

Banana (*Musa Spp.*) Value Chain in Maluku Islands, Indonesia

Semuel Leunufna

Faculty of Agriculture, Pattimura University, Ambon, Maluku, Pin code: 97233, Indonesia

ABSTRACT

A study was conducted under the framework of the project “Setting up a Blended Learning Program for Sustainable Inclusive Value Chain Development in Indonesia”, to analyze the value chain of Banana in Maluku Province, Indonesia. A number of government officials, traders, farmers were interviewed in this study in addition to studies of reports, statistical data and literatures. The study was able to map the Banana value chain system in Maluku Province and identified parties involved in the value chain. It was shown that Banana cultivation practices in Maluku Islands is still very simple, subsistent manner and lacks assistances from government or other related parties. Data indicated, however, that there is a possibility to obtain five times benefit in Banana cultivation out of the capital invested. SWOT analyses revealed that Banana is rich in genetic diversity in Maluku province, which provide possibilities for further development in terms of food industry, medicinal and agronomic sectors. There is, however, a need for improvement in many aspects along its value chain, including training of officials and farmers, provision of facilities for trading especially for export etc. Possibility for international market exists; however, there is a threat in that other provinces and other countries will take over the market opportunity when Maluku cannot be able to meet the standards required.

Keywords: Value chain, Banana, cost structure, SWOT analyzes

INTRODUCTION

Indonesia produced about 9 500 000 tons banana in the year 2015. This production came from a total harvest area of about 158 000 ha and a productivity of about 60 tons/ha [1]. This global figure was different than that provided by other data source in the country which indicated 7 299 266 tons total production out of 94 000 ha with a productivity of about 77 tons/ha [2]. Out of 11 production centers significantly account for their contribution to Indonesian banana production, three provinces; West Java, East java and Lampung gave the highest contribution covering more than 59% of the total production [2]). Although, not among the biggest banana producers provinces in Indonesia, Maluku Province was in the big 17th with the production of more than 50.000 tons out of an area of 439 ha in the year 2015 [2-4]. In the year 2015, Indonesia is noted to be self-sufficient in banana consumption, indicated by a zero banana import value [2]. The export value was about 22.000 tons which converted to 13.000.000 US \$. The importing countries were China, Saudi Arabia, Japan, Malaysia, United Arab Emirate, and Kuwait.

Corresponding Author:

Leunufnaunpatti[at]yahoodotcodotid

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Maluku is endowed with rich biodiversity (although under pressure) and many promising products can be cultivated in diversified agro-ecological production system and with agro forestry methods. In a context of growing public concern, with climate change, environmental damage as well as destruction of biodiversity, communicating on how Maluku produces its

product (with environmental services included) is a positive message and will help positioning the brand “Maluku” [5]. In terms of banana genetic diversity in Maluku islands, several surveys found 37 genotypes in North Maluku [6] and 34 genotypes in Central Maluku [7]. Among the genotypes found in central Maluku, 33 genotypes were identified in Ceram island and 20 genotypes found in Ambon Island [8]. Following a joint study among Pattimura University, Wageningen University and Research, and Agro Fair company, Barendrecht, the Netherlands, [9] reported 17 genotypes of banana traded in Mardika Market, the central traditional market in Ambon Island which is the central banana trading in Maluku Province. They also provided a simple analysis of movement of the banana from farmers in different islands to the main market in Ambon Island. As a whole activities needed to move a product or service from conception to production, delivery to final costumers and final disposal after use, the value chain can be mapped and analyzed using value chain analysis (VCA) of qualitative and/or quantitative approach, in which, quantitative information may also be obtained from secondary sources such as national (regional) statistics [10]. Recently, a joint project between Indonesia and the Netherlands was established with Agro Fair Company as the leading institution and Pattimura University, Ambon as the target institution, involving Maastricht School of Management (MSM) and Business School-Bogor Agricultural University (PB-IPB) as counterparts. “Setting up a Blended Learning Program for Sustainable Inclusive Agricultural Value Chain Development in Indonesia” project, has selected a number of commodities, specifically spice crops/plants including cloves (*Zyzygium aromaticum* (L.) Merr. & L. M. Perry), nutmeg (*Myrisica fragrans* Houtt.), sago (*Metroxylon sago* Rottbol), coconut (*Cocos nucifera* L.) and banana (*Musa* spp.), in Maluku Islands as research target of the project.

This paper reports the results of a study on banana value chain development in Maluku Islands. The objectives of the study were; to map the value chain system of banana in Maluku Islands, identifying actors involved and the roles they play on banana development; to evaluate the cost structure and benefit of cultivating and trading banana in Maluku Islands; to evaluate banana value chain development in terms of strengths, weaknesses, opportunities and threats it is facing; and to provide recommendations on the possible further improvement of banana Value Chain in Maluku Islands.

MATERIALS AND METHODS

MATERIALS

The research made use of questionnaires and writing tools in data gathering.

METHODS

Primary data collection was done by visiting markets (traditional and super markets), banana planting sites, interviewing a great number of farmers, traders, collecting traders and vendors at different time periods. The highest number of traders, collecting traders and vendors interviewed were at the “Mardika” traditional market of Ambon City. The others were Near Post-office, traditional market, Toko Enam traditional Market, Batu Koneng traditional market and Passo traditional market. Three super markets visited were Ambon Plaza, Maluku City Mall (MCM) Tantui and Ambon City Center (ACC) Passo. Ferry Ports at Hunimua Liang village and Galala village were also visited to acquire information on the schedule and frequency of departure and arrival. Farmers visited including the ones at Gunung Nona sub-village, Seri village, Siwang sub-village, Naku, Kilang and Hatalai villages, Taeno Atas sub-village, Batu Koneng sub-village, Waringin cap, Air Ali sub-villages and several other villages and sub-villages of Ambon Island. Secondary data collection was done by visiting several governmental offices, gathering information on the governmental strategic plans, accomplished works, further technical plans and reports either through focus group discussions with the department’s head and the staffs as well as formal and informal discussions with available officials. The institutions visited include Department of Agriculture of Maluku

Province, Departments of Trade of Maluku Province, Maluku Statistics Department, several shipping company at Ambon Ship Port and Garuda Cargo office, Pattimura Airport, Ambon. Visitation to and data gathering on the markets, planting sites and governmental institutions were conducted at different time periods; first during the period of December 2016 to March 2017 within the framework of collaboration with the Agro Fair Company, Wageningen University and Research and the Pattimura University, Ambon, second, during the visit of the project head and the counterpart from the Netherlands, Agro Fair and MSM, June to July 2017, and third during the time of scoping research of the project, March to April, 2018. Numbers of visitations to and data gathering in the research sites as well as telephone calls to the farmers were also done by Pattimura University research personal before and after the above mentioned occasions. A number of literatures were also studied prior to and after the data gathering to provide back ground knowledge as well as further interpretation and discussions of the results obtained. As well, a visitation or experiencing trip of delegates of Pattimura University to Ecuador and the Netherlands has provided a valuable knowledge on banana (Cavendish) cultivation and handlings to meet a high quality standard of international market, and has been beneficial in the discussion of this paper, in addition to personal local experiences.

RESULTS AND DISCUSSION

Mapping banana value chain system in Maluku islands

Banana value chain system in Maluku Islands can be discussed, as applied in general agricultural value chain system, in four main segments of activities which are Input, Production, Post-harvest (value adding) and Marketing (Figure 1). Supporting segments include Enabling Environment comprising governmental laws (acts) and policies providing political environments and regulations for the banana development, and support and Services provided by governmental institutions as well as research and educational Institutions (university, etc.) such as establishment of infrastructures, aids in input-factors and extension services.

Present situation and role of the actors in banana value chain

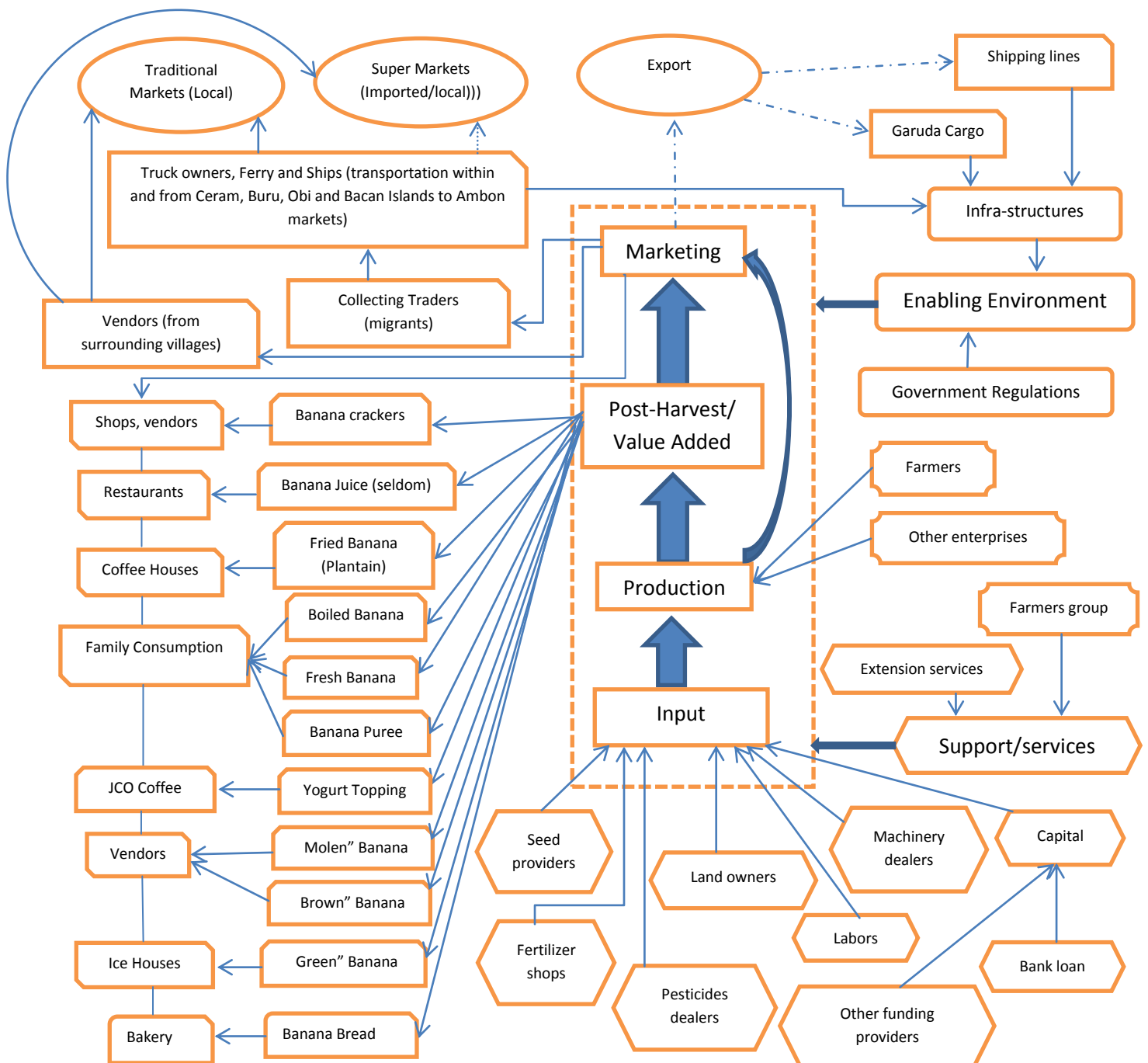
Input factors and production in farming system are commonly the function of capital provider, land owners, seed sellers, fertilizer dealers/shops, machinery dealers/shops, pesticides dealers/shops and labors (Figure 1). In banana farming in Maluku Islands, the capital used in funding the expenses is mainly of family budget and not from other sources. Planting fields for banana in Maluku Islands are of house yards, spaces near the road, "dusun" (a traditional agro forestry system practiced in Maluku Islands) and other places, some in monoculture but mostly in multiple cropping systems. The land ownership can be of other party (not the farmer) with certain agreements (formal or informal) of splitting the benefit obtained or can be of self-ownership, which may provide better income to the farmers. Banana seeds, at the first planting are mainly obtained from neighboring or/and far distance farmers, and not from seed nursery or other sources. Further seed, replacing the harvest stand will be left to the most advance seed in development of all stands. No selection is made for further seedlings. This practice is different than that implemented in Cavendish Banana farming system in Ecuador, in which, the seed to replace the harvest stand is the one closely attached to the mother plant and with certain direction to maintain planting distance within the field [11]. Fertilization is mainly not practiced in banana cultivation in Maluku Islands, when conducted, however, mainly of organic fertilizers of animal wastes (manure) and a complex fertilizer of NPK. The use of machinery in cultivation, harvesting and processing is not common in banana farming in Maluku Islands, accept simple tools such as machete used in weeding, pruning and harvesting. Similarly, pesticides application usually is not practiced. Although it is not frequently applied, the common practices of diseases controlling is eradication by burning the banana stands especially for the Bacterial wilt disease (penyakit darah pisang) caused by *Pseudomonas solanacearum*. The laborers employed in banana cultivation are usually family members of the

farmers. No hired laborers out of family members are employed as that, for example, observed in Cavendish cultivation in Ecuador, where the harvest labors were of hired professional labors group [11]. The cultural practices described above imply that, while cultivation system is still very traditional, there are plenty of rooms for improvements in farming system as well as opportunity for the provision of and, therefore, roles to play by business enterprises on input factors and production of Banana in Maluku Islands. Family is the main banana producers in Maluku Province, mostly of subsistent system. According to the agricultural census data in 2013, banana was cultivated by 52.935 households out of 175 362 RTUP (Households involved in Agricultural Activities), which was the highest among all horticultural crops cultivated in Maluku Province [12]. Improving banana value chain, therefore, will benefit more than 50 thousands families in Maluku Islands. As well, it provides the opportunity for small business enterprises other than family to play roles in banana development. Banana product in Maluku Islands are prepared and consumed and, therefore, marketed in different ways. Fresh banana of sub-group banana are consumed as dessert, baby food (banana puree) and banana juice, while for the plantain sub-group, consumption can be in the form of boiled banana, fried banana, topping for yogurt, "brown" banana, "molen" banana (banana wrapped in dough and fried, sell by vendors), "green" banana, banana crackers, and bread banana. With such various forms of consumption, banana products can further benefit other small business enterprises including restaurants, coffee houses, ice shops, banana vendors, bakery, as well as provide the opportunity for export (Figure 1).

Direct transfer of banana product from the field to traditional markets is mainly conducted by collecting traders in case of the products introduced from different islands, and by local vendors in case of the products acquired from within Ambon Island. The transport is facilitated by trucks trough ferry ships from Waipirit Ferry Harbor in Ceram Island to Hunimua Ferry Harbor in Ambon Island, in case of products from Ceram Island, and Namlea Ferry harbor in Buru Island to Galala Ferry Harbor in Ambon Island, in case of products transported from Buru Island. For the products introduced from Bacan and Obi Islands, North Maluku, the transport is accomplished through small PELNI (Indonesian National Sailing) ships to Yos sudarso Harbor in Ambon Island, near the Mardika Market, the main traditional market in Ambon Island. The role played by banana vendors, collecting traders, truck's company and drivers, ferry ships and PELNI ships are, therefore, important in banana value chain system in Maluku Islands. Banana products introduced from outside of Ambon Island are mainly traded in the main traditional market, Mardika Market, with some small amount traded in Batu Koneng traditional market. Those transported by vendors and through smaller transport vehicles in Ambon Island are traded in smaller traditional markets, Toko Enam Market, Lorong Post office Market and Passo Market. Three super markets in Ambon Island, Maluku City Mall (MCM), Tantui, Ambon City Center (ACC), Passo, and Ambon Plaza (Ambon City), traded a very small amount of banana products, which are mainly imported from other provinces in Indonesia. There is, therefore, a market opportunity for local banana products in the super markets in Ambon Island.

Banana export, similar to that of other horticultural products from Maluku Province, is still not possibly conducted at this stage of value chain development. Although several facilities of sea transports and air transports including four shipping lines operated at "Yos Sudarso" Ship harbor with transport time about 26 to 31 days [13] and Garuda Cargo, which guarantee 1 to 5 days of transport, from Indonesia to Europe, some other challenges still have to be tackle before international trading can be made possible. The challenges include provision of transporting containers with certain desirable conditions (cooling for example) for horticultural products, transporting period, which should be of as short period of time as possible, packaging and supporting documents, which should be well understood and prepared. Developing local potential commodities to strengthen food security, food self-help and food sovereignty has been one of the policies in food provision in Indonesia. The policy has, therefore been translated into strategic plans of the provinces including Maluku Province. Laws and regulations have also been produced to provide political conditions and guidance for the productions and trading of different commodities

including banana in Maluku Province. As can be seen in the map, Infra-structures supporting banana value chain in Maluku Province such as roads in different islands including Ceram, Buru and Ambon Islands, Ferry and Ships ports, up to shipping lines through sea and air have been provided by the government. However, improvements and further developments still need to be continued. This study indicated that mostly no aids and services such as capital, machinery, seeds, pesticides, and other agricultural input factors as well as extension services personals were received from the government by the farmers producing banana in Maluku Province. The finding is supported by governmental data of the survey in 2013 (Table 1) [14]. In terms of farmers association, even though, certain aids such as machinery were provided by the Municipality government through farmers associations (Ayuba and Osama Farmers Group, Ambon Island), Data (Table 1) indicated that most of the farmers in Maluku Province do not take part in association of banana growers.



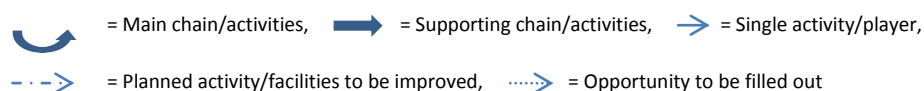


Figure 1: Banana (*Musa Spp.*) value chain map in Maluku Province, Indonesia.

Table 1: Aids received and membership in the farm group of the household cultivating/producing Banana (*musa spp.*) in Maluku Province in the year 2014.

No.	Items	Components/Description	Household (%)
1.	If the households received business aids	Received	0.62
		Not received	99.38
2.	Source of Business aids received	Government	67.04
		Non-governmental organization	3.81
		Individual	29.15
3.	Status of seed aid received	Government	
		- Free	0.14
		- Subsidies	-
		- Other than seed	0.28
		Non-governmental organization and Individual	0.21
4.	Status of fertilizers aid received	Government	
		- Free	0.20
		- Subsidies	-
		- Other than fertilizer	0.21
		Non-governmental organization and Individual	0.21
5.	Status of pesticide aid received	No aids received	99.38
		Government	
		- Subsidies	0.03
		- Other than pesticide	0.38
		Non-governmental organization and Individual	0.21
6.	Agricultural household tools/machinery received	Government	
		- Free	-
		- Subsidies	0.03
		Other than Agricultural household tools/machinery	0.38
		Non-governmental organization and Individual	0.21
7.	Agricultural tools/machinery for group received	No aids received	99.38
		Government	
		- Free	0.02
		- Subsidies	0.03
		- Other than Agricultural tools / machinery for group	0.37
	Non-governmental organization and Individual	0.21	
	No aids received	99.38	

8.	Business financing aid received	Government	
		- Free	0.01
		- Subsidies	0.03
		- Other than business financing	0.38
		Non-governmental organization and Individual	0.21
	No aids received	99.38	
9.	Training/extension service aid received	Government	
		- Free	0.03
		- Subsidies	-
		- Beside training/extension service	0.38
		Non-governmental organization and Individual	0.21
	No aids received	99.38	
10.	Business aid needed from the government for the future	Seed	5.33
		Fertilizer	10.38
		Agricultural tools/Machinery	38.35
		Capital loan from the bank without warrant	22.57
		Capital loan from the bank with subsidized interest	1.68
		Price guarantee	0.27
		Extension services on cultural techniques	5.64
		Others	11.21
		Do not need help	4.57
			No farm cooperative established
11.	Reasons for being non-member of farm cooperative	Location of farm cooperative is far from the household business	1.38
		The service from farm cooperative is not satisfactory	3.80
		Others	10.35
		Being a member	0.68
			National state owned enterprise
12.	Business partnership	Provincial state enterprise	0.09
		Private company	0.02
		Cooperative	0.18
		No partnership	99.71
			No farm group established
13.	Reasons for not being member of horticulture farm group	Do not interested	6.47
		Others	1.85
		Member	5.35

^{*)} Data are re-arranged from those presented in [14]

Costs-benefit of banana cultivation in Maluku islands

Data in Table 2 [14] indicated that, with a population of 100 banana stands, cultivated in dry season, implementing self-harvest system (harvest by the family labor), banana farm business in Maluku

Province can provide as much as forth fold to fivefold benefit to the farmers. The total production value of 17 998 401 IDR (equals to 1 295,9 US \$ with a conversion rate of 1 IDR = 0.000072US\$ per December, 2019) can be obtained from a total production of 3.11 tons and the price per Kg. at producer level of 5 779 IDR. Total cultivation expenses as high as 3 154 820 IDR is reached mainly from paying the wages of workers to conduct the cultivation activities of land preparation, planting, weeding and pruning, fertilizing, pest and diseases controlling, harvesting and product transporting as much as 1 979 234 IDR. Other substantial expenses include procurement of land and equipment, indirect taxes, and others which sum up to 1 004 471 IDR followed by fertilizers (4 179 IDR) and Fuel (1 805 IDR) (Table 2).

Table 2: Cost structure of Banana cultivation per 100 trees for dry season's cultivation.

No.	Cost Item	Value	% of Total Cost
A.	Production	17 998 402.00	100.00
B.	Production cost	3 154 820.75	100.00
1.	Seed	165 129.44	5.23
2.	Fertilizes	4 179.57	0.13
a.	NPK	4 024.77	0.13
b.	Manure	154.80	-
3.	Fuel	1 805.99	0.06
4.	Wages	1 979 234.33	62.74
a.	Land preparation	375 504.62	11.90
b.	Seedling	16 309.14	0.52
c.	Planting	168 130.53	5.33
d.	Weed controlling	413 823.28	13.12
e.	Fertilizing	3 482.97	0.11
f.	Pests and diseases controlling	7 595.46	0.24
g.	Harvesting	769 098.58	24.38
h.	Product transporting	225 289.75	7.14
5.	Other costs	1 004 471.37	31.84
a.	Land	842 314.37	26.70
b.	Other than land	162 157.00	5.14
1.	Equipment	45 631.36	1.45
2.	Indirect taxes	29 592.95	0.94
3.	Depreciation	4 281.80	0.15
4.	Others	82 110.89	2.60
C.	Surplus	14 843 580.42	470.50
Supporting Information			
1.	Cost (Rp/Kg)	1 014.37	
2.	Producer price (Rp/Kg)	5 779.47	
3.	Productivity (Ton/100 stands)	3.11	

Source: Modified from [14]

With an improvement in cultivation techniques through introductions of better facilities and techniques, it is assumed that the production will be increased not only the quantity but also the quality, which, in turn will meet the exporting standard quality including global gap (good agricultural practices) and fair trade and will increase the price and therefore the benefit of the banana farm businesses in Maluku Islands.

International trading of Banana and opportunity for Maluku Province

World's banana export in 2015 reached the quantity of 20,63 million tons, slightly decreased from that in 2014, which was 23,05 million tons, the highest export quantity since year 2011. These export quantities corresponded to the value of 10,05 billion US\$ and 11,03 billion US\$ respectively. Five major banana exporting countries in the world in 2015 were Ecuador, Belgium, Costa Rica, Guatemala and Columbia, taking the market shares of 26,47%, 8,89%, 7, 84%, 7,83% and 7,53% respectively. With the exception of Belgium, country that re-exports banana to other parts of Europe, banana export in the world has been dominated by Latin American countries, securing market shares of one half (49,67%) of the world banana market volume. Import value of Banana In the world in the year 2015, reached 13,69 billion US\$, obtained from the quantity of 20,55 million tones. Of all exports quantity in the world, European Union imported, 43,77 % followed by United States of America, 18,91 %, Russian Federation, 6,64%, Japan, 6,17% and China, 5,64% [15].

Banana International market (export) of Indonesia In the year 2015 was directed to a number of countries, mostly in Asia including China, Saudi Arabia, United Arab Emirate, and Japan with a total value of 13 million US\$ out of 22,3 thousand tons [15]. This market niche has not covered most of the highest importing countries in the world, which were European Union, the United States of America, and Russian Federation [15].

Maluku Islands has not been taking part in the export of banana, which maybe contributed, partly by the need to cover the local demand and the quality standard of the products as well as availability of infra-structures supporting the export. Other reasons include lack of regular volume and lack of big plantations causing the export as fresh fruit at commercial scale is not possible accept perhaps in the form of processed banana (Clercx – personal communication), Recently, however, there have been studies initiated to evaluate Maluku banana cultivars suited to European market [9]. Moreover, with one of the tasks of developing sustainable, inclusive value chain of several agricultural commodities including banana, the present project has the aim of improving small agricultural business enterprises in Maluku Province to meet a quality standard able to reach European market. For example, through a collaboration between Pattimura University and AgroFair Company, a number of samples of Sky hold banana (Pisang Tongkat Langit - *Musa troglodytarum* L.) puree obtained from three different villages in Ambon Island (Naku, Taeno Atas, and Siwang) were sent to the Netherlands in 2016, to evaluate the nutritional contents of this banana species.

There have also been discussions within parties taking part in the present project to encourage scientists and farmers in Maluku Islands to promote studies on this endemic species of Maluku Islands and to increase cultivation area with the end objective of exporting the Sky hold banana and its products to European market. Pisang Tongkat langit is rich in pro vitamin A, detectable by its deep, yellow orange color, which will be transformed into vitamin A when consumed. Clercx outlined the development of this species in steps such as promoting the species as a fresh fruit in Maluku especially at schools; processing into banana puree, baby food, ingredients for smoothies; research on appropriate harvesting period, processing (pasteurization) and packaging methods; developed a product and brand; market research and marketing; and develop the chain (production, agronomy; market, cost price; post-harvest, processing, conservation of quality).

Analysis of further Banana development opportunity in Maluku Province

SWOT (Strength, Weakness, opportunity, Threat) Analysis is implemented in this study to identify factors influencing Banana Value Chain Development in Maluku Province, Indonesia. The analysis is as follow:

Strengths

1. Diversity of banana genetic resources in Maluku Islands. As indicated previously, surveys identified 20 different genotypes in Ambon Island, 37 different Genotypes in Ceram Island [8] among them 17 cultivars/genotypes are routinely traded in “Mardika Market”, the main traditional markets in Ambon Island [9]. Cavendish banana, the most dominating species in international banana market, was not found in the market places in Ambon Island. Certain genotype of Cavendish banana, however, used to be exported directly to international market from North Maluku province.
2. Maluku is a part of banana triangle of genetic diversity in the world [16], and the center of origin of certain species, for example; *Musa troglodytarum* L.
3. There is a strong political will of the government to improve the economy of the local community through development of potential local commodities. This political will has also been elaborated in strategic plan and programs of provincial and Regency/Municipality governments in Maluku Province.
4. There is a willingness of Government of Maluku to improve facilities for international trading of horticultural products and develop policy of direct shipments to international markets to reduce shipping duration and therefore ensure the quality of products shipped, for example by providing shipment with cooling container shipped once a month from Ambon port.

Weaknesses

1. Lack of organization. If small farmers want to improve cultivation of banana for the local supermarkets, they should join efforts to pack banana (for example in plastic crates) and guarantee year round supply of quality bananas in certain volumes. In this way should be able to compete with bananas imported from other parts of Indonesia. It would be good to know how the banana value chains of these imported banana functions, the prices, where these bananas come from etc. (Clercx, personal communication)
2. There have not been many studies done to describe and identify various characteristics suitable for agronomic purposes or market desirability from present banana genetic diversity before further development to increase productivity and to meet wider market demands.
3. Cultivation system is still very poorly conducted, without much input factors and implementation of good cultivation techniques.
4. Banana cultivation for many farmers is mainly aimed for the family consumption and not for business purposes. The calculation of benefit/cost of banana cultivation is, therefore, not much considered or not the priority in the farming.
5. Banana transportation from other islands to Ambon markets by collecting traders is not very well packed in a good packaging form and therefore, there is no assurance of their quality in the traditional market. It is also better to understand if there are middlemen, intermediaries in banana trading and what the farmgate price is (when sold to traders), what the consumer price is and the cost/benefit structure in the chain between the farmers and the consumer (Clercx-personal communication).
6. There is not enough assistance from related governmental institutions to farmers and/or traders in terms of extension services and/or capital and other supports causing a slow development in banana farming and trading (business).

7. Although several post-harvest products (value adding) have been produced (marketed), they are mostly traditional and in small business scales.
8. Related formal institutions are still not well informed in terms of product quality certifications such as Global Gab and Fair Trade certifications causing a lack of quality consideration and inability to embark into international market.
9. Infra-structure, especially for international trading is very slow in development. Although there have been plans setting up by related governmental institutions, the execution is still to be accomplished until recently.

Opportunities

1. The diversity of banana genetic resources provides diversity of traits (characteristics), morphological, agronomic etc. which enable the selection of desirable characteristics suited to wider market demands and/or to be used as breeding materials for developing better varieties (genotypes).
2. There is a great local as well as regional market demands for different products of banana. As well, fresh banana is being traded mostly in traditional market and very few in super markets in Ambon Island. There is, therefore, a market niche for banana in super markets.
3. In addition to local and regional markets, there is an international market demand, especially in Europe, for banana with different taste than that of Cavendish banana, supplied mostly from Latin America, which has dominating international market for a long period of time. As well, with the susceptibility of Cavendish banana to some diseases which, in turn will influence the production of Cavendish banana, the market is open for different cultivars/genotypes from other parts of the world including Maluku.
4. There have been several Joint collaborations, established between some Maluku small business enterprises as well as scientific institutions with international Institutions especially in the Netherlands, which enable the acquirements of technical knowledge in cultivations and market information to the local farmers and small business as well as other related institutions in Maluku to be able to improve the productivity, quality and market acceptability and, therefore, increase the benefits and the economy of farmers and small business enterprises in Maluku.

Threats

1. The great potential of genetic diversity of Banana in Maluku Islands is being eroded (irreversible and irreplaceable loss of genetic diversity). Many of these great potentials will be wasted if not immediately conserved, studied and utilized for further development.
2. There is a real threat of diseases on Maluku banana production if cultivation system is not improved. Fusarium Tropical Race 4 has been a big threat, especially in Cavendish monoculture plantations. However, TR4 also affects many other varieties (Clercx, personal communication)
3. Maluku is only a small banana producer province in Indonesia. Other provinces such as West Java, East Java and Lampung are the highest banana producers in the country contributing more than a half (59.29%) to the whole country's production during the years 2011 – 2015, in addition to eight other prominent banana producing provinces [2]. These provinces surely will take over the regional and international markets opportunity if Maluku is not competitive in the development.

4. Philippines and India is the most dominant banana exporting countries in Asia. China, Vietnam and Laos are also big producers of banana. These counties will be big threats for Indonesia and especially Maluku in terms of covering the available market niche on banana.

Based on the present study, can be concluded that considering a great diversity of Banana genetic resources in Maluku islands, political vision and strategic plan of Indonesian and Maluku governments to develop local potential commodities, market nice available as well as farming and business players involved, it is certain that banana farming and trading businesses can be developed further to meet the required standard of local, national and international markets to improve the economy and prosperity of Maluku community.

Several points of recommendations based on the study are provided below:

1. Many studies needed to be done to describe and identify various characteristics suitable for agronomic purposes or market desirability from present banana genetic diversity before further development to meet wider market demands.
2. Cultivation system such as land reparation, seed selection, fertilization, diseases and pests management, harvesting, post harvesting and so on, is still needed to be improved to provide better production and to meet international quality standard and therefore be certified, including global gap and fair trade certifications.
3. Certification of Global gap and fair trade, however, is not of priority (Clercx, personal communication), because export of banana as fresh fruit is almost impossible and certainly not a viable perspective on the short term. If you want to focus on export (also to other island of Indonesia), processing should be developed (baby food, banana puree, dried banana, flour, etc.). This requires organization and investments.
4. Personals of government and related institutions needed to be informed and trained on improved cultivation systems (including organic farming system) and international quality standards to be able to further provide the knowledge to the farmers and small business players in banana development.
5. Banana farmers and small business enterprise personals needed to be provided with assistances such as extension services (including market information), farm machinery (small tractor for land cultivation, small planter, etc.), and capital (bank loan, etc.) to be able to further improve their working capacity.
6. There is a need for infra-structure development and improvement in banana production and trading. Some of the examples include; roads and ferry ships within and out-side the islands, international shipments through sea and air, simplifications of procedures (paper works, direct shipment rather than additional inspection ports), etc.

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REFERENCES

1. Statistics [Internet]. Food and Agriculture Organization of the United Nations. 2016 [cited 12 January 2019]. Available from: <http://www.fao.org/statistics/en/>
2. OECD Economic Outlook No. 100 (Edition 2016/2). OECD Economic Outlook: Statistics and Projections [Internet]. OECD; 2017 Nov 15; Available from: <http://dx.doi.org/10.1787/7fa317bf-en>
3. Biro Pusat Statistik dan Direktorat Jenderal Hortikultura. Produksi Pisang Menurut Propinsi 2011–2015. Kementrian Pertanian RI; 2016a [cited 2017 January] Available from: http://www.pertanian.go.id/ap_pages/mod/datahorti.
4. Biro Pusat Statistik dan Direktorat Jenderal Hortikultura. Luas Panen Pisang Menurut Propinsi 2011–2015. Kementrian Pertanian RI; 2016b [cited 2017 January]. Available from: http://www.pertanian.go.id/ap_pages/mod/datahorti.
5. Rask M, Worthington R. Communicating about Biodiversity, Public Engagement, and Climate Change. Oxford Research Encyclopedia of Climate Science [Internet]. Oxford University Press; 2017 Oct 26; Available from: <http://dx.doi.org/10.1093/acrefore/9780190228620.013.420>
6. Sutanto A, Edison HS, Riska, Nasution F, Hermanto C, Cizkova J, et al. Collecting banana diversity in eastern Indonesia. *Acta Horticulturae* [Internet]. International Society for Horticultural Science (ISHS); 2016 Mar;(1114):19–26. Available from: <http://dx.doi.org/10.17660/actahortic.2016.1114.3>
7. Sutanto A., Edison HS., Riska, Alfons and Daniells J. Central Maluku Banana Varieties –A Work in Progress. Available from file:///C:/Users/lvwighren/Downloads/IN140113.pdf
8. Hermanto C, Sutanto A, Edison HS, Riska, Alfons, Osang E., et, al. Triangle Banana exploration report, Central Maluku and Lesser Sunda Islands, Indonesia. AIAT, Medan, ITFRI, Solok Sumatera, AIAT Ambon, AIAT Timor, Agri-Science Queensland, ICHORD, Jakarta; 2013. Available from: <https://pdfs.semanticscholar.org/dd3d/b9a154c4b91f97e45e3cfc0a10cb2947bf3a.pdf>
9. Leunufna S, Woltering E, Hogeveen- van EE, Van der WJ. Inventory on banana (*Musa* spp.) as trading commodities in Maluku islands, Indonesia. *African Journal of Agricultural Research* [Internet]. Academic Journals; 2019 Oct 31;14(33):1693–712. Available from: <http://dx.doi.org/10.5897/ajar2018.13541>
10. Hellin J, Meijer M. Guidelines for value chain analysis. 2006 [cited November, 2019]. Available from: <https://www.researchgate.net/publication/265745416>
11. GULKARI KD, CHAUHAN NB, ONIMA VT. Constraints faced by the banana growers in adoption of risk management practices in drip irrigated banana cultivation. *AGRICULTURE UPDATE* [Internet]. Hind Agri Horticultural Society; 2017 Feb 15;12(1):84–8. Available from: <http://dx.doi.org/10.15740/has/au/12.1/84-88>
12. Badan Pusat Statistik (BPS) Propinsi Maluku. Potensi Pertanian Propinsi Maluku. Analisis Hasil Pendataan Lengkap Sensus Pertanian 2013. Ambon: Badan Pusat Statistik Propinsi Maluku; 2014 <https://doi.org/10.29239/j.agrikan.7.1.44-52>
13. Freightos: Instant Freight Quotes and Online Freight Marketplace | Freightos [Internet]. Freightos. 2019 [cited 12 December 2019]. Available from: <https://www.freightos.com/freight-resources/transit-time-calculator-for-international-freight-free/>
14. Badan Pusat Statistik (BPS) Propinsi Maluku. Sensus Pertanian 2013. Angka Propinsi Maluku Hasil Survei ST2013-Subsektor Rumah Tangga Usaha Tanaman Hortikultura. Buku C Tanaman Hortikultura. Ambon: Badan Pusat Statistik Propinsi Maluku; 2014. <https://doi.org/10.31219/osf.io/txuqj>
15. (ITC) I. Trade Map - Trade statistics for international business development [Internet]. Trademap.org. 2016 [cited 13 January 2017]. Available from: <https://www.trademap.org/Index.aspx?nvpm=1%>
16. Hermanto C, Edison HS, Nasution F, Riska, Malia E, Nofriarjasri, et al. Triangle Banana Exploration Report, North Sulawesi and North Maluku, Indonesia. AIAT, Medan, ITFRI, Solok Sumatra, AIAT North Sulawesi, AIAT North Maluku, Agri-Science Queensland, ICHORD Jakarta; 2012. Available from file:///C:/Users/lvwighren/Downloads/IN140114.pdf