The top five local potential agriculture products and livestock in the municipality of Lautem are **Maize, Coconut, Cattle, Candlenut, and Cassava.** ***Maize*** becomes an important diet for population in this area; So far the area planted was only around 3,800 hectares (19% of the total potential area for maize in Lautem) with the yield of 2.05 t/ha. Thus, coconut plays a pivotal role not only for domestic consumption but it can reach overseas market such as Indonesia. Coconut engages around 8000 households in the production, processing and

marketing of the product. In 2016 the total production was only 336.59 tons. Some small businesses and farmer groups in Lautem engages in the value addition of coconut into Virgin Coconut Oil (VCO), Copra, and Soap.

In addition, **Paddy rice, Maize, Cattle, Coconut and Candlenut** are the top 5 local agriculture products and livestock that is potential in Viqueque. These products offer significant jobs to rural communities, providing incomes, and in terms of market, traders and wholesalers regularly engage in buying and selling of these products to the market.

Viqueque is known as one of the municipalities in Timor-Leste that is potential for ***paddy rice*** production. The center for paddy rice production is in Uatulari, Viqueque Villa and Uatucarbau. Total production in 2019 was around 19,000 tons (equivalent to 11,400 tons of rice) with the yield 4.79 t/ha. This yield is higher than national average which is only around 2.8 t/ha. From 2018 to 2019 the cultivated area for paddy rice increased by 55.2% and the yield increase by 0.24%. The demand for rice in Viqueque is 7,398.32 t/year; while the supply of local rice was 11,464.69 tons annually. This shows there is enough supply to cover the demand needed and there is still an over supply of rice of around 4000 t/year.

One of the local potential products in Viqueque is ***candlenut.*** The potential area is 3,081 hectares; from this 891 hectares are planted with only 480 hectares is productive. There is lack of data about production in Viqueque but in Timor-Leste the productivity per hectare range from 0.5 to 1.0 tons; and this is ten times lower than productivity in West-Timor. The main market for candlenut is West-Timor Indonesia.

The result of the study also reveals that the top 5 local agriculture products and livestock that are potential in Manatuto are **Maize, Banana, Cattle, Paddy rice** and **Tangerine**. The area potential for ***maize*** is 19,896 hectares. From this there is only 5.62% is cultivated with the yield of 1.88 t/ha; this is lower than average national of 2.10 t/ha. The average production of maize per household per year is only 0.84 tons. Indeed, the varieties of maize planted by most of producers are 'Sele' and 'Bisma' which has shown high productivity of 5.0 and 8.7 t/ha respectively. In addition, there is lack of marketing opportunity for this product, and therefore producers only produce enough maize for family consumption.

Banana is one of the types of tropical fruit that growing well in the southern part of Manatuto (Natarbora) and has the potential to develop in an intensive way in the future. Most people in Natarbora involve in the production of banana and the main type of banana produced is 'Hudi Fatuk'. The total area planted is 37.3 hectares with the yield of 30 t/ha. The main market is Dili with small quantities selling through local markets. Traders came regularly in a weekly basis to purchase banana and distributed to Dili.

Local potential agriculture products and livestock produced in Lautem, Viqueque and Manatuto generally are distributed to the market (e.g., local markets and district markets).

Expensive cost of transporting the products and the lack of access to other major markets (e.g., Dili market) are the main reasons most producers rely on local and district markets when selling their produce. Producers also indicated that they have no information about prices and market demand outside local markets.

The ***main buyers*** for these potential products are traders, following by local consumers and collectors. While small percentage of the products is delivered through wholesaler, retailers and others. In addition, the main market is Dili and local markets. Buyers such as local traders play an important role in distributing local potential products to the market.

Most of stakeholders interviewed reveal that producers usually are not ***value-add*** their products before selling to the market. The main reason is because the price offer for value-add products is very low, lack of labor and capital, lack of information on the importance of add-value to the product and lack of knowledge and skills. Meanwhile, there are a number of producers that always perform value-add activities for their produce before deliver to the market. The products that normally go through value-add include coconut, candlenut, paddy rice and maize.

In terms of ***prices*** for local potential agriculture products and livestock, it varies according to the type of products, timing of selling, demand and supply and the site where the product is bought. For example, the price for one-kilogram maize in Viqueque is 0.40 cents while in Manatuto 0.45 cents. In addition, for candlenut price in Timor-Leste is determined in West-Timor market, which in turn is determined in Surabaya. As most of candlenut is exported to Indonesia and sold in Indonesian currency, the USD/Rupiah exchange rate is very important and it is the main reason for the fall of candlenut prices in Timor-Leste.

Producers usually perform ***grading*** for the product before sell it to market. The type of grading activities conducted is very basic which includes size, maturity and cleanness. Indeed, the price for graded products are little bit better compared to those product that is not graded. Products that usually graded before deliver to market include banana, maize, coconut, tangerine, candlenut and cassava.

The main ***constraints*** faced in the development of these potential products in these municipalities are low input use, low output prices, lack of financial support, lack of skills, poor quality products and others.

Despite the constraints as mentioned, the ***opportunity*** offers for the development of these products including opportunity to increase production and productivity, promote more value addition products, high demand for bovine meat both for domestic and overseas market, opportunity to improve quality of local rice and open more land for cultivation.

From the analysis it shows most of the local potential agriculture products and livestock are in high demand for both domestic and export market. Bovine meat for example, it has a high demand in the domestic market; thus, candlenut and copra it has a good demand in

Indonesian market. The domestic demand is constrained by lack of buying power resulted for the low income of most of the Timorese population except for Dili market. From the supply side, there always lack of sustainability to supply to the market to fulfill the demand needed. Finally, the result of the study clearly demonstrates that there is a potential to develop local potential agriculture products and livestock in Lautem, Viqueque and Manatuto.

To develop these potential products in the future, it is **recommended** that government and private sectors agencies involve in agriculture sector needs to provide supports and assistance which include enhancement of knowledge and skills for chain actors, make input available locally, regular price information is needed, improvement of the existing local markets, financial support for agribusiness firms, and enable environment for private sector investment in agriculture sector.

.

I. INTRODUCTION

Agriculture is one of the country's main economic activities, constituting the primary source of employment for 84 percent of the labor force (MoF, 2008), and contributing 97.7 percent of non-oil exports. As highlighted in the Strategic Development Plan 2011-2030, agriculture has an important role to play in reducing poverty, promoting rural development and assuring Timor-Leste's food security – both through food production and as a principal source of income for many of the rural poor (GoTL, 2010a; GoTL, 2012; World Bank, 2007). Since independence, Governments of Timor-Leste have invested significantly in the sector (MAP 2014) with the objective of increasing production and productivity, and improving rural livelihoods, but with limited success. The increase in food production has not kept pace with the fast population growth.

Between seventy and eighty percent of population in Timor-Leste relies on agriculture for their livelihood with seventy percent of the poor live in rural areas. The majority of rural populations are engaging in subsistence agriculture where the marginal and average productivity of the labor is low.

The key challenge facing policymakers in the agricultural sector is that of converting the sector's potential to drive growth and poverty reduction into reality. There are a number of structural obstacles to overcome in order to see an improvement in agricultural productivity and to build well-functioning markets. The vast majority of agricultural activity is small-scale, subsistence agriculture, with minimal inputs, resulting in very low yields. Similarly, there are many impediments to seeing agricultural markets emerge, including lack of financial institutions, poor quality roads, inconsistency of supply and quality, and lack of demand for produce (Lundahl and Sjoholm, 2013).

Private investment has the potential to make a positive impact to the country, particularly investing in small-scale producers in agricultural sector is very important. This is due to the most of small farmers in developing countries that support almost one third of the global population (Sahan & Mikhail 2012). Therefore, there is an opportunity for public and private investment to make a substantial positive impact on the livelihoods of small-scale food producers.

In addition, Timor-Leste needs private sector agribusiness investment. Productivity levels in the country are low by world standards and there is room for the private sector to play it's role in introducing new technologies, providing access to markets, and investing capital in the intensification of production.

Due to its significant contribution to the development, agriculture sector becomes one of the priority sectors in the Strategic Development Plan 2011-2030. As a priority sector, agriculture in Timor-Leste can provide more opportunities for investors particularly in rural areas where most of the population is concentrating and depending on this sector.

To develop agricultural sector in Timor-Leste and to attract local and foreign direct investor, the government of Timor-Leste through its investment and export promotion agency, as so called TradeInvest needs to do more promotion regarding to the potentiality of this sector including quantity of productions, types of products, agricultural infrastructure, market linkages and others. For a promotion to be successful, information or data as mentioned are very crucial.

Currently, there is a lack of information on the issues mentioned above. Therefore, TradeInvest Timor-Leste in cooperation with National Center for Scientific Research (CNIC) – UNTL conducted a Baseline Study in order to identify and collect information regarding the potentiality of agricultural products in Timor-Leste (e.g., quantity of production, types of products, market linkages and others).

II. OBJECTIVE

The general objective of this study is to identify and collect information of local agriculture products and livestock in Lautem, Viqueque and Manatuto municipalities that have potential for export and to attract more foreign investments in agriculture sector. The specific objectives are:

- To identify types of local agriculture products and livestock existed in Lautem, Viqueque and Manatuto municipalities;
- To identify local potential agriculture products and livestock in these areas;
- To identify the quantity of local potential agricultural product and livestock produced in Lautem, Viqueque and Manatuto municipalities;
- To identify demand and supply trend and price index;
- To identify major opportunities and constraints at different places in the market chain for agricultural, livestock and forestry products; and
- To map out the agricultural potentiality of each area in Timor-Leste.

III. RESEARCH PROBLEM

Agriculture sector has not achieved yet its potentiality. Although, government supports have provided high assistance to this sector, agriculture productivity to date remains low, which can be due to weak agricultural management and practices. In one hand, agriculture sector has the potential to contribute to national GDP. On the other hand, there is a lack of private investment in this sector.

In order to diversify Timor-Leste's economy, the VI Constitutional Government through the Ministry of State and Coordinator of Economic Affairs (MECAE) has put a significant effort to improve the investment climate by re-establishing TradeInvest Timor-Leste as a Public

Institute responsible for investment and export promotion. TradeInvest Timor-Leste has been created under the government Decree Law number 45/2015 of 30th December, with some main functions to promote Timor-Leste's investment and export potential, to attract foreign direct investors, to stimulate more national investment and to facilitate both national and international investors during pre-investment and post-investment.

For the purpose of accelerating investment in Timor-Leste, particularly in Agricultural sector, there is a need to collect a credible base line data. With a credible data, it will help develop this sector as well as attracting more local and foreign investors to invest in the country. Therefore, the research problem is "how to obtain credible and comprehensive data" from producers and relevant institutions in Timor-Leste. A good quality data can contribute to a successful promotion of this sector. This can help TradeInvest to promote local agriculture products that are potential for export to niche local market and international market".

IV. RESEARCH APPROACH

This research was implemented in three municipalities such as Lautem, Viqueque and Manatuto. The reason for choosing these municipalities as a research site is because of the potentiality of the local agricultural products such as paddy rice, maize, coconut, cattle and others. Despite this, in the past some of these sites are also known as major production of paddy rice, coconut (copra) and also pig.

The population in this study constituted of farmers, community leaders, MAF staff, extension workers, NGOs and International Agencies, private sector engage in agriculture sector and other relevant institutions with the total of 220 respondents. These populations were treated as sample for the study. Methods used were 'Stratified Random Sampling'.

Data collected includes primary and secondary data (both quantitative and qualitative data and the methods used for gathering the data composed of direct interview/face-to-face, FGD, in-depth interview and review of literature related crop production and marketing and others.

In addition, Participatory Rural Appraisal was used in this study such as physical field survey of the study areas. This study also used a semi-structure interview with community leaders, government institutions and local and international NGOs in order to understand institutional framework, available basic resources and organizations in the study areas. Other direct observation and documentations were also applied into this study.

The data was analyzed by using qualitative and quantitative analysis. In addition, supply chain analysis was carried out to develop a description of the value chain to identify potential high value market areas and current and potential products in the domestic and export markets in relation to the volume, specification, value and growth trends. Thus,

computer-assisted qualitative and quantitative data analysis software was used in this study.

V. CONCEPTUAL FRAMEWORK OF THE STUDY

The agricultural sector has long been recognized as an important sector and plays a significant role in the development process within many developing economies (Pingali 2006). Joshi et al. (2007) found that there has been a trend towards more commercialized farming, greater private-sector participation and a re-defined role of the government. The successful experience from the Asia-Pacific region indicated that the agricultural sector could be used to mobilize and foster economic growth in the first stages of economic development and be transformed from subsistence to a market-based system (Joshi et al. 2007). To accelerate economic growth, there is a need to modernize agricultural production, requiring markets for both inputs supply and for the sale of products and services.

In the case of Timor-Leste, agriculture is the main activity and the majority of its population depends on this sector. Thus, there are varies of crops growing by small-scale producers and the economics of scale of the farm is very small. Apart from the variety of crops growing by the household, there are a number of crops that is very potential in terms of production and market opportunities both for domestic and export market. In addition, these potential crops can attract foreign investment into the country and also local private investment. Therefore, the identification of the potential products is needed to provide comprehensive information related to the production, market opportunities, prices, demand and supply and other. If those potential crops identified can attract foreign investment and provide opportunities to local private investment in agriculture sector it will result in an increase of agricultural production. This will further impact to the rising in household income and in the end it will contribute to the reduction of unemployment and poverty in Timor-Leste

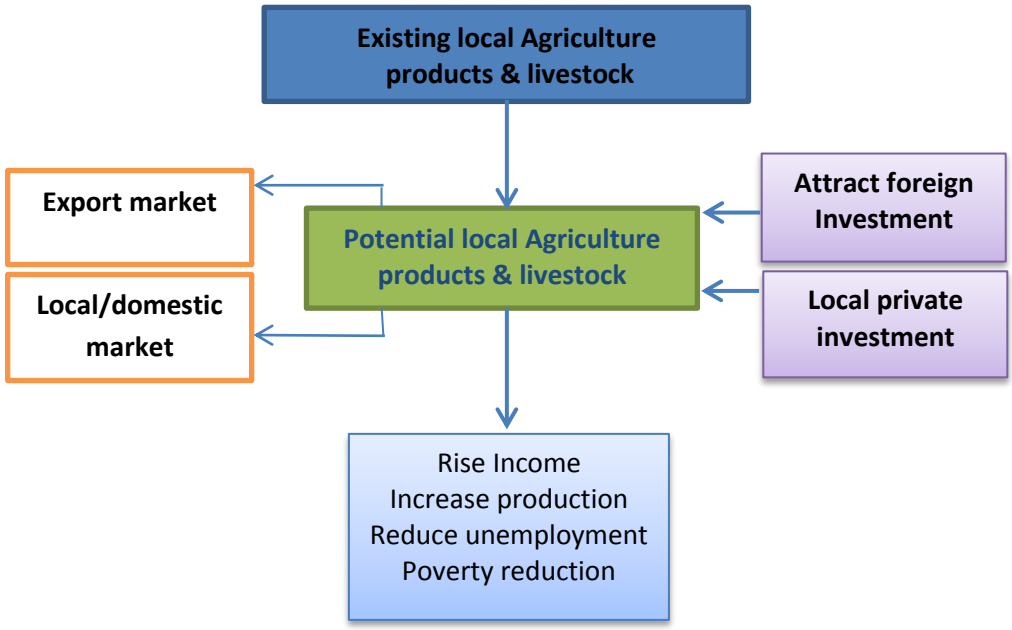


Figure 1. Conceptual framework of identification and development of local potential products

VI. LITERATURE REVIEW

Large investment in agriculture sector is significantly needed to help increase the production and marketing of agricultural products. This will further contribute to the increase in income for rural population and poverty reduction.

Private investment of all forms has the potential to make a positive impact. Therefore private sector play an important role in delivering inclusive economic growth, environmental sustainability and poverty reduction. To achieve this it must be adequately regulated and should adhere to some key principles, such as focusing on local food markets, working with producer organizations and respecting the rights of small-scale producers, workers and communities.

The main objective of government of Timor-Leste for agricultural sector is to enhance agricultural production, productivity and rural livelihoods. Therefore, investment in agriculture is a fundamental instrument to provide food and nutrition security, reduce poverty, create employment, generate sustainable broad-based economic growth, ensure environmental sustainability (MAP 2012). From 2008 – 2016 government of Timor-Leste has already investing in agriculture sector, which includes irrigation, tractors, free land preparation, seeds, agricultural equipment's and others with the total of $218.4 million dollar (RDTL 2011; National Commission for Research and Development; MAFF 2008; RDTL 2007). However, such investment has not yet produced the desired results, and Timor-Leste remains strongly depended on food imports, its agricultural production remains below potential and household food and nutrition security are still unsatisfactory.

Sahan and Mikhail (2012) pointed out government investment into small-scale producers is also a key to both attracting more private investment in small-scale agriculture as well as improving the impact of any such investment.

According to MAP (2012) approximately 75 per cent of Timor-Leste's population lives in rural areas, and most of their livelihoods derive from agriculture. About one third of the country's non-oil GDP is generated from the agriculture sector. In addition, industrial tree crops (mainly coffee) contribute about 23 per cent of export earnings and account for about 80 per cent of non-oil exports. Given its size and influence, Timor-Leste's agricultural sector can generate employment and increase incomes through sectoral development.

Timor-Leste's major farm commodities are food crops (maize, rice, peanut, cassava, and sweet potato), tree crops (candlenut, coconut, coffee, cinnamon, and cloves) and livestock. Coffee is the country's primary non-oil export and approximately 28 per cent of households earn some form of income from coffee (IMF 2011). In 2005 alone, coffee exports equaled $7.6 million, with 49.2 per cent going to the United States followed by Germany (20.7%) and 12 per cent to Portugal. In addition, coastal fisheries appear to have significant economic potential, but they are also vulnerable to overexploitation. Offshore resources include tuna, deep-sea snappers, and deep-sea shrimp, but the sustainable quantities of these resources remain very uncertain (ADB 2011).

As the majority of the population engaged in agriculture sector, raising farm output and income become a key development priority for the country and this can be done through improving agricultural productivity. Other key priorities include development of more effective agricultural markets, policies promoting investment in value-added and export commodities, and better information on prices and export opportunities.

A study done by Sendall (2006) estimates that Timor-Leste currently does not produce enough of the main commodities to feed itself, let alone produce a surplus for export. Therefore, there is an urgent need to increase agricultural production and productivity in Timor-Leste, to satisfy local demand, and produce a surplus for export. Increased economic activity within the sector, particularly trade, will provide employment and additional income across every municipality in Timor-Leste. Rahim (2005) added Timor-Leste has certain attributes that on paper lend it to being suitable to grow produce that could be sold in export markets. One example of this is snow peas. However although it is possible to work up, certain quantities of produce can be grown, certain volumes can be shipped and external markets are of a certain size. Thus, there appears to be considerable potential to diversify crop production for both local consumption and export (World Bank 2010).

Sahan and Mikhail (2012) concluded that a positive agricultural investment can benefit investors, small-scale farmers, communities and government. Therefore, government should give priority to investments in key public goods including capacity building, infrastructure, and research systems to help small-scale farmers who are not yet market-

ready to ensure their food security and livelihood. Private sector on the other hand should complement public sector investment.

VII. RESULT AND DISCUSSION

7.1 Characteristic respondent

This study covers 3 municipalities (Lautem, Viqueque and Manatuto), 11 Sub-Districts, 48 Villages and 110 Sub-Villages. The respondents constituted of MAP staff (directors, extension workers and others), lead farmers/head of farmer group, head of villages and sub villages, community leaders, teachers, traders, buyers, national and international NGOs, and coordinator of MCIA in those areas with the total of 220 respondents. The gender distribution constituted of 84.1 per cent male and 15.9 female with the average age of 47.7 years old. In terms of education, most of respondents have access to education as indicated by the number of illiterate, which is very low of only four percent. The detail of the characteristic of respondents is shown in Table 1.

Table 1. Characteristic of respondent

Description		
Total respondent (people)		220
Gender (%):	Male	84.1
	Female	15.9
Average age (year)		47.7
Education (%):	Primary school	46.8
	Secondary school	37.0
	University	12.2
	Not school at all (illiterate)	4.0
Occupation (%):	Farmer	33.2
	Community leader	34.1
	Public servant	21.8
	Trader	2.3
	Private sector	4.5
	Agencies/NGO staffs	4.1

Table 1 show the occupation of respondents generally is farmers, community leaders and public servant with small percentage of them as a traders, and private sector, which engage in producing, buying and selling of agricultural products in these areas.

7.2 Existing local agriculture products and livestock in Lautem, Viqueque and Manatuto

Respondents in particular producers in these areas generally grown food crops (e.g., Maize, paddy rice, cassava, etc.), industrial crops (e.g., coconut, candlenut, etc.), horticulture

(mustard, cabbage, tomato, etc.), forestry (teak and others), fisheries (fish pond) and ivestock such as cattle, buffalos, goats and so on. In addition, there is certain crops that typically grown well in some areas because of the climate and geographical condition such as altitude, soil and water availability. For example, in Lautem there is an availability of large area of pasture and therefore cattle and buffalos raised well in this area. Lautem is also known as center maize production in Timor-Leste; while Viqueque is famous of the production of paddy rice in particular in Uatulari and Uatucarbau; Thus Manatuto is potential for maize and some horticultural crops.

Despite the existing product grown by farmers for many years, the study also found that there are number of new crops introduced by MAP and also agencies/NGOs. These crops are Konjak (Maek), Vanilla and Rambutan. These new crops are high value crops and grown well in some of these areas.

7.3 Potentiality of the local agriculture products and livestock in Lautem, Viqueque and Manatuto

The "potentiality" of local agriculture product and livestock in this study is defined as:

- Product that has a significant contribution to the municipality overall production
- Current level of production
- Product that in terms of the existing market is still available and also has the potential for export
- Products that involve a significant number of households in the producing and marketing and also providing income for population in these areas

Based on the criteria of the potentiality as mentioned, the study reveal there are eight products which included in the top five local potential agriculture products and livestock in these municipalities. These products are **Maize, Paddy rice, Coconut, Cattle, Candlenut, Banana, Cassava and Tangerine**. The detail of local potential agriculture products and livestock for each municipality is shown in the table below.

Table 2. Top 5 local potential agriculture products and livestock in Lautem Viqueque and Manatuto

Municipio	Top 5 local potential agriculture product and livestock				
	1	2	3	4	5
Lautem	Maize	Coconut	Cattle	Candlenut	Cassava
Viqueque	Paddy rice	Maize	Cattle	Coconut	Candlenut
Manatuto	Maize	Banana	Cattle	Paddy rice	Tangerine

Based on the discussions with stakeholders, deep interviews with lead farmers and face-to-face interviews with community leaders and farmers, most of them describe that these products are potential because it engage a significant number of population to produce and also the income of the population in Lautem, Viqueque and Manatuto derive from these products. In terms of marketing, for certain potential product (e.g., banana and cattle) the demand is quite high as there is a regular (weekly) supply from these areas to the Dili market. For coconut (copra) and candlenut it has being exporting to Indonesia and Australia (as Virgin Coconut Oil).

7.3.1 The potentiality of local agriculture products and livestock in Lautem

Lautem is one of the municipalities in Timor-Leste, which located in the east part of the country. According to DGE (2016) the total population was 65,240 people with gender distribution of 32,062 male and 33,177 female. The total household was 12,050 with the household size of 5.41 (DGE 2015). Administratively the municipality of Lautem composed of 5 sub-districts, 34 villages and 151 sub-villages with the total area of 1,813.11 square kilometer (MAEOT 2016).

Most of the population in Lautem depends on agriculture as a source of income. Total area for agriculture sector is 189,647.65 hectares (DNAH Lautem 2015) with the majority area (134,147.40 ha) destined to forest. The major crops cultivated by most of the population in Lautem are including maize, cassava, coconut, horticulture crops, paddy rice and others. Meanwhile cattle, buffalos, goats, chicken and horse are livestock that generally raised by population in this area. Farmers generally still applied traditional and semi-traditional system in managing their farm with some is moving from subsistence to commercial farming (e.g., raising poultry in an intensive system as a business).

The result of the study revealed that the top five local potential agriculture products and livestock in the municipality of Lautem are **Maize, Coconut, Cattle, Candlenut** and **Cassava**. Most of the stakeholders interviewed describe that these products play an important role in providing food security and also income for most of the population in Lautem. Maize becomes an important diet for population in this area; and coconut plays a pivotal role not only for domestic consumption but it can reach overseas market such as Indonesia.

Maize - Lautem is one of the municipalities that is very potential for maize production in Timor-Leste. As maize becomes an important diet for most of the population in Lautem therefore farmers continue to grow this crop by expanding the area of production and also increase the yield of maize. The total household growing maize in Lautem is 9652 household – around 80 percent of the total household in Lautem (DGE 2015). The potential area for maize

production is around 20,000 hectares. From this potential area, there was only 3,799.79 hectares (19%) was planted in 2016 (DNAH Lautem 2016). In addition, the area harvested was 3,048.64 hectares with the total production of 6263.55 tons and the productivity of 2.05 tons per hectare.

From the area planted in 2016, there are 16,200.21 hectares (81%) of that potential a rea still abandoned; the main reason for the abandon of this potential area are including lack of market opportunities, lack of labor and lack of capital. If Lautem can maximize the potential area by 50 per cent only (yield 2.05 t/ha) it can produce around 20,500 tons of maize per year; furthermore, if the yield can be increase by 3.00 tons per hectare, the total production will rise up to around 30,000 tons per year.

With the per capita consumption of maize of 90 kilograms per year (TLHS 2004; MAF & IMF 2011) it means Lautem will need 5871.60 tons of maize per year. From the current production of maize of 6263.55 tons, it indicated that there is a surplus of production of 391.95 tons per year.

Most of maize produced in Lautem (80%) is for home consumption and the rest is for selling to the market. In fact maize producers in Lautem want to sell more their produce to the market but the volume purchased by traders/buyers is very limited due to the lack of market for this product. The main market is Lospalos and Baucau with some small quantities distributed to Dili market. The average price for maize in Lautem is US$87.5 per drum (1 drum = 200 kg of dry maize) or 0.44 cents per kilogram.

In addition, assumed that 20 percent (1,252.71 tons) of maize are distributed to the market it means it can generate an income of US$551,192.4 per year (average of US$57.1/household). Thus, if 60 percent of total current production can be selling to the market with the average price as mentioned, it means producers will receive revenue of US$1,377,891 (US$142.8/household). This is clear that market availability is an important factor for generating household income in particular in rural areas. Furthermore, if the productivity of maize can be improve this can further contributed to the rising in income for maize producers in that area.

Coconut - Coconut is growing well in Lautem. This can be seen through the area that is potential of about 10,000 hectares. From this, around 2,400 hectares (24% of the potential area) was cultivated. The total production in 2016 was 336.59 tons with the yield of 0.24 ton per hectare (DNAH Lautem 2016). In addition, it is around 8000 household (66% of the total household) are involving in the production of this crop (DGE 2015).

In Lautem, coconut can be value adding into a number of products. These products include Virgin Coconut Oil (VCO), Copra, and Soap. This kind of activities continues to develop to a

more specific quality product to fulfill the demand of the market both in Timor-Leste and overseas market. A discussion with one of the coordinator of small VCO industry (Ms Mafalda da Costa) in the village of Souro known as 'Homemade Natural Cold Pressed Coconut Oil" revealed that this small business industry can process about 900 coconut per day, and from this it produce around 90 litters of VCO a day (10 coconut = 1 litter VCO). If the production of VCO is sustainable it needs 32,850 coconuts per year. This will produce around 3,285 litters VCO annually. In terms of marketing, so far VCO from Lautem is marketed through domestic market (e.g., Lospalos and Dili market) and exported to Australia. The price for one litter VCO in domestic market is US$9.50 and for exports US$17 per litter. Based on the total production of VCO and the price mentioned for domestic market, this can generate revenue of US$31,207.5/year. For the export market it will generate an income of US$55,845 annually.

Despite the VCO small business enterprise that already established in Lautem, people are also organize themselves into groups to produce VCO. According to MAP (2015) there were six groups of producers that regularly produce VCO in Lautem for selling to domestic market. The average selling price is US$3.00 per liter. In 2015 these groups produce 460 litters. This small business enterprise contributes significantly to the economy of population in Lautem in particular coconut producers.


Copra

While for copra it exported to Indonesian market through Atambua-NTT. The average buying price of copra from producers is 0.15 cents and the selling price is 0.27 cents per kilogram. Based on the discussion with coconut producers it revealed that the price of copra is very low and therefore it affects their motivation to produce more copra for export. Thus, producers are also selling their coconut direct to the local market with the price of one dollar for 4-5 coconuts.

For the supply chain of VCO and Copra it can be described as follow. For VCO, producer's normally selling their coconut to VCO processing center than the center will process all the coconuts (e.g., grading, cleaning, heating, and pressing). Than it go to packing and labeling before finally distributed to the market. The activities starting from cleanup the coconut until labeling all is done by women's. For Copra, producers normally distribute their copra to the trader in Lautem, than the trader will dry the product for certain days – than packing, weighted, and transported to the wholesaler in Dili before it further distributed to Atambua, NTT Indonesia. The detail of the supply chain for VCO and Copra can be seen in Figure below.

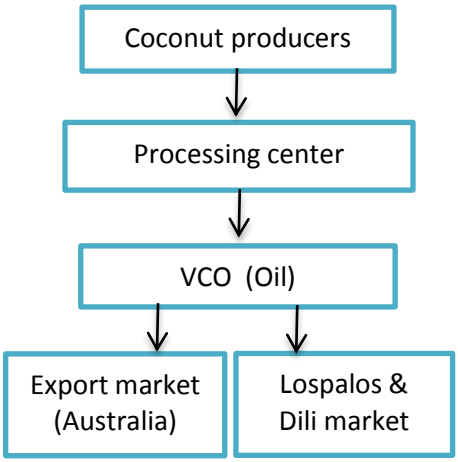


Figure 2. Coconut Oil supply chain

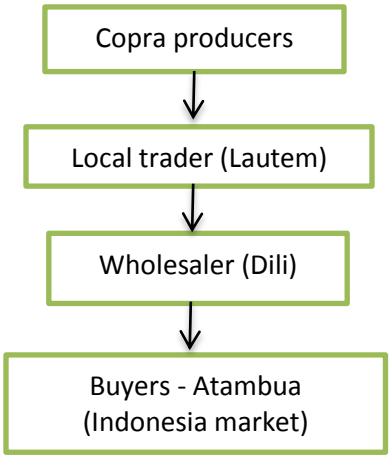
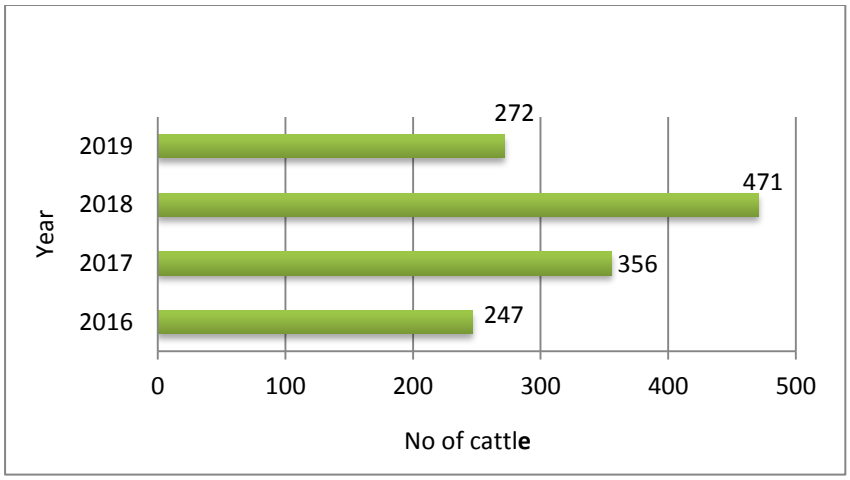


Figure 3. Copra supply chain

Cattle - The municipality of Lautem has an extensive area of natural pasture with a total area of 19,879.50 hectares (DNAH Lautem 2015). Because of this, large animals such as Cattle (include buffalos and horse) are growing well in this area. General Directorate of Statistic (2015) reveal that the total household engages in raising cattle was 4113 (34% of the total household) with the total number of cattle raised of 16,114 heads (Servico Municipal de Agricultura Lautem 2019). Most cattle raise in an open pasture (traditional system) – cattle owners generally bring their cattle's to the natural pasture in the morning and fenced it in the afternoon. So f ar there is no intensive way of raising cattle (e.g. fattening system) in Lautem.

The main buyers are traders who regularly purchase cattle in Lautem and distributed to Dili market. There is a small number of cattle selling in local market to fulfill consumer demand for beef. Data from transit station established by Ministry of Agriculture and Fisheries shows that the total of cattle distributed to Dili market from 2016 to 2019 reach 1346 heads – average 337 heads per year (Servico Municipal de Agricultura Lautem 2019). The detail of cattle delivered to Dili market is shown in Figure 4.

In terms of price, it range from US$150 – US$1500 per head; and this depending on the demand of the market, physical appearance, timing of selling and the customer necessity (e.g., tradition/culture, children schools and so on). The average price in Lautem is US$850 per head and the average price for beef is US$7.00 per kilogram. In addition, the average owned of cattle per household is four cattle's. With the average price as mentioned and assumed that in one year they can only sell two bulls it can generate an income of US$1,700 per household. This contributed significantly to economy of rural household in Lautem.



Source: Servico Municipal de Agricultura Lautem 2019

Figure 4. Number of cattle delivers to Dili Market (2016-2019)

The national consumption level annually for bovine meat is 1.19 kilogram per capita per year (Varela 2014). This consumption level is lower compared to Indonesia of 2.5 kilogram and an average of least developed countries of 4.8 kilograms (Scott et al. 2016). The income per capita of most of the population in this country contributed significantly to the low consumption level of bovine meat. Therefore consumer cannot afford to buy expensive product and they prefer to purchase other meat products that is cheaper (e.g., chicken). The national Statistic Directorate (2011) revealed that the mean per capita income per month in Timor-Leste is quite lower of $62; which for urban areas $93 and rural areas $50.

With the consumption level of bovine meat of 1.19 kilogram per capita per year, it means the demand of bovine meat for Lautem is 77.64 tons (776 heads) per year. Meanwhile, based on the total number of cattle in Lautem of 16,114 heads or equivalent to 1611.4 tons of bovine meat (100 kg carcass weight per cattle), this indicated that Lautem is more than enough to supply bovine meat to its population. Based on the demand and supply of bovine meat in Lautem, it shows that there is an oversupply of bovine meat of 1,533.8 tons (15,338 heads) per year. The oversupply of bovine meat can be distributed to Dili market; as the demand for beef in Dili is quite high around 800 tons per year (Scott et al. 2016). This high demand resulted from the annual population growth rate nationally that is quite high of 2.41% and rising of the income of the population in particular Dili. This will provide an opportunity for cattle producers in Lautem to supply cattle to Dili market. In addition, if considered that all cattle's (bovine meat) are sold with the price of $7.00 per kilogram it will generate an income of US$11,279,800 per year (US$2,742.5/household/year).

Candlenut - Candlenut is a plantation crops that broadly grown across Timor-Leste including Lautem. It is one of the local potential products in this municipality. This plant can grow well in a variety of conditions including tolerates poor soils and rocky slopes, tolerant to drought and resistant to disease. The total potential area for candlenut is 3081 hectares, and from this it is only 591 hectares was planted (MAP Lautem 2015). From the total area planted, there is around 300 hectares (10% of national productive area) considered as 'productive' (National Directorate of Coffee & Industrial Crops 2015). The annual production of candlenut in 2015 was 153.25 tons with the yield of 0.5 tons per hectare (DNAH Lautem 2016). This crop has the potential to increase the income of rural population in particular rural women and their household in this area, as they would benefit from managing, producing and marketing of candlenut product.

The main buyers for candlenut in Lautem are local traders from Baucau and also Lautem. In the past there were around 10 local traders, which purchase candlenut from producers and sell it to wholesalers in Dili. Nowadays, because of the low demand from Indonesia buyers resulted from the depreciation of Indonesian 'Rupiah' to US dollar therefore there is only three to five local traders that engage in buying and selling the product in Lautem. The reduction of the number of buyers affects the quantity of the product purchased and the price offer to producers. For example, in the past the average price offered to producers for one kilogram candlenut with 'kernel' was 0.30 cents and 'cracked kernel' (nut) 0.50 cents per kilogram (MAFF and University of Hawaii 2006).

In addition, the current price offered to producers in Lautem is 0.15 cents per kilogram for candlenut with kernel and 0.17 cents for cracked kernels. Based on the discussions with producers it shows that as a result of the lower price offered most producers in Lautem only sell candlenut with kernel. From trader perspective it revealed the average price offered by wholesaler in Dili is quite lower and this further resulted to the price provided to producers. For example, the selling price for one kilogram of candlenut with kernel is 0.27 cents; while for cracked kernel is 0.75 cents per kilogram. As a result of low price, most producers can only sell candlenut with kernel. The main reason is that the value adds from candlenut kernel to crack kernel (nut) is not followed by the premium price offered.

Candlenut is mostly produced for export. Total export of candlenut from 2005 – 2010 was 4,478 tons (Ministry of Commerce, Tourism & Industry 2010). However, as the prices become too low, farmers stop harvesting and divert labor time to other activities. The main market channel for candlenut is as a food ingredient in Indonesia, whereby candlenut kernel is exported overland to Atambua and further enters the Indonesian supply chain. Local traders purchase candlenut (kernel) from producers and deliver to wholesaler in Dili. Wholesaler will process all the products (kernel and nuts) – such as packing, weighting and

transporting to Atambua. The detail of supply chain for candlenut in Lautem is shown in Figure 5.

Figure 5. Candlenut Supply chain

According to Krisnawati et al. (2011), in one hectare can be planted 250 trees of candlenut and one tree can producing around 80 kilogram candlenut per year. Based on the total productive candlenut area in Lautem of 300 hectares means it can produce 6000 tons of candlenut per year. If assume that all of the quantities as mentioned sold with the current price of candlenut kernel of 0.15 per kilogram, this can generate revenue of US$900,000 annually.

Candlenut provides significant opportunities as an income generator for poor, rural populations in Timor-Leste. However, to improve the income of rural population it is important to value adding the products to high quality for niche market instead competing in mass markets based on volume and price. For the least, Timor-Leste is largely at a competitive disadvantage for exporting basic candlenut products to the global market (USAID 2015), which is due to the lack of market development, poor infrastructure and small-scale, subsistence-oriented production.

Table 3. Total export of Candlenut (2005-2010)

Year	2005	2006	2007	2008	2009	2010
Total Export (MT)	1009	1070	344	1094	459	502

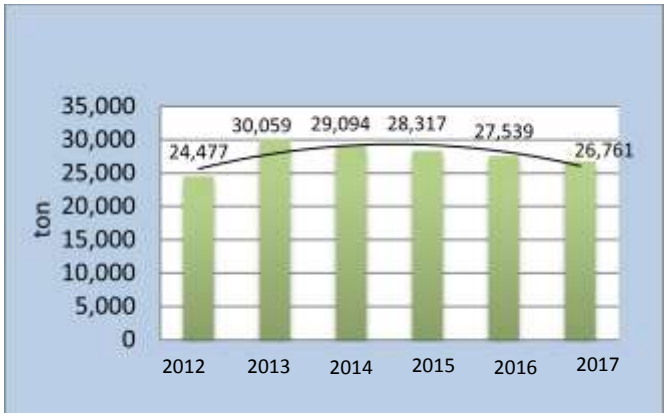
Source: Ministry of Commerce, Tourism and Industry, 2010

Cassava - It is one of the local potential products in Lautem that engages a significant number of household (7863 household) in producing the product. Cassava also becomes an important subsistence crop as most rural population continues to grow as food security for their families. The total potential area for cassava is 2020.2 hectares and the area planted in 2017 was 538.3 hectares (Servico Municipal de Agricultura Lautem 2017).

Cassava produced in Lautem generally for own consumption with small volume delivers to the local market. Cassava that distributed to the market mostly is fresh cassava and the price is 0.05 cents per kilogram. Because of the price paid that is very low therefore this product is not attractive to motivate producers to produce for the market.

Cooperativa Café Timor (CCT) is one of the private sectors that not only concentrate in coffee but also diversify its business into other commodities including cassava. Lautem is one of the CCT branches, which prioritize certain commodities to be developing such as Robusta coffee, Pepper, Moringa, Clove, Cassava and Manggo. The consideration for developing and producing cassava in Lautem shows that this municipality in terms agronomic condition is suitable and also the availability of land and climate is quite favorable. According to Mr Guimaraens (CCT coordinator in Lautem) cassava grown by CCT is a new variety that develops to fulfill the demand of raw materials for producing beer in Dili. This new variety is already distributed to producers in Lautem. Producers that organize into group will produce cassava and sell it to CCT with the price as mentioned. Despite this, CCT also has its own land for growing cassava.

According to FAO.Stat (2018), the production of cassava in Timor-Leste from 2012 – 2017 was fluctuated. For example, in 2012 the production was 24,477 tons, and in 2013 in increase to 30,059 tons, than in 2017 it decrease to 26,761 tons per year. The detail is shown in Figure below.



Source: FAO.Stat 2018

Figure 6. Production of Cassava in Timor-Leste (2012-2017)

As one of the raw materials for producing Beer, this offer an opportunity for producers in Lautem to produce more cassava so that it can fulfill what is demanding by the market and the sustainability of the produce can be maintained.

Table 4. Description of local potential agriculture products and livestock in Lautem

Description	Top 5 local potential agriculture products and livestock				
	Maize	Coconut	Cattle	Candlenut	Cassava
Household number	9652	8092	4113	Na	7863
Production (t/year)	6263.55	336.59	16,114 head	153.25	1883
Productivity (t/ha)	2.05	0.24	4 cattle's/hh	0.5	Na
Main market	Lautem/ Baucau/ Dili	Dili - VCO Indonesia – Copra Australia - VCO	Dili	Indonesia	Lautem
Average price ($/kg)	0.44	0.20/coconut	7.00 (850/head)	0.15 (Kernel)	0.05
Consumption level (kg/cap/yr)	90	Na	1.19	Na	Na
Demand (t/yr)	5871.6	Na	77.64	Na	Na
Current supply (t/yr)	6263.55	336.59	1611.4	153.25	
Export (t/year)	Na	Na	Na	746.33	Na

Source: TLHS 2004; MAF 2010; MAF; NSD and UNFPA; RDTL; IMF 2011; MAP 2012; Varela 2014; DNAHE-MAF 2015; DGE 2015; Scott et al 2016; MAP Lautem 2019

7.3.2 The potentiality of local potential agriculture products and livestock in Viqueque

The municipality of Viqueque situated in the south part of the country. Administratively it constituted of 5 Sub-Districts and 36 Villages with the total area of 1,880.39 square kilometers (MAEOT 2017). The total population is 77,877 with total household of 15,297 and the household size of 5.82 (DGE 2015;).

Most of the population in Viqueque depends on agriculture as a source of food security and income. The main crops grown include paddy rice, maize, cassava, coconut, banana, horticulture crops, soybean, green bean and others. For livestock, cattle, buffalos, pig, chicken and horse are animals that generally raised by most of the population in Viqueque. Most farmers still practicing traditional ways in managing their farm and this resulted in a low production and productivity of the crops planted.

The study found that **Paddy rice, Maize, Cattle, Coconut** and **Candlenut** are the top 5 local agriculture products and livestock that is potential in Viqueque. Stakeholders interviewed pointed out these products offer significant jobs to rural communities, providing incomes, and in terms of market, traders and wholesalers regularly engage in buying and selling of these products to the market. The majority of the population in Viqueque relies on these products for cash and also basic food necessities.

Paddy rice - Viqueque is one of the municipalities known as potential area for paddy rice production in Timor-Leste. The center for paddy rice production in Viqueque is in the Sub-District of Uatulari, Viqueque Villa and Uatucarbau. The total household engage in the production of the product is 9,115 or around 60 percent of the total household (DGE 2015) with the total potential area of 9,793 hectare. From this, there are only 3,987.92

hectares (41%) was planted with the total production of 19,107.81 tons and the yield of 4.79 tons per hectare (MAP Municipio Viqueque 2019). This yield is higher than national average which is only around 2.8 tons per hectare. Indeed the area planted, total production and the yield of paddy rice in 2019 were increase compared to previous year. In 2018, the cultivation area was 2,910.88 hectares with the total production of 10,543.52 and the yield of 3.62 tons per hectare (MAP Municipio Viqueque 2018). This means that from 2018 to 2019 the cultivated area increased by 55.2 percent and the yield increase by 0,24 percent. The details of the production and yield of paddy rice from 2017-2019 are shown in table below.

Table 5. Area planted, area harvested, total production and yield of paddy rice (2017-2019)

Year	Potential area (ha)	Area Planted (ha)	Area harvested (ha)	Total production (t)	Yield (t/ha)
2017	9,793	1490.89	Na	5,640.03	3.60
2018		2,910.88	2,910.88	10,543.52	3.62
2019		3,987.92	3,987.92	19,107.81	4.79

Source: MAP Municipio Viqueque 2019

The potential area of paddy rice in particular for Uatulari and Uatucarbau was supported by two big irrigations known as Bebui and Baidubu irrigation scheme. Bebui irrigation is located in Sub-District of Uatulari, which covers 1,100 hectares; while Baidubu irrigation situated in the Sub-District of Uatucarbau with the total area covered 800 hectares.

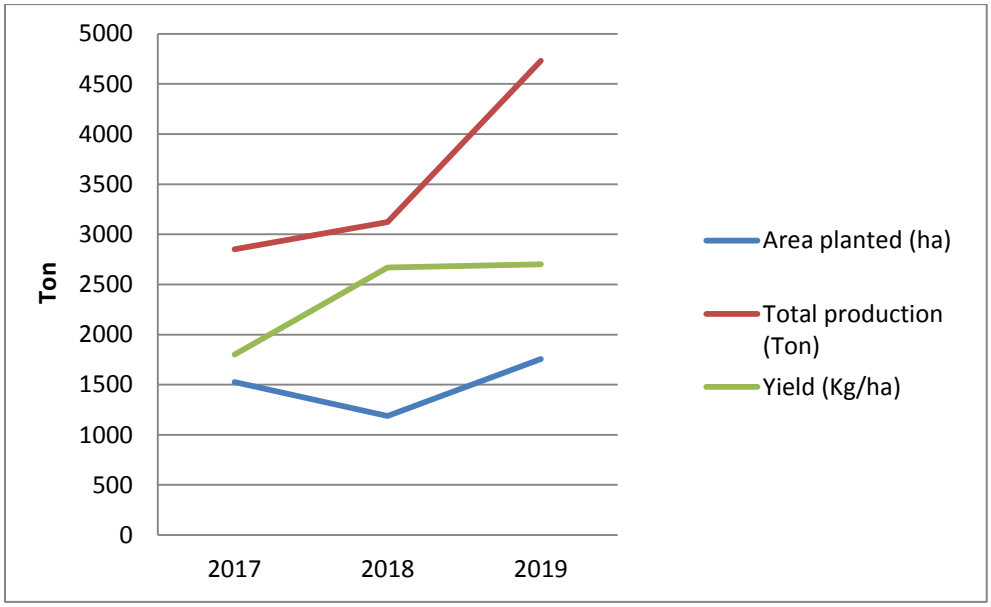
In terms of market, most stakeholders interviewed pointed out there are lack of buyer and market for this product. Because of this most of the produce destined for own consumption with very small quantity sell to local market. In the past ACELDA is one of the private firms that purchase paddy rice from these areas and the price offered was of 0.40 cents per kilogram. Nowadays there are no more trading activities done by ACELDA in Viqueque. The main reason is lack of infrastructure facilities such as road - as this affect the cost of transportation on the delivering of the product to warehouse in Baucau. In addition, based on a discussion with MCI vocal point in Viqueque revealed that in harvesting time CLN normally came to Viqueque to buy paddy rice with the price as mentioned (0.40/kg). However the continuity of CLN in purchasing the product annually cannot be guaranteed.

Based on the per capita consumption for rice of 95 kilogram per year (TLHS 2004) it means Viqueque will need rice 7,398.32 tons per year. Meanwhile the current production of paddy rice is 19,107.81 tons or equivalent to 11,464.69 tons of rice (conversion 60% paddy rice to rice). This shows there is an oversupply of rice in Viqueque of around 4000 tons annually. This provides an opportunity for private sector to invest in locally produced rice and in the

same time promoting local potential product to the national level. This can further resulted in the reduction of the importation of rice into the country.

If assumed that 50 percent of paddy rice produced in Viqueque can be delivered and sold in the market with the price of 0.40 cents per kilogram – this can generate an income of US$7,643,123 per year or US$838.52 per household per year. The annual production as mentioned is only produce once a year. If in one-year can be produce twice it means the production will be double and this will further impacted on the income receive by rural households. This provides significant revenue for rural households, which depends of paddy rice as a source of income.

Maize - Another local potential agriculture product in the municipality of Viqueque is Maize. The majority of the households (74.15%) in this area produce maize every year. This can be seen through the potential area for maize, which is 13,250 hectares. From this, only 13.26 percent (1757.34 ha) of the land was cultivated. The current production is 4,729.60 tons with the productivity of 2.70 tons per hectare (MAP Municipio Viqueque 2019). The details of the area planted and production of maize in Viqueque from 2017 – 2019 is shown in Figure below.



Source: MAP Municipio Viqueque 2019

Figure 7. Area planted and production of maize in Viqueque (2017-2019)

Figure 6 shows that the production of maize is always increasing. For example from 2017 to 2018 it rose by 9.53 percent and 2018 to 2019 by 51.52 percent. In addition, even though the area planted decrease in 2018 by 339.3 hectares however, in the same year the yield increases from 1.80 ton up to 2.67 tons per hectare. This resulted in an increase in the total production of maize from around 2800 to 3100 tons.

Based on the consumption level of maize per capita of 90 kilograms per year, it means the demand of maize in Viqueque will be 7,008.93 tons annually. In addition, from the production level of maize of 4,729.6 tons per year, this indicated that the current production cannot fulfill the demand of maize in Viqueque. This shows there is a deficit of around 2,200 tons of maize annually. To fulfill the demand of maize in this municipality, it is important to maximize the potential area that exists (yield maintained 2.7 tons/ha). If the area planted can be increase by 20 percent (from the potential area) it will produce around 7100 tons of maize per year – and this can solve the deficit of maize faced.

Most of the maize produced is for own consumption with the rest distributed to the market. There is a lack of market opportunities for this product and therefore producers only produce enough for their own consumption. The main market is local market in Viqueque with small volume distributed to Baucau and Dili market. The main buyers are local traders and consumers in Viqueque, which purchase maize for own consumption and also trading to Baucau and Dili market. The average price of maize is 0.40 cents per kilogram with the minimum price of 0.20 and maximum 0.60 cents per kilogram.

If assumed that 80 per cent of the products produced in Viqueque are sold in the market with the price as mentioned, this will generate an income to producers of US$1,513,472 annually or US$133.43 per household per year. Indeed, the income of producers can only be increase by rising the productivity or open-up more potential land for maize cultivation.

Cattle - The third local potential agriculture product and livestock in Viqueque is Cattle. According to the manager of one of the famous butcher in Dili known as 'Talho Moris' reveal that Viqueque is one of the area that regularly supply cattle to Dili market. In addition, a study done by Scott et al. (2016) also describe that cattle numbers increase in the more extensive grasslands of the east which includes Viqueque, Lautem and Baucau. The total household raise cattle are 10,547 or 68.9 percent of the total household in Viqueque; and the total number of cattle is 21,243 heads (MAP Viqueque 2017). This indicated the average cattle owned are around two cattle's per household. The detail of the number of cattle per sub-district is shown in Table below.

Table 6. Number of cattle per sub-district in Viqueque

Sub-District	Number of cattle (head)
Viqueque Villa	8,790
Uatulari	4,070
Ossu	3,137
Uatucarbau	2,801
Lacluta	2,445
Total	**21,243**

Source: MAP Municipio Viqueque 2017

The system of raising cattle is still based on the traditional system where cattle's are freed in the morning for finding fed in an open pasture and fenced in the afternoon. Cattle can be penned at night, seasonally, or in some cases not at all. In some remote areas in Viqueque, cattle are raised in larger household herds in more extensive systems for long indefinite periods with low turnoff rates. Indeed, cattle in Viqueque mostly raised in low input – low output systems. With low inputs (feed, labor, capital), outputs are also low (beef production). These production systems are not necessarily inefficient per se, especially as costs are low. However, cattle production systems in Viqueque can be seen as inefficient insofar as the existing resources are under-utilized. ACIAR through its project started to introduce an intensive way of raising cattle such as 'fattening system' in some of the areas in Viqueque. This is an opportunity where producers can maximize the resource owned and intensively manage their cattle's.

The main market is Dili market with small number of cattle's sold in local market. The main buyers are traders that regularly purchase cattle from the villages and distributed to Dili in a weekly basis. Cattle mostly are traded through spot markets, and slaughter men and traders have extensive purchase networks, and can buy direct from farmers, or through local level collectors and spotters. Most end-buyers (slaughter men) in Viqueque require only small lots (e.g. to slaughter 2-4 head per week), and traders try to aggregate a full truck (6-8 head depending on size) to reduce transport costs. In addition, there is also a large and vibrant trade in cattle, buffaloes and other animals in Viqueque for ceremonies such as funerals, weddings, graduations and others. In terms of price for cattle, it ranges from US$150 – US$700 per head; and the average price is $445 per head. For bovine meat it cost US$6.00 per kilogram. Assumed that each household will sell only one cattle per year with the price as mentioned, this will provide and income of US$4,693,415 per year.

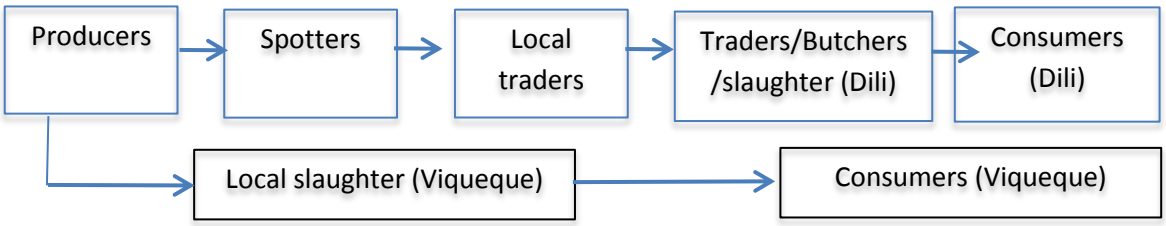


Figure 8. Cattle supply chain

According to DNS and World Bank (2008) average annual per capita bovine meat consumption in Timor-Leste is 1.19kg. This consumption levels is significantly lower than the average for least developed countries of 4.8 kilogram, lower than Indonesia of 2.5 kilograms and indeed lower than all Asian countries (Scott et al. 2016). The low level of consumption is clearly constrained by low incomes, with mean per capita incomes per month of $62; in urban $93, and rural areas $50 (DNS, 2011). Based on that consumption level as mentioned, it means Viqueque will need 92.67 tons of bovine meat or 927 heads per year; while from the supply side, it can supply around 2,100 tons of bovine meat annually. This indicated that there is an oversupply of bovine meat of 2,007.33 tons or equivalent to 20,073 heads annually. This clearly shows that Viqueque will be able to supply Dili market in a sustainable manner throughout the year. This provides an opportunity for local private sector to engage more in this sector in Viqueque. Scott et al. (2016) in their study revealed that beef consumption could be expected to increase with sustained income growth (a function of developments in the oil sector, political stability, public servant wages and pensions). Another driver of consumption is population growth of 2.41 percent per year, which if continued, will double the population by 2039. Because of urban migration, population growth in Dili will be 4.8 percent, where net per capita supply of bovine meat is estimated at 3.94 kilograms (three times higher than the national average).

Coconut – It is one of the industrial crops that grown well in Viqueque. Coconut plays an important role in terms of income for most of rural household in Viqueque as it involve around 10,500 households. The sub-district that is potential for coconut includes Viqueque Villa, Uatulari and Ossu. Since Indonesian time until now coconut usually transforms into 'Copra' and exported to Indonesia. The Potential area for coconut in this municipality is 10,105.15 hectares; however the area cultivated is only 4,020.25 hectares (39.8%) with the total production of 3,550 tons (MAP Municipio Viqueque 2017).

In Viqueque coconut can be selling as primary product (coconut), or as secondary products (e.g., copra, VCO, oil). For domestic consumption most of the populations generally purchase it as a coconut, oil for cooking and also VCO. For copra it is an export product, which exported to Indonesia. In addition, coconut and oil mostly sell in local market, while

some small quantities of oil and VCO also distributed to Dili market. The main buyers for copra are local traders.


Copra

The study shows that local traders purchase copra from producers with the price range between 0.15 – 0.17 cents per kilogram depending on the quality of the product, and sell it to the Wholesalers in Dili between 0.22 – 0.25 cent per kilogram. Meanwhile the price for one coconut is 0.10 cents. An interview with local traders revealed that the average distribution of copra to Dili market is twice a month with the total quantity distributed started from 3.2 up to 60 tons per months. The percentage of coconut and copra is 4:1 (4 coconuts for 1 kg of copra). This means that one tons of copra will needs around 4000 coconuts.

Even though the price of coconut and copra is quite low in Viqueque however, it's provided significant revenue for producers and local traders. With the average quantity of copra distributed to Dili of 31.6 tons per month, this will provide an income to local traders of US$7,584 per month (US$91,008 annually). For producers it will offer a monthly income of US$5,056 (US$60,672/year). If the price or the quantity deliver of copra increase, this will provide more income both for producers and traders in Viqueque.

Candlenut - It is a cash crop that can be found at altitudes ranging from sea level up to 700 meters and can survive in areas with rainfall ranging from 700 mm up to 2,000 mm (DAI 2005). The topography in Viqueque is feasible for candlenut to grow and it offers significant revenue to producers. According to MAP Municipio Viqueque (2017) the potential area for candlenut is 3,081 hectares; from this 891 hectares are planted with only 480 hectares is productive. There is a lack of data about production in Viqueque but in Timor-Leste the productivity per hectare range from 0.5 to 1.0 tones per hectare (DAI 2005); and this is ten times lower than productivity in West-Timor, Indonesia. If candlenut can be managed in an intensive way, one candlenut tree can yields around 200 kilograms (cracked kernel) per year. With the planting distance of 10 x 10 meters, it means one hectare can be planted 100 – 150 candlenut trees; this will produce 15 – 16 tons of candlenut nuts (Dirjen Perkebunan 2006). This indicated that there is still an opportunity to increase production of candlenut in the year to come.

The main market for candlenut is Indonesian market. Most producers in Viqueque sell only cracked kernel (nuts) to local traders with current average price of 0.75 cents per kilogram. The selling price to the wholesaler in Dili is ranging from US$1.00 – US$1.50 per kilogram. A discussion with Mr Zacaria Pinto (candlenut trader) reveals that in one-month they can only deliver candlenut one time to Dili with the quantity of 255 kilograms (8-9 sacks @30 kg/sack). Exports candlenut to Indonesia market is governed by the price of the nut in that market. So if prices in the West-Timor market are a little bit high, this will dictate a buying

price of the nuts in Timor-Leste. In addition, the chain for candlenut in Viqueque is as follows. Producers deliver their product to local traders, than they will process it (e.g., drying, packing, weighting) and transporting to wholesaler in Dili; and then it will further distributed to Atambua NTT, Indonesia.

Based on the current price and the quantity distributed per month, it will generate an income per month of US$318.75 (US$3825/year) for traders and US$191.25 (US$2,295/year) for producers. There is an opportunity to increase the income for both producers and traders. This can be done through the increase of productivity and also improve the quality of the nuts. To increase productivity and quality product, the involvement of public and private sector is needed to support this sector as this product is destined to export market, which can generate revenue to the country. According to USAID (2015) there is continuing high demand for candlenut in Indonesia as a food ingredient. This offers an opportunity for local businesses in meeting this demand through the increase in planting of candlenut throughout the country.

Table 7. Description of local potential agriculture products and livestock in Viqueque

Description	Top 5 local potential agriculture products and livestock				
	Paddy Rice	Maize	Cattle	Coconut	Candlenut
Household number	9115	11,343	10,547	10,500	Na
Production (t/year)	19,107.81	4,729.60	21,243 head	3550	Na
Productivity (t/ha)	4.79	2.70	2 head/hh	Na	0.75
Main market	Viqueque	Viqueque & Baucau	Dili & Viqueque	Indonesia (copra)	Indonesia
Average price ($/kg)	0.40	0.40	445	0.10/0.16	0.75
Consumption level (kg/cap/yr)	95 (rice)	90	1.19	Na	Na
Demand (t/yr)	7,398.32	7008.93	92.67	Na	Na
Current supply (t/yr)	11,464.69	4,729.60	2100	3550	Na
Export (t/year)	Na	Na	Na	Na	Na

Source: TLHS 2004; DNS & World Bank 2008; Varela 2014; DGE 2015; Scott et al. 2016; MAP Municipio Viqueque 2017 & 2019 (conversion paddy rice to rice is 60%)

7.3.3 The potentiality of local potential agriculture products and livestock in Manatuto

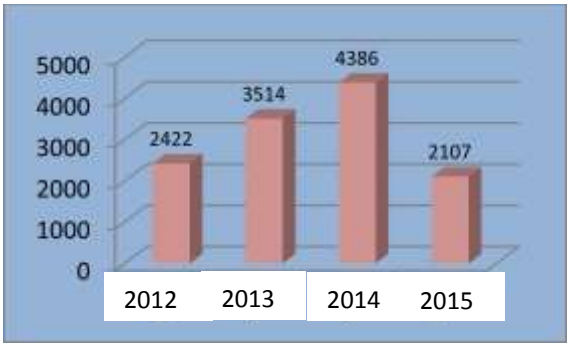
Manatuto is the only municipality that extends from the north coast to the south coast, encompassing all agro-ecological zones in Timor-Leste. Administratively Manatuto composed of six Sub-Districts, 31 Villages and 105 Sub-Villages with the total area of 1,785.9 square kilometers (MAEOT 2016). The total population is 47,806 with the total household of 7467 and the household size of 5.97 (Servico Estatistica Municipio Manatuto 2016).

The majority of the population in this area depends on agriculture as a source of livelihood and income. In the northern part of Manatuto, paddy rice is extensively planted in rehabilitated irrigation schemes while in the central uplands subsistence agriculture is

practiced based on maize inter-cropped with cassava, beans, pumpkins and other crops; thus paddy rice is also planted on a small scale in rain-fed area of the sub-district of Natarbora, closer to the south coast. At higher altitudes coffee is also cultivated to a limited extent. Main livestock are sheep, chicken, cattle, buffalo, pig and others.

The result of the study reveals that the top 5 local agriculture products and livestock that are potential in Manatuto are **Maize, Banana, Cattle, Paddy rice** and **Tangerine**. These products are potential because it contributed to the livelihood and income of most of the household in Manatuto. All these products are also grown well in this municipality and for some of the products regularly distributed to main market in Dili (e.g., banana, cattle and rambutan).

Maize – As one of the potential product in Manatuto, it's engaging a significant number of household (4607 household) to produce. The area potential for maize is 19,896 hectares. From this there is only 1,118.9 hectares (5.62%) is cultivated with the production of 2,107.4 tons per year (MAP Municipio Manatuto 2015) and the productivity of 1.88 tons per hectare; this is lower than average national of 2.10 tons per hectare (DNAH 2015). In addition, the production of maize in the last four years (2012-2015) is fluctuated. From 2012 the production was 2422 tons and in 2014 it jump up to 4386 tons and in 2015 it down to 2167 tons (MAP 2015). The details of the production of maize in Manatuto are shown in Figure below.



Source: MAP 2015

Figure 9. Production of maize (2012-2015)

Figure 8 show that the average production of maize per household per year is only 0.84 tons. Indeed, the varieties of maize planted by most of producers are 'Sele' and 'Bisma' which has shown high productivity of 5.0 and 8.7 ton per hectare respectively (Sirappa and Razak 2010).

There is lack of marketing opportunity for this product, and therefore producers only produce enough maize for family consumption. Maize mainly sells through local markets; and buyers generally are consumers and some local traders. Producers sell dry maize with

the price range from 0.40 – 0.50 cents per kilogram. In addition, there is not much value added activities for this product.

Based on the per capita consumption of maize, the municipality of Manatuto will need around 4,300 tons of maize per year. Meanwhile from the supply side, it can only supply around 2,100 tons annually. This indicated that the current production cannot fulfill the demand of maize for the population in Manatuto. There is a deficit of around 2,200 tons maize per year.

Banana – it is one of the types of tropical fruit that growing well in the southern part of Manatuto (Natarbora) and has the potential to develop in an intensive way in the future. The total area planted is 37.3 hectares, with the production of 1,119 tons per year (DNAH 2008) and the productivity of 30 tons per hectare. Most people in Natarbora involve in the production of banana and the main type of banana produced is Saba banana ('Hudi Fatuk').

The main market for this product is Dili market with small quantities selling through local markets. Traders came regularly in a weekly basis to purchase banana and distributed to Dili. The main buyers are traders from Baucau and Dili. Most people in this area generated their income from banana – This reflects that large quantities of products are sold to the market.

Producers in Natarbora normally sell banana to traders in 'big bunch' – an average price for one big bunch of banana is US$3.00 (US$150/ton). One big bunch composed of 15 small bunches; and the weight of one big bunch is about 20 kilograms (50 big bunch = 1000 kg) while for small bunch is about 1.34 kilograms. This means one kilogram banana will cost about 0.10 cents. In addition, traders sell bananas to retailers with US$5.00 – US$6.00 per one big bunch (US$275/ton). Thus, retailers sell the banana to institutional customers and consumers in small bunch with the price range from $0.75 cents – US$1.00. It means that one big bunch of banana will cost around US$13.00 (US$650/ton). This indicated the demand for banana domestically is quite high as traders hire trucks in a weekly basis to transport banana and other local products to Dili market (transport cost range from US$600 – US$1,000 per trip).

If assume that the production of banana as mentioned (1,119 tons) all is marketed with the price of US$150 per ton – this will generate a revenue for producers of US$167,850 per year; US$307,725 for traders; and US$727,350 for retailers per year. This product offer a significant income for producers and buyers involve in the production and distribution of the product to the market.

Cattle – Most stakeholders interviewed pointed out that cattle is one of the livestock that is potential in the municipality of Manatuto. The main reason for this is because the existing domestic market for cattle is good, the demand for bovine meat in Dili market is

high, there is a wide area of pasture for grazing in particular in south coast area, and it engages a significant number of households in raising cattle.

The total household involve in raising cattle in Manatuto is 1831 household with the total number of cattle of 9,282 heads; this means an average owned per household is five cattle's (DGE; MAP Municipio Manatuto 2015). In addition, in 2016 the total number of cattle was down to 4,828 heads (47.98%). There is no clear reason why the numbers of cattle in that year decrease drastically.

In addition, there is two ways of raising cattle in this area. First, cattle are grazing in an open pasture in the morning and penned it in the afternoon. Second, cattle are raise through a fattening system (intensive) – where cattle's are feeding in a regular basis (morning-night) in the cage. The later mostly applied by producers reside in Natarbora.

The main market is Dili; and the main buyers are local traders who regularly purchase and sell cattle's to the main market. The price of bovine meat in Manatuto is US$6.00 per kilogram. Meanwhile the price of cattle is varying; for producer with traditional system, cattle sell directly to local traders and the price is based on the negotiation, the physical appearance of cattle and others. For this the price is range from US$250 up to US$800 per cattle. For producers using fattening system, the price is based on the weight of the animal. For cattle weight less than 200 kilograms it cost US$2.00 per kilogram (life cattle) and for cattle weight more than 300 kilograms it cost US$2.75 per kilogram (details see table 8). Indeed, for producers with fattening system, the price is very transparent both for producer and buyers as all depends on the weight of the cattle. The more the weight will increase the revenue received by producers. Producers applying fattening system get assistance from ACIAR project and MAP in a regular basis.

The demand for bovine meat in Manatuto is 56.89 tons per year (based on bovine meat consumption of 1.19 kg/cap/year). Meanwhile the supply of bovine meat per year is 482.8 tons. This shows there is an oversupply of bovine meat of around 425 tons (4250 cattle's) annually. As the demand of bovine meat in Dili that is quite high (Scott et al. 2016), this offer an opportunity for local entrepreneur to more involve in facilitating such business in the year to come. In terms of revenue it is quite promising. Assume that the oversupply of cattle (bovine meat) as mentioned is distributed to Dili market with the price of US$2.70 per kilogram life cattle – this will generate an income of US$3,442,500 per year (assume average weight 300 kg/head) or 1,880.10 per household per year.

Table 8. List of price for live cattle

Cattle wight (Kg)	Price ($/Kg)
< 200	2.00
200 - 249	2.50
250 – 299	2.70
> 300	2.75

Paddy rice – The municipality of Manatuto is one of the municipalities that are potential for rice production in Timor-Leste. Because of this potentiality, two permanent irrigation schemes such as Laclo and Buruto irrigation were established. The total number of household engage in the production and marketing of paddy rice is 3,026 household or around 40.5 percent of the total household in Manatuto (DGE 2015). Sub-districts that are potential for paddy rice in are Laleia (Buruto irrigation), Manatuto Villa, Laclo and some dry land areas in Natarbora.

The area potential for paddy rice is 23,650 hectares with the cultivated area of 1,863 hectares in 2015 and 1,661.7 hectares in 2016 (MAP Municipio Manatuto 2016). In addition, the total production was 2,997.10 and 6,288.10 tons per year respectively. In terms of productivity, it was 1.8 tons per hectare in 2015 - and increase up to 3.03 tons per hectare in 2016 (increased by 40.59%). The increase of the productivity mainly is caused by the application of Integrated Crop Management (ICM), use of hybrid variety of paddy rice and irrigation. A report done by JICA (2013) revealed that before the establishment of irrigation scheme the productivity of paddy rice was 1.7 tons per hectare; and after irrigation was ready and implemented the productivity rose up to 3.28 tons per hectare.

With the conversion of paddy rice to rice of 60 percent, it means the total rice production in Manatuto in 2015 was 1,798.26 tons and 2016 was 3,772.86 tons. Based on per capita consumption of rice of 95 kilogram per year in Timor-Leste, Manatuto will needs 4,541.57 tons of rice per year. Indeed the total production as mentioned cannot fulfill the demand of rice for the population in this area. There is a deficit of around 768.71 tons annually.

The main market for rice is Manatuto itself (local market) with small volume distributed to Dili market. There is lack of market opportunities for this product as imported rice dominated local markets and villages with the price below local rice. The main buyers are local consumers and some traders in this area. A discussion with some of paddy rice producers revealed that in the past the Center for National Logistic (CLN) was also bought paddy rice from producers with the price 0.40 cents per kilogram; but now a day there is no such activities done by CLN in Manatuto.

To fulfill the demand of local rice in Manatuto it is important to maximize the potentiality area for paddy rice, as the current cultivated area is only 7.03 percent from the total potential area that exist in Manatuto. In addition there is an availability of water throughout the year as there is two irrigation schemes established in this area. So, increase the production of paddy rice is viable and therefore private sector intervention is needed to support the sector. Assume that producers can maximize the use of a half (50%) of the potential land or around 11,800 hectares (productivity remain 3.03 tons/ha), it will produce 35,829.75 tons of paddy rice or equivalent to 21,497.85 tons of rice. If a half of this production (paddy rice) is sold to the market with the price as mentioned it will generate an income of US$17,914.88 per year.

Table 9. Demand forecast for rice in the municipality of Manatuto from 2021 – 2025

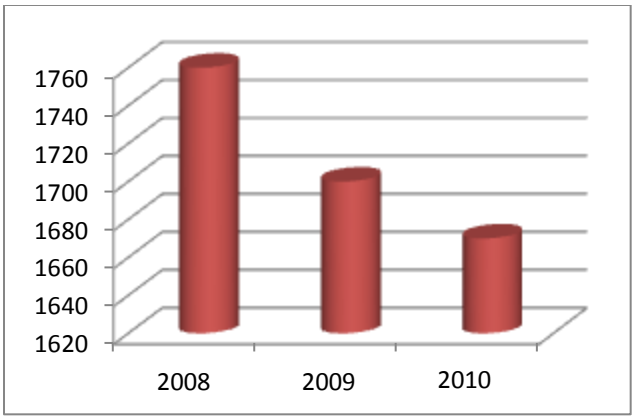
Description	2021	2022	2023	2024	2025
Population (based census 2015)	52,809	53,918	55,050	56,206	57,386
Demand for rice (ton/year)	5,016.86	5,122.21	5,229.75	5,339.57	5,451.67

 # Per capita consumption is 95 kg per year; average national population growth rate = 2.1%

Based on the demand forecast as shown in Table 9, it means that with the population growth rate of 2.1 percent per year, the municipality of Manatuto will need rice around 26,160 tons for the next five years.

Tangerine – It is one of the commodity that is potential in the municipality of Manatuto. Tangerine is grown well in areas range from lowland to upland. Areas suitable for tangerine in Manatuto are inluding Laclubar, Soibada and some part of Natarbora.

The total potential area for tangerine in Manatuto is around 19,800 hectares, and from this there is only 8.67 hectares was planted in 2012 and 9.10 hectares in 2013 (DNAH 2014). The total production was 104.04 and 91.00 tons respectively; while the productivity is 11 tons per hectare and this is still low compared to Indonesia of 21 tons per hectare. The production of orange in Timor-Leste from 208-2010 is continuing to decrease from 1760 tons in 2008 down to 1670 tons in 2010 as shown in Figure 10.



Source: DNAH-MAP 2010

Figure 10. Production of Tangerine in Timor-Leste

Tangerine produced in Manatuto mostly distributed to Dili market with small volumes sell through local market and the surrounding municipalities such as Manufahi and Viqueque. The main buyers are traders and wholesalers who purchase tangerine in a bulk (based on trees). In terms of price, producers generally sell one tree of tangerine ready for harvest for $100-200/tree (one tree can produce an average of 35 kg of tangerine). This means one kilogram of tangerine can be sold by 0.23 cents per kilogram. According to Badan Penelitian dan Pengembangan Pertanian (2012), one hectare can be planted 500 tangerine trees. With the average price of $150 per tree it can generate an income of $75,000 per year.

Table 10. Description of local potential agriculture products and livestock in Manatuto

Description	Top 5 local potential agriculture products and livestock				
	Maize	Banana	Cattle	Paddy Rice	Tangerine
Household number	4,607	Na	1,831	3,026	Na
Production (t/year)	2,107.40	1,119	9,282	6,288.10	91.00
Productivity (t/ha)	1.88	30	5 cattle's/hh	3.03	11.00
Main market	Manatuto & Dili	Dili	Dili	Manatuto & Dili	Manatuto
Average price ($/kg)	0.45	0.10 ($3/big bunch)	2.70 (life cattle)	0.40	0.23 ($150/tree)
Consumption level (kg/cap/yr)	90	Na	1.19	95	3.60
Demand (t/yr)	4,300	Na	56.89	4,541.57 (rice)	167.83
Current supply (t/yr)	2,100	1,119	482.80	3,772.86	91.00
Export (t/year)	Na	Na	Na	Na	Na

Source: TLHS 2004;DNAH 2008; MAP 2010; Varela; DNAH; Correia et al. 2014;MAP Municipio Manatuto; DNAH; DGE 2015; Scott et al.; MAP Municipio Manatuto 2016; MCIA Municipio Manatuto 2020
(Conversion paddy rice to rice is 60%)

VIII. MARKETING OF LOCAL POTENTIAL AGRICULTURE PRODUCTS AND LIVESTOCK IN LAUTEM, VIQUEQUE AND MANATUTO

The result of the study shows the majority (94.8%) of stakeholder interview describe that the local potential agriculture products and livestock produced in Lautem, Viqueque and Manatuto are distributed to the market (e.g., local markets and district markets). Expensive cost of transporting the products and the lack of access to other major markets (e.g., Dili market) are the main reasons most producers rely on local and district markets when selling their produce. Producers also indicated that they have no information about prices and market demand outside local markets. They are mainly price takers and their primary source of price information is their buyers, which can lead to price manipulation by the buyers. In addition, lack of access to markets and the low prices received by producers deter them from increasing their production.

The main buyers for these potential products are traders, following by local consumers and collectors. While small percentage of the products are delivered through wholesaler, retailers and others (see Figure 11). In addition, the main market is Dili and local markets. Buyers such as local traders play an important role in distributing local potential products to the market. For example, a banana trader that came regularly in a weekly basis to purchase banana and other local products from Viqueque and Natarbora and deliver to Dili market. As the majority of farmers lack capital and access to transport, which affected their ability to reach markets, their presence in in rural remote areas offered an assured market for local produce to high-end markets.

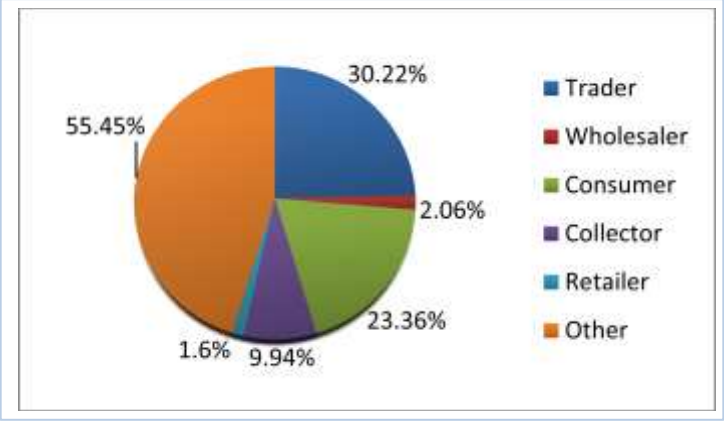


Figure 11. Main buyers for local potential products in Lautem, Viqueque & Manatuto

Value added – The study reveals that most of stakeholders interviewed (86.54%) describe producers usually are not value-add their products before selling to the market. The main reason is because:

- The price offer for value-add products is very low

- ❖ Lack of labor and capital
- ❖ Lack of information on the importance of add-value to the product
- ❖ Lack of knowledge and skills

In addition, there is 13.46 percent of stakeholders said there are a number of producers that always perform value-add activities for their produce before deliver to the market. The products that normally go through value-add include coconut, candlenut, paddy rice and maize. A discussion with coconut producer in Viqueque reveals that it is important to value-add the product because the market is needed (e.g., copra). Indeed the price offered is quite low – but at least there is a local buyer that regularly purchases the product; this provides significant income for producers in rural areas.

The main challenges faced by producers in adding value the product are 'the low price offered' – there is no premium price attached to the new product. Therefore, candlenut producers in Lautem prefer to sell candlenut with kernel instead of cracked kernel, which in term of price is not too different.

The study also reveal that coconut is the product that can be transform to a number of new product such as VCO, Copra, Soap and others. A site visit to a processing center for Virgin Coconut Oil in Souro – Lautem reveal that by transforming coconut into VCO it can offer significant revenue to people engage in the business. Despite this, there are a number of small businesses operated in transforming coconut into soap and also some business engages in copra processing.

Prices - In terms of prices for local potential agriculture products and livestock, it varies according to the type of products, timing of selling, demand and supply and the site where the product is bought. For example, the price for one-kilogram maize in Viqueque is 0.40 cents while in Manatuto 0.45 cents. The details of price for local potential agriculture products and livestock are show in Table below.

Table 11. Prices of local potential agriculture product and livestock

Municipality	Price of the product ($/kg)							
	Maize	Paddy rice	Coconut	Cattle	Candlenut	Cassava	Banana	Tangerine
Lautem	0.44	Na	0.20	850/head	0.15 (kernel)	0.05	Na	Na
Viqueque	0.40	0.40	0.10	445/head	0.75 (cracked)	Na	Na	Na
Manatuto	0.45	0.40	Na	800/head	Na	Na	0.10	0.23

The price is always fluctuated and there is no fixed price for most of these local potential products. It's also depends on supply and demand. In addition, the candlenut price in Timor-Leste is determined in West-Timor market, which in turn is determined in Surabaya. As most of candlenut is exported to Indonesia and sold in Indonesian currency, the

USD/Rupiah exchange rate is very important and it is the main reason for the fall of candlenut prices in Timor-Leste (USAID 2015).

Grading – There are more than 60 per cent of stakeholders interviewed saying that producers usually perform grading for the product before sell it to market. The type of grading activities conducted is very basic which includes size, maturity and cleanness. Indeed, the price for graded products are little bit better compared to those product that is not graded. In addition, it is around 30 percent of stakeholders reveal that some producers are not grading their produce due to lack of labor, lack of buyers and lack of knowledge and skills regarding marketing issues such as value adding, grading and other activities. Products that usually graded before deliver to market include banana, maize, coconut, tangerine, candlenut and cassava.

IX. CONSTRAINTS AND OPPORTUNITIES

9.1 Constraints

Most producers in Lautem, Viqueque and Manatuto facing many constraints related to the production and marketing of local potential agriculture products and livestock. In terms of production it is still characterized by low level of farm inputs, low productivity, fluctuation in production and poor product quality. In marketing side it constrained by high marketing costs, lack of access to main markets and low prices for the products.

The low level of production and productivity and poor quality poor quality products can be attributed to the following constraints faced by producers in these three municipalities.

Low Input Use - One of the main reasons for the poor productivity is the low level of input use by producers in the farm. There is little input use by producers apart from seeds and labor. Very few farmers apply fertilizers and pesticides. This in turn is due to the low levels of income and low purchasing power of farm households. Most producers still rely on traditional seeds. To increase crop productivity, inputs such as seeds, fertilizers and chemicals are needed.

Low output prices - Lack of buyers have a negative impact on the price offered to producers. Because of this, there will be power imbalance between buyers and producers – and buyer tends to dictate the price. In addition, there is lack of competition amongst buyers and as producers have no alternative market, they often accept whatever price is offered. To address this problem, more investment on infrastructure including communication is needed. This will resulted in a more buyers enter to the markets and farmers will also have more access to other markets. Furthermore, this will encourage competition and will benefit farmers in terms of getting a better deal on prices for their produce.

Lack of Financial support - One of the stumbling blocks for producers in Lautem, Viqueque and Manatuto is the lack of capital to purchase inputs and invest in the improvements in the farm. With the lack of cash to purchase inputs and the lack of access to credit, it is difficult if not impossible for producers to increase production and productivity of their crops.

Lack of skill - Producing and marketing of agricultural products and livestock to high-end markets require skills. Indeed, most producers in these municipalities have low skill level and this affect their ability to increase production. Thus, most producers continue to practice traditional ways in managing their crops. To improve the skill of producers, investment in human capital is needed.

Poor quality product – As most producers in these municipalities lack of skills both in production and marketing, lack of financial support and lack of market information therefore it affect the quality of the product produced. Most of the local potential agriculture products in Lautem, Viqueque and Manatuto are in low quality. This further resulted to the price offered. To improve the quality of the product, private and public sector investment in terms of training, credit, and information and communication need to be taken into consideration.

Other constraints - lack of access to market, lack of capital, import (e.g., rice), government policies, lack of involvement of private sector, lack of information, lack of input supply and youth migration.

9.2 Opportunities

Despite the constraints and challenges as mentioned, the nine potential products in these municipalities offer an opportunity for private sector to engage more in developing the products so that Timor-Leste can be self-sufficiency in terms of food and also income for rural households. These opportunities are including:

Increase production and productivity – The productivity of most of local potential agriculture products in these municipalities are quite low. There is an opportunity to increase production and productivity through improve farm management, open-up more potential land for cultivation, apply Good Agriculture Practices (GAP) in managing the farm and apply regular inputs (e.g., seeds, fertilizer, chemicals, others). To do this the role of public and private sector is needed.

Value added product – One way to improve the value of the product is through the transformation of primary product to another product (e.g., coconut to VCO). Industrial crops such as coconut and candlenut are quite potential in Viqueque and Lautem. However, there are not many activities on the adding value of these products. Indeed the demand for value added products for export (e.g., copra, VCO, cracked candlenut) is promising. This provides an opportunity for businesses to invest in processing (value add) of these

products. This can be done through training to improve the skills of producers, provide technical assistance and financial support or investing on applicable technology that can help the processing of the product so that it will produce add value product with good quality standard.

High demand for bovine meat – The demand of bovine meat in Indonesia in 2017 reach 168,558 ton (Kementrian Pertanian Indonesia 2017) and the importation for cattle for Java Island alone is around 298,000 head in 2018 (demand for cattle 6-7%/year). This provides an opportunity for private sector to invest in cattle production not only for domestic consumption but also for export. In addition, the demand for domestic consumption for bovine meat is 2,308.10 tons per year; and Dili alone needs around 800 tons of bovine meat per year (Scott et al. 2015).

Improve quality of domestic rice – Most rice produce in these areas is in poor quality compared to the imported rice. However the price is higher than the imported one – therefore consumers are preferred to buy imported rice. To compete with imported rice it is important to improve the quality of domestic rice. To do this, private sector involvement is needed. Private sector intervention can be done through investing in the production and processing side. For government, it needs to play their role in terms of legislation and creating an enable environment for individual or companies to invest in the sector. By investing in improving the quality of domestic rice it will favor domestic consumers and in the same time reducing imported rice. This will result not only in terms of production and quality domestic rice but also it has a further impact on income, food security, jobs and poverty reduction.

Open-up more land for cultivation – The study reveal that there is around 25 percent of most of the potential lands in Lautem, Viqueque and Manatuto are cultivated and the rest is abandoned. The main reason is lack of labor, lack of capital, lack of irrigation and climate change impact. As a result these municipalities cannot reach their potentiality in producing agricultural crops. To maximize the use of abandoned land for cultivation government and private sector need to take into consideration so that those areas can be develop according to their potentiality. This can be done through investing in machinery equipment's, financial assistance and human resources. Through the open-up more land it will resulted in an increase in production and in the same time absorb more labor in rural areas.

X. CONCLUSION AND RECOMMENDATION

10.1 Conclusion

To foster economic growth in Lautem, Viqueque and Manatuto, it is important to modernize agricultural production, which requiring markets for both inputs supply and for the sale of products and services. To enhance the markets that are already existing and

develop new markets can be done through the improvement in infrastructure, improvement in access to information, reduction in transaction costs and promoting competition.

The study reveal that the existing crops that mostly grown by producers are paddy rice, maize, cassava, coconut, candlenut, coffee, tangerine, mango, mustard, cabbage, carrots, tomato, and others. While livestock raised includes cattle, buffalos, goats, Chicken and pigs. There are a number of new crops, that also grown by producers in Lautem, Viqueque and Manatuto which includes Konjak (Maek), Dragon fruit and Vanilla.

There are eight local potential agriculture products and livestock identified in Lautem, Viqueque and Manatuto. These potential products are Maize, Paddy rice, Cattle, cassava, Coconut, Candlenut, Banana and Tangerine. These products considered as potential because agronomically it grown well in these areas, engage a significant number of household in the production and marketing, there is an existing market for these products, and in terms of revenue, it offer a significant income for producers, traders, wholesaler and retailers in these municipalities. For certain products such as copra, VCO and candlenut it is destined for export market.

The production and the yield of most of local potential products in Lautem, Viqueque and Manatuto considered very low. This caused by lack of the use of inputs in the farm, continuing use of local seeds variety, poor farm management and the effect of climate change.

From the analysis it shows that most of the local potential agriculture products and livestock are in high demand both for domestic and export market. Bovine meat for example, it has a domestic demand that is quite high; thus, candlenut and copra it has a good demand in Indonesian market. In addition, the domestic demand is constrained by lack of buying power resulted for the low income of most of the Timorese population except for Dili market. From the supply side, there always lack of sustainability to supply to the market to fulfill the demand needed.

To develop these potential products in Lautem, Viqueque and Manatuto, the presence and support from private and public sector is needed. Despite the constraints facing such as low productivity and low quality products however, there are opportunities for further improvement for local potential products. These includes opportunity to increase production and productivity, improve more value addition products, opportunity to invest in cattle production, and finally opportunity to invest in rice sector so that the quality of local rice can be improved and this will resulted in the reduction of rice import into the country. Furthermore, the new products, which have high value such as Konjak, Vanilla and Rambutan, need to take into consideration for further development in these areas.

10.2 Recommendation

Based on the result of the study, it is recommended that government agencies and private sectors have the responsibility to provide supports and assistance to the producers and chain players in the production, processing and marketing of local potential products identified in these municipalities, which includes:

- Enhance knowledge and skills for actors engage in the supply chain through regular training;
- Promote more value-adding activities for local potential agriculture products so that it can improve the value of the product – and hence more revenue for producers;
- As most producers still depends on local seed which affect to low productivity, therefore more support on input supply (e.g., new seed variety) is needed;
- Regular information on prices not only for local potential products but also for agricultural products in general is important as this can be used as basis for bargaining with buyers for a better deal in particular in local markets in rural areas;
- The existing market for these potential products is operated well however, it needs further improvement so that it can facilitate the movement of the products from remote areas to the market more easily. This can only be done through the improvement in infrastructure, improvement in access to information, reduction in transaction costs and promoting competition;
- Agribusiness firms are important in terms of facilitating products for both domestic and export market. Therefore, it needs government support in terms of financial so that they can invest more in the value adding activities and linking producers to market;
- The involvement of private sector in the development of agricultural sector in general is needed. Therefore, the enable environment for the private sector investment in this sector needs to be taken into consideration;
- Finally, this study should become one of TradeInvest's priorities/annual activities (continuation to other municipalities in Timor-Leste) as part of investment and export promotion.

REFERENCE

ADB, 2011, *Asian development outlook 2011: Economic trends and prospects in developing Asia*, Asian Development Bank, Philippine.

Correia, V.P., Guterres, A. and do Rego, A.P. 2015, *Market study on banana and Tomato in Liquica and Baucau, Timor-Leste*, FAO and UNTL, Dili, Timor Leste

DGE, 2016, *Municipio Manatuto em numeros*, Quarta Edição, Direcção Geral Estatistica, Dili

DGE, 2016a, *Municipio Lautem em numeros*, Quarta Edição, Direcção Geral Estatistica, Dili

DGE, 2015, *Timor Leste em Numeros*, Terceira Edição, Ministerio Financas, Dili, Timor-Leste

DNAH, 2010, *Fruit production in Timor-Leste from 2008-2010*, Diresaun Nasional Agricultura e Horticultura, MAP, Dili

DNAH Municipio Lautem, 2015, *Clasidicasaun no luan area municipio Lautem*, Diresaun Nasional Agricultura e Horticultura , Lautem

DNAH Municipio Lautem, 2016, *Numero luan area plantas industrias iha municipio Lautem*, Diresaun Nasional Agricultura e Horticultura , Lautem

Direktorat Jenderal Perkebunan, 2006, *Pedoman budidaya kemiri*, Dirjen Perkebunan, Departemen Pertanian, Jakarta.

IMF, 2011, *Democratic Republic of Timor Leste: 2010 article IV consultation* – Staff Report, IMF Country Report No. 11/65, International Monetary Fund, Washington D.C.

JICA, 2013, *The study on business opportunities development of Timor-Leste*, JICA, Dili

JICA, 2014, *Summary of evaluation results of Laclo Irrigation*, JICA, Dili

Joshi, P.K., Gulati, A. and Cummings, R. 2007, *Agricultural diversification and smallholders in south Asia,* Academic Foundation, New Delhi, India.

MAFF, 2009, *Area planted and production of horticulture in 2007*, Horticulture Division, Ministry of Agriculture, Forestry and Fisheries, Dili, Timor-Leste.

MAFF, 2008, *Agribusiness Timor-Leste, Agribusiness newsletter volume 3(1) February 2008,* Agribusiness Division, Ministry of Agriculture, Forestry and Fisheries, Dili, Timor-Leste.

MAP Municipio Viqueque, 2019, *Rezultadu analiza dadus produktividade no produsaun Batar no Hare iha municipio Viqueque*, Ministerio Agricultura e Pescas, Viqueque

MAP Municipio Viqueque, 2017, *Numero potensialidade natar e to'os por Posto Administrativo em município de Viqueque*, Ministerio Agricultura e Pescas, Viqueque

MAP Municipio Manatuto, 2016, *Total efectivos animais, Segundo a especial em municipio Manatuto,* Ministerio Agricultura e Pescas, Manatuto

MAP Municipio Lautem, 2015, *Relatorio area potencial plantas industrias no actividade parseiro desenvolvimento CCT*, Ministerio Agricultura e Pescas, Lautem

MAP, 2015, *Dadus area potensia, cultiva no produsaun Batar tinan 2015*, Diresaun Nacional da Agricultura, Horticultura e Extensaun, MAF, Dili, Timor-Leste

MAP, 2015, *Dadus área café e plantas industriais, produsaun e área potencial*, Direcao Nacional do Café e Plantas Industrias, Ministerio Agricultura e Pescas, Dili

MAP Municipio Manatuto, 2015, *Numero producao das principais culturas em municipio Manatuto*, Ministerio Agricultura e Pescas, Manatuto

MAP, 2014, *Dadus área potencial produsaun horticultura no produsaun frutas 2012-2013*, Direcao Nacional de Agricultura e Horticultura, Departemento Desenvolvimento Horticultura, Ministerio Agricultura e Pescas, Dili

MCIA, 2020, *Informasaun publikasaun presu komoditas nasional Municipio Manatuto*

periodu Fevereiro 2020, MCIA Manatuto
MAEOT, 2017, *Area administrativa por Posto Administrativos em Municipio Viqueque*, Ministerio Administrasaun Estatal e Ordenamento Territorio, Viqueque
MAEOT, 2016, *Estrutura Administrativa município de Lautem*, Ministerio Administrasaun Estatal e Ordenamento Territorio, Lautem
National Commission for Research and Development, 2008, *State of nation report, Vol. 4*, Ministry of Economy and Development, RDTL, Dili, Timor-Leste
NSD and UNFPA, 2011, *Population and housing census of Timor Leste 2010*, Volume 3, National Statistic Directorate and United Nations Population Fund, Dili, Timor-Leste.
Pingali, P. 2006, *Agricultural growth and economic development: a view through the globalization lens*, Agricultural and Development Economics Division, Food and Agriculture Organization, Rome, Italy.
Rahim, K.K. 2007, *Market feasibility study for AMCAP*, UNOPS, Bangkok Thailand. RDTL, 2007, IV Constitutional government program 2007 – 2012, Presidency of Ministrers'
RDTL, 2011, *Timor-Leste strategic development plan 2011 – 2030*, Republic Democratic of Timor Leste, Dili
RDTL, 2007, IV Constitutional government program 2007 – 2012, Presidency of Ministrers' Office, Dili, Timor-Leste
Sahan, E. and Mikhail, M. 2012, *Private investment in agriculture: why it's essential, and what's needed,* Oxfam Discussion Paper, September 2012
Sendall, A. 2006, *West Timor market study*, GTZ, Dili, Timor Leste. TLHS, 2004, Census Timor Leste, UNFPA, Dili, Timor-Leste
Servisu Estatistica de Viqueque, 2017, *Viqueque em números 2017*, DGE, Viqueque
Servisu Municipal de Agricultura Lautem, 2019, *Potensia pekuaria no veterinaria municipio Lautem*, Ministerio Agricultura e Pescas, Lautem
Sirappa, M.P. and Razak, N. 2010, Penelitian produktivitas jagung melalui pemberian pupuk N,P,K dan pupuk kandang pada lahan kering di Maluku, Prosiding Pekan Serealia Nasional, Ambon.
TLHS, 2004, Census Timor Leste, UNFPA, Dili, Timor-Leste.
USAID, 2015, *Timor-Leste economic diversification analysis: Candlenut, mobile finance market and tourism assessments*, LEO Report, USAID.
Varela, C. 2014, *Análise do Custo de abate e comercialização da carne de vaca no Distrito de Dili, Timor Leste,* Masters Dissertation, Programa de Pós-Graduação e Pesquisa Universidade Nacional de Timor Lorosa'e,
Waldron, S., Correia, V.P., Mulik, M., Do Rego, A.P. and Varela, C.C. 2015, *The Timor-Leste beef cattle industry,* ACIAR, Camberra
World Bank, 2010, *Draft document on expanding Timor-Leste's near-term non-oil exports*, Diagnostic Trade Integration Study, Poverty Reduction and Economic Management Sector Unit East Asia and Pacific Region
World Bank, 2007, *World development report 2008: Agriculture for development*, The World Bank, Washington DC

APPENDIX

Appendix 1. List of stakeholder consulted

No	Expert name	Title / position	Institution	Telp
1	Edmundo da Costa	Director	MAP Lautem	78065037
2	Raimundo da Cruz	Head of Industrial plant	MAP Lautem	77376943
3	Francisco J. Monteiro	Administrator	Posto Adm Lautem	
4	Venancio Ximenes	Coordinator Extension	MAP Lautem	78065032
5	Zito Guimaraes	Head of Livestock	MAP Lautem	
6	Elizito J.Ximenes	Head of Fisheries	MAP Lautem	77258249
7	Tito Batista	Agribusiness staff	MAP Lautem	76130950
8	Cancio Miranda	Wholesaler (Copra and Candle nut)	Private business	75235064
9	Bruno Amaral	Project Coordinator	GIZ Lautem	77376085
10	Arsenio M.Costa	CDO	Posto Adm Lospalos	77347983
11	Basilio da Costa	Project Coordinator	Local NGO - Fraterna	75055535
12	Lucio de Oliveira	Coordinator	CCT Losplaos	
13	Carolino dos Santos	Coordinator	Cooperativa Fini Losp.	77673310
14		Administrador	Autoridade M. Viqueque	
15	Manuel Ximenes	Project Coordinator	ADRA-Int NGO	77403236
16	Bonifacio Amaral	Coordinator Extension	MAP Viqueque	
17	Aniceto Gusmao	Extension worker	MAP Viqueque	77477442
18	Fernando	Head of Fisheries	MAP Viqueque	74005697
20	Raimundo C.Freitas	Vocal Point MCIA	MCIA Viqueque	77322434
21	Bendito Amaral M.	Project Manager	TOMAK	
22	Joao Lemos	CDO	Posto Adm Uatulari	78418223
23		Planning Director	Municipio Manatuto	
24	Firmino da Costa	MAP officer	MAP Manatuto	77270503
25	Edalina da Costa	Chief of Admministration	Posto Adm Manatuto Vila	77410830
26	Duarte da Costa	Head of Environmental	MCIA Manatuto	77328170
27	Chiquita da Silva	Agriculture Coordinator	Local NGO-Moris Foun	77379141
28	Fernando Valentin	CDO	Posto Adm Laclubar	76265804
29	Venancio C.Ximenes	CDO	Posto Adm Barique	77313030
30	Alarico Moniz	Vice Director	SPP Natarbora	75633066
31				

Appendix 2. Potential area for *industrial crops* in the municipality of Lautem – 2015

Commodity	Potential area (ha)	Planted area (ha)	Productive area (ha)	Yield (t/ha)	Production (t)
Coconut	7,673.23	2,433.23	1,402.46	0.24	336.59
Candlenut	2491.00	592.00	306.5	0.50	152.25
Vanilla	85.50	1.50	1.50	-	-
Robusta coffee	93.90	10.90	3.90	-	-
Arabica coffee	7.00	2.00	0.50	-	-
Sugar cane	1,000.00	-	-	-	-
Cacao	1,174.60	313.44	-	-	-
Areca nut	475.50	164.5	80.00	-	-
Cashew nut	40.00	-	-	-	-
Clove	110.00	72.12	-	-	-
Tobacco	250.00	-	-	-	-
Pepper	250.00	93.16	-	-	-
Total					

Source: MAP Lautem 2015

Appendix 3. Total number of *Livestock* in the municipality of Lautem

Posto Administrativo	Buffalo	Cattle	Horse	Goat	Pig	Chicken	Duck	Cow milk
Lospalos Vila	5,298	4,533	1,777	2,259	11,004	19,334	898	5
Lautem	6,570	3,486	521	6,824	7,896	17,300	-	-
Iliomar	2,437	4,155	342	1.156	6,707	12,339	-	-
Luro	3,765	2,464	263	781	6,233	12,839	-	-
Tutuala	2,086	1,554	202	483	2,483	13,564	12	-
Total	20,156	16,114	3,105	11,505	33,943	75,376	207	5

Source: MAP Municipio Lautem 2020

Appendix 4. Production and productivity of *Paddy rice* in the municipality of Viqueque 2019

Posto Administrativo	Potential area (ha)	Planted area (ha)	Harvested area (ha)	Productivity (t/ha)	Production (t)
Lacluta	845	11.60	11.60	3.09	35.80
Ossu	791	20.02	20.02	3.01	60.22
Uatucarbau	1,960	1,388.25	1,388.25	5.94	8,248
Uatolari	3,455	1,743.15	1,743.15	4.85	8,452.86
Viqueque Villa	2,742	824.90	824.90	2.80	2,310.93
Total	9,793	3,987.92	3,987.92	3.94	19,107.81

Source: MAP Municipio Viqueque 2019

Appendix 5. Production and productivity of *main crops* in the municipality of Manatuto 2015

Main Crops	Potential area (ha)	Planted area (ha)	Harvested area (ha)	Productivity (t/ha)	Production (t)
Maize	19,896	1,118.9	1,118.9	1.83	2,107.40
Forerai	-	25.2	25.2	1.20	30.24
Cassava	1260	251.1	213	5.00	106.50
Sweet potato	8,000	117	117	3.00	501
Greenbean	-	15	15	1.40	21
Soybean	-	45	44	1.50	66
Paddy rice	23,650	1,863	1,661.68	1.80	2,997.10

Source: MAP Municipio Manatuto 2015

Appendix 6. Candlenut Production by municipality in Timor-Leste

Municipality	Production area (ha)	% of total area
Baucau	933	32
Viqueque	629	21
Ainaro	320	11
Lautem	307	10
Bobonaro	307	10
Oecusse	138	5
Manufahi	109	4
Covalima	94	3
Manatuto	92	3
Liquica	10	<1
Aileu	5	<1
Dili	2	<1
Eremra	1	<1
TOTAL	2,947	100%

Source: National Directorate of Coffe & Industrial Plants – MAF 2015

Appendix 7. Photos

Cassava production – CCT Lautem

Vanilla – New product introduced in Lautem

Discussion with Copra trader

Meeting with extension worker