

**VEGETABLE SUB-SECTOR GROWTH STRATEGY
DOCUMENT FOR EAST NUSA TENGGARA (NTT)**

September 2017

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Abbreviations

AIP-PRISMA	Australia-Indonesia Partnership for Promoting Rural Income through Support for Markets in Agriculture
PPI	Progress out of Poverty Index
CAGR	Compound annual growth rate
GAP	Good Agricultural Practices
ha	hectares
ILAF	Intervention Logic Analysis Framework
NTT	Nusa Tenggara Timur (East Nusa Tenggara)
YBTS	Yayasan Bina Tani Sejahtera
EWINDO	East West Seed Indonesia
WHO	World Health Organization
NASA	PT Natural Nusantara

1. Executive summary

Indonesia's vegetable production has increased by an average of 2.7 percent per year, since 2003 from 7.37 million tonnes to 13.8 million tonnes in 2013. Despite being the largest vegetable producer in Southeast Asia, Indonesia's vegetable imports is constantly growing faster than its export. Consequently, the trade balance of the commodity tends to be deficit. According to (Arsanti, et.al, 2006), the increase in import-export ratio over the years is mainly caused by decreasing competitiveness of local products since imports have a better quality and competitive price. There are 31 provinces in Indonesia that produce over 20 types of vegetables with 86 percent of all vegetables grown in the islands of Java and Sumatra. The major vegetable producing provinces are: West Java (32 percent), Central Java (16 percent), NTT (12 percent) and North Sumatra (9 percent); these four provinces account for over 69 percent of all vegetable production.

Vegetable production in NTT accounts for only 0.56 percent of Indonesia's total vegetable production in 2013. NTT produced 66,091 tonnes of vegetables from 15,113 hectares in 2013. NTT is a difficult region to produce different types of vegetables due to its short intense wet season and long dry season. In addition, the land quality in NTT is considerably less fertile (thin layer of top soil) and more fragile than Java, Lombok or Bali. NTT is considered to have low productivity of vegetables which is reflected by negative productivity index. NTT's vegetable productivity is only 3.2 tonnes/ha, which accounts for less than 30% of national average (10.32 tonnes/ha) in 2013. This productivity gap in NTT indicates that there is a significant room for leveraging vegetables productivity. In NTT, only 28 percent of vegetables have been produced in 2013, Sikka is the leading producer in the province, followed by Kupang. The high rate of vegetable production in Sikka indicates that farmers in NTT are mostly concentrated in that region.

TTS district is a typical village in Timor Island where drought was a significant constraint limiting farmer's ability to improve farming productivity. In more recent years an extended drought lasting up to 7 to 9 months has been experienced, whereas previously communities were experiencing a 5 month long dry season. This longer drought has been hindering farmers' ability to pursue normal agricultural livelihood practices. Traditionally the farmer's livelihood depended on only one effective growing season which was during the rainy season. The farmers were mostly growing agriculture products such as corn only for food security and subsistence. In the past, drought contributed to harvest failure and forced the younger generation to leave the village for alternative work to more urban areas.

There is an opportunity to stimulate the production of vegetables in NTT once the primary crop is harvested. NTT vegetable consumption was about one-third (16.2 kg/year) of the national average in 2013. An analysis of the production and consumption data shows that NTT was a net importer of vegetables with the exception of garlic and spinach. This shows that there is an opportunity to decrease the import substitution for leafy vegetables such as choisum, kangkung, amaranth, kale, and cabbage in NTT. In 2013, choisum was the main vegetable commodity produced in NTT with more than 5,000 ton production/year. Also, shallot, kale, adzuki bean and eggplant are produced in this region and add to the farmer's income source.

Analysis of the vegetable market in NTT reveals that there are a number constrains that affect the poor farmer's ability to do better and increase their income. Poor farmers in these areas are

highly dependent on rainfall patterns, however during drought they are not able to cultivate their land and lose out on income opportunities. Most of the female and male poor farmers who have access to water during drought season is very limited. This is because the poor farmers don't have land close to the river or have any access to infrastructure built by the government, such as irrigation channels, ponds and wells. Also, some of the poor farmers who have access to water are still not able to harness it due to the traditional pattern of crop cycle. These poor farmers do not have any technical knowledge and information about cultivating crops which could be cultivated during these seasons and are profitable. Thus, our analysis shows that if knowledge and information about such types and varieties of short-cycle vegetables are introduced in these areas it will increase the farmer's income even during the drought season.

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2. Background

The Australia-Indonesia Partnership for Promoting Rural Income through Support for Markets in Agriculture (AIP-PRISMA) is a multi-year program that is a part of the Government of Indonesia's midterm development strategy to accelerate poverty reduction through inclusive economic growth. With the support of the Government of Australia, the program aims to achieve a 30% increase in the net incomes of 300,000 male and female smallholder farmers in eastern Indonesia by December 2018. PRISMA works in NTT, West Nusa Tenggara (NTB), East Nusa Tenggara (NTT), Papua, and West Papua.

This Sector Report aims to provide a logic and rationale for market-based interventions which can support the vegetable sector to benefit the smallholder farmers in East Nusa Tenggara (NTT).

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3. Sector description

The sector profile provides information on the status and potential of the target sector. This has been derived mainly from secondary data and literature relevant to the vegetable sector.

3.1 Sector Profile

3.1.1 Overall Context

Vegetable is categorized under horticulture, together with fruits, decorative flowers, and medicinal plants. In Indonesian government, it is managed under horticulture department in Ministry of Agriculture, but the grouping of horticulture in Indonesia compared to other countries might be different. In Indonesia maize, cassava, sweet potato, soybean and taro are belong to main crops, while in several other countries, they belong to horticulture. Baby corn, sweet corn and edamame belong to horticulture. So, horticulture in Indonesia generally characterized by commodity with high economic values and the cultivation process requires intensive process and skill. Indonesia land condition which are spreading and small size suitable to be planted by horticulture plants. In various country, horticulture has important role in increasing farmer income, creating job, and promoting investment in village level. Horticulture with spread and small size land, added with perishable condition of the products become a big challenge for farmers and trader in serving the customer. Pricing of horticulture product is high when its fresh and starting to be lower in a short time when the product no longer fresh and even become waste around 20-50% of mismanage and bad storing system.¹

Indonesia position as the 4th largest market in the world with population 3.51% of world population, around 255 million people is a potential market to be supplied with local vegetable. Although the number of vegetable consumption in Indonesia now is still lower than 400gr/capita/day required by WHO and FAO, Indonesia 57,7 gr/capita/day², but progressively Indonesia is showing positive trend on vegetable consumption. Based on *Susenas (national economic census, BPS)* data March 2016, almost 97.29% Indonesian people consume vegetables in last a week when the survey is conducted. The conclusion is almost all Indonesian people consume vegetables, but still in low amount than suggested by WHO and FAO. The highest Indonesian vegetable consumptions are for spinach, water spinach, long bean, tomato and eggplant, vegetable soup/*capcay*, and mix vegetable (*lodeh* and *sayur asam*). *Susenas 2016* also mentioned the more income, higher number of vegetable consumes by the household, except for spinach and water spinach which has been largely consumed by less than IDR 150.000 income (medium to low income).³ Increasing awareness of consuming more vegetables makes demand of vegetables is higher than supply. This fact is opening a potential market for farmers to improve their yields and other actors to maximize their role for not missing the opportunities and letting the demand satisfied by import products.

The fact is progressive trend of Indonesian vegetable consumption not in line with Indonesian vegetable production for several kinds of vegetable. Demand of several vegetable commodities outstrips supply, like mentioned in figure 2, for commodities like spinach, water spinach, long bean, eggplant, garlic, and cabbage. As mentioned previously, Indonesia is

¹ Accessed from <http://www.bbpp-lembang.info/index.php/arsip/artikel/artikel-pertanian/941-pasca-panen-sayuran>

² Indonesian vegetable consumption, accessed from <https://gaya.tempo.co/read/news/2017/01/24/060839202/penduduk-indonesia-ternyata-kurang-makan-sayur-dan-buah>.

³ Consumption per capita household a year based on national economic census 2016 http://aplikasi2.pertanian.go.id/konsumsi/tampil_susenas_kom_th.php and <http://gizi.depkes.go.id/wp-content/uploads/2017/01/Paparan-BPS-Konsumsi-Buah-Dan-Sayur.pdf>.

depending on imports to satisfy the demand for certain vegetables.⁴ Vegetable consumption in Indonesia has its own pattern of consumption and variation per province and even per district. People in West Java is famous of their habit of consuming green vegetables in raw or steam, this is the reason behind high demand of leafy vegetables in West Java. West Java has the biggest vegetable overall production in Indonesia, and followed by Central Java, and East Java in the third place. The picture is shown by figure 3, where NTB production of vegetables dominated by Solanum and Allium; while NTT vegetables production is small in almost all of kinds of vegetables. Oversupply in Java Island is sent to neighbouring island. Indonesian people has its own local vegetable to satisfy the demand of vegetable, although the position of vegetable in Indonesian diet still in a low portion than suggested by FAO and WHO. The way mostly Indonesian processed their vegetable are also reducing its important vitamins and minerals of using coconut milk and cook them in high temperature and for a long time. For example, people in West Sumatera used to eat cassava leaf as their common consumed vegetable, this kind of vegetable is easily found and not expensive for people there, it is cooked as cassava leaf with coconut milk. The levelling of diet for majority of Indonesian people, rice as the most important, followed by protein from meat, soybean *tempe* and tofu, egg, fish, and the last one is vegetables and fruits. For Indonesian people, eating without vegetables and fruits is still fine. Recently, in middle income Indonesian people this behaviour has changed due to shifting in their lifestyle to healthier lifestyle. Therefore, in the future the consumption of vegetable in Indonesia lately increased.

Figure 1. Consumption and Production Comparison 2016 Vegetables Commodities

Vegetable Commodities	Unit	Consumption/capita/year Estimation Number*	Indonesian Population Number**	Estimation National Consumption	Vegetable Production (Kg)***	Production-Consumption
Spinach	Kg	4.03	255,461	1,029,507.83	150,085	(879,422.83)
Water Spinach	Kg	4.44	255,461	1,134,246.84	305,071	(829,175.84)
Green Mustard	Kg	2.09	255,461	533,913.49	600,188	66,274.51
String Bean	Kg	1.14	255,461	291,225.54	291,314	88.46
Long Bean	Kg	3.34	255,461	853,239.74	395,514	(457,725.74)
Tomato	Kg	0.417	255,461	106,527.24	877,792	771,264.76
Cassava Leaf	Kg	2.66	255,461	679,526.26	NA	NA
Eggplant	Kg	2.74	255,461	699,963.14	514,320	(185,643.14)
Bean Sprout	Kg	0.88	255,461	224,805.68	NA	NA
Mix Vegetable Soup/Capcay	Pack	8.3	255,461	2,120,326.30	NA	NA
Mix Vegetable Lodeh/Sayur Asam	Pack	5.26	255,461	1,343,724.86	NA	NA
Raw Jack fruit	Kg	0.55	255,461	140,503.55	NA	NA
Shallot	Kg	2.713	255,461	693,065.69	1,229,184	536,118.31
Garlic	Kg	1.749	255,461	446,801.29	20,295	(426,506.29)
Red Chilli	Kg	2.96	255,461	756,164.56	1,045,182	289,017.44
Rawit Chilli	Kg	2.96	255,461	756,164.56	869,938	113,773.44
Cabbage	Kg	1.356	255,461	346,405.12	118,388	(228,017.12)
Cucumber	Kg	1.616	255,461	412,824.98	447,677	34,852.02

*Consumption 2015 Susenas

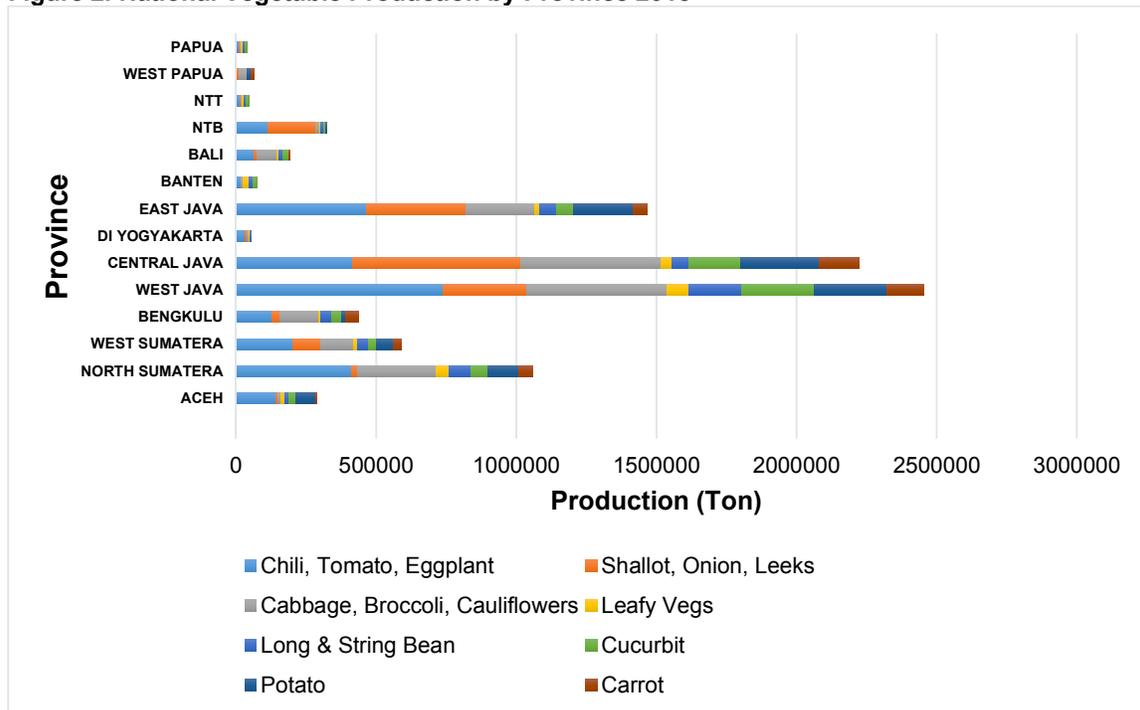
**Population 2015, BPS

***Production 2015 MoA

Cabbage and Cucumber use data consumption 2014

⁴ Indonesian Population 2015 accessed from <https://www.bps.go.id/linkTabelStatis/view/id/1274> ; Production 2015 Accessed from MoA; and consumption 2015 from <http://gizi.depkes.go.id/wp-content/uploads/2017/01/Paparan-BPS-Konsumsi-Buah-Dan-Sayur.pdf>

Figure 2. National Vegetable Production by Province 2015⁵



Challenge in Indonesian vegetable sector is in the ability to match the supply location with where the demand located by considering perishable status of vegetable.

Indonesian part where produce vegetables are spreading in all over Indonesia for smaller land size, with farmer behaviour tend to plant high value vegetable and not aware of their geographical and soil potency and condition, GAP, crop planning and post-harvest handling (GHP). Knowing that the price of Chilli is increasing, most of the farmer prefer to plant chilli, instead of other vegetables. As the consequence, too much supply on chilli, instead of getting high price, the price is become lower. Case in segmented vegetable like broccoli, pokchoy, leafy vegetables, most of the farmer still difficult in finding the market to sell their product other than local market so no incentive for them to plant these vegetables, push their production and increase yield. Accessing big demand in the city urges trader to have a proper post-harvest handling, so the vegetable condition is still fresh and people the city still willing to buy. Indonesian farmer has overwhelmed with the challenge in planting vegetables like finding good input materials, cultivate the land, waiting for harvest time, pest and disease, and hiring staffs. So, considering that, post-harvest handling and marketing their product is surpassing their capacity. There is collector and trader help the farmer to distribute their product. By not in charged with this, let the bargaining power of farmer become low, compare to their product cannot be sold, it's better for them getting low price at least their initial capital spent for planting vegetables break event. Helping vegetables farmer with this devil circle, assisting them to solve input and planting problem, prevent pest and disease, linked with fair market actor with fair buying price, help trader dealing with perishable condition of vegetables are the potential target of vegetable sector.

Government of Indonesia keep on providing enabling environment by set regulation for import and export based on Indonesian local production capacity.

Farmer who grouped into farmer's group supported by giving subsidy for seeds, fertilizer, and tools. President Jokowi, under Ministry of Villages, Disadvantage Regions, and Transmigration developed BUMDes allocates government funding from ADD (*Anggaran Dana Desa*-Village Budget Fund) and APBD (regional funding) to be managed autonomically by the government in village level. BUMDes

⁵ Processed from Ministry of Agriculture data 2015

stands for village owned enterprise is a government initiative to let village owned an enterprise where all or part of the funding owned by villagers itself through government funding or from village owned income to manage the asset, village resources, and services for the sake of its people in the respective districts. This policy is based on UU No 6, 2014 about village governance. The purpose of BUM Des is to improve village economic condition, optimize village assets, increasing rural people participation to manage their potency, promoting collaboration with external parties, opening opportunity to let rural people get accessed to market exposure, public service, working opportunities, to increase their income. Funds managed under BUMDes is used to be spent for supporting agriculture as well, where become a chance for PRISMA's partner to supply their product and procured partner's product by village level government. The amount for agriculture in every district is different, the elaboration on how this policy worked in each province or district is elaborating in local context based on local information. This policy is made to help farmers with financial problems.

Abundance problems faced by farmers, and actor along the long vegetable supply chain, with disparity of accessed available among province, different potency and geographical conditions. Each province has their own specific characteristic of farmer and vegetable market. These are the potential target for AIP-PRISMA to explore the market-based intervention in vegetable sector with potency of 1,122,000 HH vegetable farmers in Eastern Indonesia: East Java 625.000 HH; NTB 58,000 HH; NTT 92,000 HH; Papua 300,000 HH; and West Papua 47,000 HH. By addressing the problem with custom solution based on each province characteristics explored in this document, the aim of increasing 30% income of 300,000 Indonesian farmers will be achieved by 2018. The local context and market characteristics is elaborating further through local context, sector dynamics, analysis, and finally coming up with strategy for change.

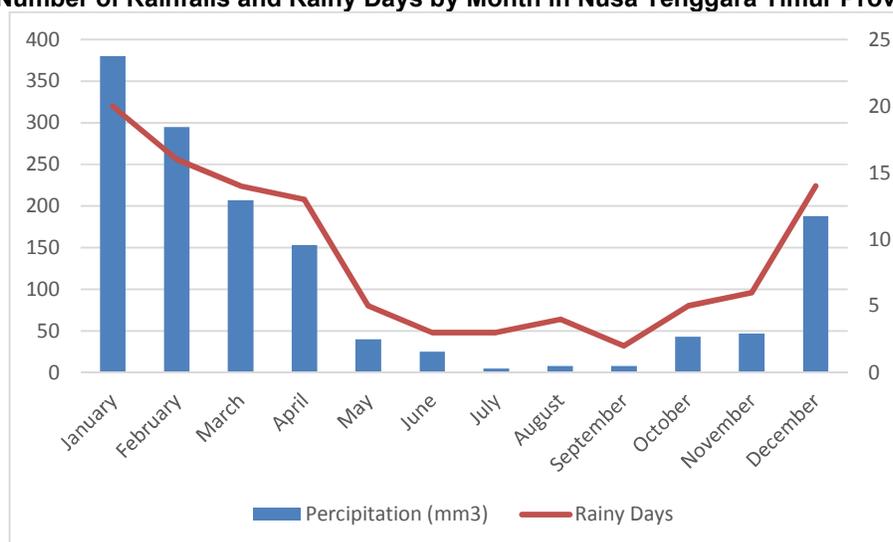
3.1.2 Local context

NTT (East Nusa Tenggara) is a province that consisted of 1,192 islands, with 44 habituated islands. Big habituated islands in NTT are Flobamorata (Flores, Sumba, Timor, Alor, and Lembata). Administratively, NTT has 21 districts and 1 city, and overall 2,952 villages. The largest district in NTT is Sumba Timur (7,005 km² which made up 14.61% of NTT)⁶. The smallest district in NTT is Sabu Raijua (460 km² which made up 0.96% of NTT). Transportation between districts in NTT and outside NTT is mainly dominated by sea or airfreight, some of in island transportation use land-route).

NTT's weather is hot, with average between 26 – 28 °C in 2015, with some exception in few areas that could reach average 19.9 °C in 2015. The highest temperature recorded in 2015 is 37.4 °C and the lowest is 8.8 °C. Based on the data in 2015, the average precipitation is 600 – 2,700 mm³, with Manggarai district that as the highest rainy days in a year (160 rainy days), Manggarai Barat district as the second highest (125 rainy days), and Ngada district as the third highest (121 rainy days). On the other hand, Sumba Tengah district has the lowest rainy days in a year (31 rainy days), then Timor Tengah Selatan (62 rainy days), and Timor Tengah Utara (68 rainy days).

⁶ http://ntt.bps.go.id/backend1812/pdf_publicasi/Provinsi-Nusa-Tenggara-Timur-Dalam-Angka-2016.pdf

Figure 3. Number of Rainfalls and Rainy Days by Month in Nusa Tenggara Timur Province, 2015⁷



NTT's projected population in 2015 is 5.1 million with 2.5 million males and 2.6 million females. The number of households in NTT in 2015 is 1.1 million with average household members of 4.6 . The population density in NTT is 108 people per km² with the highest density is in Kupang city (2,432 people per km²) and the lowest is in Sumba Timur district (35 people per km²). NTT is also one of the poorest provinces in Indonesia, with poverty rate that stood at 22.58% (in 2015, based on SUSENAS 2010-2015), compared to Indonesia's poverty rate that stood at 11.13% (in 2015). The poverty line is set at monthly income of IDR 344,809 (USD \$24.8) per capita⁸. This leads to 1.1 million people, approximately 250,000 households (with assumption 1 household = 4.6 household members) in NTT is living below poverty rate. NTT's Human Development Index (HDI) in 2015 is 62.67, which is below national HDI.

Most of NTT's population works in agriculture sector (61.65 %). One of the agriculture sector that NTT farmers are working on is horticulture, with the highest production of vegetables in 2015 is chayote (10,228 tons on 1.248 Ha) led by Sikka. The top six vegetable commodities grown in NTT are shallot, chili, potato, cabbage, Chinese cabbage, and chayote. Top vegetable production is chayote, followed by Chinese cabbage and chili. Whereas, the largest land cultivation for vegetable is used for chili, followed by Chinese cabbage. Total farming land for the top six vegetables in NTT is 7,166 Ha and total production is 22,129 tons in 2015. This leads to the average vegetable productivity in NTT is 3.89 tons/Ha. Meanwhile, the vegetable consumption in NTT is only 16 kg/per capita/year, which is much lower than national average of 40 kg/per capita/year and even lower than WHO recommendation of 80 Kg/per capita/year.

⁷ NTT Province Agency for Meteorology, Climatology and Geophysics

⁸ <https://www.indonesia-investments.com/news/news-columns/poverty-rate-indonesia-11.1-of-population-in-september-2015/item6341?>

Figure 4. Vegetable Production NTT in 2015 (in Tons)

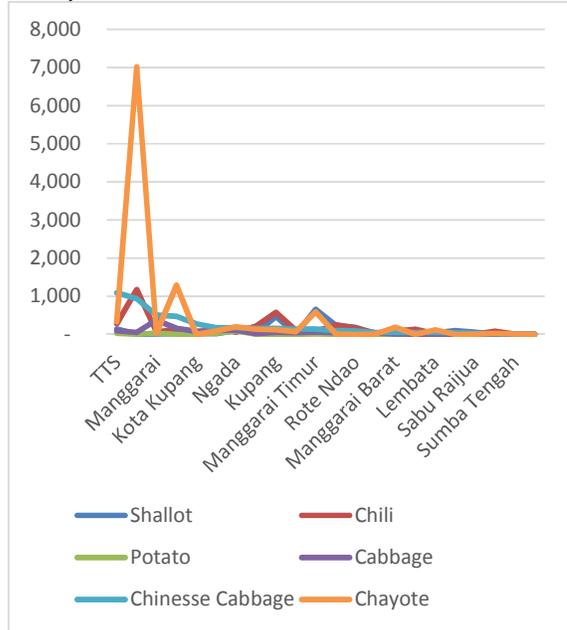
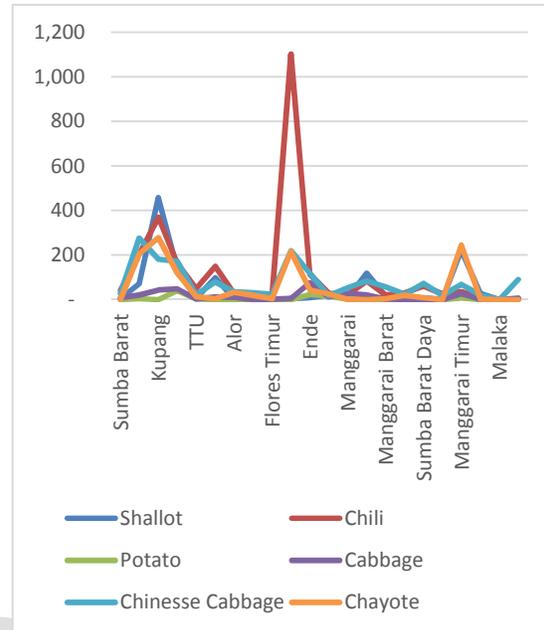


Figure 5. Vegetable Land NTT in 2015 (in Ha)



Sikka was the leading vegetable producers in NTT in 2015, followed by Alor, Timor Tengah Selatan, and Manggarai Timur. Sikka contributed up to 41% of the total vegetable production in NTT, and the largest producer of chili and chayote. The percentage of smallholder farmers (farmers who cultivate less than 0.5 Ha) in Sikka is approximately 6% of the total NTT's smallholder farmers. The largest percentage of smallholder farmers is in TTS district (13%) that constitutes from 26,500 smallholder farmers. TTS as one of the leading vegetable producers in NTT produced chinese cabbage the most.

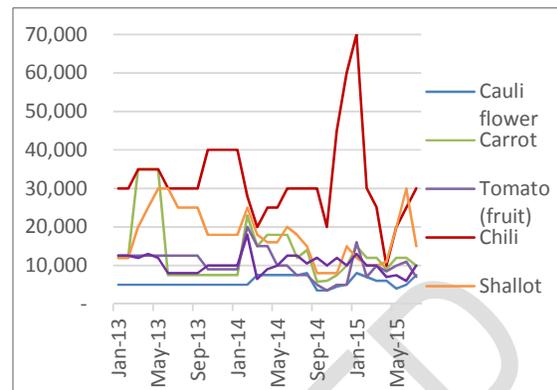
Compared to other provinces in Indonesia, vegetable farmers in NTT are experiencing lower productivity and the vegetable price in NTT is relatively higher. NTT's vegetable productivity is only 3.89 tons/Ha⁹, which accounts for less than 33% of national average (12.02 tonnes/ha)¹⁰. Most of the vegetable household are small holders who perceived vegetable farming as an additional livelihood income, and therefore they are spending minimal effort to grow and maintain their crops with limited resources and external inputs. The high vegetable price is also doesn't benefit farmers due to the high vegetable farming cost, which are transportation and labours.

⁹ Accounted by averaging productivity of shallot, potato, chili, cabbage, Chinese cabbage, and chayote in 2015.

¹⁰ Source: BPS NTT, 2013

Vegetable price in NTT has experienced high fluctuation since 2013, which makes it difficult for farmers to predict the market prices. Each vegetable product has a different pricing trend and the fluctuation is significant. Chili, as the most expensive vegetable in NTT, doesn't follow the other vegetables' price trend. Its price varies significantly throughout the year. While for the other vegetables, the price is peaked around January and reaches the lowest point around October.

Figure 6. Vegetables price trend in NTT¹¹



The vegetable quality produced in NTT is relatively good, especially the green leafy vegetables. Despite the poor post-harvest handling during transportation which causes quality degradation, traders usually retain quality of the vegetable during selling it by sprinkle water on the green leafy vegetables. However, the quality of some vegetables such as tomatoes and carrot the local crops quality is not as good as the crops sold in other provinces.

Many parts of NTT are at an extremely high risk of water shortage. Nusa Tenggara Timur is one of the driest provinces in Indonesia, with an average seven dry months (May-October) in a year. In the absence of irrigation or moisture conservation, in most of these area rainfall is only able to support crop cultivation for 60 to 100 days a year. In addition, NTT is prone to extended drought as a symptom of El Niño effect, many farmers in Timor District of NTT have to rely on government aid after experiencing crop failure due to drought. The drought has increased the number of households who are unable to meet their basic food requirements and has increased the number of farmers who have moved to working in the informal sector.

3.2 Sector dynamics

3.2.1 Market overview

Farmers do not perceive vegetable farming to be an economically viable option. Smallholder farmers, who lack of many resources, such as knowledge in good agricultural practice, access to water, quality soil, access to market, access to agricultural inputs, do not acknowledge vegetable farming to be a business opportunity with secure and cost-effective option. In Timor, farmers' focus is on food security, such as planting corn for food stock. If there is any harvest surplus, it will be sold to the middleman or local market. Since vegetable has short shelf life, fluctuated price, limited market options, and farmers do not have sufficient post-harvest handling practice which will degrade the vegetable quality and price, vegetable farming is not the farming priority for Timor's farmers. But in Flores, farmers have better understanding and

¹¹ Source: <http://pip.kementan.org/>

knowledge about vegetable farming practice and better water access all year round. This leads Flores' farmers to have vegetable farming as business, not just for food stock.

Vegetable farming value chain in NTT involves input retailers, farmers, collectors, traders, and customers. The chain starts from farmers purchasing agriculture inputs, cultivating and harvesting the vegetable. Farmers sell the harvested crop, without any sufficient post-harvest handling, to collectors or directly to traders in the local market. From there, the crops are then traded in traditional or modern markets, hotels and restaurants. If there is any crop oversupply, it will be sent to other provinces.

Vegetable farming in most of the places in NTT has been subsidized by the government. Government, from district, province, and national level, has given subsidy to vegetable farmers. The subsidy includes seeds, fertilizers, pesticides, tools, and support system (such as irrigation). In 2018, government of Indonesia will put their focus on horticulture, mainly in shallot and chili, which will lead to high number of subsidy in the market.

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3.2.2 Sector map

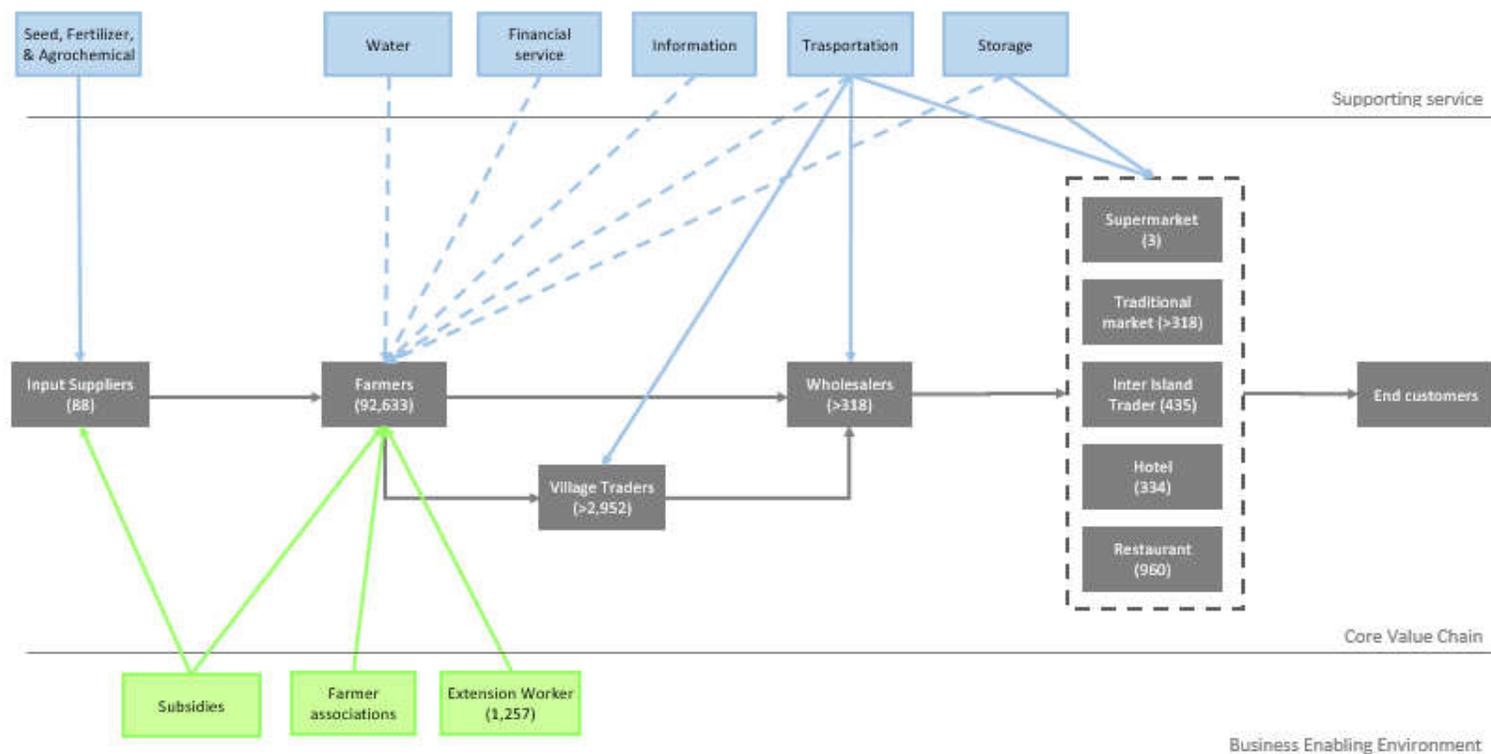


Figure 7. Vegetable sector market map

3.2.3 Core value chain

Inputs

The main source of planting material is from input retailers, and only small percentage of smallholder farmers use retained seed. Various kind of seed brands are widely available in input distributors and smaller shops in subdistrict areas. Most farmers in Timor have been using the same crop variety for many years, and this variety choice is mostly subjected to local market preference. Farmers in these areas are reluctant to adopt and try new varieties of crop seeds if its appearance is different from the common variety that are sold in market or not known to them. Panah Merah and Kapal Terbang are the most trusted brand used by farmers in Timor and Flores. It offers a wide range of dry and wet season vegetables seeds with different types of varieties which is adoptable to low and highland conditions.

The other main inputs used by vegetables farmers are fertilisers and pesticides. Most farmers use subsidised fertilisers and access other chemical inputs from private input retailers. The most common fertilisers used by framers is subsidised NPK, SP36, Urea, and ZA. However, as the enforcement of Agricultural Department policy, subsidized fertilizer can only be distributed to farmer groups' members. This policy creates a havoc to smallholder farmers because it makes new administrative procedure for the farmers to get the subsidised fertilisers. A smaller portion of farmers also purchase unsubsidised fertilisers to substitute the unavailable subsidized fertilizer. Some other farmers also utilize their livestock manure as organic fertilizer. Several chemical brands (including Nufarm, Syngenta, Bayer, and DGW) are sold in the input distributors. During the recent years, DGW has raised its popularity due to its field staffs' availability in NTT. Pesticides and other chemicals are generally purchased on cash payment.

Water, as one of the most important input for vegetable farming, is scarce in some parts of NTT region. In dry land farming areas in Timor and Sumba, vegetable farmers rely on rainfall water, with limited irrigation available. Meanwhile, farmers in Flores get easier access to water. NTT is one of the driest provinces in Indonesia, with 7 dry months (May-October) in a year. Annual rainfall, varied between 350-1,000mm, can only provide enough water to grow crops around 60-100 days a year. In the absence of irrigation or moisture conservation, this rainfall is unable to support vegetable farming during the drought period. In addition, changing rainfall patterns due to climate change and climate related phenomena as El Nino are exacerbating the scarcity of water in NTT. This coupled by limited skill to conduct good agricultural practise and high drought occurrence in Timor region becomes a constraint for farmers to expand their vegetable farm. Meanwhile, Flores has water almost all year with only small portion farmers in the region experience reduction of water level during dry season.

Production

Vegetable sector is dominated by small farms, with most vegetable households owning less than 1,000 meter squares. Farmers in Timor Island have traditionally planted maize as the basis of household food stock in the rainy season and a limited number of fruit and vegetables is cultivated once the corn is harvested. Vegetable is mainly cultivated in certain season while in the other season, farmers cultivate rice or maize. In Timor, smallholder farmers plant vegetable after rice and/or maize season. Main vegetables crops planted by farmers are

tomato, chili, cabbage, chayote, and shallot. While in Flores, especially Ende, farmers recognize the potential of gaining profit margin by selling vegetable in the low season, hence they started to plant vegetable during rainy season.

Table 1. Vegetable production calendar in Timor and Flores

Timor Island

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Corn	Veg	Veg	Veg	Veg	Veg	Fallow	Fallow	Fallow	Fallow	Corn	Corn

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Corn	Corn	Corn	Corn	Fallow	Fallow	Fallow	Fallow	Fallow	Fallow	Prep	Corn

Flores Island

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Veg	Veg	Fruit	Veg	Veg							
Corn	Corn	Fallow	Corn	Corn							

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Corn	Corn	Corn	Veg	Veg	Veg	Veg	Veg	Veg	Veg	Veg	Corn

From the table 1 above, the most common cropping pattern in Timor is corn – vegetable – corn. While, in some villages where water is scarce during dry season, such as Hanae and Penfui, land is left idle after corn season and vegetable is planted together with corn. On the other hand, Flores’ crop pattern is corn or paddy and vegetables – vegetables – vegetable – corn and vegetables. Other farmers in Ende decide to cultivate vegetable all year since water is always available. In Maumere, farmers stick to the dry season vegetable farming with the similar crop pattern as Timor’s. The peak vegetable harvest occurs around May to September.

Vegetable planting pattern is based on experience and traditional knowledge. The most often case is that farmer follows their peer and experience to decide which crops should be planted. Decision taken by farmers in NTT are made without enough information and market analysis. This leads to inevitable oversupply of certain type of vegetable and undersupply of the other type of vegetable. Farmers also don’t get enough information about weather prediction before planting their crops. They rely on traditional weather forecast technique, such as monitoring the traditional signs and signals associated with rain.

Few farmers who started cultivating vegetable due to government’s program don’t know how to properly cultivate vegetable. They haven’t got enough knowledge and information of how to cultivate, which leads to the bad quality of harvested crops up to failure. The unavailability of extension service workers to provide knowledge and information might be one of the factors that cause this to happen.

Women and men are both actively engaged in vegetable production as either farmers or as labourers (and sometimes as both). In most district, men and women are almost equally responsible for most of the farming activities, such as planting, weeding, and harvesting. Women dominates the price negotiation in the market, and the household financial management. While men’s domination is mostly in hard labour activities that require strength, such as spraying pesticides and bringing water to the farm. Decision about agricultural inputs is made by both men and women in the household. From the study case in Borong, women do all the vegetable

farming activities since the men are busy in the other crops, which are the main source of income.

Harvesting & Trading

Most vegetable harvested in NTT is consumed fresh within the island. Vegetable is a highly perishable item with a short shelf life, therefore farmers sell their crop immediately after harvesting. Farmers' lack of sufficient post-harvest handling practices cause them to not storing their vegetable for longer time in order. Because of this, they can't take advantage of higher prices when the market price is higher. In addition to that, there's no vegetable processing companies available in the market to absorb the oversupply vegetable production during the harvesting season. Farmers usually sell their vegetable products to nearby local markets and sometimes to local traders. Some local traders get the harvested crops from the farmers' field directly if the harvest is big enough.

There is alternative market available for vegetable in NTT, such as hotels, restaurants, and supermarkets, but the post-harvest handling practice is relatively poor. Simple postharvest handling comprises washing, sorting, bundling, and strapping are applied before the harvested crop is collectively transported to the nearest traditional market. Meanwhile, a small percentage of farmers in rural areas where difficult terrain hinders logistic access, need to get their products collected from the roadside (by a collector) in an open truck before going to the markets. These farmers usually don't do pre-sorting nor packing of harvested crop. Harvested crop, such as tomatoes, is stacked in an open basket without any cover used to minimize the damage during transportation. Better post-harvest handling is only applied by entrepreneur-minded-farmers in Flores, who utilize carton board materials for strapping their perishable harvested crops. The limited postharvest handling knowledge of smallholder farmers in NTT is the main barrier for gaining better selling price as well as accessing modern market, such as hotel and restaurant. In addition to that, the irregular supply of vegetable from farmers is also one of the reason why the alternative end markets don't prefer to source from them.

Farmers in Eastern Indonesia has weak bargaining power¹². Smallholder farmers usually has less than one hectare of mixed farming. They sell their products to collectors or sometimes they directly sell to local market, and accept the price offered. They don't have access to selling prices in markets. Based on White (2007), the value chain analysis of four supply chains, supermarkets give the highest return to farmers because it contains value creation activities, such as applying efficient technology in cultivation and conducting post-harvest handling. The lowest value added chain is a channel to traditional markets.

Since local vegetable supply is not adequately fulfilling demand in NTT, inter-island trade has been taken in seasonal period when certain vegetable quantity is low. Sikka as the largest vegetable producer in NTT is becoming the important vegetable source for Kupang districts. Furthermore, vegetable production in Timor regions also channelled to traditional wholesalers and retailers in nearby urban markets such as Timor Leste. Besides, there is also inter-provincial trade channelled to the main market in NTT. Long shelf life vegetable such as tomato, potato, garlic and shallot are normally sourced from Bali, Makassar and NTT.

¹² White (2007), *Vegetable Value Chains in Eastern Indonesia – a Focus on Chili*

Additionally, during low vegetable season during November until February, traders normally purchased vegetable from other provinces.

3.2.4 Supporting Functions / Services

Commercial private breeder service / nursery is not a common practice in the NTT. Farmers normally grow vegetable from seed purchased in input retailers. The seedling produced from the seed is transplanted, then cultivated by themselves.

Credit unions and cooperatives are the most common and accessible financial institution in NTT. Farmers usually ask for loan from credit unions or cooperatives, instead of banks. This is because credit unions and cooperatives are more accessible and wide-spread across NTT. Credit union Pintu Air is one of the strongest credit union brand in NTT. There is also cooperative that have strong presence in horticulture sector in Timor, named TLM (Tanaoba Lais Manekat). The local government has *Anggur Merah* program which provide financial support by establishing cooperative in rural districts. Despite of widely available financial institutions t, it is rare for farmer to get additional capital from these institutions. In fact, the interest rate, collateral requirement and administrative procedures hamper smallholder farmers to apply for loans. Furthermore, farmers also have limited knowledge of financial products and institution that are available in their districts.

Knowledge flow along the vegetable value chain is lacking, and smallholder farmers only have few channels to obtain information and knowledge about good agricultural practices (GAP). Farmers mainly get their information through farmer groups. However, the knowledge gained from farmer groups is generally poor. In addition, some farmers are reluctant to share their knowledge and information to other farmers. They have the mindset of sharing knowledge and information to their peer farmers will make the other farmers' productivity better and lead to oversupply and worse price. They also perceived knowledge as asset and farming success is an individual pride of each farmer. Prior to AIP-PRISMA's engagement in the sector, only Ewindo and DGW provides extension services to farmer group in NTT. However, limited extension service staff limit its coverage to only urban districts. Meanwhile, other input producers do not employ field staff and do not regard vegetable farmers in NTT as an important potential market and have therefore focused their extension efforts in other provinces.

At the same time, input dealers and local traders also have limited knowledge of vegetable cultivation. In the absence of embedded service provision, business interactions between farmers and collectors are largely restricted to the vegetable sale. Wholesalers are also a weak source of technical know-how in the sector. Finally, government advisory services are poorly equipped to transfer know-how in vegetable farming because extension staff lack critical expertise.

3.2.5 Supporting Rules and Regulations (Enabling Environment)

Agricultural policy in Indonesia focused for decades on achieving food self-sufficiency and price stability, especially in rice. The government used a wide variety of policy instruments in pursuing those goals, but mainly subsidies to purchased inputs. A typical example is a large subsidy for fertilizer, but water (irrigation systems), fuel, credit, tree planting materials, and pesticides were also subsidized. Indonesia's largest farm input subsidy was for

many years a fertilizer subsidy. Recently during the last 5-7 years, seeds subsidies take places using money from national as well as local government budget (CHCG, 2012).

Most of the subsidy related to horticulture is decentralized in district government level up to village level. Village level subsidy is mainly contributed from Dana Desa (mandate from UU Nomor 6 in 2014 about Village). Based on the Government Regulation / Peraturan Pemerintah Nomor 14 in 2014 about Dana Desa, Dana Desa is prioritized to be used for village development and empowerment¹³. The other form of subsidy comes from province level and national level. Based on the national plan, 2019 will be the year for horticulture, with main focus in BaBe (Bawang Merah / Shallot and Cabe / Chili).

For supporting Government commitment to improve the livelihood of NTT inhabitants, the Ministry of Agriculture enforced regulation number 48/ Permentan/OT.140/10/2009 about Good Agricultural Practice for Fruit and Vegetables. The regulation' main purposes are:

1. Increases production and productivity
2. Increases quality and safety of harvested crops
3. Increases production effectiveness
4. Improves efficiency of utilization of natural resource
5. Maintains soil fertility, environment sustainability and sustainable production system
6. Encourages farmers and farmer groups to have a responsible behaviour toward crop produced, its implication to health and safety of themselves, and environment.
7. Enhances crop competitiveness and its acceptance in international and domestic market.
8. Provides safety to customer.
9. Improves farmer welfare.

The number of government extension staffs was increased from 2013 to 2014 by 4.84%. The increase of women government extension staffs was higher compared to the men counterpart. NTT has the 5th largest government extension staffs compared to the other provinces in Indonesia. In 2014, there is 1.257 government extension staffs in NTT. In the case of subsidy, most of the extension service workers are not actively participating in disseminating knowledge and information. One of the reason is due to the lack of monetary incentives for them since it's not been budgeted as a part of subsidy budget.

¹³ <http://www.republika.co.id/berita/jurnalisme-warga/wacana/17/07/23/otjn6h396-dana-desa-dan-kemiskinan-kita>

4. Analysis

4.1 Problems in the Core Function and underlying causes

The problems and underlying causes are specific to the poor target groups that AIP-PRISMA seeks to support through interventions in the vegetable market system in NTT. These problems have been identified through the Sector Dynamics section above and are also presented in the Intervention Logic Analysis Framework (ILAF) table. The two key problems can be summarised as:

- Farmers experience low productivity
- Farmers experience low selling price

4.1.1. Farmers experience low productivity

Vegetable farmers in NTT don't possess enough good agricultural practice since the farming knowledge has been handed down from generation to generation. Even though the knowledge is given from the previous generation, but overall farmers in NTT don't possess good enough agricultural practice to have a good productivity. The knowledge they get from their ancestors might not be applicable anymore in this generation. This is also coupled by the fact that knowledge from ancestors is their main source of agricultural knowledge. Extension service workers, who disseminate good agricultural knowledge, is limited. They mostly reside in the more urban area, makes the rural smallholder farmers are less connected to the knowledge.

One of the factor that contribute to low productivity is inaccessible water supply. In most of the districts in Timor and Sumba, water availability is one of the major problem. Even if there is water spring available, the rural farmers might not have the proper infrastructure to get that water, such as no irrigation, well, and pump. Many of them carry the water from the mountain spring few kilometers away from their land. In the dry season, water shortage is very common, and farmers need to buy water from the water tank car provider to irrigate their land. Some of the farmers who can't afford that, prefer not to plant horticulture, since horticulture needs more water and nursing.

Limited availability of inputs and input shops, especially in rural areas. In the very rural areas in NTT, farmers need to travel up to few hours to reach the nearby agriculture input shops. Usually, agriculture input shoes are available in district level. Even though there are agriculture inputs available, not all the inputs are available. Farmers have limited choices of inputs, and the price is generally more expensive compared to the price in other provinces, such as Java. Thus, farmers keep on using lower quality inputs which cause the lower productivity. The other factors of the unavailability of the inputs, especially seeds, are the low supply of inputs (crop failure or wrong allocation) and limited distribution channels to get the products in NTT.

4.1.2. Farmers experience low selling price

Low vegetable price is mainly because of oversupply of vegetables during the peak period, which normally occurs during August to October, and low market information. Farmers in NTT have been following the traditional cropping pattern for generations. In the rainy

season from November until March, most farmers grow maize and rice. After harvesting period of rice or maize, farmers utilize the rest of the rainfall season to grow vegetable crops such as chili, shallot, and tomato. Farmers also don't have any access to market information, such as market price and alternative markets to sell their crops. They also don't have sufficient knowledge of post-harvest treatment to enable their crops be sold to a bigger market.

Farmers do not have enough information, such as weather and market price to help them decide which crop they should plant. The lack of access to weather information prevents farmers from choosing the appropriate vegetable varieties. The lack of market information, commodities' demand, pricing, and value chain also lead to farmers' low bargaining power and low selling price with uncertainty of available market for their harvested crops.

Farmers do not have enough knowledge and/or information to have proper agricultural practice and post-harvesting treatment, which leads to lower quality of the harvested crops. The limited knowledge that farmers have is also due to several reasons, which are limited number of market actors (private sector and government) who provide good agricultural practice (GAP) knowledge and post-harvest treatment to them. Government extension service workers are mainly give assistantship to staple crops farmers, such as rice and maize, while the number of private sector's agronomist or field staff is insufficient in NTT. The main private sectors who provide information to farmers in NTT are EWINDO and DGW.

In NTT, middleman can control the market price, especially for the inter-island imported crops. Since the number of middleman in the market is limited, especially the big traders who do inter-island trading, they have the power to maintain the price. For example, in shallot, most of the shallot supply in NTT is from outside NTT, and even though the price of shallot outside NTT is decreased, the traders in NTT still maintain the same price (not decreasing it). In NTT market, traders or middlemen have the power to control the price over farmers (low bargaining power of farmers).

4.2 Weaknesses in Services and Rules/Regulations

There are several services and enabling environment factors which affect the underlying causes of the problems highlighted above. To strengthen the market system, it is crucial that identified weaknesses in these services and enabling environment factors are the target of interventions. The key services weaknesses are detailed in the ILAF table and include:

- Limited number of market actors who produce, promote, and distribute unsubsidized fertilizers
- Limited access to quality input materials
- Market actors have limited knowledge on GAP
- Limited number of market actors who provide GAP knowledge and market information

4.2.1. Limited number of market actors who produce, promote, and distribute unsubsidized fertilizers

Most of the time in Indonesia, fertilizer has always been subsidized by the government. Even though the subsidy regulation had changed recently to only give the subsidy to farmers who are in the farmers groups, but most of the fertilizer input in the market is subsidized. Subsidized fertilizers have been hard to find because of the unavailability in the market. While in the market, commercial fertilizers are also hard to find because of the intense fertilizers subsidy, commercial actor are not aware of the retail market potentials. They have been mainly focused on B2B market and left out the retail market.

4.2.2. Limited access to quality input materials

As being stated before, the number of input distributors or retailers in NTT is limited, and they are mainly in the district level, which can be reach after few hours travel from village. In addition to that, the input shops are not providing all inputs. Some inputs are hard to find because most of the input suppliers don't perceive NTT as the potential market and put extra marketing or promotion effort in NTT.

4.2.3. Market actors have limited knowledge on GAP

Vegetable farming practices generally learned from parents, experiences and is effected by peer farmers. Farmers are generally don't have adequate knowledge of how to plant vegetable, especially in the seeding stage.

Competency of the market actors on GAP is generally also lacking due to limited of timely and reliable knowledge source can be accessed. Only few portion of input distributors and retailers provide suggestion on application of products they are selling. Knowledge promoted by input sellers generally based their customers' experience, which sometimes insufficient to solve severe pest and disease attack problems. In the other hand, skewed incentive structure may distort the information and knowledge are provided to the farmers.

Meanwhile, government extension staffs only provide general knowledge on farming practices. Further, large portion of extension staffs in many districts are focusing on staple crops, and only limited GAP knowledge is provided to vegetable farmers. In the exception of vegetable producing centre, District Government assigns extension staffs to disseminate GAP knowledge to vegetable farmers. However, there is still a limitation in public extension staffs' capacity on pest & disease control. Extension staffs' pest and disease knowledge usually limited to certain pesticide brands. On the top of that, one extension staff's coverage area is quite big, hence they can't really visit all the areas that they're responsible for.

Besides pest and disease control, knowledge related to proper fertilizer application is also lacking. Timing and frequency of fertilizer application could be vary based on nutrient required by different type of soils, commodities and plant growth stage. However, market actors' knowledge related to the proper usage across these different types of conditions are still limited. Further, rigorous physical observation is required to determine proper fertilizer dosage.

4.2.4. Limited number of market actors who provide GAP knowledge and market information

Number of market actors who have allocated their field staffs in NTT is limited, thus leads to the limited actors who provide reliable GAP knowledge to vegetable farmers. The locations that had been tapped by the private actors, vegetable farmers usually get knowledge from the private agronomist, such as EWINDO, Nufarm, and DGW. But due to the number limitation of the private agronomists, only few vegetable farmers can be reached by them. Coverage of private agronomist is limited to vegetable centres and suburbs areas.

Similarly, the presence of public extension staffs in NTT is also lacking and hence transfer of knowledge is limited. There are only 1,257 public extension workers for the whole province, with total 1.2 Million farmer households should be reached. It is mean that a single public extension worker should cover 100 farmer households. Further, as local government generally prioritize staple crops, only few percentage of extension workers who provide the GAP knowledge to vegetable farmers.

Input sellers and fellow farmers are the other knowledge source can be accessed by farmers. Input retailers usually only provide general knowledge related to products they are selling, and only few of them are willing to provide consultation service to farmers. While, fellow farmer as one of the farmers' most trusted knowledge source is easier to be accessed. However, knowledge provided by fellow farmers may not be timely and reliable.

Lack of GHP knowledge cause inferior quality of vegetables which effect to its accessibility to reach bigger market. In the other hand, exchange of market information is very underdeveloped, where asymmetric market information become one of barrier for farmers to benefit the higher price. Traders are unlikely to share market price information to farmers. While, other players such as input kiosk, extension staffs, and agronomist have lack of incentive to share the market information. The only possible market information source is fellow farmers.

4.3 Cross Cutting Issues (Gender and Environment)

Preliminary observation shows no sign of gender issues within the sector's context.

There may be gender issues within the vegetable sector in EJ that we are simply unaware of which be kept updated with observations from field visits, and FGD gender as the intervention progresses.

Few environmental issues in the vegetable sector have been described in the previous sections.

Improper application and overuse of chemicals is a common issue in the sector which directly affects to the increase pest resistance and reduction of soil fertility. Because of this, farmers need to increase intensity of fertilizer and pesticide usage in the following cycle. Meanwhile, reduction of soil productivity effects to the decreasing of productivity.

5. Strategy for Change

The strategy is designed to strengthen the weaknesses in the current service provision and enabling environment in the market system. This takes the form of (1) identifying the market potential, through calculations to show the potential of the sector; (2) a vision of change, to envisage how the value chain or market system would operate if identified problems are resolved; and (3) a set of interventions which can be targeted at specific market actors or groups of market actors which can be engaged to drive change in the system.

5.1 Market Potential

There is market opportunity to stimulate production of vegetables during the rainy season when prices are particularly high. Despite high market prices for vegetables harvested during rainy season November to February, most farmers in NTT are only producing vegetables after corn and paddy season. There is potential for AIP-PRISMA to tap into the prospect of shifting production to rainy period to enable farmers to get a better price during low season months. There is also a potential to promote market outlook assessment for improving planting decision management. Besides, there is also scope for implementing better post-harvest handling to add economic value of the harvested vegetables.

5.2 Vision of change

Focusing on achieving the potential outlined above for the vegetable sector in EJ, a vision of change can be outlined for both the sector and service levels. The vision of change at the **sector level** is to: (1) increase smallholder vegetable production and productivity during rainy and dry seasons (2) improve market performance for farmers. At the **service level**, it is envisaged that farmers will have improved access to: (1) quality input, (2) good farming knowledge, (3) good post-harvest handling practise knowledge, (4) off-season vegetables technology, and (5) financial services.

5.3 Interventions areas and pathways to systemic change

It is crucial that interventions are designed which are 'systemic' so that outcomes are not dependent upon the project or development partner for sustainability. This means that AIP-PRISMA should not seek to provide services (or at least only temporarily) but rather enter the market system in a catalytic manner to tackle the service weaknesses in existing market actors. Based on our analysis, three key intervention areas are necessary to transform the vegetable sector in NTT:

Intervention Areas	Approved, on-going, or completed interventions and intervention concepts
Intervention Area 1: Improving access to quality inputs	Strengthen promotion and expansion of distribution of good quality inputs
Intervention Area 2: Strengthening dissemination of agriculture knowledge (GAP) and information	Encourage market actors, especially at the level of service provider to provide GAP knowledge and market information
Intervention Area 3: Promoting off-season vegetables technology	(1) Strengthen promotion of off-season vegetables technologies, (2) Introduce GAP for farming during rainy season.

Intervention Area 4: Improving access to financial service	Promoting viable business model of financial support for vegetables farmers
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Intervention Area 1: Improving access to quality inputs

One of the problem that is faced in the market is the limited availability of quality inputs. This might due to limited distribution channels, limited resource for promotion, up to the supply that is lower than the demand. The intervention of improving access to quality inputs will partner with input producers, such as EWINDO, NASA, and Rainbow, and with input distributors, such as Sahabat Tani and Sumber Tani, to improve access to quality inputs. This will be coupled with the dissemination of knowledge and information to make sure the vegetable cultivate their crops properly.

Intervention Area 2: Strengthening dissemination of agriculture knowledge (GAP) and information

Besides GAP, this intervention area also aim to improve farmers' good post-harvest practices (GHP). With the adoption of GHP, to retain quality of fresh harvested vegetables can be retained which result to increasing its market value. The GHP intervention area comprise (1) supporting farmers to effectively engage with market actors aside the traditional vegetable chain, (2) supporting capacity building of post-harvest handling practices include proper sanitation, packaging, storage and transportation, (3) supporting farmers' collective efforts on selling the harvested vegetables to wider market channels.

There may be a potential to collaborate with BPTP and universities to seek innovation of post-harvest handling practices. Besides, a possibility of linkage between vegetable farmers and processing companies need to be further assessed.

Intervention Area 3: Promoting off-season vegetable technology

Promotion off-season vegetables may involve: (1) supporting promotion of suitable of vegetable seed for rainy season, (2) supporting education to farmers towards the opportunity of gaining better market price in rainy season, (3) supporting farmer capacity building for good agricultural practices of vegetable farming in rainy season. Since women are involved in the planting of vegetables and influence decisions around seed and pesticide usage, as well as trading practices, it will be important that exposure to the benefits of vegetable planting in rainy season and information on better practices are accessible to women and tailored to their needs.

Good cultivation practices during rainy season may involve promotion of vegetable seeds for rainy season, good pest control practices, and utilization of agriculture tools. Appropriate vegetable seeds can be promoted to be grew during rainy season includes (1) vegetables seed with high resistance to high humidity, (2) vegetable crops that are productive throughout the rainiest months, and (3) grafted seedling. Additionally, rain shelter and plastic row covers can be used to protect the vegetable crops from wet condition.

Intervention specifically promotes off-season planting didn't commences yet. However, as mentioned earlier, PRISMA is working with Agrosid to introduce seed treatment using *Trichoderma sp.* and *Gliricadium sp.* There may be other potential off-season technologies can be adopted from research institution where further exploration is need to be conducted.

Intervention Area 4: Improving access to financial service

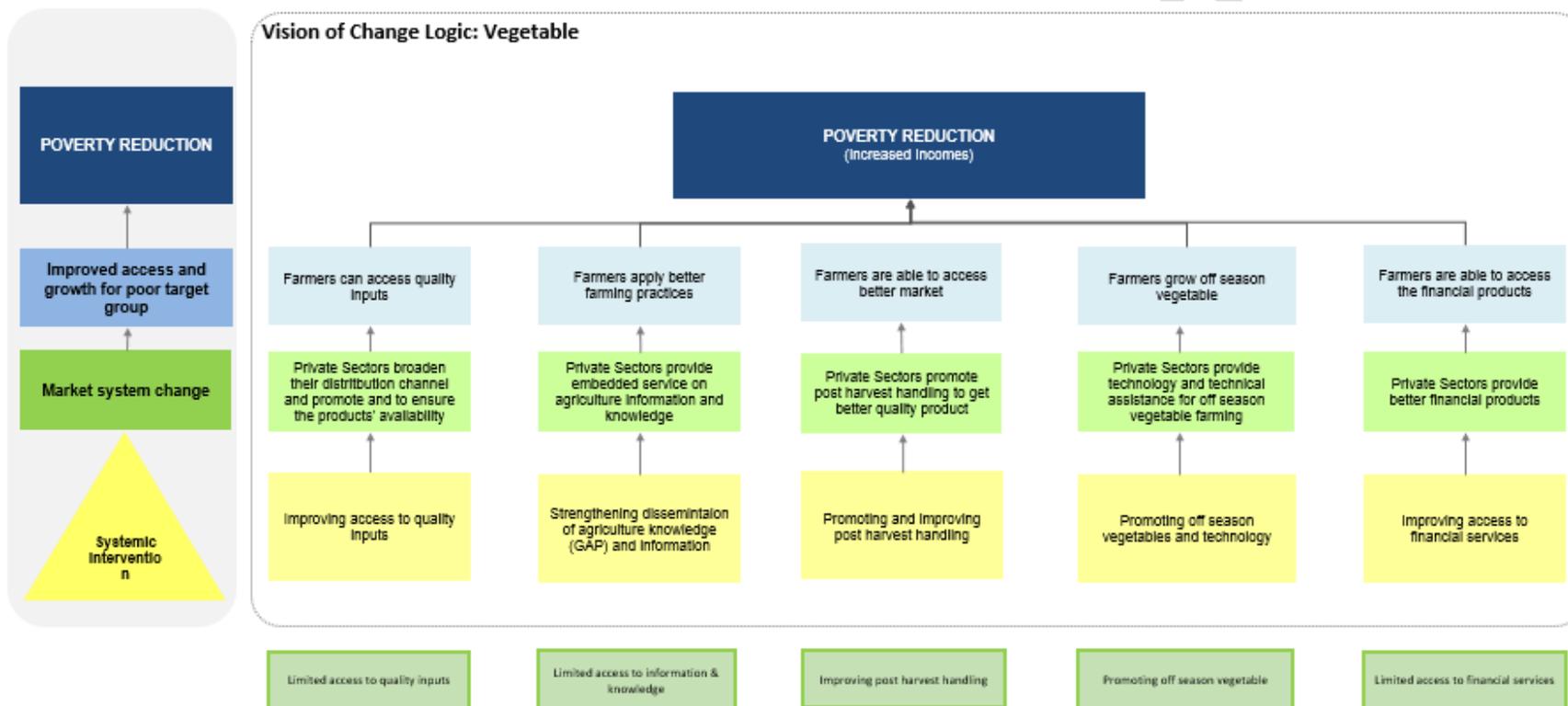
The goal of this intervention area is to stimulate vegetable production through favourable loan scheme for purchasing of agricultural inputs. The introduction of affordable loan scheme may involve supporting (1) education on credit union or cooperative product loan to farmer, and (2) create linkage between financial institution and vegetable traders.

Potential partners are Yayasan Tanaoba Lais Manekat and BPR Centra Pitobi who are interested to expand their financial service coverage to agriculture sector. The financial access will be introduced into current intervention with EWINDO where farmers need access to finance to reach better alternative markets and NASA where loan product is required. Further, collaborating with SAFIRA, value chain finance (VCF) training will be also provided to input retailers and other related market actors to minimize risk of nonperforming loan.

5.4 Sequencing and prioritization of interventions

Since vegetable farming practice in NTT is not the common practice, and the market is still limited, intervention in vegetable NTT subsector should be started from improving access to quality inputs and strengthening the dissemination of GAP. These two interventions can be done simultaneously with the same partners. The second step of the intervention is the improving access to financial service and promoting off season vegetables. This intervention will be done once the farmers already comfortable with farming vegetables and want to scale up their farming.

5.4 Sector Vision of Change Logic



Annex 1. Intervention Logic Analysis Framework (ILAF)¹⁴

¹⁴ Adapted from *Toolkit for Market System Analysis, International Development Enterprises (IDE), 2012*

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(1) Problem/ Symptom	(2) Underlying cause	(3) (4) Services and Enabling Environment	(5) Service weaknesses/ underlying causes	(6) Intervention Areas	Service Provider/ Partner	
Farmers experience low productivity	Farmers don't have access to good quality inputs	Seed, Fertilizer, and Agrochemical	Low profitability to establish independent input shops in rural area Limited input market players in NTT	Intervention Area 1: Improving access to quality inputs	<ul style="list-style-type: none"> · Sumber Tani · Sahabat Tani · Dunia Tani 	
	Farmers don't have enough knowledge on GAP	Information	Market actors have limited knowledge on GAP Limited number of market actors who provide GAP information		Intervention Area 2: Strengthening dissemination of agriculture knowledge (GAP) and information	<ul style="list-style-type: none"> · EWINDO · NASA · Dunia Tani
	Minimal input usage for vegetable farming	Information	Market actors have limited knowledge on the business case of vegetable farming Limited number of market actors who provide the business case of vegetable farming			
	Farmers experience low selling price	Farmers can't reach bigger market	Information	Market actors have limited knowledge of post harvest handling information to farmers Limited number of market actors who provide the post harvest handling knowledge		
			Financial institution	Limited financial institutions to bridge the payment lead time	Intervention Area 3: Linking supply chain actors (big customers and farmers) with financial institution	<ul style="list-style-type: none"> · EWINDO · Modern Market · Financial Institution

	Farmers lack of market information and planting decision	Information	Limited number of market actors who provide market information	Intervention Area 2: Strengthening dissemination of agriculture knowledge (GAP) and information	<ul style="list-style-type: none"> · EWINDO · NASA
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Annex 2. Identified market actors

Market actors	Institution	Contact	Position
Finance	Cooperative Sami Jaya	Mr. Petrus	Manager
Extension Service	Guna Darma Wibaya (GDW)	Mr. Melkianus Iele	PPL
Input	CV. Gerhana	Mrs. Geni	Owner
	Toko Sahabat Tani	Mrs. Regina Litmantoro	Owner
	Dunia Tani	Mr. Herry	
	CV. Commodore	Emi Lay	Owner
Trader	Supplier to Modern Market	Mr. Jeffrey Sucipto	Owner
	Vegetable Retailer	Veronika	
		Heris	
		Yustina	

		Adrianus	
		Yovita	
Government	Management of Local Market	Sius Benofinit	Head
	BPSB	Ibu Yus	Head
	Waturaka Village	Aloysius Djiraloy	Village Head
	Food Security Department	Alex	Head
	Agriculture Department	Paul	Head
	Extension Department (PPL)	Jhon	Head
	Deputy of Meyer		
Farmer / Group	Kelompok Tani Idola Bersama	Yonrid Sabuna	Leader
	Farmer	Sius	
	Farmer	Nurdin	

	Farmer	Sisilia	
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Annex 2a. Gender Roles Analysis

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No	Activity in production	Task Division		Explanation
		M	F	
1	Decision on the commodity to be planted	√	√	Discuss between male and female. Decision made by women based on economic reasons.
2	Buying inputs	√	√	Discuss between male and female. Decision made by women based on economic reasons.
3	Select vegetable variety	√	√	Discuss between male and female. Decision made by women based on economic reasons and past experience.
4	Land preparation	√		Dominated by men.
5	Planting	√	√	Conducted by men and women.
6	Weeding	√	√	Conducted by men and women.
7	Pest control	√		Dominated by men.
8	Harvesting	√	√	Conducted by men and women.
9	Packaging	√	√	Conducted by men and women.
10	Transporting	√		Transportation from field to home, and home to market usually conducted by men.

11	Selling vegetable	√	√	Discuss between male and female. Decision made by women based on economic reasons
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Annex 3. People Interviewed

Date	Location	Represent	Name interviewed of	Position	Contact Details
	Kupang	Cooperative Sami Jaya	Mr. Petrus	Manager	
	Kupang	Guna Darma Wibaya (GDW)	Mr. Melkianus lele	PPL	
	Kupang	CV. Gerhana	Mrs. Geni	Owner	
	Kupang	Toko Dunia Tani	Herry Hariyanto	Owner	081339343339
	Ende	Toko Sahabat Tani	Mrs. Regina Litmantoro	Owner	081339409565
	Soe, TTS	CV. Commodore	Emi Lay	Owner	
	Kupang	Supplier to Modern Market	Mr. Jeffrey Sucipto	Owner	
		Vegetable Retailer	Veronika		

			Heris		
			Yustina		
			Adrianus		
			Yovita		
	Pasar Soe, TTS	Management of Local Market	Sius Benofinit	Head	
	Kupang	Balai Pengawasan dan Sertifikasi Benih (BPSB) of NTT	Ibu Yus	Head	
	Soe, TTS	Waturaka Village	Aloysius Djiraloy	Head of Village	
	Maumere	Food Security Department	Alex	Head	
	Maumere	Agriculture Department	Paul	Head	
	Maumere	Extension Department (PPL)	John	Head	
	Maumere	Deputy of Meyer			

	Soe, TTS	Kelompok Tani Idola Bersama	Yonrid Sabuna	Leader	
	Waturaka, Ende	Farmer	Alaisius Djili		
	Rewa Ranga Selatan, Ende	Farmer	Nurdin		
		Farmer	Sisilia		

Annex 4. Investigation Team

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Shahi Prajwal – Head of Portfolio, AIP-PRISMA

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