

**SEAWEED SUB-SECTOR GROWTH STRATEGY
IN
EAST NUSA TENGGARA, WEST NUSA TENGGARA, WEST PAPUA**

BEING UPDATED



KALIMAJARI

2016

TABLE OF CONTENTS

1. Executive Summary	1
2. Background.....	2
3. Sector Description	3
3.1. Sector Profile.....	3
3.1.1. Overall Context	3
3.1.2. Local Context	5
3.2. Sector Dynamics.....	7
3.2.1. Market Overview	7
3.2.2. Core Value Chain.....	8
3.2.3. Supporting Function/Services.....	8
4. Analysis.....	9
4.1. Problems and Underlying Cause	9
4.1.1. Farmers' Productivity is Low.....	9
4.1.2. Low Selling Price of Dried Seaweed	9
4.2. Weaknesses in Services and Rules/Regulation	10
4.2.1. Information and Extensions Service	10
4.2.2. Seed Resource and Development.....	10
4.2.3. Financial Acces.....	10
4.2.4. Information and Extension Service of Post Harvest Practices.....	11
5. Strategy for Change.....	11
5.1. Vision of Change	11
5.2. Set of Interventions	11
5.3. Sector Vision of Change Logic.....	13
Annex 1. Intervention Logic Analysis Framework (ILAF).....	14

LIST OF TABLES

Table 1. World Key Producers of Red Seaweeds, 2013 (in Thousand Tons).....	4
Table 2. Seaweed Cultivation Database on Potential and Effective Comparison of Cultivation Area, Production Volume and Total Farmers in NTB, NTT and Papua/West Papua 2014	6

LIST OF FIGURES

Figure 1. World Imports of Raw Dried Seaweed by Major Buyer, 2013.....	3
Figure 2. World Imports of Raw Dried Seaweed , 2003-2013	3
Figure 3. World Red Seaweed Production, 2004-2013.....	4
Figure 4. World Exports of Raw Dried Seaweeds by Major Supplier, 2013.....	4
Figure 5. World Exports of Raw Dried Seaweed, 2004-2013.....	4
Figure 6. Seaweed Production Provinces.....	5
Figure 7. Seaweed Production Volume in Indonesia 2010-2014.....	5
Figure 8. Market Map General.....	8

1. Executive Summary

Based on World Imports data of Raw Dried Seaweed (RDS) by Major Buyer that released by UN Trademap, needs of world seaweed raw material industry showed an increasing tendency. In 2004, RDS import was around 340,000 tonnes, in 2013 it reached 594,900 tonnes of RDS. From 555 species that grow in Indonesia's water, 37 of them known to be have high economical value which most cultivated by Indonesia's farmers, that are *Eucheuma Cottonii* dan *Eucheuma spinosum*, carrageenan producer.

For Indonesia that has coastal areas reach 81,000 km, the second longest in the world after Canada, seaweed cultivation is a great potential for national economic pillar. In 2013, Indonesia was recorded as the world largest red seaweed producer with production reached 931,600 tonnes of RDS or meet world needs in the amount of 58% (FAOSTAT: *World Red Seaweeds Production, 2004-2013*).

Indonesia's seaweed production keep experience significant growth from year to year. In 2010 Indonesia was produced 391,500 tonnes dried seaweed and keep increasing, up to 2014 national seaweed production reached 1,023,400 tonnes RDS (Ministry of Marine and Fisheries 2014)

NTT, NTB, and West Papua are parts of the high-quality seaweed producer province in Indonesia, because water ecosystem condition which is low pollution, and suitable for seaweed's growth, especially *Eucheuma Cottonii* and *Eucheuma Spinosum*. NTT is the second largest seaweed producer province in Indonesia, in 2013 they produced 1,966.2 tonnes RDS (*statistic book of fishery 2014*). While NTB placed the national fifth largest, with production of 770.37 tonnes. And West Papua, especially Fak Fak district, eventhough haven't produced in large capacity yet, but quite interested by industry and seaweed exporters because specially for Fak Fak district where is producing *Giant Cottonii* variety. This variety is known as high-quality material.

Among exporters, seaweed quality in East Nusa Tenggara (NTT) and Papua are renowned as products that are at high rank in the list of exporters most desirable seaweeds, because it contains gel strength, high yield as well as viscosity, beside low pollution ecosystem. However, behind the these promising opportunities and potentials of commodities business that almost fully be managed by farmers, the fact that most of the farmers still live under living standard because of low income which is caused by at least two main factors that have their own complexities, which are:

1. Low productivity as the result of:
 - Global weather and climate change factor
 - Poor seaweed farmer's information and knowledge accessibility that tends to be at remote regions about cultivation technology and harvest/post-harvest handling
 - Poor farmer's accessibility to capital and financial
 - First level (village) local traders don't give sufficient information about quality standard that is needed by industry and exporter
2. Low farmer's selling price to the local traders, as the first chain in long market chain, as the result of:
 - High operational cost, especially expensive transportation cost from inland region and islands that must be beared by local traders
 - Most of the manufacturing company locations and seaweed exporters are ver far from seaweed cultivation location, so that make high transportation cost and weak knowledge transformation about cultivation aspect, harvest and post-harvest method that very influential towards the level of product's quality
 - Low seaweed product quality from farmers that is far from exporter and manufacturer industry quality standard
 - Not yet built interrelationship that give benefits each other (reciprocal relationship) between industry, local traders and farmers mainly related with quality improvement

- Local traders/collectors don't understand the quality standard that needed by manufacturer/exporter because poor communication intensity between collector and manufacturer about quality standard. Even if there is, that information does not reach the farmers.

Based on the conditions mentioned, it is necessary to do program intervention that is able to give beneficial impact to all parties in seaweed business chain sustainably, especially for seaweed farmers that in time receive fair benefits from this seaweed business.

Those visions can be achieved by strengthening support from exporter/manufacturer and local traders to motivate farmers in effort to improve the quality and quantity of seaweed production correspond exporter/manufacturer need standard, so that in time has direct impact towards farmer's income as the part of fair profit distribution for exporter/manufacturer, collector and farmer.

Intervention forms that is recommended based on this survey findings are:

1. Exporter/manufacturer's commitment strengthening facilitation in effort to increase seaweed production quality and quantity that is followed by fair profit distribution between businessman, collector, and farmer.
2. Assistancess of module making and seaweed demonstration plot production that implement Good Management Practice (GMP) and good practices of post-harvest.
3. Encouraging exporter/manufacturer to be more proactive in effort to improve seaweed production quality and quantity with method mastery and GMP implementation and good practices of post-harvest through collectors that in turn will train and promote GMP method implementation and good practices of post-harvest.

2. Background

Indonesia as an archipelago state with amount of island 17,504 islands and length of coastline reach 81,000 km has large potential for seaweed commodity development. Indicative land area that can be used for Indonesia's seaweed commodity cultivation reach 769,452 ha. From that amount, still around 50% or 384,733 ha that is used effectively (*Directorate General of Fisheries Cultivation Ministry of Marine and Fisheries Republic of Indonesia; 2013*). Seaweed production development in Indonesia's water territories has large potential, concerning world seaweed raw materials industries needs showed increasing trend. In 2004 UN Trademap recorded, world imports of Raw Dried Seaweed around 340,000 tonnes and keep increasing up to 2013 world seaweed imports reach 594,900 tonnes RDS.

Indonesia's seaweed production keep on experiencing significant increase year by year. In 2010, Indonesia was recorded produced 391,500 tonnes dried seaweed and keep increasing, up to 2014 national seaweed production reached 1,023,400 tonnes RDS (Ministry of Marine and Fisheries 2014). Indonesia was also recorded as the world largest red seaweed producer since 2013 with production reached 931,600 tonnes of RDS or meet world needs in the amount of 58% (*FAOSTAT: World Red Seaweeds Production, 2004-2013*).

NTT, NTB and West Papua are seaweed producer provinces that widely known among manufacturer and seaweed exporter. With their own uniqueness, the three provinces are very suitable for quality seaweed production development, because they have low pollution waters environment condition, sufficient sunlight, flow, pressure, salinity, Ph and water quality as well as salinity that are suitable with seaweed biological needs and growth. NTT is the second largest seaweed producer province in Indonesia, in 2013 they produced 1,966.2 tonnes RDS (*statistic book of fishery 2014*). While NTB placed the national fifth largest, with production of 770.37 tonnes. And West Papua, especially Fak Fak district, eventhough haven't produced in large capacity yet, but quite interested by industry and

seaweed exporters because specially for Fak Fak district where is producing *Giant Cottonii* variety. This variety is known as high-quality material.

Behind the large potential of world seaweed business which is clearly explained and illustrated, most of farmer's life in Indonesia have not received this business great benefits yet, which able to improve seaweed farmer's wealth. To get more objective illustration about this seaweed business dynamics, PRISMA, cooperated with Kalimajari Foundation conducted survey and field study at NTB, NTT and West Papua regions to obtain more detail study materials regarding: (1) potential, actors role that related with cultivation activities; (2) amount of farmers and the cultivation area spread, production and harvest season, product's quality up to market absorption; (3) business analysis and market chain in NTB, NTT and West Papua. Based on data findings and analysis this survey's result be used as design and program intervention strategy determination for the next phase.

3. Sector Description

3.1. Sector Profile

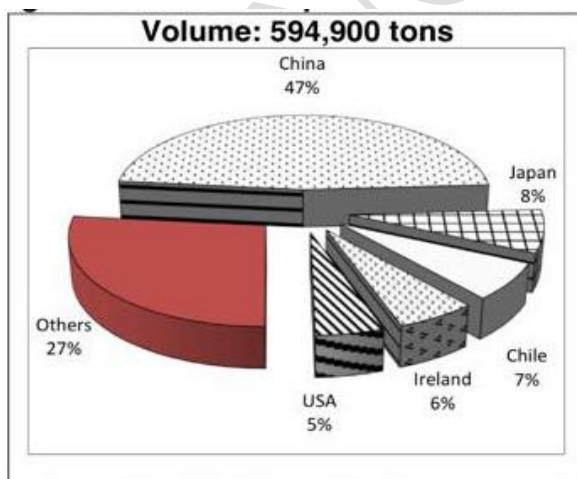
This sector profile give general information about status quo and potential target sector, sourced from secondary data and relevant literature with seaweed sector.

3.1.1. Overall Context

Based on UN Trademap, needs of world seaweed raw material industry showed an increasing tendency. In 2004, imports of Raw Dried Seaweed around 340,000 tonnes and in 2013, it reached 594,900 tonnes RDS. China is the largest RDS importer by absorbing 47% from the total of world imports, followed by Japan 8%, Chile 7%, Ireland 6%, and USA 5%. While the rest 27% is the combination of several importer countries such as, United Kingdom, Denmark, Philippines, and Republic of Korea.

Even if experiencing fluctuation, RDS import value shows varied increasing trend, from total import value 500 millions USD in 2004, increased to almost 1.1 billions USD in 2013

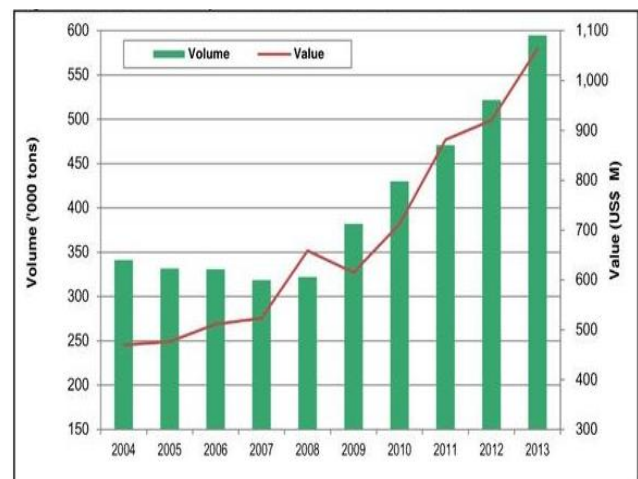
Figure 1. World Imports of Raw Dried Seaweed by Major Buyer, 2013



Note : Total volume was estimated based on the trends of previous years data

Source : UN Trademap

Figure 2. World Imports of Raw Dried Seaweed, 2003-2013



Note : Volumes from 2009, 2010, 2012 and 2013 were estimated based on the trends of previous years data

Source : UN Trademap

While, from supply side, FAOSTAT recorded seaweed production development which also tends to increase. If in 2004 the total world production was 393,432 tonnes RDS, then in 2013 the world seaweed production reached 1,598,400 tonnes RDS. Based on FAOSTAT data, Indonesia seaweed

production is experiencing significant increase. Since 2008, Indonesia is the world largest seaweed producer country, move China and Phillipines that dominate world seaweed production volume in previous years. In 2013, Indonesiawas recorded as the world largest red seaweed producer with production reached 931,600 tonnes RDS or equal with 58% from total global production.

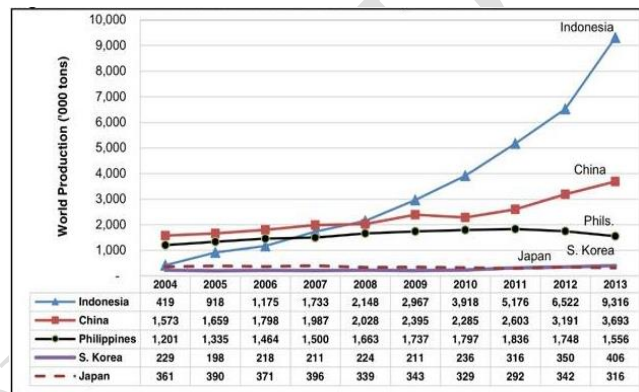
Based on Ministry of Marine and Fisheries Republic of Indonesia’s data which mention Indonesia seaweed production tend to increase significantly year by year. In 2010, Indonesia was recorded generate dried seaweed production as much as 391,500 tonnes and keep on increasing, until in 2014 national seaweed production reached 1,023,400 tonnes RDS (*Ministry of Marine and fisheries 2014*).

Tabel 1. World Key Producers of Red Seaweeds, 2013 (in Thousand Tons)

Countries	RDS	% Share	Rank
Red Seaweeds	1,598.4		
Indonesia	931.6	58%	1 st
China	369.3	23%	2 nd
Philippines	155.6	10%	3 rd
South Korea	40.6	3%	4 th
Japan	31.6	2%	5 th
Others	69.7	4%	

Source : FAOSTAT

Figure 3. World Red Seaweed Production, 2004-2013

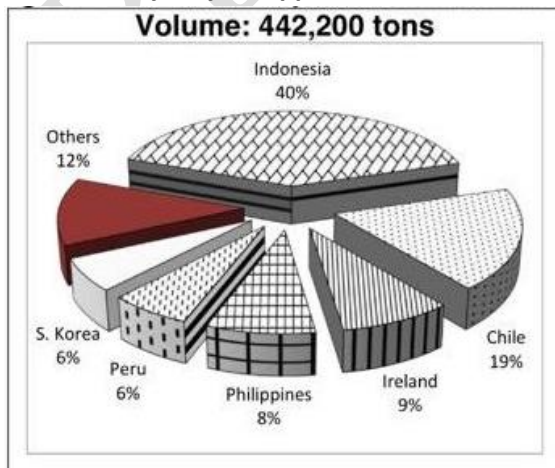


Source : FAOSTAT

Based on UN Trademap data, world Raw Dried Seaweed export volume experience fluctuation with an increasing trend from 2004-2013 and predicted to keep increasing for next years, following with the increasing trend of world seaweed raw material industry needs which currently has produced more than 500 derivatives product, in food product category (jelly, salad dressing, syrup, etc), pharmacy and cosmetic product (capsule, pill, store tooth, toothpaste, hair cream, soap, etc), and non-food industry (fertilizer, animal feed, ceramic, paint, textile printing, etc).

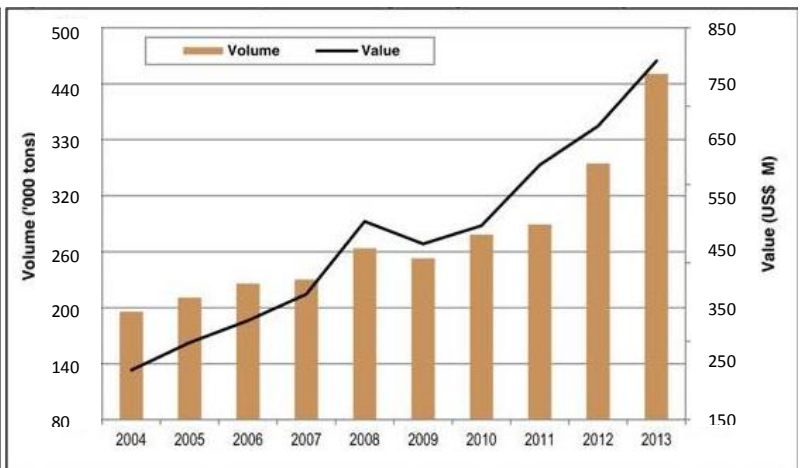
World volume growth and export value of RDS are having fluctuation with increasing trend. World export volume in 2004 as much as 196,000 tonnes RDS with value of 240 million USD, increase significantly in 2013 reached 442,000 tonnes RDS which worth 800 million USD. In 2013, Indonesia dominated world export volume until 40% from the total of world RDS export volume.

Figure 4. World Exports of Raw Dried Seaweeds by Major Supplier, 2013



Source : UN Trademap

Figure 5. World Exports of Raw Dried Seaweed, 2004-2013

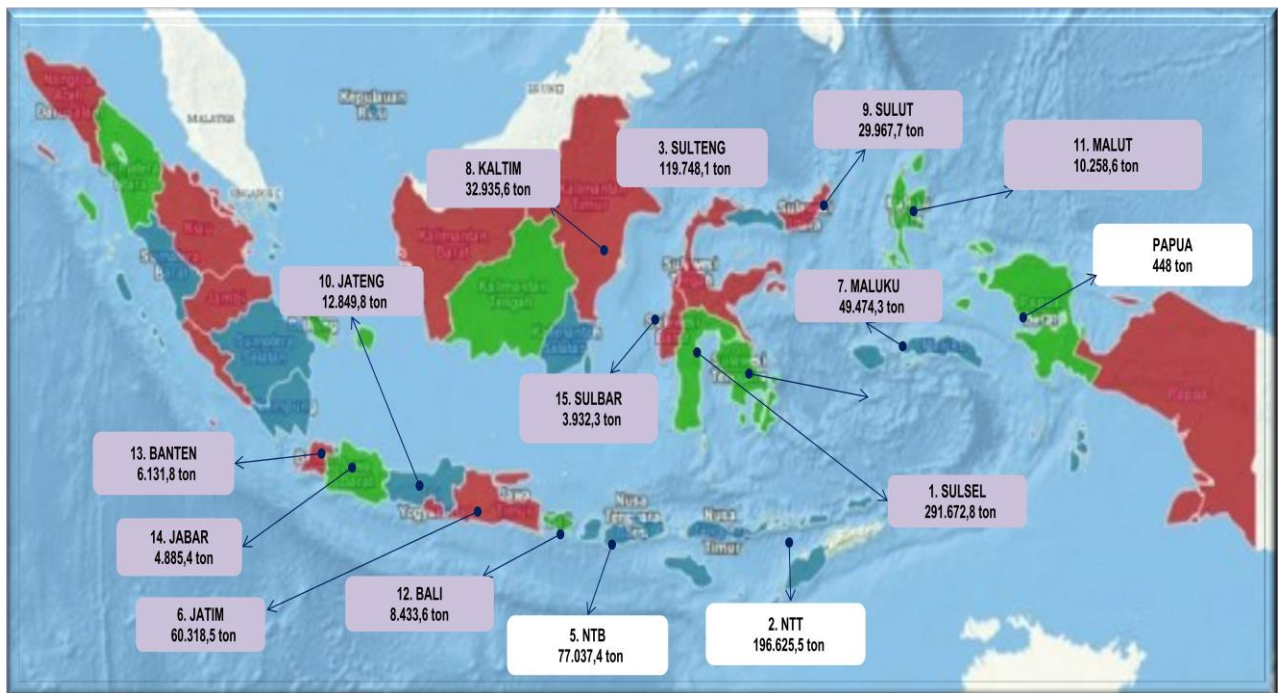


Source : UN Trademap

3.1.2. Local Context

Indonesia waters environment condition are suitable for tropical seaweed cultivation. As the part of ‘coral triangle’ territories that extend from west of Java sea to Solomon Islands in the East and from Phillipines water in the North side until NTT waters in the South. From 555 species that grow in Indonesia’s water, 37 of them known to be have high economical value which most cultivated by Indonesia’s farmers, that are *Eucheuma Cottonii* dan *Eucheuma spinosum*, carrageenan producer.

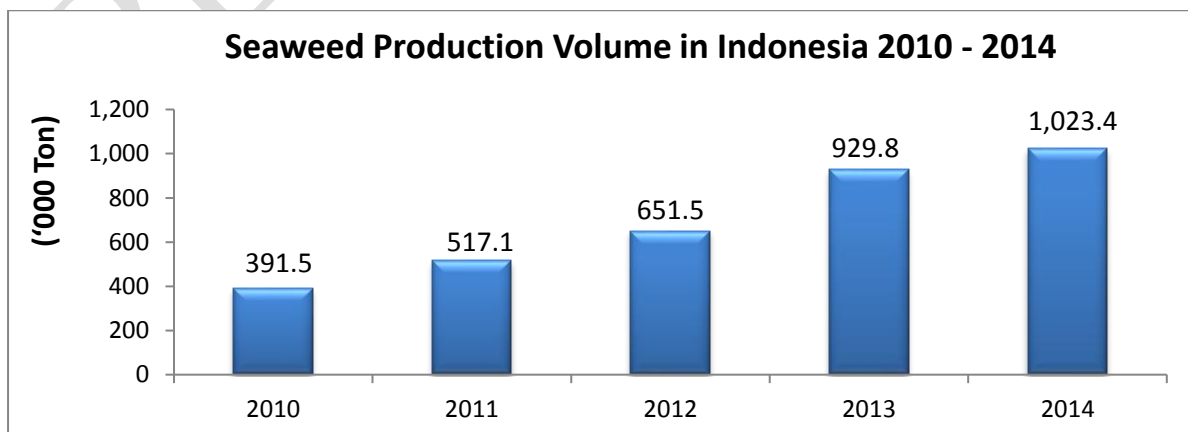
Figure 6. Seaweed Production Provinces



Source : Statistic Book of Fishery Indonesia, 2014

Seaweed cultivation in Indonesia has been developed since early 1980s and keep increased production in the following years. In 2010, Indonesia was recorded generate dried seaweed production as much as 391,500 tonnes and keep on increasing, until in 2014 national seaweed production reached 1,023,400 tonnes RDS (Ministry of Marine and fisheries 2014).

Figure 7. Seaweed Production Volume in Indonesia 2010-2014



Source : DJPB KKP, 2015

With their own uniqueness, NTB, NTT, and Papua/West Papua are very suitable for quality seaweed production development, because they have low pollution waters environment condition, sufficient sunlight, flow, pressure, salinity, Ph and water quality as well as salinity that are suitable with seaweed biological needs and growth. NTT is the second largest seaweed producer province in Indonesia, in 2013 they produced 1,966.2 tonnes RDS (*statistic book of fishery 2014*). While NTB placed the national fifth largest, with production of 770.37 tonnes. And West Papua, especially Fak Fak district, eventhough haven't produced in large capacity yet, but quite interested by industry and seaweed exporters because specially for Fak Fak district where is producing *Giant Cottonii* variety. This variety is known as high-quality material.

Table 2. Seaweed Cultivation Database on Potential and Effective Comparison of Cultivation Area, Production Volume and Total Farmers in NTB, NTT and Papua/West Papua 2014

Province	Area (Ha)		Production (Ton)		Farmer (Person)	
	Potential	Effective	Potential	Effective	Potential	Effective
Nusa Tenggara Barat	45,330	22,665	800,000	770,370	50,000	13,852
Nusa Tenggara Timur	68,764	34,382	4,685,612	1,966,200	1,136,429	60,783
Papua/West Papua	77,347	38,675	469,982	235,000	306,800	4,214
Total	191,441	95,722	5,955,594	2,971,570	1,493,229	78,849

Sources: Directorate General Fisheries Cultivation Ministry of Marine and Fisheries Republic of Indonesia 2014

3.2. Sector Dynamics

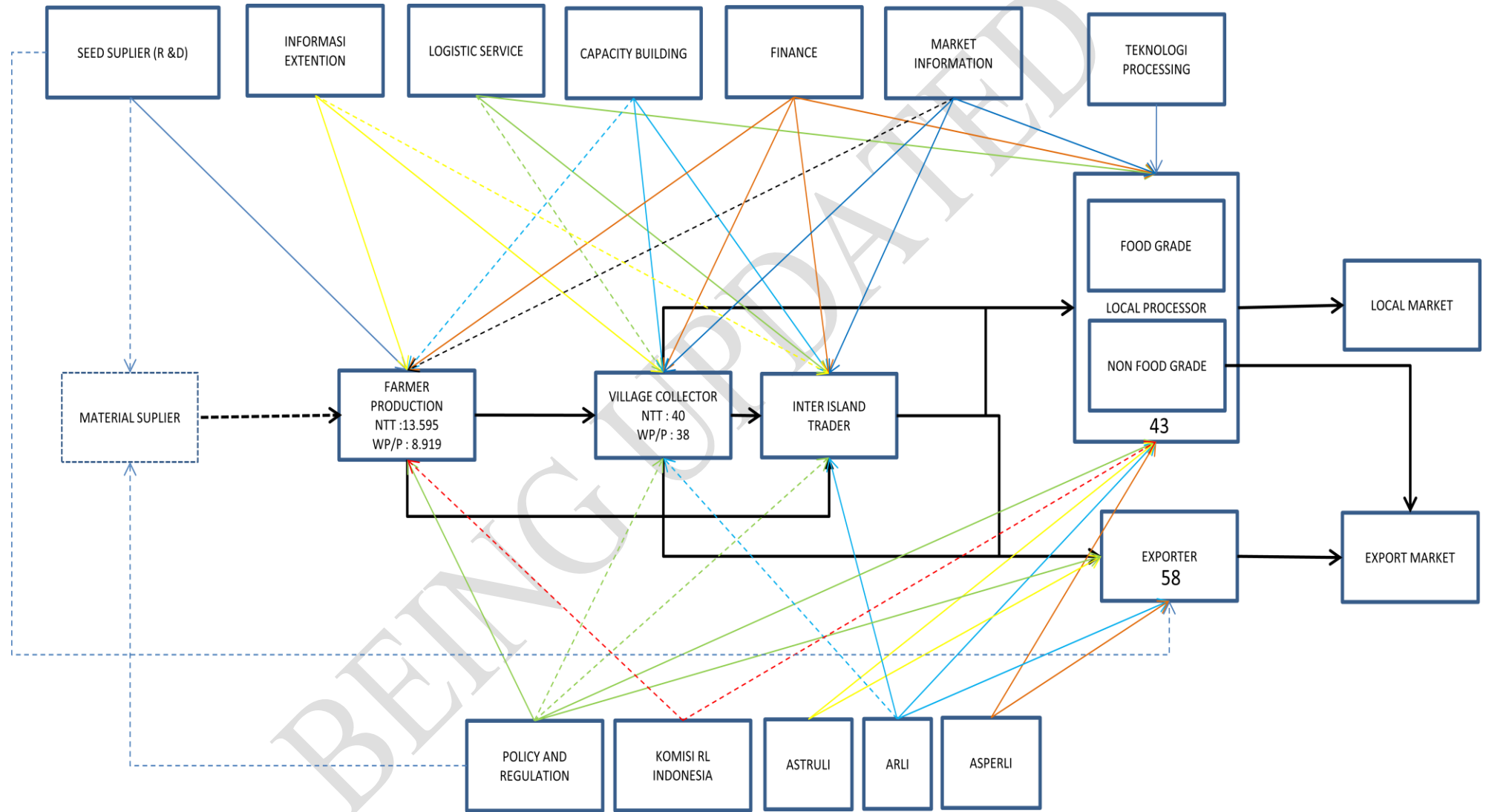
3.2.1. Market Overview

Relationship between players in seaweed sector has its own uniqueness, and not the same between seaweed producer region. In general, NTT and NTB farmers are selling their products to village traders or local traders that are operating in several villages at once. This village trader or local trader usually are the sole proprietorship business without legal enterprises, which next will sell to larger trader, usually in the central town that also become the merchant between islands. The merchant next sell seaweed product to the manufacturer/ RDS processor into carrageenan, or to the exporter. This processor sell some of it to domestic market and another part for export. While the exporter tends to sell product in the form of RDS which has been selected based on seaweed quality grades that is acceptable from various producer regions.

While Papua, does not have many traders. Generally, West Papua seaweed farmers that most of them in Fak Fak district, sell their products to the merchant between islands who also become as the seaweed large trader, or to farmers group that also a trader. Next, farmers group and large trader sell directly to exporter or manufacturer/process in Java Island.

In more detail, can be seen on the following market map:

Figure 8. Market Map General



3.2.2. Core Value Chain

Most of the farmers cultivate *Eucheuma Cottonii* type and few are cultivating *Eucheuma Spinosum*. *E. Cottonii* is the type that commonly absorbed by market, either to be processed as carrageenan material or for export RDS. In NTB, NTT generally, not much farmer's effort that able to give value added for production quality because of low knowledge about production technique and industry's standard needs.

Eucheuma cottonii seeds, are most widely cultivated by farmers in these three regions, most of it obtained by farmers from nearby environment, another is from the result of trade with other farmer's community, directly or brought by traders within islands. Specially for NTB and some part of NTT, farmers obtained the seeds from local government program that cultivated wider after. Until this study is conducted, not many seaweed farmers who do seedlings effort as distinctive activity which generates better quality of seeds. Even if there are some seeds left, they are unsustainable local government trial program like on nursery center at Alor region, which is NTT Province government initiative.

Material supply or known as seaweed production means, commonly sent from Java by merchants within islands who usually become seaweed local traders.

In general, seaweed cultivation practices that implemented by farmers at these 3 provinces tend to implement old methods and ways. NTB and West Papua farmers do long line method more while NTT does off bottom method more with rope span averagely 25 meter, so that vulnerable to movement of water flow and coral friction. That makes NTT farmers rely on seasons that bring water flow changes.

Based on the explanation of merchants, most of the farmers RDS products in NTT and NTB came from harvested crops less than 40 days. Early harvesting leads to lower gel strength and reduced carrageenan content. Drying process of seaweed harvest results that commonly dried on sands and decreased its value in markets.

Eventhough there is not large capacity yet, West Papua seaweeds are highly desireable because the product is 'giant cottonii' type that harvest with ideal age which is 45 days, and dried by hang it, didn't touch the ground so that produce relatively clean RDS.

3.2.3. Supporting Functions / Services

Most of the seaweed cultivation locations are in remote area that has deficient transportation access, and far from processor factory and main building of exporter. This condition gives effect to low prices that received by farmers and local traders who bear the high cost of transportation.

Farmers existences that are spread in remote area, especially NTT and Papua also contribute for poor farmer's knowledge regarding seaweed production improvement technique that correspond with market standard. Even though many complains about product's quality, but all the people, in this case exporter and processor, don't give much information about quality standard needed, including other form of intervention as an effort to improve production quality.

Majority of seaweed farmers don't have information about seaweed price movement in the market. The only source about price obtained from local traders, so that transparency in determining seaweed selling price standard that is fair for farmers and village traders become quite important issue.

When there are several farmers who got more knowledge about effort to improve production whether it is a result of government increasing capacity program or NGO, often face challengesm no financial support for business development capitals because of difficult access to bank loans nor non-bank financial institution in NTT and most of NTB.

During this period of study, Papua's farmers received decent capital access from Bank Papua through farmer's business loans that is in Fakfak. The cooperation bank-farmers community give positive impact towards motivation to produce quality product by implementing cultivation practices and sustainable post-harvest handling.

4. Analysis

4.1. Problems and Underlying Cause

The problems and underlying causes are specific to the poor target groups that PRISMA seeks to support through interventions in the seaweed market system in NTT and West Papua. These problems have been identified through the Sector Dynamics section above and are also presented in the Intervention Logic Analysis Framework (ILAF) table. The 2 key problems faced by farmers can be summarised as:

- Farmers' productivity is low.
- Low selling price of dried seaweed

4.1.1. Farmers' Productivity is Low

Seaweed productivity in NTT and NTB had experienced significant decline since 2015 until this survey implemented (August 2016). This production volume decrease considered as a result of el-nino, that followed with changes symptom (anomaly) in sea surfaces temperature which tend to be higher (warm) than normal average situation and give bad impact towards seaweed growth.

Beside natural factors, low productivity also caused at least by these following matters:

1. Poor knowledge and agriculture practices implementation, including skill to identify disease and information about climate change as well as alternatives to solve the problem faced. Poor knowledge not only affecting production volume, but also a big challenge for production quality.
2. Most of the farmers didn't implement proper harvest and post-harvest practices. In general, Farmers harvest seaweed that aged less than 40 days. While the ideal age of seaweed is 45 days. Except Fakfak farmers, almost all farmers do the drying process by drying directly on sands area, so that affect product's cleanliness. Whereas Fakfak farmers used to dry by hang the seaweed until dry, and generates cleaner product.
3. Farmers didn't get financial support access which is necessary for business development capital. That condition also influences farmer's motivation to do quality improvement which needs cost, start from seeds provision, to cultivation material provision and post-harvest treatment.

4.1.2. Low Selling Price of Dried Seaweed

Low quality of seaweed production that produced by current farmers influence directly towards selling prices which received by farmers, because market pays according to the quality standard of manufacture industry. This happens when farmers harvested the seaweed less than 45 days. Poor harvest practices and unclean drying process which are affecting substantially production cost of carrageenan processor company that received unclean product and low gel strength.

These low pricess also influenced by high transportation cost as a result of far distance between cultivation location and processor company and exporters. This distance constraint is an important

factor of low farmer's information access and local traders toward price development and product quality which is applied in processor companies and exporters.

4.2. Weaknesses in Services and Rules / Regulation

There are a number of services and enabling environment factors which affect the underlying causes of the problems highlighted above. The key services weaknesses are detailed in the ILAF table and include:

- Information and Extension Service
- Seed Resource and Development
- Financial Access to Farmer
- Information and Extension Services of Post Harvest Practices

4.2.1. Information and Extension Service

In general, not many efforts that give value added for seaweed production quality to the majority of stakeholders because of poor knowledge about production technique and post-harvest methods that fit with industry's needs. So far, not many counseling programs to improve farmer's capacity, one of the causes is unavailable system and competent counsler to improve farmer's capacity.

Even if many complains toward volume consistency and product's quality, there are no efforts from government nor market stakeholders to give information about quality standard and industry needs which give motivation to farmers do production quality improvement effort.

Information needs and production capacity expansion effort are important aspects for farmers as well as market stakeholders and industry. Government and private sector supposed to fill that role, so that farmers are able to improve their capacity to produce high quality product, until in time will give impact for their welfare. For market stakeholder and processor industry, along with farmer's capacity improvement, will receive guarantee of sustainable quality product supply.

4.2.2. Seed Resource and Development

Eucheuma cottonii, is the type that widely cultivated by farmers in three provinces, most of it obtained from nearby environment, another is from the result of trading plants with other communities, whether it is directly or brought by merchants within islands. NTB farmers and some part of NTT, obtained seeds from local government program which next develop wider. While Papua farmers are luckier because they have Giant Cottonii variety that known as high quality product.

Until this study is conducted, not many seaweed farmers who do seedlings effort as distinctive activity which generates better quality of seeds. Even if there are some seeds left, they are unsustainable local government trial program like on nursery center at Alor region, which is NTT Province government initiative.

Seedling center existence and study about quality seeds development which easily access by farmers are essential to build farmer's motivation in order to improve quality and production volum that necessary for industry sustainably.

4.2.3. Financial Access

Farmer's financial skill is a crucial issue in efforts to improve national seaweed products. Most of the seaweed farmers that spread in various remote area, experience difficulties of capital access. Beside Bank Papua Fak Fak branch, almost no banks and other financial institutions that have funding programs for farmers and local traders. Production spread which almost all of it are in this remote

region causing high production material prices and transportation which has to be beared by farmers and local traders.

Experiences of farmer's cooperation with Bank Papua Fak Fak branch show that support and financial access facility are able to improve seaweed production volume and quality more consistently. From that cooperation, farmer and local trader's income, in this case represented by farmers community, experience significant increase because capable to produce high quality products by implementing cultivation practices and proper post-harvest treatment.

4.2.4. Information and Extension Services of Post Harvest Practices

Harvest practice habit to harvest the seaweed before 45 days and drying treatment by dry the harvested on the beach sands which cause low quality seaweed, so that affect significantly towards price received by farmers. This low quality has already been complained by market stake holder and processor industry because influenced for low gel strength level. Yet, both exporters and processor industry never told this matter directly to the farmers.

Far distance constraint is the main reason that often told by market stakeholder about the fact that low communication intensity and education about applied quality standard. Until this survey is conducted, no systematic effort to build reciprocal relationship that give benefits each other between industry, local traders and farmers, mainly related with quality improvement. Farmers and local traders not yet understand about quality standard that needed by processor industry/exporter because of low communication intensity with processor industry/exporter about quality standard. Even if there is, the information didn't received by farmers.

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) a vision of change, to envisage how the value chain or market system would operate if identified problems are resolved; and (2) 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. Vision of Change

PRISMA's vision of change is that by 2018, seaweed farmers in Eastern Flores will increase their productivity of quality seaweed. This means producing export-quality seaweed which attracts a high market value, encouraging other smallholder farmers to start quality seaweed production, and increasing national production to meet global demand.

5.2. Set of Interventions

- **Intervention 1:** Strengthening technical capacity and collaborative networks among farmers and collectors for seaweed processing
- **Intervention Area 2:** Public private partnership in developing seaweed sector

Intervention Area 1: Strengthening technical capacity and collaborative networks among farmers and collectors for seaweed processing

Intervention Overview:

1. Increase knowledge and technical capacity of processing company (PSP) on seaweed cultivation (GMP), post-harvest practices, demoplot establishment, and particularly on seed production
 2. Facilitate PSP on developing reciprocal collaboration with collectors and farmers
 3. Disseminate, by PSP and ISPs, knowledge of GMP and post-harvest practice to farmers through collectors.
- RKN (processing company)
 - New company and first SRC Food Grade factory in East Indonesia
 - Will have laboratory facility to develop quality seeds managed by microbiology experts from the Philippines
 - Dry seaweed input: 300 tons per month, SRC produced 10 tons per day
 - Commits to develop farmers and collectors (Bumdes, Lead Farmers)
 - Connect to Bank NTT to provide credit to farmers

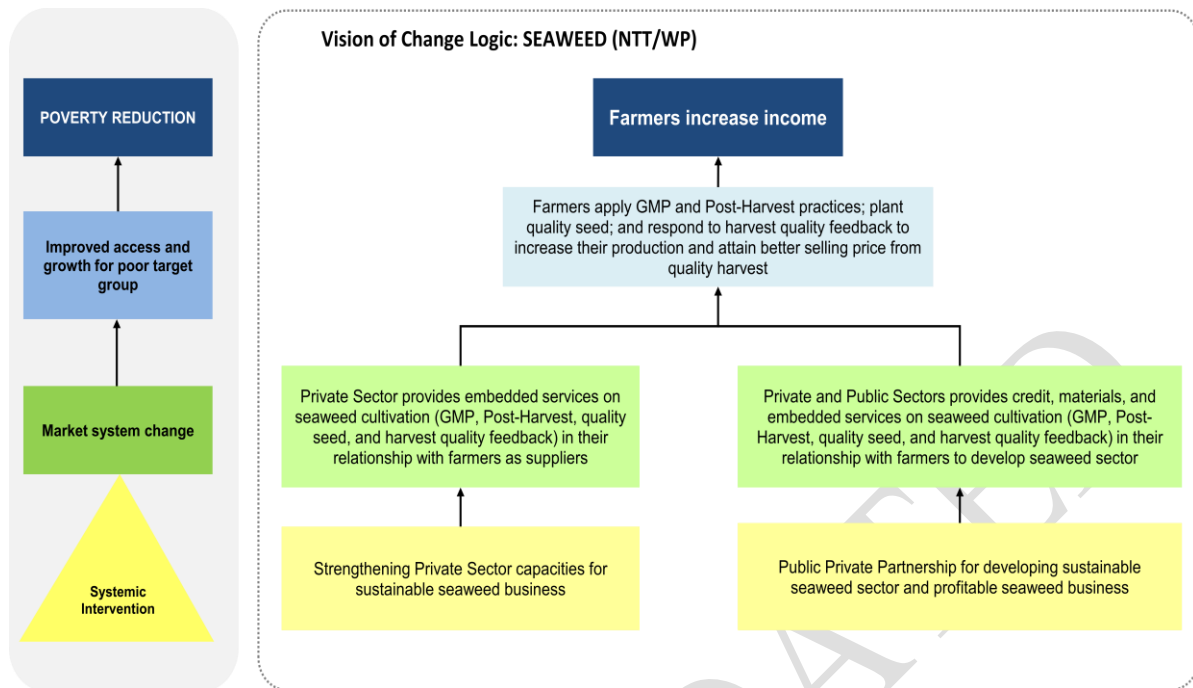
Can be integrated with ATC factory in NTT

- Chip Sabu Raijua Factory (processing company)
 - A new processing company in Sabu island
 - Existing raw material input 2-3 tons / day with target 10 tons / day
 - Produces ATC Non Food Grade
 - Can be linked to RKN

Intervention Area 2: Public private partnership in developing seaweed sector**Intervention Overview:**

- (1) Facilitate Public Private Partnership of PSPs (local financial institution, government, and off-takers) on developing seaweed sector in WP.
 - (2) Increase knowledge and skill capacity of government and financial institution on seaweed cultivation (GMP), post-harvest practices, demoplot establishment, and seed production.
 - (3) Facilitate financial institution, government, and off-takers on developing reciprocal collaboration with collectors and farmers.
 - (4) Disseminate GMP and post-harvest practices to farmers through collectors and by PSPs.
- Bank of Papua (financial institution)
 - The only bank in Indonesia that successfully serves credit to seaweed farmer
 - Has strong vision in developing economy of coastal people in Papua
 - Has good credibility from the people in Fakfak
 - Local Government of West Papua/ Papua (through BPM (Society Empowerment Body) and DKP (Maritime and Fishery Office)
 - Has feature program in seaweed sector
 - Actively provides supports (materials for cultivation) to farmers
 - Provide supports in seaweed cluster program and Rural Agriculture Self-supporting Program (PNPM Mandiri Pertanian Perdesaan)
 - PT Indonusa Alga Emas Prima (national buyer)
 - Large ATC and SRC factory in East Java
 - Input capacity 300 tons / month and keep expanding factory's capacity into 1,000 tons / month and quality
 - Currently has cooperation with farmers in Fakfak-West Papua and willing to join intervention

5.3. Sector Vision of Change Logic



BEING UPDATED

Annex 1. Intervention Logic Analysis Framework (ILAF)

(1) Problem/ Symptom	(2) Underlying cause	(3) (4) Services and Enabling Environment	(5) Service weaknesses/ underlying causes	(6) Intervention Areas	Service Provider/Partner	
Farmers' productivity is low	Lack of knowledge on seaweed farming practice (Good Management Practice / GMP)	Information and extension service	Limited access to information and knowledge on GMP	<p>Intervention Area 1: Strengthening technical capacity and collaborative networks among farmers and collectors for seaweed processing</p> <p>Intervention Area 2: Public private partnership in developing seaweed sector</p>	<p>Intervention Area 1:</p> <ul style="list-style-type: none"> • RKN (processing company) • Chip Sabu Raijua Factory (processing company) 	
	Unappropriate post-harvest practice		Processing company has lack of knowledge of GMP			<p>Intervention Area 2:</p> <ul style="list-style-type: none"> • Bank of Papua (financial institution)
	Quality seed is not available		Seed R&D			
	Lack of financial capacity to grow seaweed	Finance	Limited financial access to farmers		<ul style="list-style-type: none"> • Local Government of West Papua • PT Indonusa Alga Emas Prima (national buyer) 	
Low selling price of dried seaweed	Low quality of seaweed due to unappropriate post-harvest practice	Information and extension service	Limited access to information and knowledge on post-harvest practice			
	Limited feedback from buyers (collector and processing company) to farmers and un-coordinated relationship among them in supply chain.		Lack of capacities on developing well coordinated communication between farmer and buyers.			

BEING UPDATED