BASELINE STUDY ON THE IDENTIFICATION OF LOCAL PRODUCTS IN BOBONARO, ERMERA AND LIQUICA THAT HAVE POTENTIAL FOR EXPORT AND TO ATTRACT FOREIGN INVESTMENTS IN AGRICULTURAL SECTOR

(*Second Phase*)

FINAL REPORT

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TERMS AND ABBREVIATIONS

ADB	Asian Development Bank
AIP	Australia-Indonesia Partnership
Cap	Capita
CCT	Cooperativa Cafe Timor
CNIC	Centro Nacional de Investigacao Cientifica
CLN	Centro Nacional Logistica
CAAKUB	Centro atendimento Agricola Kuda Ulun Bobonaro
DGE	Direcao Geral Estatistica
DNAHE	Direcao Nacional de Agricultura, Horticultura e Extensaun
FGD	Focus Group Discussion
FAO	Food and Agriculture Organization
ha	Hectare
HRI	Hotel, Restaurant and Institutions
IMF	International Monetary Fund
Kg	Kilogram
MAFF	Ministry of Agriculture, Fisheries and Forestry
MAP	Ministerio Agricultura e Pescas
MECAE	Ministry of State and Coordinator of Economic Affairs
MCIA	Ministerio Comercio, Industria e Meio Ambiente
NGO	Non Governamental Organization
NSD	National Statistic Directorate
Na	not available
NCBA	National Cooperative Business Association
NTT	Nusa Tenggara Timur
PRISMA	Promoting Rural Income through support for Markets in Agriculture
RDTL	Republic Democratic of Timor-Leste
SPSS	Statistical Package for Social Science
t	Ton
TLHS	Timor Leste Household Survey
UN	United Nation
UNFPA	United Nation Population Fund
UNTL	Universidade Nacional de Timlor Lorosa'e
USA	United States of America
USD	United States Currency
Yr	Year
$	Dollar
%	Percentage

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EXECUTIVE SUMMARY

To explore and develop the abundant of the natural resources, private sector investment is needed as they can make a positive impact to the country, particularly investing in small-scale producers in agricultural sector in rural areas in Timor-Leste. Indeed agriculture sector has the potential to be developed, however, at present time; this sector is still far from its potential contribution to the national GDP.

Timor-Leste needs private sector agribusiness investment to increase the production and productivity of most of the crops grown by small producers. As productivity levels of the crops in Timor-Leste are low by world standards, therefore there is room for private sector to play their role in particular in introducing new technologies, providing access to markets, and investing capital in the intensification of production

The study was conducted in the municipality of Bobonaro, Ermera and Liquica. Respondents constituted 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 Bobonaro, Ermera and Liquica that have potential for export and to attract more foreign investments in agriculture sector.

The study shows most farmers in these areas grown food crops (e.g., paddy, maize, cassava, mungbean, etc.), industrial crops (e.g., coconut, coffee, tangerine, etc.), horticulture (mustard, cabbage, carrots, tomato, etc.), forestry, fisheries and raising livestock such as cattle, buffalos, goats and so on. Despite the existing product grown by farmers, there are a number of new crops introduced in Bobonaro, Ermera and Liquica, which includes Vanilla, Konjak (*Maek*), Dragon fruit, Brocoli, cauliflower and some new variety of bananas such as 'cafendix'.

The study also revealed that there are 10 local potential agriculture products and livestock identified in the municipality of Bobonaro, Ermera and Liquica, and they include **coffee, Vanilla, maize, paddy rice, mungbean, cattle, shallot, cabbage, banana and tangerine.**

The top five (5) local potential agriculture products and livestock identified in the municipality of Bobonaro are **Paddy Rice, Maize, Mungbean, Cattle and Shallot**. From 2015 – 2019 the area planted for paddy rice in Bobonaro increase significantly by 75% and this further resulted in the increase in production and productivity by 3.6 tons per hectare. In addition, the demand for rice in Bobonaro is around 9287 tons per year; while the supply is only around 7584.6 tons. In terms of maize Bobonaro can supply more that its demand which accounted for only 8798.6 tons annually; while the current level of production achieved 24,575 tons.

In addition, the top 5 local potential agriculture products and livestock in Ermera are **Coffee, Vanila, Tangerine, Shallot and cabbage**. These are products that contribute significantly to the economy of the population of Ermera.

Coffee still becomes the major export for non-oil commodity in Timor-Leste. The production of coffee including Ermera represent around 25 per cent of the total population in Timor-Leste; and Ermera alone, coffee engages around 16,900 household in the sector. In terms of the area of coffee in Ermera, there is an estimated of 28,000 hectares, or 58 per cent of the total area coffee plantations in Timor-Leste. The study reveals that the current production of coffee in Ermera is 9761 tons per year with the productivity of 0.65 tons per hectare. To increase the production a number of measures have being implemented by MAP and CCT which includes the rehabilitation of old coffee trees (pruning), distribution of coffee nursery and others.

The total area of **vanilla** in Ermera is around 60 hectares with the total household involve in growing vanilla is 227 households. The current production of vanilla in Ermera is around 6 tons. Most of the vanilla produced is destined for export market. So far the main buyer is CCT/NCBA. The current average price of wet vanilla is US$45 per kilogram. With the current production and the price of vanilla as mentioned, it will provide revenue of $271,125 per year ($1,194.4/household/year).

The study also revealed the top 5 local potential agriculture products and livestock in Liquica which includes **Coffee, Banana, tangerine, cattle and maize**. These local products and livestock are very potential in Liquica due to the community's dependency as source of income and food security, potential for existing market both domestic and export market, and the contribution for local economy and income.

Banana is one of the local potential products in Liquica which employed a significant number of households. The average farm size is range from 0.2 to 2 hectares and the yield is very low accounted for 0.91 tons per hectare. This considered lower than the average yield of most of bananas producing countries such as Philippines and Ghana of 13.3 tons per hectare. The low production mainly is due to lack of crop management, low skill of producers and intensive use of local seeds. For areas with potential for banana production such as Loes the income of the majority of the population is generated from banana. This reflects by a large quantity of the products (95%) sold in the market. The main market for banana is Dili and the main buyers are local traders.

Another local potential agriculture product in Liquica is **tangerine**. Data from Ministry of Agriculture and Fisheries shows the potential area for tangerine in Liquica is around 20,000 hectares. However, there are only 26.52 hectares (0.13%) of the total area has being planted. In addition, the production of tangerine was 291.72 tons with the yield of 11 tons per hectares. The main market is Dili and Liquica and the average price is $125 per tangerine tree or $3.50 per kilogram.

The initiative showed by some agribusiness companies, private sector agencies and NGOs in distributing local potential products to the markets so far in these municipalities have been improved. As majority of the farmers lack capital and access to transport which affected their ability to reach markets, the initiatives offered some producers an assured market for their produce to high end markets.

The study also shows 92.8 per cent of the top 5 local potential agriculture products and livestock produced in Bobonaro, Ermera and Liquica are selling to the market. These potential products are distributed through traders, retailers, cooperatives, CLN, wholesalers, agribusiness firms and others.

The majority of producers (95.8%) in Bobonaro, Ermera and Liquica are not conducted **value added** for some of the local potential products before selling to the market. The main reason for not performing value addition is due to producers do not know how to value add the products; lack of knowledge and skills; lack of training on how to conduct value added activities and lack of information on the importance of value added. In terms of **grading**, there are only 23% producers who perform grading activities for their products and 77 per cent are not grading the products at all. The main reason includes lack of labor, lack of buyers and low prices.

The main **constraints** faced regarding the the development of local potential agriculture products and livestock in Bobonaro, Ermera and Liquica are including low prices of the product, low production and productivity, economic of scale, human resource constraints (lack of skills) and lack of information.

Meanwhile the **opportunities** offered includes broad opportunities to increase production of local potential products, opportunities for processing vanilla, high demand for cattle in Dili and Indonesia, there is an opportunity to reduce rice import, maximization of the use of land for cultivation in particular for potential crops, high demand for domestic and export market for certain local potential products, opportunity to find new market for vanilla and an opportunity for processing industry for banana.

The result of the study clearly demonstrates that there is a potential to develop local potential agriculture products and livestock in Bobonaro, Ermera and Liquica. However, issues such as lack of inputs, low price for the produce, low quality and low skills of farmers hindering the opportunity to develop these products. In relation to these issues, it is **recommended** that government agencies and private sectors involve in agriculture sector needs to provide supports and assistance to producers and chain players; the need for infrastructure developments (e.g., including information & communication infrastructure); introducing high yield varieties; promoting value-added activities; more private sector investment in production and marketing of agriculture products; providing agribusiness companies in terms of technical and financial support; and the need to strengthen the existing markets and development of new markets.

INTRODUCTION

Geographically, Timor-Leste is a small country, but has abundant of natural resources. The economy mainly relies on agriculture sector as it may contribute to national GDP, employ almost three quarters of the workforce, provide over 70 per cent of the population with their main sources of livelihood and offer the largest potential exports and trade. To explore and develop the abundant of the natural resources, private sector investment is needed as they can make a positive impact to the country, particularly investing in small-scale producers in agricultural sector in rural areas in Timor-Leste.

Indeed Timor-Leste needs private sector agribusiness investment to increase the production and productivity of most of the crops grown by small producers. As productivity levels of the crops in Timor-Leste are low by world standards, therefore there is room for private sector to play their role in particular in introducing new technologies, providing access to markets, and investing capital in the intensification of production.

In addition, 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 investor's particularly in rural areas where most of the population is concentrating and depending on this sector. In addition, agriculture sector has the potential to be developed, however, at present time; this sector is still far from its potential contribution to the national GDP.

To attract local and foreign direct investor to invest in agricultural sector in the country, the government of Timor-Leste through its investment and export promotion agency, as so called TradeInvest needs to do more promotion regarding 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.

So far there is a lack of information on the issues as mentioned. To obtain that information's Trade Invest 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.

II. OBJECTIVE

The general objective of this study is to identify and collect information of local agriculture products and livestock in Bobonaro, Ermera and Liquica 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 Bobonaro, Ermera and Liquica 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 Bobonaro, Ermera and Liquica 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

Although government of Timor-Leste have provided an intensive supports and assistance to agriculture sector, but it has not achieved yet its potentiality. One example is agriculture productivity to date remains low and this is due to weak agricultural management and practices. In one hand, agriculture sector has the potential to contribute to national GDP but on the other hand, there is a lack of private investment in this sector.

To diversify the economy of Timor-Leste, the VI Constitutional Government 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.

To accelerate investment in Timor-Leste, particularly in agricultural sector, there is a need to gather 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. The research question is "how to obtain credible and comprehensive data from producers and relevant stakeholders and 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 and livestock that are potential for export to niche local and international market.

IV. RESEARCH APPROACH

The site of the second phase of this research includes the municipality of Bobonaro, Ermera and Liquica. These sites are known as potential areas for the development of agricultural sector including coffee, vanilla and horticultural products. The population in this study constituted of farmers, community leaders, MAF staff, extension workers, NGOs and International Agencies and other relevant institutions with the total of 200 people. These populations were treated as sample for the study. Methods used were 'Stratified Random Sampling'. The details of samples distribution are shown in the Table 1.

Tabel 1. Sample distribution

Municipalities	Lead Farmers	Community leaders	MAF Staffs	Extension workers	Chefe do Suco	Adm do Posto	Total
Bobonaro	10	4	5	5	45	7	76
Ermera	10	4	5	5	42	6	72
Liquica	10	4	5	5	23	5	52
Total	**30**	**12**	**15**	**15**	**110**	**18**	**200**

Data was collected from both primary and secondary data (both quantitative and qualitative data). Methods used for gathering data included 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 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.

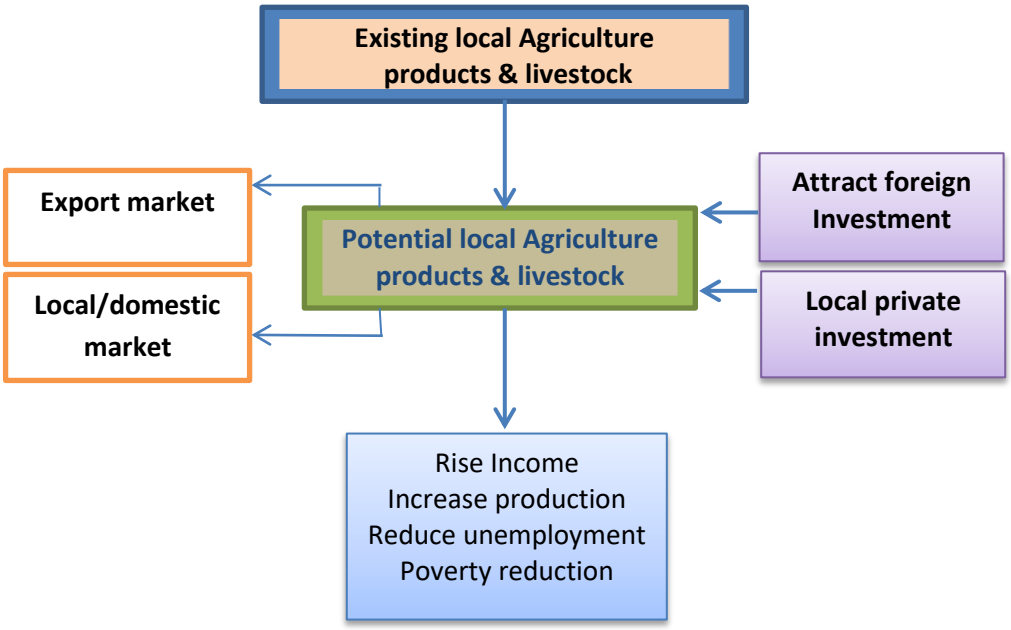


Figure 1. Conceptual framework of identification and development of local potential products

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 plays 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

The site for the second stage of this study was conducted in the municipality of Bobonaro, Ermera and Liquica, and it covers around12 Posto Administrativos. The total sample is 167 respondents, which constituted of 66 respondents from Bobonaro, 51 from Ermera and 50 respondents from Liquica. Respondents included in this study composed of MAP staff (directors, extension workers and others), agribusiness companies, lead farmers/head of farmer group, head of villages and sub villages, community leaders, lecturers, traders, buyers, national and international NGOs, and coordinator of MCIA.

In terms of the gender, male accounted for 96.4 per cent and female is only 3.6 per cent. Most of the respondents finished secondary school and only 12 per cent not school at all (illiterate). The details of the characteristic of respondents are shown in table below.

Table 2. Characteristic of respondent

Description		
Total respondent (people)		167
Gender (%):	Male	96.4
	Female	3.6
Year (average)		46.8
Education (%):	Primary school	38.8
	Secondary school	41.3
	University	7.8
	Not school at all (illiterate)	12.0
Occupation (%):	Farmer	16.2
	Community leader	80.8
	Public servant	2.4
	Trader	2.4

7.2 Existing local agriculture products and livestock in Bobonaro, Ermera and Liquica

The study shows most farmers in these areas grown food crops (e.g., paddy, maize, cassava, mungbean, etc.), industrial crops (e.g., coconut, coffee, tangerine, etc.), horticulture (mustard, cabbage, carrots, tomato, etc.), forestry, fisheries and raising livestock such as cattle, buffalos, goats and so on. Most of the existing crops grown by farmers in these areas are the same; however there is certain crops that typically grown well in some areas because of the geographical condition. For example, Ermera is known as center for coffee production; while Bobonaro is famous of the production of paddy rice. In addition, despite the existing product grown by farmers for many years, there are a number of new crops introduced in recent years in Bobonaro, Ermera and Liquica. These new crops are including vanilla, Konjak (*Maek*), Dragon Fruit, Brocoli, cauliflower and some new variety of bananas such as *cafendix*. Most of 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 the municipality of Bobonaro, Ermera and Liquica

To define the potentiality of local agriculture product and livestock, it needs to fulfill a number of criteria's. These criteria's are including the product contribution to the municipality overall production; current level of production; existing and potential market and export potential of the product; and finally the total household involvement to produce the product. Based on the criteria of the potentiality as mentioned, the study reveal the top five (5) local potential agriculture products and livestock for each municipality as shown in the table below.

Table 3. Top 5 local potential agriculture products and livestock in Bobonaro, Ermera and Liquica

Municipio	Top 5 local potential agriculture product and livestock				
	1	2	3	4	5
Bobonaro	Paddy rice	Maize	Mungbean	Cattle	Shallot/garlic
Ermera	Coffee	Vanilla	Tangerine	Cabbage	Shallot/garlic
Liquica	Coffee	Banana	Tangerine	Cattle	Maize

7.3.1 The potentiality of local potential agriculture products and livestock in Bobonaro

The municipality of Bobonaro is one of the municipalities in Timor-Leste located in the western part of the country and sharing a border directly with Indonesia. In the north part it's bordered with Liquica, in south part bordered with Covalima and in the west bordered with NTT Indonesia. The total area is 1,380.82 km2 with the total population of 7,762 people and the total household of 17,635 (DGE 2015). Bobonaro is constituted of six sub-districts and 50 villages with the population density of 71 people/km2.

Agriculture becomes an important source of income and livelihoods for the majority of population in Bobonaro. The total area suitable for agriculture is approximately 25,000 hectares or around 18.1 per cent of the total area. The major crop cultivated by farmers includes paddy rice, maize, mustard, cabbage, shallot, garlic, and others. In addition, livestock raised are including cattle, buffalos, goat, horse, pig and chicken. Most of the agricultural system applied is still subsistence with some slightly moving away from subsistence to semi and commercial farming.

The result of the study shows that the top five (5) local potential agriculture products and livestock in the municipality of Bobonaro are **Paddy Rice, Maize, Mungbean, Cattle and Shallot/Garlic.** From the discussions and interviews with stakeholders it reveals that these products play an important role in the economy of the majority of population in Bobonaro. The existing market for these products domestically is quite good, the engagement of people in Bobonaro in producing these products is significant, and some of the products in the past have being exported to Indonesia (e.g., cattle and green bean).

Paddy Rice – Bobonaro known as one of the municipalities in Timor-Leste, which is very potential for paddy rice production. Since Indonesian times until recently, Bobonaro still become the center of paddy rice production in this country. This can be seeing through the significant involvement of the household in producing paddy rice, which around 8,500 households or 48.2 per cent of the total household in Bobonaro (DGE 2015). In addition, the productivity of paddy rice is also increase up to 3.6 ton/ha compared to national level, which only achieved around 2.5 ton/ha (DSA Bobonaro 2019 & MAP 2015). Despite this, there are two permanent irrigation schemes (Maliana I and Maliana II) that provide water continuously for the whole year in supporting the production of paddy rice in this area.

The potential area for paddy rice cultivation in Bobonaro is 7762 hectare hectares, but only around 3,500 hectares are planted (45.1%). The area planted for paddy rice in Bobonaro in 2016 was 866.40 hectares and in 2019 was 3503 hectares (MAP Bobonaro 2019). This means there is an increase of the area of production of 2,657 hectares (75%) during four

years' time. The increase in area planted resulted to the increase in production and productivity. For instance, the production of paddy rice in 2017 was 6,974.19 tons with the productivity of 3.28 tons/ha, and in 2018 it was increase up to 11,395 tons with the productivity of 3.6 tons/ha (an increase in the productivity of 0.32 ton/ha). The details of the area planted and production of paddy rice are shown in figure 2.

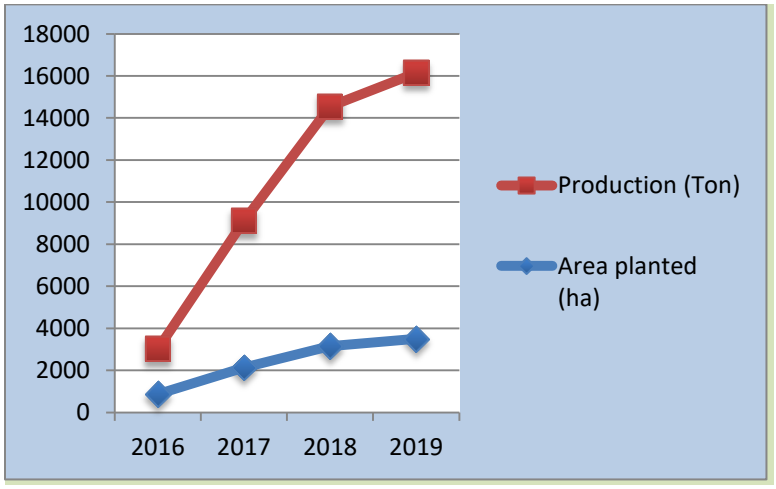


Figure 2. Area planted and production of paddy rice (2016 – 2019)

If the per capita consumption of rice of 95 kilogram per year it means Bobonaro will need around 9287 tons of rice annually. In fact the current production of paddy rice in Bobonaro in 2019 is 12,641 tons or equivalent to 7584.6 tons of rice. This indicated there is a deficit of the supply of rice of around1700 tons per year.

Most of the production of paddy rice produced (65%) still for own consumption, and the rest is distributed to the market. The main market is Liquica, Ermera and Dili. In terms of local market, the demand is quite significant as Liquica and Ermera does not have enough suitable land and irrigation to produce rice. Therefore most of the rice produced in Bobonaro generally bough by people from these two municipalities. There is only a small number of volumes are further distributed to Dili market in particular for red and black rice. The average price for paddy rice is 0.40 cents per kilogram, while for rice is $1.05 per kilogram ($26/sack of 25kg). In addition, in recent years there is market opportunities offered by government (CLN) to buy locally produced rice, and this provides an opportunity for producers in Bobonaro to produce more for the market.

Based on the total production of paddy rice of 12,641 tons, and assume 60 per cent is sold to the market with the price of $400/ton; this will generate an income of $5,056,400 ($594.9/household/season).

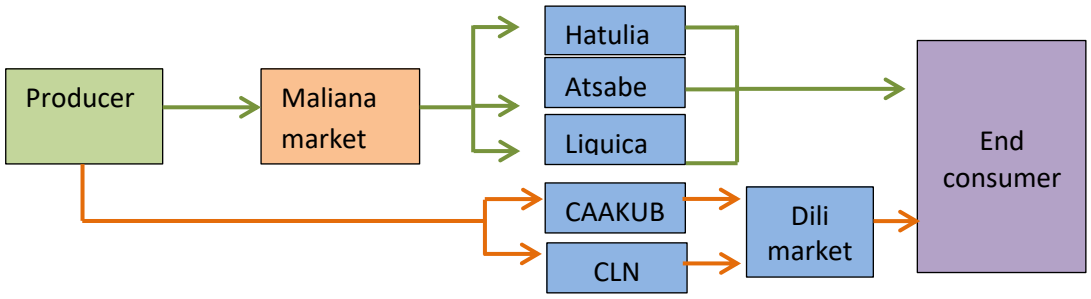


Figure 3. Supply chain of paddy/ rice in Bobonaro

Maize – It is a product that engages more than 15,000 households in Bobonaro to produce. Maize is the second potential product after rice with around 85 per cent of the population planted every year. The total area planted in 2018 was around 9000 hectares and 2019 down to 6507 (MAP Bobonaro 2019). Even though the area planted decrease however, the production and productivity of maize increase significantly. For example, the production in 2018 was around 19,700 tons and in 2019 rise up to 24,500 tons (increase by 4800 tons). If Bobonaro can maintain an increase of maize annually it means in the next 5 years Bobonaro alone can produce more than 48,500 tons of maize.

With the level of consumption of 90 kilogram per capita per year, it means the demand of maize for Bobonaro is 8798.6 tons per year. Thus, with the current level of production of 24,575 tons in 2019, there is an over supply of about 15,776.4 tons annually. If this surplus can be sold with the price of $400 per ton it will generate an income of around 6 million US dollar per year or $417 per household per year. The main market for maize is Ermera and Liquica. These areas topographically are located in highland areas where the production of maize is very low and take more than 4 months to produce. Indeed traders and consumer generally bought maize in small quantity. The price of maize is 0.40 cents per kilogram or $400 per ton.

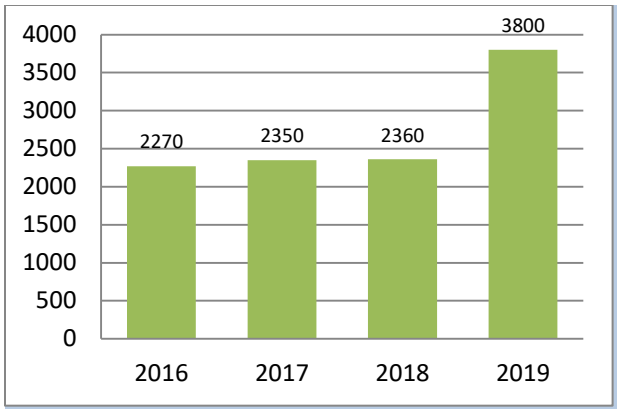


Figure 4. Productivity of maize in Bobonaro

Mungbean – One of the local potential agriculture products in Bobonaro is Mungbean. There is no information on how many households producing mungbean, however there is a total of household produce beans of 10,063 (DGE 2015) and this may include mungbean. The potential area for mungbean in Bobonaro is 1467 hectares but the area planted is only 686 hectares (MAP Bobonaro 2011; 2019) or it is only 47% of the total potential area planted. In terms of the total production, it's around 550 tons per year with the productivity of 1.10 tons per hectare. The productivity of mungbean is very low however; it is higher than the national average of 0.90 tons per hectare (MAP 2012). If Bobonaro can maximize all the potential areas it will produce around 770 tons of mungbean annually; or, if producers can increase the productivity of about 2.5 tons per hectare it will produce around 3,600 tons per year.

The main market for mungbean is Maliana, Dili and Indonesia with the average price of $1.25 per kilogram. With the total production as mentioned it can generate an income for producers of $687,500 annually. In addition, the main production area for mungbean is Maliana, Balibo and Bobonaro.

Cattle - Bobonaro is one of the three municipalities in the west part of Timor-Leste, which is very Potential for cattle production. The total number of household raised cattle is 8489 households (48.1%) with the total number of cattle of 37,052 (DGE 2015). This indicates that each household raises around four cattle's.

The system of raising cattle composed of two ways. The first, producers generally raise their cattle's in an open field for the who owned more than five cattle's. The second way is through fattening system which producers manages their cattle's in an intensive way including feeding three times a day and others.

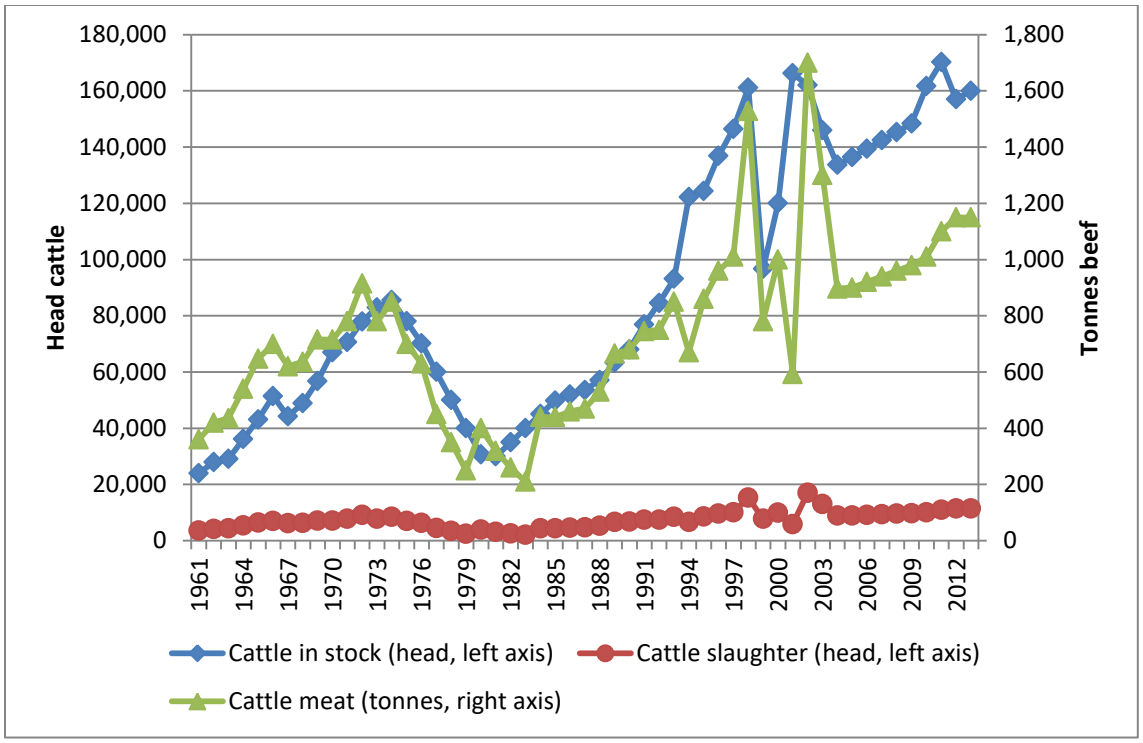
The main market is Dili and Indonesia; with the latest trading illegally through the border (Scott at al. 2016) and the number is quite significant. The main buyers are traders who regularly buy and distribute cattle's to the main market and the volume of trading is very small around 10 – 12 cattle's per week (Scott et al. 2016). With the national consumption level for bovine meat of 1.19 kg/cap/year (Varela 2014), this means the demand for bovine meat in Bobonaro is 116.2 tons per year. The per capita consumption of meat as mentioned is quite lower; compared to Indonesia of 2.5 kilogram and an average of least developed countries of 4.8 kilograms. The lower consumption of bovine meat is caused by low income which affect to the consumer buying power, and also consumer preferences to buy other meat which quite cheaper. Indeed, the mean per capita income per month in Timor-Leste is quite lower of $62; which for urban areas $93 and rural areas $50 (NSD 2011). The average price is $550 per cattle ($7.50/kg bovine meat).

Based on the total number of cattle in Bobonaro of 37,052 or equivalent to 3705.2 tons of meat (100 kg carcass weight), it means there is more than enough to supply bovine meat to the population in Bobonaro (demand only 116.2 t/year). The over supply of bovine meat of 3589 tons can be further supply to the main market in Dili and other municipalities. In addition, the demand for cattle in Indonesia is quite big as the domestic production of cattle in Indonesia can only fulfill about 45% of the Indonesian demand for beef (Agus & Widi 2018). As a result, in 2016 Indonesia import 195,764,113 cattle and mostly from Australia.

The high demand of beef market in Indonesia offered an opportunity for Timor-Leste cattle industry as there is an over supply of beef in Timor-Leste of about 20,000 tons (DGE 2015). This can be further exploited as a potential market for cattle export.

In fact Timor-Leste produces enough beef to be self-sufficient, however lack of demand, low purchasing power and lack of capacity to meet the supermarket and high-end hotel, restaurant and institution (HRI) trade; means Timor-Leste still imports some beef in particular from Australia and New Zealand of around 100 tones per year (UNComtrade 2015).

From census data 2015 shows that 25.8 per cent of all households (52,864 households) in Timor-Leste raised cattle, totaling 221,767 head (DGE 2015) with more extensive production areas including Bobonaro, Covalima, Oecusse and Manufahi. The detail for cattle production indicators in Timor-Leste is presented in figure 5.



Source: FAOSTAT 2012

Figure 5. Cattle and beef industry indicator in Timor-Leste

Shallot and Garlic – Another potential product in Bobonaro is Shallot and Garlic. The area where communities mostly produce shallot and garlic is in Posto Administrativo Bobonaro (Marobo complex), Maliana and Balibo. The Potential area for shallot is around 600 hectares and there is only 60 per cent (360 ha) are planted (MAP Bobonaro 2019). In addition, the productivity of shallot is 1.2 tons per hectare.

The main market is Bobonaro and Dili. However, the volume of the product distributed to the market is small as there is lack of buyers and most of the product sold only in Bobonaro. Buyers are including traders, retailers and consumers in Bobonaro. The price of shallot is US$1.50 per kilogram. Indeed, shallot is in high demand in Indonesia. This is related to the importance of this product as a key ingredient for Indonesian cuisine. From 2008 – 2012 the national consumption of shallots averaged 1.04 million tons per year (AIP-PRISMA 2015). In terms of imports it accounted for 7-15% annually (average 110,000 tons/year) and most of shallot is imported from Thailand, Philippines, Vietnam, India and Myanmar. This is another important market that Timor-Leste can exploit. Timor-Leste has plenty of potential areas to produce shallot including

Bobonaro and geographically it's very close to Indonesia. If Timor-Leste can maximize its effort to fulfill some of the demands of shallot in Indonesian market it will generate significant income to the country. Table below present a summary of the local potential agriculture products and livestock in Bobonaro.

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

Description	Potential local agriculture products and livestock				
	Paddy Rice	Maize	Mungbean	Cattle	Shallot
Household number	8500	15,128	10,063	8489	Na
Current production (t/year)	12,641 (7584.6)	24,575	550	37,052	432
Productivity (t/ha)	3.60	3.80	1.10	-	1.2
Main market	Ermera, Liquica & Dili	Ermera & Liquica	Dili & Indonesia	Dili & Indonesia	Bobonaro & Dili
Average price ($/kg)	0.40	0.40	1.25	7.50 ($550/head)	??
Consumption level (kg/cap/yr)	95	90	Na	1.19	Na
Demand (t/yr) Bobonaro National	 9287.4 110,887.9	 8798.6 105,051.8	 Na	 116.3 1387.0	 Na
Current supply (t/yr)	7584.6	24,575	550	3705.2	432
Export	-	-	-	-	-

Source: TLHS 2004; MAF; NSD and UNFPA; RDTL; IMF 2011; MAP 2012; Varela 2014; DNAHE-MAF 2015; DGE 2015; Scott et al 2016; MAP Bobonaro 2019 # Conversion paddy rice to rice is 60%;

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

Ermera is one of the municipalities in Timor-Leste that is very potential for coffee production. Demographically Ermera is located at 8° 40-100' south latitude and 125° 01-35' east longitude. Ermera consists of five sub-districts namely Atsabe, Letefoho, Hatolia, Ermera, and Railako. Topographically, Ermera is divided into four areas according to altitude: 1) areas with altitude of 40–100 m including Hatolia, Sare, and Marobo River; 2) areas with 100–500 m altitude in Hatolia town; 3) areas with 500–1000 m altitude including Tallo, Fatubesi, Ermera and Railako; and 4) areas with more than 1000 m altitude including Atsabe and Letefoho. The total area of Ermera is 770.83 km2 and the total population of 125,702 (second highest after Dili) with total household of 20,671 (DGE 2015).

The main crops grown by farmers include coffee, maize, vegetables (e.g., cabbage, carrots, mustards, broccoli, etc), vanilla, fruits (e.g., tangerine, rambutan, mango, etc), beans and so on. Meanwhile the livestock mostly raised by farmers are including cattle, chicken, pig and goat. The rainy season started from October to March and the dry season is from April to September.

The result of the study revealed the top 5 local potential agriculture products and livestock in Ermera are **Coffee, Vanila, Tangerine, Shallot/Garlic and cabbage**. These are products that contribute significantly to the economy of the population of Ermera and also engages a significant number of farmer households in producing these products. Stakeholders interviewed mostly describe these products as potential local products in Ermera that can be developed further in particular increasing the productivity and also the market.

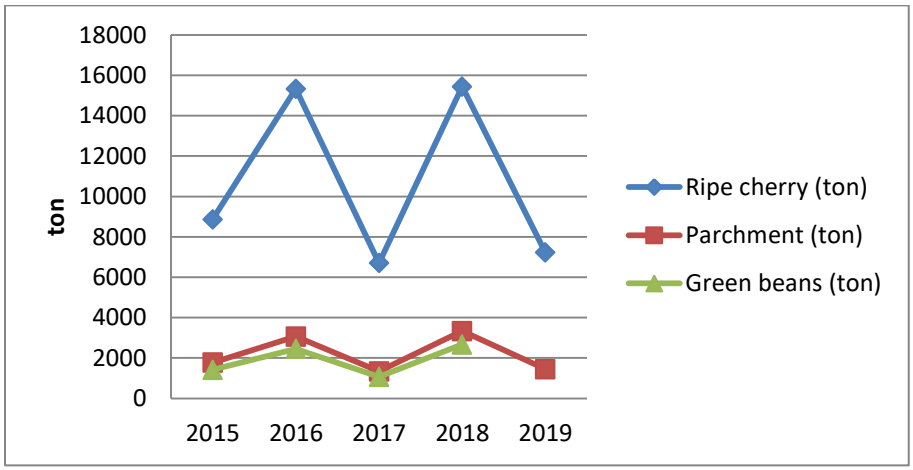
Coffee – So far coffee still become the major export for non-oil commodity in Timor-Leste. The production of coffee including Ermera is dominated by an estimated 44,000 small household producers which represent around 25 per cent of the total population in Timor-Leste (Oxfam 2002); and in Ermera alone, this commodity engages approximatelly 16,939 household in the sector (DGE 2015). In terms of the area of coffee in Ermera, there is an estimated of 28,000 hectares, or 58 per cent of the total area coffee plantations in Timor-Leste (MAFF 2010). Even though coffee still remains as Timor-Leste's major export, the contribution of this sector to the national economy is very important and in terms of the income, it offers to a significant proportion of the rural population.

The study reveal that the current production (netto) of coffee in Ermera is 9,760,999 kilograms (or 9761 tons) per year with the productivity of 0.65 tons per hectare (CCT; MAP Ermera 2019). From the interview and discussions with stakeholders, the majority of them are really concern with the the low production of coffee – which continue to decrease. Howerver, there are a number of measure that has being implemented by MAP and CCT to increase the production and this includes the rehabilitation of old coffee trees (pruning), distribution of coffee nursery and others. So far there are around 600 hectares of coffee that has being rehabilitated (MAP Ermera 2019). According to coffee and cacao expert Mr.Soebadi (CCT consultant), coffee that has being pruned can increase the production by 200 per cent or on average 10 kilograms per coffee tree. In addition, in the last 4 years around 3 million coffee threes that has being pruned by CCT in coffee production areas in Timor-Leste. If prune can increase production as mentioned, it means the productivity of coffee in Ermera will rise up to 1.95 tons per hectare. This will resulted in the increase of production by 54,600 tons annually.

Most of coffee produced in Ermera is destined for export. There is only small percentage of coffee is marketed domestically. The total export of coffee from 2015 – 2019 is always fluctuated. For example, in 2017 and 2018 the volume of export for parchment was 1339.72 and 3338 tons respectivelly (CCT 2019). The export destination countries are including USA, Canada, Australia and Japan. The details of the export of coffee in Timor-Leste is shown in figure 6. In addition the main buyers and exporters for coffee in Ermera are CCT–NCBA, Timor Global, Timor Corp., Peace wing Japan, Olam, Alter Trade and Parchic. The average price for coffee cherry is 0.34 cents/kg. For coffee with quality grade

'A' the price is vary. For example, Olam company offer $2.25/kg, Timor Corp $2.50/kg and Peace Wing $2.75/kg.

The demand for Timor-Leste's coffee is high, however the production is very low. To fulfil the demand for export market, improving the productivity is an option that need to be taken into consideration.



Source: CCT 2019

Figure 6. Export of coffee from 2015 - 2019

Vanilla - Vanilla is a second local potential agriculture product in Ermera. Vanilla was re-introdfuced as a cash crop by CCT in 1996 and started from 2002 – 2005 began to export the product which internationally certify as "organic product". The total area of vanilla in Ermera is around 60 hectares and the total household involve in growing vanilla is 227 households (MAP Ermera; CCT 2019). The production of vanilla from time to time is vary. For example, in 2015 was around 700 kg, 2017 was 145 kg and 2019 rsie up to 6025 kg (CCT 2019). The details of the production of vanilla from 2010 – 2019 is shown in figure 7.

In addition, most of the vanilla produced is destined to the export market. So far the main buyers for this commodity is CCT/NCBA and the main market is USA and New Zealand. The price of wet vanilla in 2018 for grade A was $57/kg and grade B $45/kg. In 2019 the price going down slightly to $50/kg for grade A and $40/kg for grade B. Compared to the price of

wet vanilla in 2005 of $22.50/kg (Correia et al. 2005), the current price increase significantly by 45 per cent in 14 years time.

The result of the study shows one vanila tree can produce an average of 1.8 kilograms wet vanilla. From the interview with a group of vanilla farmers in Suco Leimea Sorin Balun, it reveal that from 225 vanilla trees can only produce 405 kg vanilla. This group planted around 15 hectares of vanilla. In addition, with the planting distance of 2 x 2 meters, one hectare can be planted 2500 vanilla tree (4500 kg/ha).

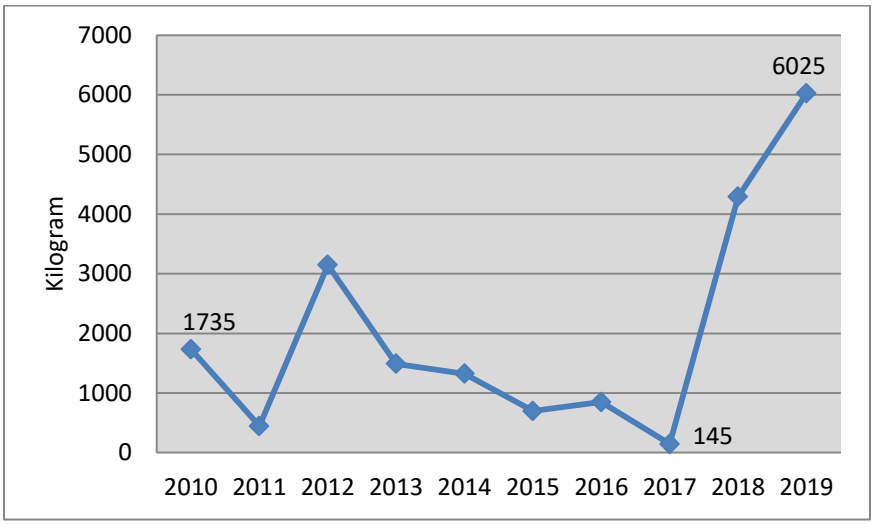


Figure 7. Production of Vanilla in Ermera (2010 -2019)

With the current production of 6025 kilograms and the average price of $45 per kilogram, this will provide a revenue of $271,125 per year ($1,194.4/household/year). If vanilla farmers can maximize the area of planted of 60 hectares it means the production of vanilla in Ermera will reach around 12 million dollars annually. Based on the information as mentioned, the development of vanilla in Ermera will have a good prospect in the future. From the agronomic aspect, the topography of Ermera is feasible from growing vanilla as the cultivation of this plant requires a temperature range of 21 to 32 °C, an evenly distributed annual precipitation of 1500 mm or more, 80 per cent relative humidity and altitudes of 0 to 600 m above sea level (FAO 2009). From the economic aspect it provides a significant revenue and this futher resulted in an increase of income of the population in Ermera.

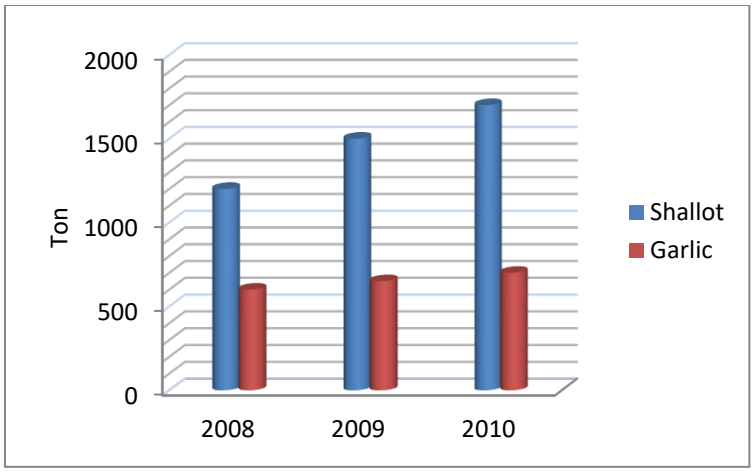
Tangerine - It is a commodity that growing well in Ermera as this plant can be grown in low land and also up-land areas. Data from the Ministery of Agriculture shows that the potential area for tangerine in Ermera is around 5000 hectares (MAP 2014); however it is only planted 87.65 hectares (MAP Ermera 2019). In addition, the total production in 2012 was 505.47 tons and 2013 down to 252.7 tons (MAP 2014). In terms of the productivity, it is around 3 tons per hectare; and this is very low compared to Indonesia of 21 tons per hectare. Areas where tangerine mostly grown are including Humboe, Mertutu, Railaco, and Letefoho.

Most of tangerine produced in Ermera is distributed to Dili with the rest is selling to the local market around Ermera and other municipalities. For prices, producers normally 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 Badang Litban 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/year. Thus, if the average productivity of 21 tons per hectare, with the total planting area of 87.65 hectares Ermera can produce around 1840.7 tons tangerine per year. Furthermore, the maximization of a half of the potential areas for tangerine in Ermera (2500 ha) it will produce 52,500 tons of tangerine per year.

Shallot/Garlic – These are some of the commodities that are very potential in Ermera. Shallot and garlic growing well in Ermera and the majority of producers are small-scale farmers who produce only in a small area of land averaged 0.2 hectares. The total area planted for shallot is 11.3 and garlic 13.8 hectare ((DNAH-MAP 2007).

The total production of shallot and garlic in Timor-Leste is around 1700 and 700 tons respectively (see figure 8); and for Ermera it is around 35 tons and 29 tons (DNAH-MAP 2007; 2010). In addition, the productivity of shallot and garlic in Ermera is very low accounted for only 3.1 and 0,93 tons per hectare. If compared to Indonesia, the productivity of shallot and garlic is 9.31 tons and 9.09 tons per hectare (BPS & Dirjen Hortikultura 2017). This indicated that there is still rooms to increase production of shallot and garlic. Indeed, there is lack of data on the potentiality for these commodities; but through the discussions and interviews with stakeholders, around 80 per cent of them stated that shallot and garlic are very potential in Ermera.

Most of shallot and garlic produced is sell to the local market in Ermera and other municipalities - where cheaper import of shallot and garlic have not penetrated yet; and a small percentage is distributed to Dili market. In the local market, most of the products are sold in volume (e.g., cans, sacks, buckets and bunches); and the price for shallot is $1.50 per kilogram (harvest season). This price will rise-up to $2.25 per kilogram in a few months later. With the price of $1.50/kg it can generate an income for producers of $52,500 per year. The main buyers are traders who engaging in buying and selling of agricultural produce.



Source: DNAH-MAP 2010

Figure 8. Production of Shallot and Garlic in Timor-Leste from 2008-2010)

Cabbage – Another potential local product in Ermera is Cabbage. The total household engage in vegetable production in Ermera is 13,639; and from this, around 6800 (50%) involve in the production of cabbage. According to MAP (2007) the total area planted for cabbage in Ermera is 50 hectares with the total production of 390 tons.

In addition, the production of cabbage from 2014 – 2018 shows significant increase. For example, in 2017 the production was 219.65 tons and in 2018 rise up to 667.6 tons (MAP Ermera 2019); an increase of about 33 per cent. The yield of cabbage is 7.8 tons per hectare. According to FAO (2006) and MAC (2008), under good growing conditions and use of good seed varieties, cabbage can yield up to 20 tons per hectare. The details of the production of cabbage in Ermera is shown in grafic below.

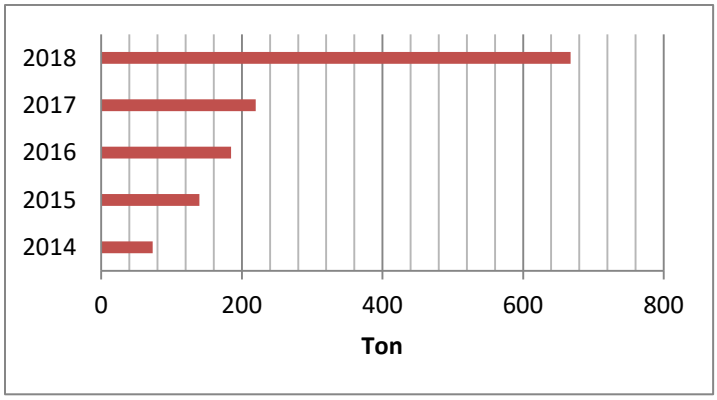


Figure 9. Production of cabbage in Ermera (2014-2018)

The main market for cabbage is Dili and the main buyers are local traders and supermarkets. Traders normally bought in bulk or in advance payment when producers started to grow cabbage. Meanwhile some supermarkets operated regularly in a weekly basis to purchase cabbage and other vegetables. Most of the cabbage produced in Ermera is sold in the market, with the average price of 0.50 cents per kilogram. From the total production as mentioned, it can generate a total value of about $300, 000. Cabbage alone could provide a substantial improvement in income of farm households in the Ermera. The details of the local potential agriculture products and livestock in Ermera are shown in table 5.

Table 5. Description of local potential agriculture products and livestock in Ermera

Description	Potential local agriculture products and livestock				
	Coffee	Vanilla	Tangerine	Shallot/ garlic	Cabbage
Household number	16,939	227	Na	Na	6800
Current production (t/year)	9761	6.02	505.5	35/29	390
Productivity (t/ha)	0.65	4.5	3.0 (21)	3.1/0.93	7.8
Main market	USA , Canada, Australia & Japan	USA & NZ	Dili & Ermera	Local market	Dili
Average price ($/kg)	0.34/kg (cherry)	45/kg wet vanilla	150/tree	1.50/kg	0.50/kg
Consumption level (kg/cap/yr)	Na	Na	Na	Na	Na
Demand (t/yr)	-	-	-	-	-
Current supply (t/yr)	9761	6.02	505.5	35/29	390
Export (ton)	10,712.7 (Ripe cherry)	1.0 (dry vanilla)	-	-	-

Source: TLHS 2004; DNAHE-MAP 2007 & 2010; MAP 2014; DGE 2015; MAP Ermera 2019; CCT 2019
 # Conversion – Wet to dry Vanilla is 6:1

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

Liquica is one of the municipalities in Timor-Leste that is very close to capital city – around 45 minutes' drive from Dili. Administratively Liquica constituted of three Posto Administrativos and 23 villages of which 10 villages are located in coastal areas and the others in up-land areas. The total area is 550.95 square kilometer with the total population of 74,454 and the total household of 11,885 (DGE 2015).

The livelihood of most of the population depends on agriculture sector. This includes fisheries for communities live throughout coastal areas and crops and livestock production for those live in lowland up-land areas such as Lois and Bazartete. The crops mostly grown are including coffee, maize, cassava, paddy rice, vegetables, fruits (e.g., mango, tangerine, etc) and papaya. Meanwhile the majority of population in Liquica raises cattle, goat, chicken, pig and horse.

The result of the study shows the top 5 local potential agriculture products and livestock in Liquica are **Coffee, Banana, tangerine, cattle and maize**. According to the discussions and

deep interviews with stakeholders it clearly stated that local products and livestock as mentioned are very potential in Liquica due to the communities dependency as source of income and food security, the existing market both domestic and export market, and the contribution for local economy and income.

Coffee – this commodity mostly grown by communities live in up-land areas with the household engages in coffee production of 6703 (DGE 2015). The total area is around 12,000 hectares with the production of 4050 tons and the yield around 0.52 tons per hectare (MAP 2015). Due to the coffee that is too old, lack of shade trees, changing in climatic condition and poor farm management, it's directly affecting the production of coffee.

Most of coffee produced in Liquica is destined to export market with a very small percentage sold in domestic market. Main buyers are including CCT and Timor Global and the price offered to producers is 0.30 cents per kilogram cherry (or $1.40/kg dry bean).

Banana – It is one of the local potential products in Liquica, which employed a significant number of households to produce it. The average farm size is range from 0.2 to 2 hectares. In addition, the yield of banana is very low accounted for 0.91 tons per hectare (Correia et al. 2015); which considered lower than the average yield of most of bananas producing countries such as Philippines and Ghana of 13.3 tons per hectare (IFPRI; Bathan & Lantican 2010). The low production of banana mainly is due to lack of crop management, low skill of producers and intensive use of local seeds.

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For areas with potential for banana production such as Loes the income of the majority of the population is generated from banana. This reflects by a large quantity of the products (95%) sold in the market (Correia et al. 2015). The main market for banana is Dili and the main buyers are local traders who regularly buying and selling of agricultural produce in Liquica. In addition, the average price of one big bunch of banana is $3.00 (one big bunch composed of 15 small bunches). The weight of a big bunch is 20 kilograms and small bunch is 1.34 kilograms. This means that the price of one-kilogram banana is 0.15 cents.

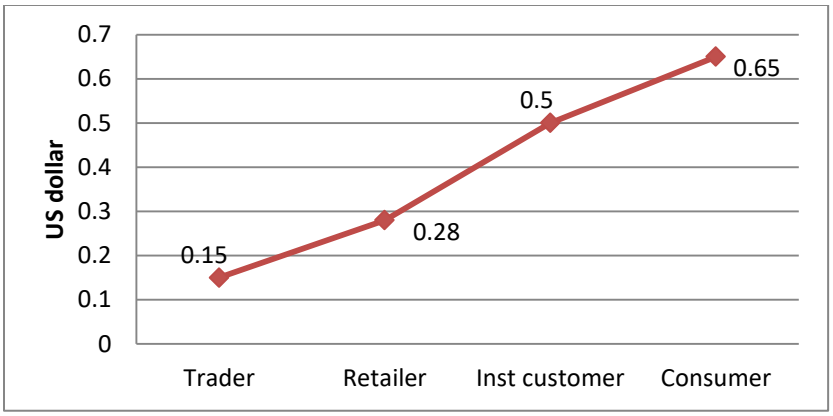

Figure 10. Average price of Banana

A study done by Correia et al. (2015) revealed that the quantity of banana sold by traders during peak season accounted for around 15 tons and in low peak season around 6 tons. In terms of the distribution system, most of the products mainly go through local traders than Dili markets retailers and finally consumers as shown in figure below.

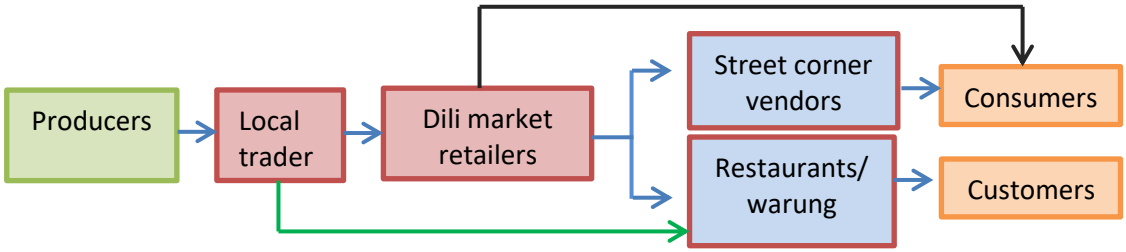

Figure 11. Supply chain of Banana in Liquica

Tangerine – Another local potential agriculture product in Liquica is tangerine. Data from Ministry of Agriculture and Fisheries shows the potential area for tangerine in Liquica is around 20,000 hectares. However, there are only 26.52 hectares or 0.13 per cent of the total area has being planted (MAP 2014). In addition, the production of tangerine was 291.72 tons with the yield of 11 tons per hectares.

Meanwhile, the result of the study revealed that with the planting distance of 6x6 meters farmers grow around 500 tangerine trees per hectare. This means with the total area planted as mentioned, there will be13, 260 tangerine trees are available in Liquica. Thus, with the average production of 35 kilograms per tangerine tree, this will resulted in a total production of 464,100 kilograms or 464.1 tons of tangerine per year. Based on this, the yield of tangerine will be 17.7 tons per hectare and this is higher than national level but lower than tangerine yield in Indonesia which accounted for 32.5 tons per hectare (Departemen Pertanian 2009a) and this means there is still an opportunity for improving the yield of tangerine.

In terms of marketing, most of the tangerine produced is for selling to the market. The main market is Dili and Liquica and the main buyers are local traders. The average price offered

is $125 per tangerine tree or $3.50 per kilogram. This will provide significant revenue for producers of $1,624,350 annually.

Cattle – It is one of the potential agriculture products in Liquica that engage a significant number of households of 4252 with the total number of cattle 10,726 heads (DGE 2015; MAP Liquica 2016). In the past farmers in Liquica raising cattle in a traditional way where cattle left in an open pasture in the morning and fenced in the afternoon. However, due to the continuous assistance and support from MAF and some international agencies such as ACIAR, nowadays farmers raise cattle in an intensive way through fattening system. This resulted Liquica as one of the municipalities that regularly supply cattle to main market in Dili.

Farmers in Liquica raised cattle for a number of reasons and this includes financial necessities for families, cultural and tradition festivals, housing construction, school fees and so on. The main market is Dili and the main buyers are local traders who operated regularly in this area. In addition, for cattle that raised through fattening system, the price is based on live cattle weight and this is regulated by the government. For example, cattle with live weight 200 – 250 kilograms the price is $2.50 per kilogram and cattle with live weight more than 300 kilograms the price is $2.70 per kilogram. If a cattle weight 300 kilograms means farmers will receive $810 ($2.70 x 300 kg). For farmers who not raise cattle through fattening system the price will depending on the negotiation between cattle owner and trader and this can be vary between $500 – 700 per cattle (300 kg). For bovine meat the price is around $6 – 7 per kilogram.

As per capita consumption of bovine meat nationally is quite low therefore its affect the demand for this type of meat. The demand for bovine meat in Liquica is 88.6 tons per year; while the supply is 1072.6 tons annually. This indicated that there is an over supply of bovine meat. This can be further exploring to find new market both for domestic and export market.

Maize – Most of population in Liquica growing maize. According to DGE (2015) the total number of household involving in maize production is 10,196 households. In addition, the area planted for maize is 1919.53 hectares with the total production of 4408.41 tons and the yield of 2.45 tons per hectare (MAP Liquica 2016).

The main market is Liquica and Ermera; with small volume are selling to Dili market. However, there is a lack buyers, therefore there is only small quantities of the product is sold with the price of 0.40 cents per kilogram. For most part of Liquica, maize usually produced once a year; but in some parts of Liquica such as 'Loes' maize can be produced throughout most of the year. Most of maize produced in Loes is distributed to Dili market as fresh harvest maize. This type of maize has a significant demand in Dili market.

The demand for maize in Liquica is around 6700 tons per year; while the annual supply is only 4408.41. This shows that Liquica need to increase the production of maize to fulfill its demand as there is a deficit of supply of around 2200 tons per year. One way to increase

the production of maize is through the improvement of maize yield and variety or maximizing the use of land area available. Assumed that there is a market available to absorb all the products produced with the price $400 per ton, this will generate revenue of $1,763,200 annually. The details of local potential agriculture products and livestock in Liquica are shown in table below.

Table 6. Description of local potential agriculture products and livestock in Liquica

Description	Potential local agriculture products and livestock				
	Coffee	Banana	Tangerine	Cattle	Maize
Household number	6703	Na	Na	4252	10,196
Current production (t/year)	Na	45.9	291.7	10,726	4408.4
Productivity (t/ha)	0.6	9.0	11.0	-	2.5
Main market	USA , Canada & Australia	Dili	Dili & Ermera	Dili	Liquica & Ermera
Average price ($/kg)	0.30/kg cherry	4/bunch	150/tree	7/kg (600/cattle)	0.40/kg
Consumption level (kg/cap/yr)	Na	Na	Na	1.19	90
Demand (t/yr)	Na	Na	Na	88.6	6700.8
Current supply (t/yr)	6703	45.9	291.7	1072.6	4408.4
Export (ton)	10,712.7 (Ripe cherry)	-	-	-	-

Source: TLHS 2004; MAP 2014; DGE; MAP; Correia et al. 2015; MAP Liquica 2016; CCT 2019

VIII. MARKETING OF LOCAL POTENTIAL PRODUCTS AND LIVESTOCK

The study reveal that an initiative showed by some agribusiness companies, private sector agencies and NGOs in distributing local potential products to the markets so far in these municipalities have been improved. As majority of the farmers lack capital and access to transport which affected their ability to reach markets, the initiatives offered some producers an assured market for their produce to high end markets. This can be seen in the more frequent and more regular delivery of products, sometimes on a weekly basis. This also meant that the transport costs and transaction cost was also reduced.

In addition, the study also shows 92.8 per cent of the top 5 local potential agriculture products and livestock produced in Bobonaro, Ermera and Liquica are selling to the market. These potential products are distributed through traders, retailers, cooperatives, CLN, wholesalers, agribusiness firms and others. Thus, it is around 65 per cent of the products is selling through traders, 58.5 per cent through local markets and 8.9 per cent is distributed through retailers as indicated in figure below.

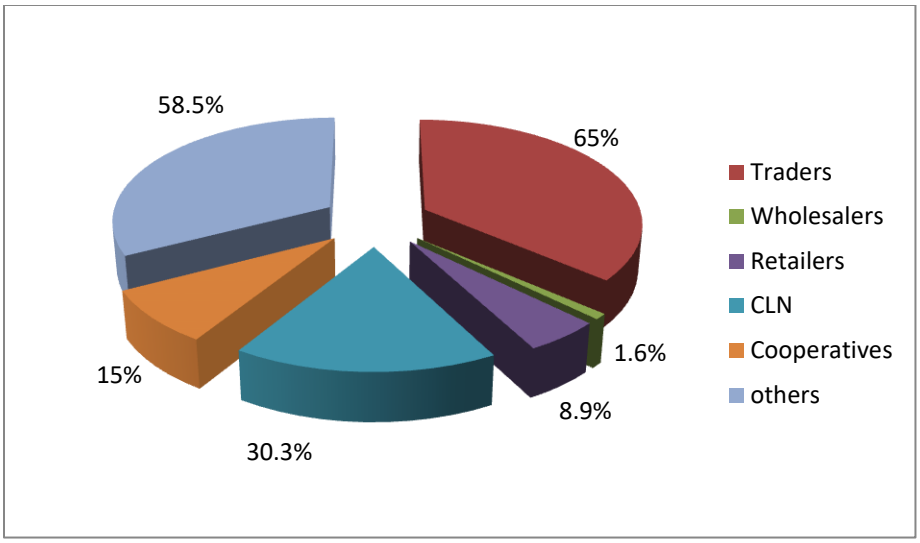

Figure 12. Main buyers for local potential products & livestock

Value addition is an extra feature added by producers to increase the value of the product; and this is very important as it provides consumer with an incentives to make purchase thus increasing revenue of the producers. The study shows 95.8 per cent producers in Bobonaro, Ermera and Liquica are not conducted value added for some of the local potential products before selling to the market. The main reason for not performing value addition for the product is due to 1) producers do not know how to value add the products 2) lack of knowledge and skills 3) lack of training on how to conduct value added activities and 4) lack of information on the importance of value added. There are only around 4.2 per cent producers who perform value addition activities for their products before selling to the market. Through the interview it reveals producers who value add their products can improve the value and better price for their product. Local potential products that go through value added are including paddy rice, maize and coffee. In terms of **grading**, there are only 23 per cent producers who perform grading activities for their products and 77 per cent are not grading the products at all. The main reason includes lack of labor, lack of buyers and low prices.

For prices, it is varying according to the type of local potential products, supply and demand and also the chains where the products will go through until it reach the market. For example, in Bobonaro the price of one kilogram bovine meat is $7.50 while in Liquica $7.0. For vanilla it depends on the grade of the product; for grade A the price will be higher than grade B and so on. There is no fixed price for most of these local potential products and in some cases the prices of these products are always fluctuated (e.g., vanilla price).

In addition, through the discussions with stakeholders in particular in Ermera and Liquica, most of them are concern with the prospect of coffee industry in Timor-Leste as this

commodity offer a very low price to producers compared to other commodities such as horticulture products, vanilla and so on as described by one of the stakeholder below.

> '*A significant number of coffee farmers in Ermera now started to move out from coffee sector and engage in the production of horticulture products (e.g., cabbage, mustard, broccoli, etc.), Vanilla and other commodities which offer a better price for farmers. In terms of income, these products provide more income than coffee and therefore I am very concern about the future of coffee in Ermera. The income they got from these commodities three times higher compared to coffee'*
> *(Mr Fernando Soares - Administrador Posto Administrativo Ermera)*

This clearly shows that producers in these areas are quite realistic with the income they got from coffee and other commodities. For example, one kilogram of coffee cherry valued 34 cents, while the same weight for wet vanilla valued $45; thus one kilogram of cabbage cost 0.50 cents and this can produce two to three times a year. Because of this, it is important for government and stakeholders engage in coffee sector to take into consideration in particular on how to increase the production and productivity of coffee and in the same time improve the value of this product. The reason is that 'coffee' plays an important role in the economy of Timor-Leste for a number of years.

IX. CONSTRAINTS AND OPPORTUNITIES

9.1 Constraints

The main constraints faced by producers regarding the local potential agriculture products and livestock in Bobonaro, Ermera and Liquica are including low prices of the product, low production and productivity, economic of scale, human resource constraints (lack of skills) and lack of information.

- ***Low output prices*** - Limited number of buyers appears to negatively impact the price offered to producers due to the power imbalance. There is lack of competition amongst buyers and as producers have no alternative market, they often accept whatever price is offered to them, whatever low that may be. Buyers are often able to manipulate the price. To address this problem, more investment on infrastructure is needed so more buyers can enter markets and farmers will also have more access to other markets. This will encourage competition and will benefit farmers in terms of getting a better deal on prices for their produce.
- ***Low production and productivity*** – Low production and productivity are challenges that generally emerged from the response of stakeholders. This resulted from the low levels of input use, lack of skills, lack of capital and lack of information. To increase crop productivity, inputs such as seeds, fertilizers and chemicals are needed.
- ***Economic of scale*** - Most producers of local potential agriculture products and livestock in Bobonaro, Ermera and Liquica are small landholders with a very limited formal

education and lack of capital. These clearly reduce their willingness and capacity to purchased inputs needed including fertilizers and chemicals, seeds and mechanization equipment's.

- ***Human resource constraints (lack of skill)*** - Low skill level of most producers in the study site affect their capability to increase production. Even though producers experiencing in managing their farm however, they continue to practice traditional ways of crop management. Producing and marketing of agricultural products and livestock to high-end markets require skills, which small farmers might not have.
- ***Lack of Information*** - Lack of market information is often quoted as a major reason why producers are not realizing better prices for their produce. Extension service neither is limited nor market information system to arm farmers with knowledge of prices and potential markets. Often, their main source of price information apart from the buyers is other farmers or friends who have just returned from the market that day. Moreover, farmers have very little or no power of arbitrage in the market and have limited choice as to which markets they can sell into. Consequently, they often receive whatever price they are offered.
- ***Other constraints*** - poor quality product, lack of access to market, lack of capital & access to credit, import (continue to rise), government policies, lack of involvement of private sector, lack of information, lack of input supply and youth migration.

9.2 Opportunities

Meanwhile the opportunities offered by agriculture sector in these areas includes broad opportunities to increase production of local potential products, opportunities for processing vanilla as this will improve the value of the product, high demand for cattle in Indonesia, there is an opportunity to reduce rice import, maximization of the use of land for cultivation in particular for potential crops, high demand for domestic and export market for certain local potential products, opportunity to find new market for vanilla and an opportunity for processing industry for banana.

- ***Opportunities to increase production for local potential products*** – Most of the productivity of local potential agriculture products in Bobonaro, Ermera and Liquica are very low. Opportunities to increase productivity of these products are feasible and this can be done through the use of high variety seed, better farm management, maximization of the use of potential land, and others. Government and private sector can play an important role on improving the productivity, as this will have a further implication on improving food security and also income for most of the rural households.

- ***Opportunities for processing vanilla*** – Value adding vanilla product from wet to dry vanilla will improve the value of the product. As a comparison the average price for one kilogram wet vanilla is US$45 while for the same weight for dry vanilla cost around US$400. Processing of vanilla before selling to the market is really important as this can

improve significant revenue for vanilla producers. Therefore, opportunities to invest in processing of vanilla are needed. This can be done through improving the skills of vanilla producers in terms of how to value add vanilla product according to demand of the market or investing on applicable technology that can process vanilla product with good quality standard.

- ***High demand for cattle (bovine meat)*** – According to the Kementrian Pertanian Indonesia (2017) the development of consumer price of bovine meat in Indonesia tends to increase every year. This resulted from the demand for beef that is high. The demand of bovine meat in Indonesia in 2017 reach 168,558 ton 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 and for Government to rethink again for open-up cattle export to Indonesia. In addition, Dili alone need around 800 tons of bovine meat per year (Scott et al. 2015).

- ***Opportunity to reduce rice import*** – Increase the production of rice in Timor-Leste will have an impact on the reduction of import of rice into the country. As the yield of rice that is very low, therefore reducing import of rice can be done through improving the production of this product (e.g., through investing in yield improvement, adaptable technology, open-up potential areas for rice cultivation, and better farm management practices). This is an opportunity where private sector can play their role in particular investing in smallholder rice producer in rural areas. This will resulted not only in terms of rice production but also it has a further impact on income, food security, jobs and poverty reduction. Indeed, government needs to play their role in terms of legislation and creating an enable environment for individual or companies to invest in the sector.

- ***Maximization of the use of land for cultivation*** – Most of the potential areas in Bobonaro, Ermera and Liquica has not fully developed yet for local potential agriculture products. The reason is that smallholder producers in these areas lack of capital, labor and skill to maximize the use of their land for cultivation. This is an opportunity where government and private sector need to intervene in terms of maximization of the use of land for agricultural production (e.g., through contract farming, etc.).

- ***Opportunity to find new market for vanilla*** – Theoretically, if there is more market available there will be more competitive for the product in terms of quality and value. The result of the study shows that even though the price of vanilla is high however, there is lack of buyer/market for the product. As a result there is no competition in purchasing the product. This offers an opportunity for private sector in Timor-Leste to engage more as a buyer or finding new market for vanilla.

X. CONCLUSION AND RECOMMENDATION

10.1 Conclusion

Successful development of agricultural sector in Bobonaro, Ermera and Liquica, especially for the top 5 local potential agriculture products and livestock will require support from both the government and the private sector. Indeed this support will increase producer's income so that producers form a growing market for the domestic industry as well as earning foreign exchange.

In addition, to accelerate economic growth in these areas, there is a need to modernize agricultural production, requiring markets for both inputs supply and for the sale of products and services. The strengthening of the existing markets and development of new markets can be done through the improvement in infrastructure, improvement in access to information, reduction in transaction costs and promoting competition.

The result of the study shows that the existing crops producers generally grown are including paddy rice, maize, cassava, mungbean, coconut, coffee, tangerine, mango, mustard, cabbage, carrots, tomato, and fisheries and raising livestock such as cattle, buffalos, goats and so on. Despite the existing crops grown by producers however, there are a number of new crops that also planted by producers in recent years in Bobonaro, Ermera and Liquica which includes vanilla, Konjak (*Maek*), Dragon fruit, Brocoli, cauliflower and some new variety of bananas such as Cafendix.

In addition, the local potential agriculture products and livestock identified in Bobonaro, Ermera and Liquica are coffee, vanilla, paddy rice, maize, shallot, tangerine, cabbage, cattle, mungbean and banana. As a potential products it contribute significantly to the income of the population in these areas, engage a large number of household in the production and marketing sector and the availability of the existing market both domestic and international market (e.g., coffee and vanilla).

The production and productivity of local potential products in these areas are very low. The productivity of coffee for example is still less than one tone per hectare and tangerine only 3 tons per hectare. These yields are still far for the potential production that these crops can achieve. This is due to the poor farm management, lack of input supply and extensive use of local variety seeds.

In terms of the demand, most of the local potential products and livestock are in high demand in domestic and international market. Cattle (bovine meat) are in high demand for domestic and Indonesian market, while coffee (organic) and vanilla is also having a good demand for foreign market. The main issue faced is there is lack of supply to meet the demand of the market.

Despite the constraints facing such as low productivity and low quality products and others however, there are opportunities for further development for local potential products and livestock in Bobonaro, Ermera and Liquica. These includes opportunities to increase production, opportunities for processing vanilla, high demand for cattle in domestic and Indonesia market, maximization of the use of land for cultivation and opportunity for processing industry for banana.

10.2 Recommendation

The result of the study clearly demonstrates that there is a potential to develop local potential agriculture products and livestock in Bobonaro, Ermera and Liquica. However, issues such as lack of inputs, low price for the produce, low quality and low skills of farmers hindering the opportunity to develop these products in an effective and efficient way. In relation to these issues, it is recommended that government agencies and private sectors involve in agriculture sector have the responsibility to provide supports and assistance to the producers and chain players which includes:

- Capacity building through training to improve knowledge and skills of producers and chain players;
- Information on prices of agricultural products are not readily available and do not reach farmers in rural areas. Therefore it is important that information reaches farmers so they can use it to bargain with buyers for a better deal. Thus, the need for infrastructure developments, including information and communication infrastructure;
- Introducing high yield varieties for local potential agriculture products and livestock;
- Promoting value-added activities for local potential agriculture products so that it can improve the value of the product;
- More private sector investment in production and marketing of agriculture products is needed as this will resulted in a better quality and value for the products;
- Providing agribusiness companies in terms of technical and financial support for the development of value added activities and linking producers to market activities;
- To strengthening of the existing markets and development of new markets is needed and this can be done through the improvement in infrastructure, improvement in access to information, reduction in transaction costs and promoting competition

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

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APPENDIX

Appendix 1. Area, Production, Producers and potential areas of coffee in Timor-Leste (2015)

Municipio	Area (ha)		Production (ton)	No of producers	Potenial area (ha)
	Productive	Non-productive			
Ermera	20,800	11,200	5360	27,210	1945
Manufahi	4163.25	2241.75	3560	12,420	1450
Liquica	7777.25	4187.7	4050	7232	1448
Ainaro	3417.3	2278.2	2540	6450	1240
Aileu	1152	620	1040	1430	2730
Bobonaro	563	406	950	1027	1490
Covalima	18	12	460	41	1250
Manatuto	227.5	72.5	450	0	0
Viqueque	0	0	0	0	0
Baucau	2	1	0.002	2	100
Lautem	12.9	88	0.005	10	100.9
Oecusse	2	3	0.002	5	100
Total	37,908	21,038	17,960	55,827	11,853.9

Source: Direção Nacional do Café e Plantas Industrias – MAP 2015

Appendix 2. Production and yield of Maize and paddy rice in Municipio Bobonaro

	Maize				Paddy rice			
Year	Area planted (ha)	Area harvested (ha)	Yield (ton/ha)	Production (ton)	Area planted (ha)	Area harvested (ha)	Yield (ton/ha)	Production (ton)
2016	3352.5	3155.1	2.27	12,804.45	866.40	866.40	2.49	2155.50
2017	2599.6	2599.6	2.35	6109.34	2132.70	2132.70	3.28	6974.19
2018	9036.0	8357.1	2.36	19,793.01	3148	3148	3.60	11,395
2019	6507	6500	3.80	24,575	3503	3500	3.60	12,641

Source: Direção Serviço Agricultura Município Bobonaro - 2019

Appendix 3. Production and yield of Mungbean município Bobonaro

Year	Area planted (ha)	Area harvested (ha)	Yield (ton/ha)	Production (ton)
2016	150	150	0.97	145.5
2017	155	155	1.02	158.1
2018	184	184	1.20	220.8
2019	197	197	1.20	236.4

Source: Direção Serviço Agricultura Município Bobonaro - 2019

Appendix 4. Potential áreas for Tangerine and Banana in Timor-Leste from 2012-2013

Municipio	Tangerine						Banana					
	2012			2013			2012			2013		
	Area planted (ha)	Yield (ton/ha)	Total production (ton)	Area planted (ha)	Yield (ton/ha)	Total production (ton)	Area planted (ha)	Yield (ton/ha)	Total production (ton)	Area planted (ha)	Yield (ton/ha)	Total production (ton)
Aileu	24.37	22	536.14	25.59	10	255.90	6.00	4	24.00	7.50	10	75.00
Ainaro	23.05	18	414.90	24.20	10	242.00	7.00	6	42.00	8.75	10	87.50
Baucau	19.28	15	289.20	20.24	9	182.16	135.77	16	2172.32	135.77	11	1493.47
Bobonaro	12.24	14	171.36	12.85	9	115.65	4.16	12	49.92	12.00	10	120.00
Covalima	4.16	15	62.40	4.37	8	34.96	4.00	10	40.00	15.25	10	152.50
Dili	52.02	10	520.20	13.01	10	130.10	5.20	9	46.82	4.94	9	44.46
Ermera	24.07	21	505.47	25.27	10	252.70	6.00	8	48.00	12.00	8	96.00
Liquica	25.09	22	551.98	26.52	11	291.72	0.40	9	3.60	5.50	9	49.50
Lautem	26.01	10	260.10	27.31	10	273.10	6.24	10	62.40	25.75	10	257.50
Manatuto	8.67	12	104.04	9.10	10	91.00	3.12	17	53.04	25.85	10	258.50
Manufahi	8.36	15	125.40	8.78	10	87.80	4.00	14	56.00	27.50	11	302.50
Oecusse	15.60	12	187.20	16.38	9	147.42	0	11	0	4.50	9	40.50
Viqueque	8.77	12	105.24	9.21	12	110.52	5.72	19	108.72	12.50	10	125.00
Total	251.69		3833.63	222.83		2215.03	187.61		2706.82	297.81		3102.43
Average		15.23			9.85			11.15			9.77	

Source: Direcao Nacional da Agricultura e Horticultura – MAP 2014

Appendix 5. List of stakeholder consulted

No	Expert name	Title / position	Institution	Telp
1	Aderito Santos	Director	MAP Maliana	77187900
2	Jose de Deus	Director	MAP Ermera	77806550
3	Alberto G.Lopes	Coordinator	CAAKUB Maliana	77029966
4	Lucio da Costa	Staff	JICA Maliana	77025881
5	Mateus Rosario	Manager	World Vision Maliana	77293663
6	Rince Nipu	Director	Local NGO OHM	77615050
7	Martins Magno	Director	MCIA Maliana	77087440
8	Tomas Barreto	Adjunto Adm Posto	Bobonaro	77304123
9	Egidio Loisiga	Adjunto Adm Posto	Maliana Vila	78123276
10	Olandina M.Leite	Manager	TOMAK Maliana	78065004
11	Rui	Agribusiness Staff	MAP Maliana	
12	Antonio M. Lay	Extension Coordinator	MAP Maliana	77296508
13	Adao Pirez	Adjunto Adm Posto	Atabae	76521181
14	Luis Mira	Manager	Avanza Maliana	
15	Moises Borromeu	Vice Rector I	ETCI	78536231
16	Augusto	Manager	Avanza Ermera	78154725
17	Arlindo dos Santos	Director	IMI	77304194
18	Luis P.do Carmo	Adjunto Adm Posto	Letefoho	77443610
20	Celestino M.	Head Farmer group	Vanilla farmer Hatulia	76160159
21	Agostinho A.de Deus	Field staff	Peace Wing Letefoho	
22	Antonio Babo	Coordinator	Cooperative Ermera	76685384
23	Fernando Soares	Administrador	P.A.Ermera Villa	
24	Salvador S. Santos	Director	MCIA Liquica	77087443
25	Mario da Silva	Diretor	MAP Liquica	78065031
26	Vitor Soares	Extension coordinator	MAP Liquica	77451679
27	Manuel A. Ramos	Head of Village	Vatuboro	75270736
28	Joao N.Braz	Administrador	P.A. Bazartete	77304211
29	Martinho dos Santos	Head Farmer group	Fahilehu	77380082
30	Jose H. Afonso	Manggis farmer	Aldeia Tolido Kraik	
31	Manuel A. Ramos	Banana farmers	Suco Lisadila	75270736
32	Eng. Subady	Coffee expert	CCT railaco	77017894
33	Antonio Babo	Staff	MCIA Ermera	76685384
34	Julio dos Reis	Director	IADE Ermera	