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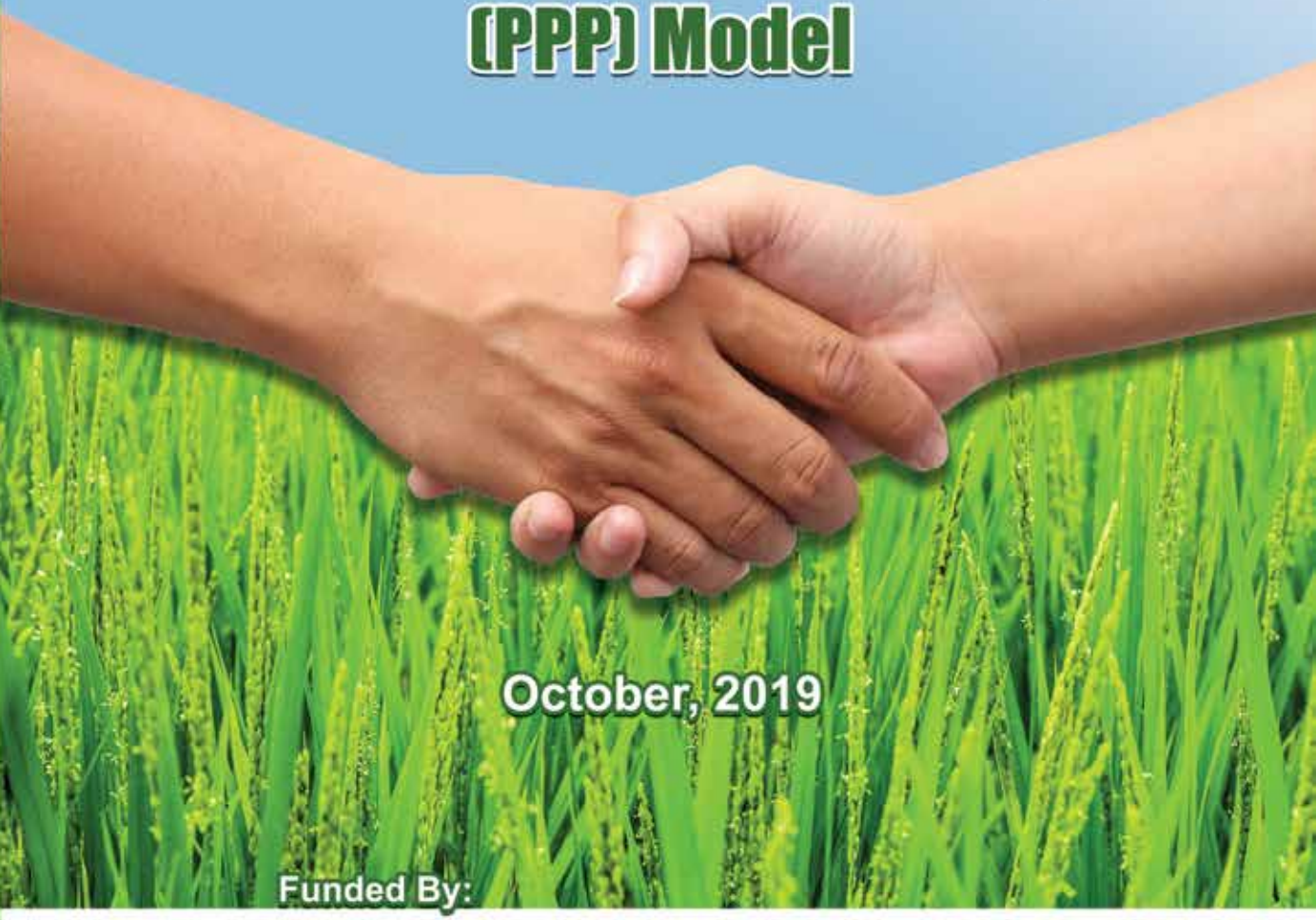
Rice SEED Sector Development

MOALI

MRF
Myanmar Rice Federation

Study Report

Developing Incentive Mechanisms/ Public Private Partnership (PPP) Model



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Analyzing current policy gaps and incentive mechanism in the Rice Seed Sector, particularly focusing in the Ayeyarwady Delta, Recommending and Developing Strategies for the necessary Incentive Mechanisms

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DISCLAIMER

This study is supported with financial assistance from Livelihoods and Food Security Fund (LIFT). The views expressed herein are not to be taken to reflect the official opinion of any of the LIFT donors

Table of Contents

President Message of MRF

With the support of **R**ice **S**eed **S**ector **D**evelopment (RSSD) Project, Myanmar Rice Federation **(MRF)** has prepared this publication on "Analyzing current policy gaps and incentive mechanism in the Rice Seed Sector, particularly focusing in the Ayeyarwady Delta, Recommending and Developing Strategies for the necessary Incentive Mechanisms. **MRF** aims to support and implement the sustainable development of Myanmar rice industry by optimizing the effective and efficient utilization of all the available resources in rice industry. MRF is responsible for ensuring the sustainable development of Myanmar rice sector, promoting and advocating the welfare of all the stakeholders and exercising better coordination, effective and efficient implementation of rice policies laid down by the government through the activities to ensure supply and price stability, to modernize and upgrade processing and storage facilities, to incentive producers and stakeholders, and most importantly, to ensure national food security

The adoption of a National Seed Policy (2016) gave Myanmar a great opportunity to strengthen the agriculture of the nation and reinforced its contribution to the national economy and food security." Furthermore, the Seed Sector Road Map addressed both public and the private sector, their interaction and collaboration and recommended various prioritized actions. Therefore, **MRF** firmly believes that the public private partnership arrangement is one of the solutions to develop rice seed sector in Myanmar. With this study, **MRF** aimed to analyse the current seed business environment, with a focus on the rice seed sector in the Delta Region. This included current policy incentives to the seed sector and government priorities, developing a strategy and recommended investment mechanisms for the rice seed sector, and sharing of study findings with key stakeholders, the Myanmar government and other development agencies.

To some significant extent, this publication undoubtedly fills the knowledge and understanding gaps of Myanmar rice sector, with special regard to existing and emerging PPP systems in Myanmar. **MRF** and her Executive Committee are very grateful to The Livelihoods and Food Security Fund (LIFT) donors of **RSSD Project**, the development partners, authors, co-authors and researchers who contributed a great deal for making this publication possible. This report surely lifts our level of understanding and enables both private and public stakeholders to have sustainable progress in the rice industry of Myanmar.

U Ye Min Aung
President
Myanmar Rice Federation

List of Abbreviation

ADS	Agricultural Development Strategy
BS	Breeder Seed
CS	Certified Seed
DAR	Department of Agricultural Research
DoA	Department of Agriculture
EGS	Early Generation Seeds
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
FS	Foundation Seed
FSWG	Food Security Working Group
IFC	International Finance Cooperation
IPR	Intellectual Property Rights
IRRI	International Rice Research Institute
ISF	International Seed Foundation
ISSD	International Seed Sector Development
ISTA	International Seed Testing Association
JICA	Japanese International Cooperation Agency
JV	Joint Venture
KII	Key Informant Interview
LIFT	Livelihood and Food Security Trust Fund
MADB	Myanmar Agriculture Development Bank
MAPCO	Myanmar Agribusiness Public Cooperation
MFA	Myanmar Farmers Association
MFSPEA	Myanmar Fertilizer, Seed and Pesticide Entrepreneurs Association
MIC	Myanmar Investment Committee
MPPA	Myanmar Paddy Producers Association
MRF	Myanmar Rice Fredration
MRIA	Myanmar Rice Industry Association
MRMA	Myanmar Rice Millers Association
MRPTA	Myanmar Rice & Paddy Traders Association
MRSDS	Myanmar Rice Sector Development Strategy
NAG	Network Activity Group
NGO	Non Profit Organizations
NSC	National Seed Committee
PPP	Public Private Partnership
PVP	Plant Variety Protection
RS	Registered Seed
RSSD	Rice Seed Sector Development
TSC	Technical Seed Committee
USDA	United States Department of Agriculture
WHH	Welthungerhilfe
WUR	Wageningen University & Research

Executive Summary

The assignment on the developing "Incentive Mechanisms/Public Private Partnership (PPP) Model in Seed Business in Delta Area" was a part of the Rice Seed Sector Development (RSSD) project and Myanmar Rice Federation's strategic action plan.

Three main objectives of the study were 1) to analyse the current seed business environment, with a focus on the rice seed sector in the Delta Region. This included current policy incentives to the seed sector and government priorities, 2) to develop a strategy and recommended investment mechanisms for the rice seed sector, and 3) for sharing of study findings with key stakeholders, the Myanmar government and other development agencies

To fulfil the purpose of the research, a qualitative method was chosen. The research methodology included a **desktop review, Key Informant Interviews (KIIs)**/ Stakeholders Consultation meetings and **Focus Group Discussions**. The study was carried out in Yangon, Nay Pyi Taw, Pathein, Kyaung Gone, Kyeiklatt, Labutta, Bogale and Mawlamyinwgyun.

"The adoption of a National Seed Policy (2016) gave Myanmar a great opportunity to strengthen the agriculture of the nation and reinforced its contribution to the national economy and food security." Furthermore, the Seed Sector Road Map addressed both public and the private sectors, their interaction and collaboration and recommended various prioritized actions.

Significant changes have been taking place in rice sector in Myanmar in recent years by the motivation of private sector. Myanmar was the world's sixth-largest rice producing country, producing over 23 million MT in 2017-18 from the total cultivated areas of 6.17 million hectare (DOA, 2019). According to the Department of Agriculture (DOA) statistics 2019, the Ayeyarwady region covers about 28 percent of total paddy (rice) production and over 2 million baskets of paddy seeds are needed for the total area of acres in delta areas.

Conventionally, farmers used their own seeds and supply seeds from the informal sources when they needed the seed. Nonetheless, the demand for quality seeds and certified seeds has been increasing year by year. The most important key actors were DAR and DOA (Seed Farms, Extension) from the public sector, and Seed Growers, Private Seed Companies, Contact farmers and Farmers from the private sector.

The Role of MRF, representing most of the key actors was crucial by bridging and supporting private and public sectors. With 90 baskets per acre yield and the price at 12,000 MMK /basket, total revenue of 1 acre of seed production was over

1 million MMK. At a result, the gross profit was 481,800 MMK /ac and benefit cost ratio was **+0.81**.

As for PPP, there were a wide range of definitions for PPP, reflecting the mean of partnerships arrangements and objectives of multistakeholders for a common interest according to the literature. In Myanmar, there were 11 active PPP projects and the total investment in active PPP was US$ M 3,707 in Myanmar. The sectors, which involved in the active PPP were ITC, electricity, natural gas and port project. As for agriculture sector, although the government encouraged to the private sector, the practically developed model and implementation of PPP project has not been yet gearing up nationally. The reasons of adopting PPP were basically to 1) reduce public capital investment, 2) improve efficiency due to strong profit incentive, 3) take private sector the accountability, 4) specialize in expertise, 5) share risk/responsibility and 6) clear mandate and focus by each sector.

Multi-stakeholder partnership was the best model of PPP for seed business at current situation in Myanmar. Formal contractual arrangements as contract farming and joint venturing would be recommended for rice seed business.

Incentives for different sectors, extension and technical assistances needed and the perspectives of Financial Institutions were also clearly mentioned in the study. As a lesson learnt, the experience of Srijana tomato hybrid seed production in Nepal has been reviewed.

In the last chapter, several constraints at each level of the key actors and seed business environment were identified. The main bottleneck of various constraints and challenges in developing PPP and incentive mechanism was ***"Insufficient supply of early generation seeds (EGS)"***. If the bottleneck has been solved, the whole seed sector would be well functioning and most of general challenges could be overcome. Based on the findings, the following recommendations were provided;

1. Enforcing appropriate quality certification and product safety standards, and encouraging the participation of domestic and foreign private-sector firms.

2. Providing seed policy reform for letting private sector involvement in the certification system and quality assurance by the private sector. Government's incentives on subsidy for producing Breeder Seeds from the revenue of the rice export.

3. The policy documents needed to be improved for a good system of quality control for more competitiveness of the Myanmar seed sector within the wider ASEAN and global level

4. to determine clearer mandates between public & private. Roles and responsibilities, risks and rights should be cleared.

5. Conducting Capacity Building programs for the stakeholder's potential involved on the PPP investment model

6. To organize policy platform for the public- private dialogue in the rice seed business

7. To arrange National Seed Reserve by MoALI or CSR Program of MAPCO/ MRF

8. To facilitate to private sector for the use of public facilities to expand the production of good quality EGS (JV/ Concession)

9. To take in place climate adaptive solutions in PPP for seed business

10. To develop public Insurance system

11. To subsidize for the infant stage of the companies by the government such as special loans by MADB or tax exemption

I. Introduction

1.1 Background Information

This "Study on Incentive Mechanisms/Public Private Partnership (PPP) Model in Seed Business in Delta Area" is a part of the Rice Seed Sector Development (RSSD) project, which has been implemented by the consortium of Welthungerhilfe (WHH) and Wageningen University & Research (WUR), with support from associate technical partners, Myanmar Rice Federation (MRF), Resilience B.V. and Mukushi Seeds. The project is operating from a WHH office in Pathein. The project is funded by the Livelihood and Food Security Trust Fund (LIFT) in Myanmar. The goal of RSSD project in the Ayeyarwady Delta is to contribute to increase sustainable agricultural production by improving female and male farmers' access to and uptake of quality improved seed and well adapted varieties.

The project aims to strengthen the rice seed value chain, to improve the performance of different operators and service providers, to increase demand orientation, and to improve coordination among seed value chain actors. The project has four components:

1. Supporting Government seed farms on early generation seed (EGS) production
2. Supporting seed business development
3. Strengthening seed quality assurance
4. Strengthening seed sector coordination

RSSD was designed from the outset to be led by 'economic drivers' that would facilitate uptake, impact and sustainability of possible social sector interventions later on. Rice seed production was identified as the one of the agriculture-based sub-sectors of most potential to be the 'economic driver' in the Ayeyarwady Delta region. RSSD works extensively with over 50 seed producers, 5 seed farms and 5 seed companies, DOA, and DAR, both at national and regional level, and aims to contribute improved quality seed production and uptake, to produce significantly higher yields, to improve access to markets and to raise income for farmers and, subsequently, strengthen their overall resilience.

"The adoption of a National Seed Policy (2016) gives Myanmar a great opportunity to strengthen the agriculture of the nation and reinforce its contribution to the national economy and food security." Furthermore, the Seed Sector Road Map document (2017-2020) highlights the challenges encountered by Myanmar's seed sector stakeholders. The Road Map addresses both the public and the private sectors, their interaction and collaboration, and recommends various prioritized actions.

The Seed sector policy document, among various long-term strategies , also highlighted the key strategies on the incentive mechanisms as follows:

- Encourage the private sector, through various incentive schemes, to progressively expand certified seed production and marketing of the major crops, especially rice
- Support and sponsor public sector activities related to seed research, foundation seed production, seed quality assurance and seed uptake.
- Support private sector capacity expansion in both research and foundation seed production to an acceptable level by making the foundation materials generated by DAR and DOA available to the private sector.
- Assist the private sector to progressively develop internal seed quality assurance procedures that will aid seed companies to license quality seed in due course.

In Myanmar, under the umbrella of MRF, many innovative business models evolved like Myanmar Agribusiness Public Cooperation (MAPCO) and Gold Delta, which work closely with farmers who are the primary producers of Paddy rice and Rice seed.
Myanmar Rice Federation (MRF) was formally formed in 2012 as a national level Federation, by restructuring and upgrading Myanmar Rice Industry Association (MRIA). MRF represented the private sector of Myanmar Rice Millers Association (MRMA), Myanmar Rice & Paddy Traders Association (MRPTA), Myanmar Paddy Producers Association (MPPA), Myanmar Farmers Association (MFA), Myanmar Fertilizer, Seed and Pesticide Entrepreneurs Association (MFSPEA) and Rice Specialization Companies (RSC).

MRF aims to support and implement the sustainable development of Myanmar rice industry by optimizing the effective and efficient utilization of all the available resources in rice industry. MRF is responsible for ensuring the sustainable development of Myanmar rice sector, promoting and advocating the welfare of all the stakeholders and exercising better coordination, effective and efficient implementation of rice policies laid down by the government through the activities to ensure supply and price stability, to modernize and upgrade processing and storage facilities, to incentive producers and stakeholders, and most importantly, to ensure national food security.
Similarly to MAPCO and Gold Delta Companies, many other rice specialized private seed companies are interested to develop and expand their seed business in the Ayeyarwady Delta region. In recent years, numerous emerging seed companies - including RSSD (supported seed companies) - are expanding their seed production and distribution systems. Similarly, many more small seed growers are gradually scaling up their seed business at commercial scale, therefore there is a huge need of connecting small seed growers with the seed companies in the region. Therefore, the regional rice seed sector platform recommended to commission the present study.

1.2 Objectives of the Study

The major purpose of the study was to analyse the ***current seed business environment, with a focus on the rice seed sector in the Delta Region***.

The study had three key objectives:

- To analyse the current seed business environment, with a focus on the rice seed sector in the Delta Region. This included current policy incentives to the seed sector, and government priorities,
- To develop a strategy and recommend investment mechanisms for the rice seed sector,
- By sharing of study findings with key stakeholders, the Myanmar government and other development agencies which will be able to further develop and fine tune policy recommendation.

1.3 Methodology and Scope of Work

To fulfil the purpose of the research, a qualitative method was chosen. Wigren, 2007 defines qualitative study as a study that focuses on understanding the naturalistic setting, or everyday life, of a certain phenomenon or person that includes the context, not a uniform perspective. Qualitative study means coming close to the site and learning from it. Scope of Incentive Mechanism / Public Private Partnership (PPP) Model Study in the Ayeyarwady Delta included the following methodology:

A desktop review: overall rice industry in Myanmar, existing information on contract farming systems and best examples of PPP models, policy review especially on the rice seed sector in the delta region and RSSD's proposal, reports and the secondary data.

Key Informant Interviews: Key Informant Interviews (KIIs) or Stakeholders Consultation meetings were conducted with the key

stakeholders of rice seed value chain such as Director General/ Deputy Director General of DAR and DoA, representatives of MRF and MAPCO, Heads of seed farm in Pathein and other relevant key stakeholders.

Focus Group Discussions: A number of FGD were conducted with seed growers associations and a number of farmers groups in Pathein, Kyaung Gone, Kyeiklatt, Labutta, Bogale and Mawlamyinwgyun during the field study.

The collected data were formulated as a comprehensive report through 1) early writing of Theory of PPP and incentives mechanisms, industry and, reviewing 2) disconfirmation of a governance focus study within this context and verifications through the consultation with key stakeholders, 3) elaborate themes and questions and 4) developing the report.

List of people/ groups interviewed and sets of questionnaires were presented in the Annex 1 & 2. The main criterion for selecting respondents for this study was the person initially revolved around the three key stakeholder categories linked to the rice and paddy seed business or rice value chain. Those stakeholders belonged to both, private and public sectors.

II. Literature Review

2.1 Overview Rice Sector in Myanmar

Significant changes have been taking place in rice sector in Myanmar in recent years by the motivation of private sectors. Myanmar is the world's sixth-largest rice producing country. The country's rice production was over 23 million T in 2017-18 from the total cultivated area of 6.17 million hectare. According to the statistics of Department of Agriculture (DOA), the Ayeyarwady region covers about 28 percent of total paddy (rice) production, followed by the Bago region at about 17 percent and the Sagaing region at 12 percent.

According to the Department of Agriculture, national average yields for monsoon paddy (rice) and for summer paddy were about 3.8 MT/Ha and 4.6 MT/Ha in 2016/17. The national average rice yield of 3.8 MT/Ha is still low considering the potential yield that can be achieved when farmers would plant good-quality seeds of high-yielding varieties and apply improved crop management practices. Production trend of monsoon and summer paddy is illustrated in the Figure 1.

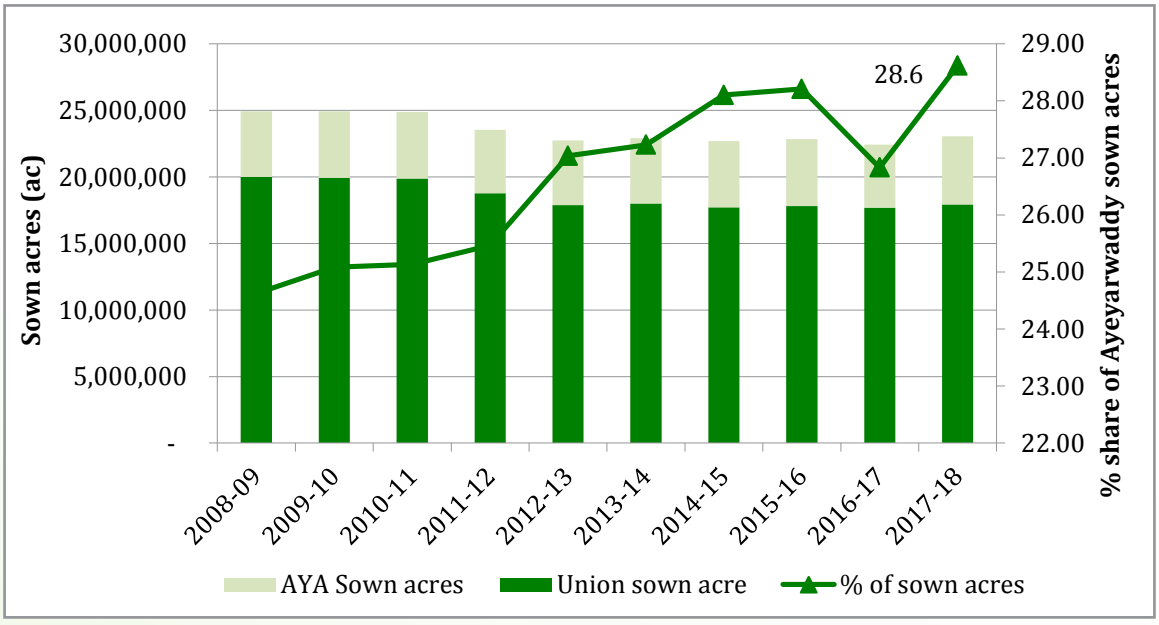

Figure (1) Trend of Paddy Cultivation in Ayeyarwaddy and the Whole Union

As for consumption, rice is the staple food in Myanmar, rice contributes about 66% of the population's daily calorie intake. Total union rice consumption is about 8 million ton per year while urban consumption is about 2 million ton per year and rural consumption is about 6 million per year.

Approximately 10% of total production volume flows to export amount. Therefore, large amounts of rice volume are consumed in domestic markets in Myanmar. Rice

is the major export crop in Myanmar. Myanmar was recorded as the world's largest exporter in 1930 and its annual exports of milled rice were about 3 million tons. Due to decreasing of sown acres, Myanmar's rice exports dropped from about 0.4 million ton in 1995 to 0.12 million ton in 2010. According to the USDA data, Myanmar rice exports were increased up 1.8 million ton in 2015/16. But in 2016/17, the amount was decreased to 1.6 million ton. Myanmar exported 2.8 MT of rice in 2016/17 due to larger demand from EU and African countries. In 2017/18, Myanmar exported 3.35 MT of rice to 60 countries and extended markets to 22 new countries. Myanmar exported to China, Bangladesh, India, Middle East, Africa and EU. China is a large importer of Myanmar rice through border trade. As of 2017/18, the export volume of rice in Myanmar was 3.35 MT.

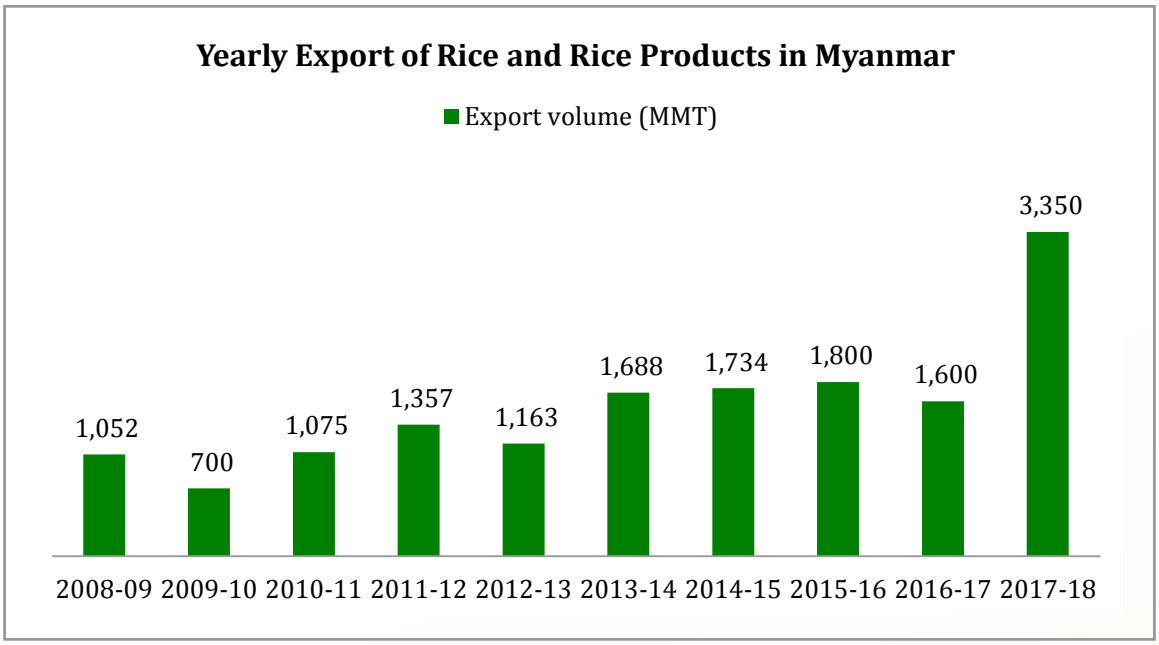

Figure 2: Export Trend of Myanmar rice and rice products

The Myanmar Rice Sector Development Strategy (MRSDS 2014). highlighted the priority investment areas of government to improve the structural weaknesses along the rice value chain. The MRSDS also guides the government in reviewing and revising current policies that stifle the sector and formulate new ones to stimulate investments from the private sector and foreign investors.

2.2 Rice Seed Supply in Myanmar

It is controversial that it is challenge or opportunity by having a large range of varieties of paddy in the country. Having many different varieties of rice, it is difficult to get the purity and uniformity of the variety along the rice value chain by involving multi-actors of paddy trade, milling and trading. On the other hand, it is an advantage of having a wide range of varieties of rice so that Myanmar can sell the specific variety of

rice directly to the different end buyers according to their preferences. For example, even for Emehta rice group, Zeeyar can be sold to the middle East countries and IR747 can be sold to the Philippine as the preference of the buyers.

In Myanmar, there are more than 147 varieties of rice widely grown throughout the country under different local names. In order to improve the milling quality and outturn, as well as for breeding, and multiplication purposes, Myanmar traditional varieties were classified into five major groups based on the length and breadth of the grain, namely, Emehta, Letywezin, Ngasein, Medon, and Byat in 1927, by Mr. R. A. Beale. He had standardized the local rice varieties in order to facilitate external and internal trade. These classified groups are:

Table (1) Beale Classification System of Myanmar paddy and rice

Type	Group	Varieties	Length of paddy (mm)	Length and Breadth ratio	Description
A	Emahta	Ayeyarmin, Hmawbi2, Kyaw ZeYa, ShweWar Htun, Sinthwe Latt, Sin A Kari 3, Thee Dat Yin	> 9.41	> 3.30	Long, slender grain; kernel translucent
B	Letywezin	Manwthukha, Shwebo Manaw	8.4 to 9.8	2.8 to 3.3	Slender grain; kernel translucent
C	Ngasein	Ngasein, Kamar Kyi, Shwe Ta Sote	7.75 to 9.0	2.4 to 2.8	Short, medium grain; kernel usually trans-lucent, with abdominal white
D	Meedon	Paw San Hmwe, Paw San Yin, Shwebo Paw San	7.35 to 8.6	2.0 to 2.4	Short, roundish, bold grain; kernel opaque and chalky
E	Byat	Lin Pan Chaw	> 9.00	2.25to 3.0	Large, broad grain; kernel opaque and chalky

Until around 1960s, Myanmar farmers cultivated only local varieties. Starting from 1962-63, indigenous paddy varieties were selected and multiplied at seed farms and

distributed seeds to farmers through state extension agents (over 1 million metric ton of certified Seed was distributed in 1962-63). Rice production had been developed through Whole Township Paddy Production Program launched in 1977-78 in selected townships of Ayeyarwaddy, Bago, Yangon, Mandalay and Sagaing Regions, covering 2.5 million ha of paddy. Summer paddy program was launched in1992-1993 with the introduction of high yielding variety (HYV) paddy seeds, which were multiplied in state seed farms and distributed to farmers. Hybrid seed was introduced in Myanmar under rice-oriented crop production policy around 2000s.

Ten most common paddy varieties and their cultivated areas of monsoon paddy and summer paddy in 2017-18 are listed in the Table (2) and (3). In the rainy season, the most common varieties were Manawthukha, Sinthukha, Ayeyarmin, Meedone, Shwewahhtun, Sinakayi, Hnankar, Ngasein, Pawsanyin and Pawsan varieties. Most of Emehta varieties were mostly grown in summer season.

Table (2) 10 most common paddy varieties sown in Monsoon Season in Myanmar

Sr.	Variety	Sown area (mil ha)	Sr.	Variety	Sown area (mil ha)
1.	Manawthukha	0.90	6.	Sinakayi	0.25
2.	Sinthukha	0.74	7.	Hnankar	0.24
3.	Ayarmin	0.41	8.	Ngasein	0.23
4.	Meedone	0.28	9.	Pawsanyin	0.22
5.	Shwewahhtun	0.27	10.	Pawsanmhwe	0.18

(Source: Myanmar Agriculture Sector in Brief 2018)

Table (3) 10 most common paddy varieties sown in Summer Season in Myanmar

Sr.	Variety	Sown area (mil ha)	Sr.	Variety	Sown area (mil ha)
1.	Theehtutyin	0.38	6.	90 days	0.12
2.	Shwethweyin	0.13	7.	Palethwe	0.02
3.	Sinthukha	0.13	8.	IR- 747	0.03
4.	Manawthukha	0.10	9.	Pakhanshwewar	0.02
5.	Yadanartoe	0.07	10.	Hmawbi-3	0.01

(Source: Myanmar Agriculture Sector in Brief 2018)

The Ayeyarwaddy region is called “Granary of Myanmar” and paddy is the principal crop of Ayeyarwaddy. Rice is the major crop of the region but addition to rice, other crops such as maize, groundnut, beans and pulses, sunflower and jute are growing as well. According to the results of production areas in 2017/18, the Ayeyarwady

region covered about 28 percent of total paddy (rice) production, followed by the Bago region at about 17 percent and the Sagaing region at 12 percent.

In Ayeyarwaddy region, there are total 6 districts and sown areas of respective districts for monsoon season and summer season are presented in Table 4. In table, average and total yields of respective districts are also described.

Table (4): Sown Acres and Yields of respective districts in Ayeyarwaddy Region

Districts Ayeyarwaddy	in Monsoon Rice			Summer Rice		
	Sown Acres (ac)	Average Yield (baskets)	Total Production (baskets)	Sown Acres (ac)	Average Yield (baskets)	Total Production (baskets)
Pyapon	877,505	58.56	50,564,630	389,713	99.24	3,867,214
Pathein	843,103	72.63	60,612,081	276,047	90.66	25,027,211
Hinthada	532,873	75.48	36,967,533	36,189	91.94	3,327,262
Labutta	585,214	63.49	37,156,774	162,715	97.11	15,801,926
Myaungmya	521,960	79.02	41,245,840	304,535	98.08	29,868,088
Maubin	392,615	73.31	28,649,566	216,271	95.91	19,783,337

(Source: DoA, Pathein in 2019)

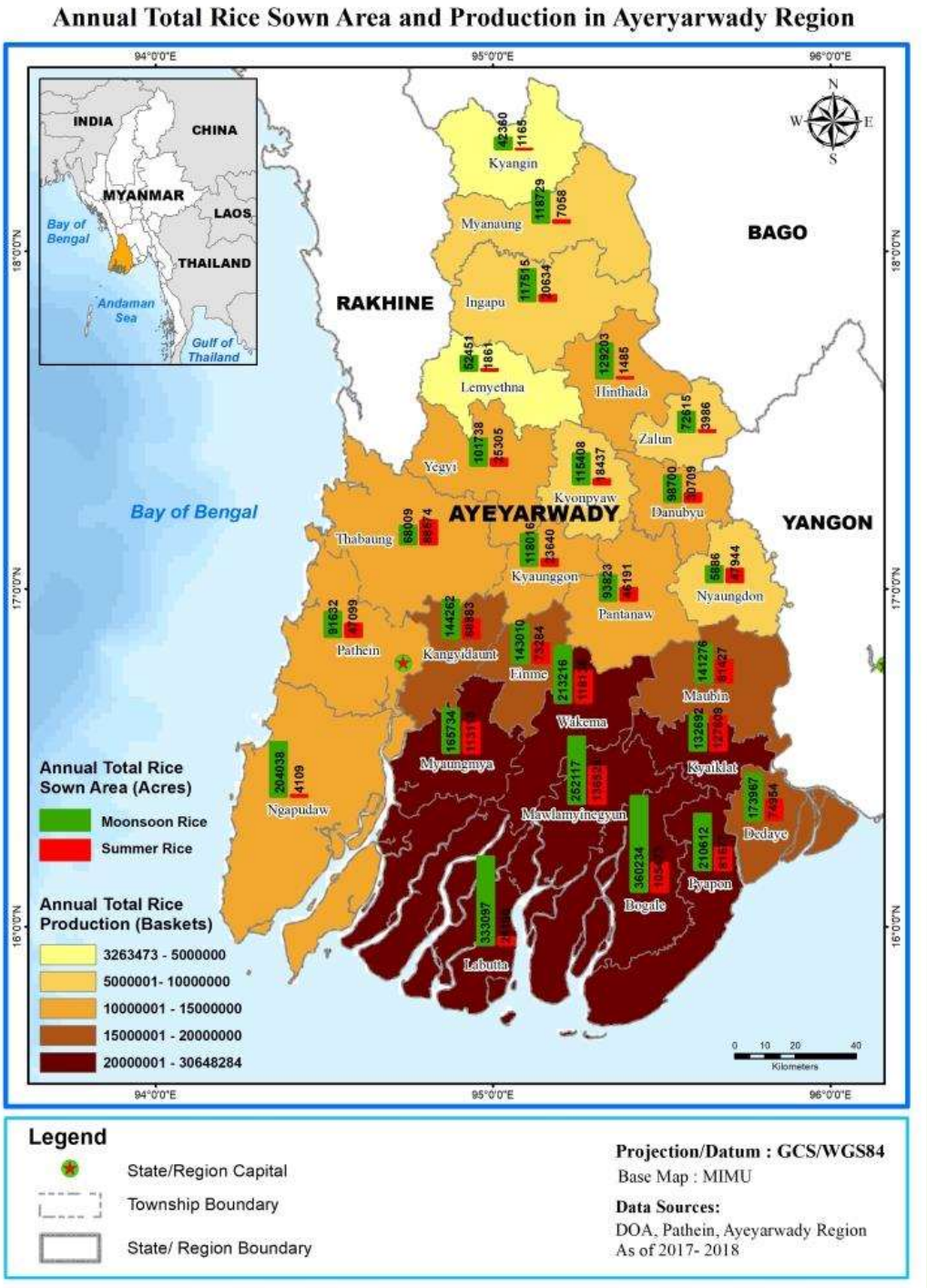

Figure (3): Sown areas of rice in Ayeyarwaddy region

Myaungmya district occupied the largest sown areas of paddy in Ayeyarwaddy region, and it was amounted about 29,868,088 acres. The second largest sown areas was in Pathein District. Labutta District occupied the third largest sown areas for both of monsoon rice and summer rice productions. Figure (3) presents about sown acres and yields of the respective districts in Ayeyarwaddy region.

2.3 Paddy Seed Demand of Delta Areas in Myanmar

According to the information from KII, over 2 million baskets of paddy seeds are annually needed for the total area of rice in delta areas. Conventionally, farmers use their own seeds and supply seed from the informal sources when they need the seed. Nonetheless, the demand for quality seed and certified seeds has been increasing year by year. The demand driving factors for quality seeds and certified seeds are that 1) quality and improved seeds of paddy assure high yield and better quality of the crop harvest, 2) Increased awareness and knowledge of using good seeds, 3) clear benefits of using good seeds, and 4) market driven for quality rice locally and internationally.

2.4 Paddy breeding and seed system in Myanmar

As for paddy breeding and seed systems in Myanmar, breeding, research and seed production are mainly taken the responsibilities by the Government. There are about 68 research and seed farms throughout the country in Myanmar. DAR in Yezin produces Breeder Seed (BS) and maintains the nucleus seed and breeder seed of rice varieties. DAR research farms and DoA seed farms in delta receive the breeder seed from DAR, Yezin to produce Foundation Seed (FS). Both of DAR research farms and DoA seed farms involved in the production of FS and RS.

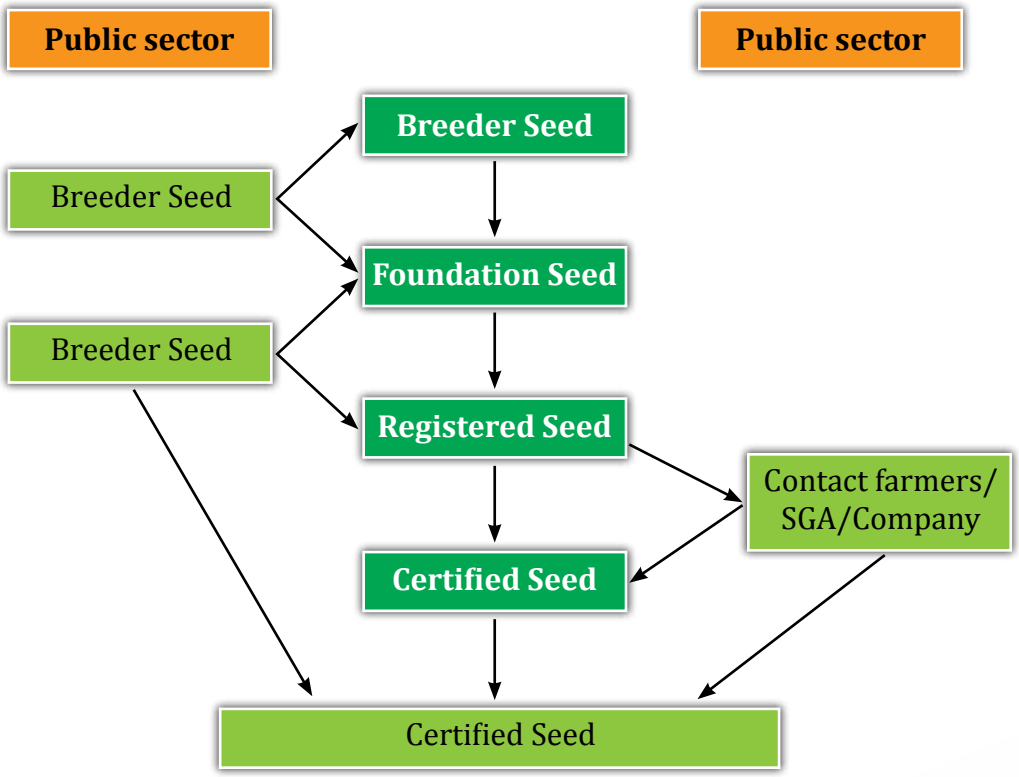

Figure (4) Seed System and Flow of Paddy Seed in Myanmar

Moreover, NGOs and Seed Growers also demand for FS to produce RS which are supplied from the research farms and DoA seed farms. There is insufficient supply of FS and Seed Growers need to order 1 year ahead to get FS.

DoA works with contact farmers or key farmers to multiply FS into CS. Registered seed is produced from foundation seed. CS is commercially distributed among the farmers directly from DoA or through the contact farmers. Seed Growers or Seed Company have to buy RS from DoA.

As for newly introduced seed/ varieties, a number of procedures are to be followed.

These steps are illustrated in the Figure 5.

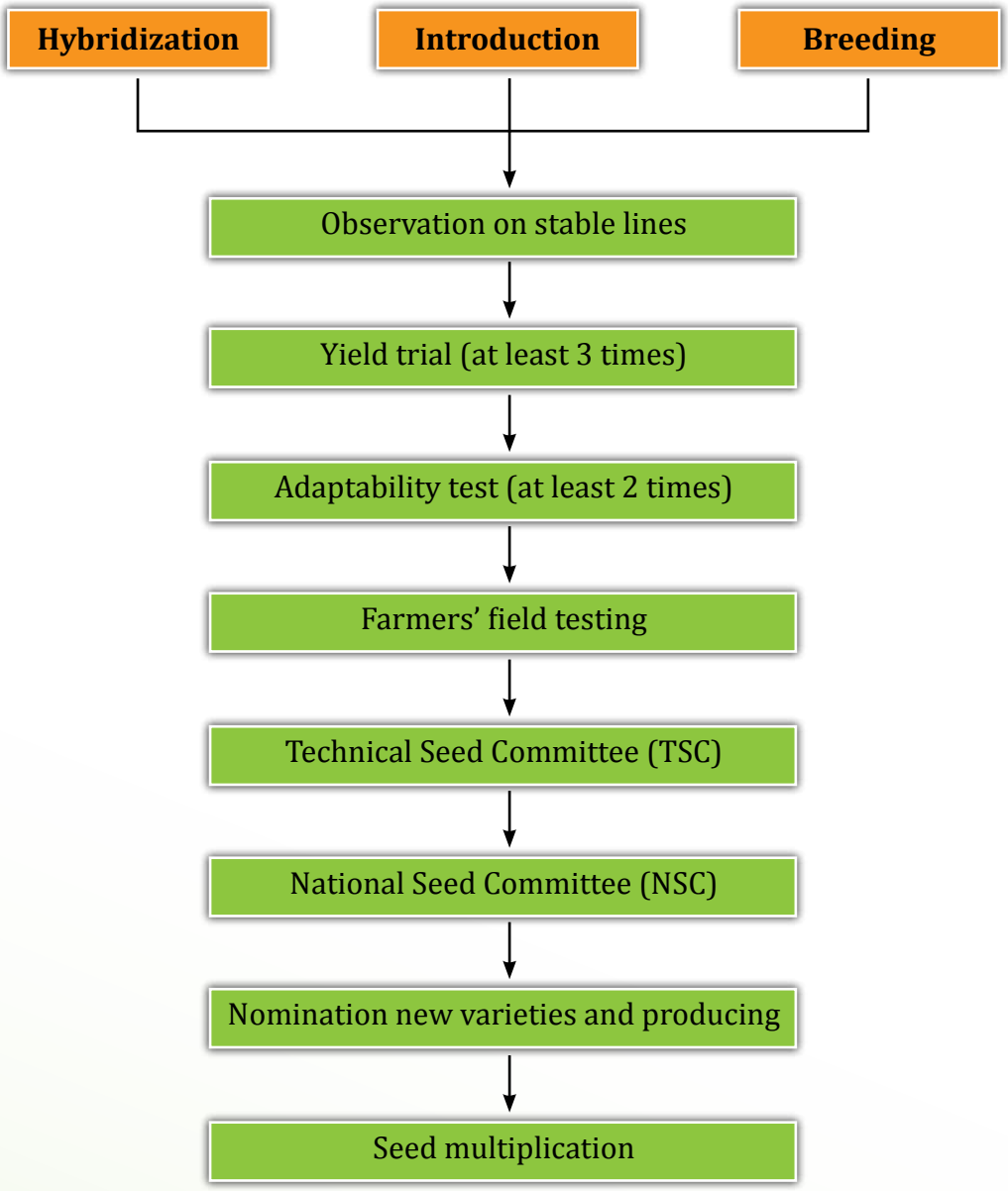

Figure (5) Procedure of Introducing new varieties of seed in Myanmar

Myanmar's hybrid rice research was started in 1991. In 1997, research on hybrid rice and released on its hybrid seeds were done under FAO project. (FAO, Global hybrid rice: progress, issues and challenges by D.V. Tran and V.N. Nguyen 1998) Hybrid rice activities in Myanmar are being pursued by both the public and private sector which is primarily dominated by Chinese seed companies. Yield advantage of hybrid was shown to be about 12% - 48% over inbred varieties through experimental trials done by IRRI and the Mandalay Division in 2003. (David J. Spielman 2012, the Economics of Hybrid Rice in South Asia,).

In 2011, the Government tried to increase the rice production with the increase in sown area expansion and increase in rice yield per acre by forcing hybrid rice production. Hybrid rice (Palethwe) seed production has been carried out starting from 2011-12 monsoon season especially in Shwe Taung Farm, Yezin Agricultural University, Yangon Region (by various Companies), Mudon and Thathone seed farms in Mon State and other states and regions. F1 Hybrid rice cultivation was summarized in Table 5.

Table 5 F1 Hybrid Rice Cultivation in Myanmar

Year	Sown Area (ha)	Yield (MT/ha)	Production (MT)
2011-12 (Summer)	3046	6.13	23061
2012-13 (Rainy)	12618	5.16	78314
2012-13 (Summer)	11925	7.31	87124
2013-14 (Rainy)	17110	6.18	23.14
2013-14 (Summer)	17805	-	-

(Source: MOAI 2014)

However, hybrid rice production and domestic and international markets for hybrid rice were not much.

Yearly supply of paddy seeds by DoA and DAR under MOALI are described in the Table 6.

Table 6 Yearly supply volume of Paddy Seed by MOALI and private sector

	Supply volume by (DoA/DAR) baskets	Producing area (ac)	
		Farmers	Private
2011-12	3,505		
2012-13	2,136		
2013-14	2,170		
2014-15	19,926	28	690
2015-16	18,987	460	16
2016-17	21,731	8	888
2017-18	25,080	-	541

(Source: Myanmar Agriculture at a Glance 2018)

III. Paddy Seed Value Chain in Myanmar

There were two obvious seed supply systems in Myanmar; formal and informal systems. Informal seed supply was supplying their own seeds that has been kept in, previous season or buying normal grains from rice millers and traders for the seed, and getting from the other farmers and their relatives. Still most of the farmers, more than 80%, (LIFT, 2016) kept their own seeds and used in the next year. When they wanted to change the variety or regenerate the seed, they sold up all the paddy and buying the seed from the other farmers who kept good quality appearances such as less off type, less percentage of unfilled grains, uniform seed size and color, etc. Supply of paddy seed was mainly dominant by the informal supply chain.

Formal seed chain is visualized in the value chain map (Figure 6). Formal seed supply chain included public- private relationships in terms of seed production, distribution and marketing.

3.1 Mapping Paddy Seed Value Chain

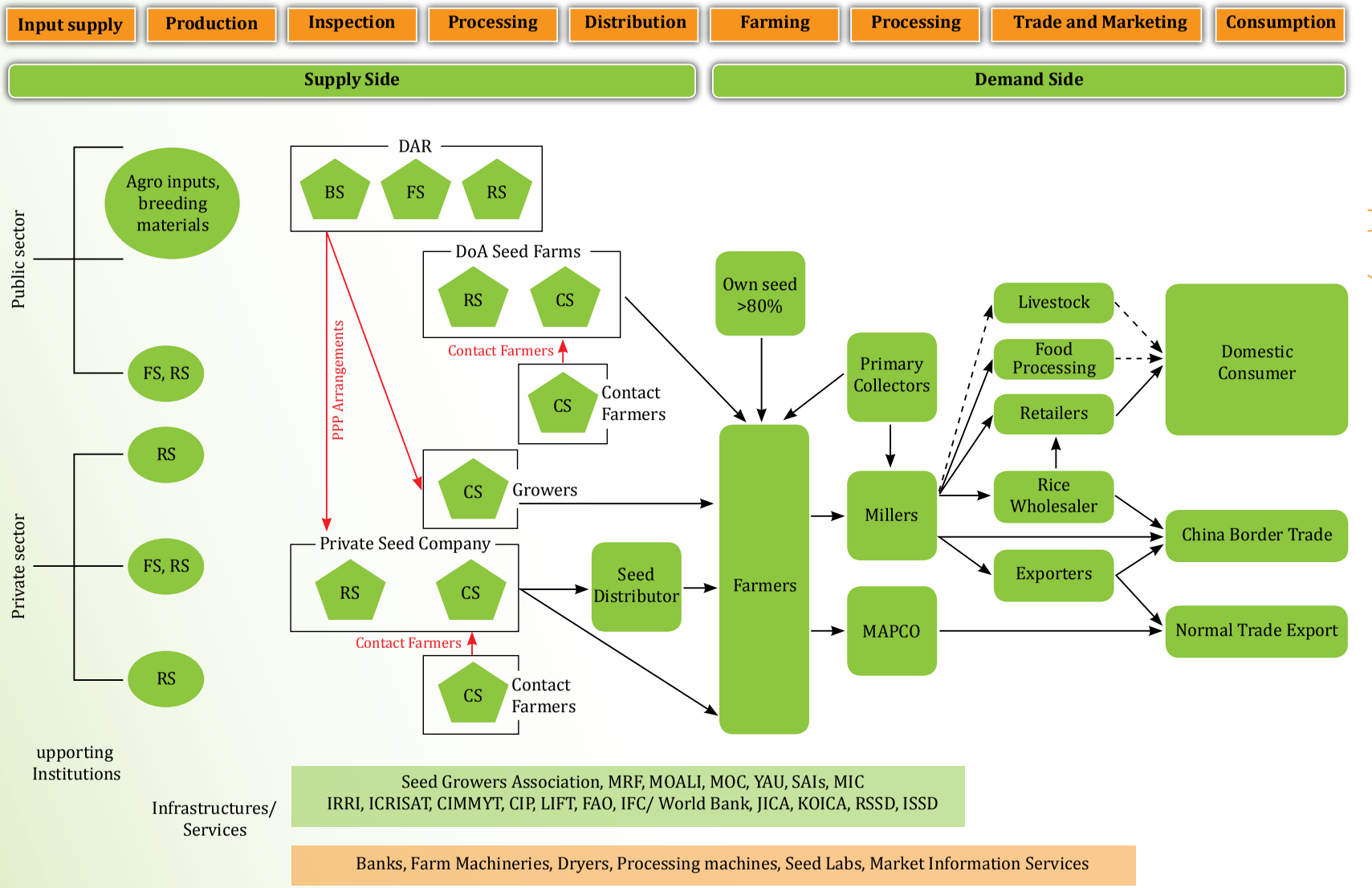

Figure 6: Value Chain Map of Paddy Seed on Supply and Demand Sides

3.2 Key Actors of Paddy Seed Value Chain

According to the map, paddy Seed Value Chain included the following actors in general.

- **Public Sector:** DAR, DoA (Seed Farms, Extension), MIC, MOC, YAU
- **Private Sector:** MAPCO, MRF, Millers, Seed Growers Associations, Private seed producers and the farmers
- **International Organizations:** IRRI, ICRISAT, CIMMYT, CIP, LIFT, FAO, IFC/ World Bank, JICA, KOICA, EU, ISF and WHH- RSSD/ISSD, etc.

Amongst, the most important key actors were: DAR and DoA (Seed Farms, Extension) from the public sector and Seed Growers, Private Seed Companies, Contact farmers and Farmers from the private sector.

The Role of MRF, representing most of the key actors was crucial by bridging and supporting private and public sector.

3.2.1 Public Sector

Value Chain map of paddy seed illustrated the linkages and inter-linkages of the various actors involved in the rice seed value chain on the demand and supply sides from public and private sectors.

Department of Agricultural Research (DAR): DAR was the most relevant institute that produces and supplies quality rice seed throughout the country. DAR had its own lands and seed processing facilities to produce early generation seeds (EGS) including Breeder Seed, Foundation Seed and Registered Seeds for its next cycle of seed production and sold to farmers through DoA seed farms and dealers. DAR produced BF and guaranteed for purity and quality seed characteristics. Every year, DAR produced 17 to 25 varieties of BS. However, after RS, DAR could not produce and multiply into CS Since DAR has handed over these processes to DOA. As a result, DAR does not know the exact demand condition for seed by the private sector.

MOALI encouraged PPP in seed production but not yet clear guidelines and implementation were given.

But for pulses industry, DAR started implementing with Tropical Bio-tech company. Funding system, benefit share, rules and regulations were important to be mentioned

clearly. Moreover, DAR already signed MoU with Golden Sun Land, private company for rice research and seed production.

There was no seed certification system for early classes of seeds and it was necessary to establish Seed certification system by the third party. For example, ISTER could help in establishing seed certification association and certification system to certify the seeds. Seed certifying Agency could be also acted by private sector. Government in Myanmar needed commercialized seed system with full of capacity.

Moreover, DAR could provide FS to the private sector to produce RS. However, there was a need of the mechanism in order to control private sector not to sell at very high prices. DAR was preparing to make a protocol for seed producing process. ISTA- could also be working with the private companies.

Department of Agriculture (DoA) Seed Farms: were responsible to multiply into Certified Seed 1 and 2 through key farmers then distributed to the farmers. DoA was again a major player of paddy seed value chain. It had a mandate to supply quality seed to rice growers throughout the country. It acted as the dealers across the country, selling both certified and truthfully labeled seed to farmers according to their demands.

Department of Agriculture also had a paramount role in diffusing knowledge of HYVs, seed production techniques and farming practices among farmers, and providing them with technical support.

The seed wing of the public sector influenced on all the actors in the value chain (on both the supply and demand sides); its resources as well as policy regulations could significantly affect the functioning of each actor. In this regards, roles and responsibilities were needed to be made between the DAR focusing on varietal development, on farm research and releasing EGS to the DoA seed farms, and DOA which was working on multiplying the varieties into sufficient quantities of registered seed.

The National Seed Committee played an important role in drafting policy that affected both the public and private sector engaged in the rice seed business.

***Box**-RSSD supported 4 DoA Seed farms out of 6 so that the Seed Farms could produce EGS. Four seed farms were Tha Yong Chaung, Myaung Mya, Shwe Laung and Auk Kwing Gyi seed farms. The information system of supply and demand forecasting for EGS application was established under the project so that the farmers and SGs knew the information of where to buy seeds, how much the price was, etc. Data sourcing and updating were to be done by DoA in 26 townships of Ayeyarwaddy delta areas.*

According to the discussion with the official of regional DoA, DoA was mainly involved in seed multiplication and distribution and the private sector as well. In these regards, it was necessary to clarify who will do what and clear role in PPP. Department of Cooperatives also had planned to produce CS from RS. Actually, Department of Co-operatives could provide financing seed growers associations or contracted seed growers instead of producing seeds. Instead of doing by their own ways, it was necessary to collaborate each other.

DoA Seed farms has been upgrading in terms of processing and packaging, facilities Quality Checking and sensitization were needed to make sure the quality of seeds produced by the private sector.

Ministry of Commerce (MoC): MoC was preparing the Investment manual. From the point of trade promotion department of MoC, rice was the first priority in National Export Strategy (NES) which has been implemented by MoC. Seed and land were major issues to be addressed according to the NES. Having many different varieties was also one of the issues in exporting rice from the point of quality control. Participation of MOALI and private sector's participation were very appreciated. . Seed development plan would be placed into the overall rice export plan by MoC but responsibilities between MOALI and MoC should be cleared. Multi-stakeholders' coordination would be needed in order to meet the demand from private sector. Seed Law, PPP and Contract farming law were placed to be in line with Foreign Direct Investment law (FDI) to motivate foreign private investment in the seed sector. To implement PPP, having standard operating procedure (SOP) should facilitate for easier implementation.

Constraints of Public Sector in Developing the Seed Industry

According to the consultation meetings with relevant stakeholders, a number of constraints encountered by public sector have been identified as follow:

- Limited number of Technicians in the department. There were only 5-6 Breeders in Myanmar
- Limited number of skillful persons in seed labs
- Lack of modern facilities of seed processing in their seed farms
- Limited number of staffs and resources to produce enough amount of EGS
- Limited number of staffs and resources for conducting field inspection

- Lack of supporting of private sector which has been developed/matured already to the staffs, township seed officers
- DoA could not buy/ store CS from contact farmers for 6-7 months ahead until the farmers needed to buy the seed while their contact farmers wanted to sell their seeds immediately after harvesting.
- Limited financial resource to increase producing of EGS
- Poor technical knowledge and ethic of contact farmers to follow the procedures of seed production and processing
- Poor coordination and collaboration between different departments and ministries which were working on the rice sector

3.2.2 Private Sector

From the private sector, the key actors were the seed grower associations, private seed companies, and contact seed growers and farmers who bought the paddy seeds through their dealers or directly with seed growers/ companies.

In the demand-side of paddy seed value chain, farmers were the key actors, and they demanded various varieties of quality rice seed according to their needs. Input suppliers who supplied the farmers with fertilizer, pesticide, and credits were also the key actors because input suppliers also supplied seeds to the farmers.

The engagements of private sector in paddy seed production and marketing have been encouraged by the Ministry in 2010s. Rice Specialized Companies founded in 2009-10 produced certified paddy seeds through contract farming arrangement between company and farmers and redistributed among the commercial farmers. Some of these private companies are Dagon International, Ayar Hinthar, Golden Sun Land, New Ayar, Great Wall, Green Asia, Myint Zayar companies.

MRF: MRF did not involve in seed production or contract farming but the members of MRF, especially rice specialized companies and MAPCO involved in seed production and contract farming. MAPCO operated contract farming for seed growing with contact farmers (SGAs), by providing seeds, fertilizers, loan, without interest rates (100,000 MMK per ac in last year) and buy back the seeds to re-distribute to the farmers.

MAPCO: MAPCO had Agricultural Service Centers (ASC) which provided services such as re-distribution of seed to the farmers, land preparation, harvesting and threshing services by their machines, and drying and processing in their mills.

A total of 32 planned ASC projects connecting with rice complex project already implemented in Kyeiklat, Tontae, Myaung Mya, Pyapon, Naypitaw, Madaya and so on. MAPCO's contract farming of seed production and quality rice production looked successful since 95% of the loan money was returned by the farmers. In 2017-18, a total of 7000- 8000 acre of paddy was operated in delta area.

As for pricing policy, seed was bought back at pre-determined price, which was already agreed based on market price. There was no contract farming law yet and MAPCO involved in developing Standard Operating Procedures (SOP) for contract farming which was already drafted by MRF and proposed to Parliament.

Farmers demanded for involving in MAPCO's contract farming (To buy back all the seeds and grains from contracted farmers, to borrow money more, to increase the number of farmers, etc.). However, purchasing power of MAPCO was limited and they have limited financial capacity since the interest rate of JICA's two steps loan was still high (8.5%- 13% as SME loans to the millers).

MAPCO Golden Lace in partnership with Daewoo Company would be operated seed production with contact seed growers in Tun Taw Township by next season. Operating cost could be borrowed from their banks since they were joint venturing for rice business. The total project investment was 11 million USD including contract farming, seed production and or Warehouse Receipt System.

Private Seed Companies: As of in the study areas, 6 private seed companies, who have been operating in seed production and contract farming with contact seed growers and farmers were met during the study.

5 private seed producing companies were selected out of 8 Companies (Ayeyar Pathein, Aya Dagon, Kyeiklat, Mone Thida and Mote Thone Foundation) and 30% cash contribution was provided for investing in their seed business. The companies have upgraded their seed production and storage facilities from these co investments.

Table 6: Summary of the Activities of Private Seed Companies

Company	Capacity of Seed Production	Varieties/ Seed grade	Contract Farming	Active Areas
Ayar Dagon	100 ac	Sin Thukha	Yes	Ye Kyi
Ayar Pathein	Around 500 acre (50000 baskets contracted)	Pawsan Yin, Sinthwe Lat, Sinthukha, Thee Htat Yin, Ayayrmin	Yes	Pathein
Monsoon Foundation	30 ac (own) + 65 farmers networks	Sinthukha and 90 days Pakhan Shwe War and Paw San Yin	Yes	Kyaung Gone
Mone Thida	Not yet in delta	-	-	Magway, Bago
Good Brothers	300 ac their own+ 6000 ac CF		Yes	Ye Kyi
Kyeik Latt	500 ac	Japanese Hitomebore, 90 days, Shan Yadana, Paw San Yin	Yes	Kyeiklat

According to the information from KIIs with private companies, type of contract farming, and relationships with public sector were totally different from each other. Different companies used different approaches especially for seed multiplication and distribution. Incentive mechanisms to the farmers, pricing strategy and procurement mechanism were also different.

Ayar Dagon operated contract farming with over 100 acres in 3 villages (40-50 farmers) in 2012-13. Company provided credit with 2% monthly interest rate and machinery service with differed payments. Selection criteria of contracted farmers were people who are recommended by village authority, having suitable land/ site location and following the technical suggestion and quality control given by DoA through field inspections. Sinthukha variety was produced in CF.

Ayeyar Pathein company was founded in 2009 since the Government has driven private sector to invest in contract farming in rice sector, otherwise they could not get the export quota and opportunities. MRF helped private companies in contract farming, national rice reservation and ASCs. Ayar Pathein operated contract farming with 50000 acres of paddy to produce quality seeds of different varieties.

Monsoon Foundation (MTF) started in 2015, by providing agricultural trainings linking with the technicians from DAR, in machine repair and maintenance training, cultural practices, and providing farm inputs to the farmers (seeds, fertilizers, chemicals/ organic inputs, and credits). These were free of charge services to the farmers and source of finance was from the private donors. MTF also technically provided farmers nearby for 150 acres land consolidation activity started in 2017-18, organizing 17-18 villages with regional government budget. Collective farming and collective marketing by linking with the millers would be initiated. MTF guaranteed for seed procurement back at 10% higher than grain market price. Technician from DAR directly came and inspected 2-3 times per season in seed production.

Picture: Seed Storage facility of MTF in Kyaung Gone Township

As for Good Brothers (GBS) Company, Sinthukha and Shan Yadanar 1 and 2 rice varieties coming from China were multiplied in Myanmar as a contract farming. GBS worked jointly with Chinese fertilizer company, Youn Ti Hwa to provide farmers 1 bag of Urea, 1 bag of T-Super and 0.5 bag of MoP and 80000 kyat/ac for labor charges with 2.5% monthly interest rate. GBS bought back seeds at 2000 MMK/basket higher than the market price. GBS targeted to work for 30,000 acres of contract farming.

Kyaiklat Company was recently formed as a seed producing company by the individual seed grower, U Aye Than. Kyaiklat company produced 80 ac of Pawsan Yin 80 and 300 ac of 90 days (AAE 1) varieties in the monsoon season and Shan Yadanar (DU 8) variety for GBS company in the summer season. He also worked with other contracted

seed growers to produce RS from FS and CS from RS. He sold the seeds at 1.5- 2 times higher than market price, and price fluctuation was mainly depended on the market price of paddy.

Seed Growers Associations

The seed growers' associations brought together the multitude of individual seed growers for a voice of local seed growers at township and district level.

RSSD provided support to Private seed growers in 4 townships of Pathein, Bogale, Labutta, and Mawlamyinegyun with the expansion in Kangyi Daunt Township. From the total of 160 Seed growers, 22 Farmers were provided business matching grants of 5000 USD for the establishment of post-harvest facilities such as warehouse, dryer, and cleaning machine.

A number of Seed Growers Associations were registered to implement the collective action in paddy seed business in the study areas. "Shwe Khit Arr Man" SGA consisted of 73 members of small seed growers or farmers and adopted participatory guarantee system (PGS) for seed production in Bogale and Mawlamyine Kyun Townships, by the support of GRET and INGO. The objective of SGA was to access enough quality seed in the villages and townships in the delta areas. EGS Seed, especially RS seeds were supplied from the DoA seed farms. In PGS, the field inspections were carried out with the participation of other NGOs and other farmers groups and as a result, seed demand could already be organized during the field days/ field inspection events. Shwe Khit Arr Man produced over 5000 baskets of good quality paddy seeds from 100 acres in the last year. The price of seed was pre-determined and agreed prior to the delivery. Other SGAs such as "Swan Yee Htet", "Sein Pan Tar" were also well operating in 4 project areas. They supplied good quality seeds with the following quality aspects.

Seed Class- Certified Seed
Germination- 97-98%
Moisture 11-12%
Purity- 98%
Weed seeds and others- 1% maximum

Constraints for Seed Growers in the association are listed as follow.

- Labor scarcity
- Seed business License are still needed
- Collaboration with public departments (DoA, DAR)
- Limited Funds
- Higher cost of organizing field inspection and field events
- Higher transport cost from farm to warehouse for collective marketing
- Some warehouses were not in good condition
- Difficult to get enough amount of RS
- Mass storage- more losses
- Less financial capacity to store seed for 3-9 months
- Lack of Guarantee Market for pure variety grains/ quality grains

Contract Seed Growers

In the villages where the land and site location were good enough, DoA worked with some contract seed growers (also called Key Farmers/ Contact Farmers) to multiply the seeds especially from RS to CS and sometimes from FS to RS. Most of them were large scale farmers who could produce the paddy up to hundred acres of land. A summary of seed production of some contracted seed growers is described in the Table 7.

Table 7–Summary Information of Contract Seed Growers in Study Areas

Farmer	Seed producing area (ac)	Varieties	Area	Contract with
U Tin Aung Than	270 ac	Paw San Yin, Sinthwelat, Thee Htat Yin and Pakhan Shwewar	Mawlamyine Kyun	DoA
U Kyaw San Oo	100 ac	Paw San Yin, Japanese variet, "Hetome bore" and 90 days variety	Bogale	U Aye Than, U-Net Company
U Tin New Oo	20 ac	Paw San Yin, Thee Htat Yin and 90 days variety	Bon Lon Chaung village, Kyeik Latt	DoA, U Aye Than

Farmers in the study areas wanted to involve in seed production and to do contract farming with Contract Seed Growers for the uniformity and accessibility of seeds. However, they didn't have enough financial capacity to operate contract farming with the farmers. Why the farmers wanted to do contract farming was that, Contact Seed Growers could manage best farming practices such as application of farm inputs, time of harvesting, and using post-harvest facilities, etc.

Picture: Meeting with Contracted Seed Growers of Kyeik Lat Seed Company

Challenges of Contract Seed Growers

- Limited amount of RS was available, Seed farms did not believe their capacity (CGS). But they could not produce RS by themselves.

- Poor access to post harvest facilities,
- It took too long to test the sample seed (Randomly sampling) in the seed labs in Yangon. Sample was taken by the township DoA at the time of harvest and after bagging.
- Limited finance during the storage of seeds at least for 4-5 months
- Skillful labors were needed in removal of off- type rice plant and transplanting activities. CSGs have to keep them with some incentives. Year-round labors have to be paid (10000 MMK/day), in roughing, ttransplanting process.
- High interest rate if they borrowed money from the companies (2-2.5%)
- Uncertain demand for seed and unstable price of paddy/ seeds

Economic Analysis of Contract Seed Growers

Farm economic analysis of contract seed growers from 90 days variety seed production was conducted by FGD with contract seed growers at Kyeiklatt Seed Company. Summary analysis is described in the Table 8.

The average production cost of seed in monsoon season was nearly 600,000 MMK per acre of which cost of labor contributed the highest percentage (37%), followed by cost of inputs (36%). Cost of hiring machineries / cattle was 15%, whereas costs for post harvesting and handling process contributed about 8% and the cost of borrowing money shared 3% of the total variable cash costs.

With 90 baskets per acre yield and the price at 12,000 MMK/basket, total revenue for 1 acre of seed production was over 1 million MMK. As a result, the gross profit was 481,800 MMK/ac and benefit cost ratio was +0.81. This means that if the farmer invested 1 unit of money, the benefit was 0.81 unit.

Table 8- Farm Economic Analysis of 90 days variety seed production

Description		Cost (MMK/ac)
Labor cost (221,000 kyat/ac, 37% of TVC)	Nursery	36,000
	Uprooting/sowing/transplanting	50,000
	Fertilizer/pesticides application, irrigation, overall management	50,000
	Inspection 3 times	35,000
	Harvesting	50,000
Inputs cost (218,000 MMK/ac 36% of TVC)	Seed (RS)	20,000
	Fertilizer	132,000
	Herbicides	15,000
	Pesticides	15,000

Cattle/ machinery hiring (92000 MMKac 15% of TVC)	Fuel	36,000
	Lime, EM	
	Land Preparation	45,000
	Transportation	15,000
	Threshing	32,000
Post Harvest (48,000 MMM/ac 8% of TVC)	Bag	13,333
	Cleaning, sorting	26,667
	Certification	8,000
Cost of interest (19,200 MMK/ac 3% of TVC)	MADB	7,200
	Company	12,000
	Total Variable Cash Cost (TVC)	**598,200**
Yield	90 basket/ac	
Sale Price	12000 MMK/basket	
Revenue from sale		1,080,000
Gross Profit		+ 481,800
Cost/Benefit		+ 0.81

3.2.3 Seed Dealers/ Distributors

As for seed distribution, private seed dealers or some of the DoA offices distributed the seeds to the farmers. Private dealers also distributed vegetable seeds, fertilizer, pesticide, and farm equipment. Some millers also distributed the seed at township level.

Meeting with Seed Dealer in Ma U Bin Township

There were about 4-5 seed distributors in Ma U Bin township. U Aye Than bought certified paddy seed from DoA and Seed growers. He registered his business for the distribution of paddy seeds according to the seed law which was issued by DoA. He was also an Agro-Inputs dealer in the region. He sold different products of fertilizers, pesticides and farm inputs.

He received the pre- order for 500 baskets of CF paddy seed. It was pre-ordered for most common variety accepted in both sides. He supplied Sin Thu Kha, Bay Gyar, and Taung Pyan varieties seeds.

He had to pay seed growers/ DoA 10% higher than market price for the seed as an incentive.

3.2.4 Supporting Organizations

Financial Institutions

Public Sector - MADB, Department of Cooperative, Department of Rural Development (DRD)

MADB provided seasonal loan to the farmers with 0.8% monthly interest rate. The amount of loan was 150000 MMK/ac.

Cooperative groups under Department of Cooperative provided 81 billion MMK as microfinance through over 3600 members in Ayeyarwaddy delta. Department of Co-operative Supported 300,000 MK/ac seed growers who were the members of cooperative groups 300000 MMK/ac for seed production and 3 years re-payment which has been started in 2018-19. The interest rate was 1.5 % per month and the finance came from China Exim Bank (CEB) as a loan of 400 million USD. There were 5 Seed growers cooperatives in Ayeyarwaddy region. The constraints were poor monitoring and technical back stopping to the seed growers. Farmers did not have enough financial literacy and management capacity and they just looking for the loan. Awareness and trainings only were not enough and effective monitoring and coaching were needed to implement effectively. Department of Cooperative was willing to involve in PPP (multi-stakeholders partnership) in rice seed industry from the role of financial institution and strengthening of seed growers cooperative groups.

Private Banks

United Amera Bank (UAB) is a commercial bank and most of its investments were in construction, trade and other sectors but not for Agriculture sector. Since Agriculture was more risky, although Agriculture was a huge part of Myanmar economy. UAB provided hired purchase loan for farm machinery to the farmers with 6 months repayment plan. And UAB also financed to other micro-financing companies and fertilizer companies. UAB and similar commercial banks showed less interest in investing in seed sector. However, UAB interested in plush loan system for the farmers who wanted to store their seeds/ products.

Yoma bank was also a commercial bank, willing to provide financing to 1) the large scale rice farmers who have 200 acres of land (insurance was needed), 2) Agri-input dealers – manufactuctures/ importers/ dealers, 3) Contract farming companies, 4) Traders, and 5) Rice millers. Yoma bank also interested in Plush loan/ locked in here system for paddy as (Agri-inventory discounting). In this system, it was necessary to work with third party commodity management company from India.

Myanmar Apex Bank (MAB) was also a commercial bank but working/ supporting to MAPCO and the rice sector. If MAPCO was working on warehouse financing, MAB would provide financing in the system. MAB also provided loan in upgrading rice

mills, exporting of rice and input distribution with long-term loan 3-5 years pay back to as the instruction of Central Bank in Myanmar. With USAID program, development project such as weather-based insurance would be tested by MAB.

NGOs

Together with the farmers, the private sector and NGOs have been engaged in the production and marketing of rice seed from the supporting role. It was impossible to compete with the formal seed supply system which has been implemented by DoA and contact farmers as regards to the need for quality rice seed far exceeds demand over the supply. There was thus considerable opportunity for the private sector to invest in and expand rice seed business to supply quality seed to the farmers and strengthening of seed grower associations by the support of NGOs.

A number of local and international NGOs were working on seed sector development of rice in the study areas. Amongst, JICA was implementing 5 years master plan of paddy seed production and upgrading of Government seed farms. Mercy Corps was working in Labutta area with some local NGO and CSOs. WHH was leading this project of WHH/ RSSD. GRET, Radanar Ayar Association and Law Ka Ahlin were working on seed production and marketing development of paddy with many small and medium farmers.

3.3 Seed Certification System

To assure the quality of rice seed across the whole country, DoA (Seed Division) had the mandate to monitor fields for breeder, foundation, register and certified seeds, as well as to monitor seed markets across the country, but it had very limited capacity to fulfill this mandate.

DoA was responsible to monitor and inspect fields for the production of RS and CS in the contact farmers' fields. DoA seed officers inspected at least 2-3 times and if quality was approved, sample seeds harvested were sent to the seed lab (So far accreditation is not yet from the National Accreditation Body) to test the quality of seed. Seeds were

checked for genetic purity, germination rate, physical purity and moisture content. If it is passed, it is certified.

However, DoA had very limited resources to fulfill this mandate. The staffs did not have enough vehicles to carry out field inspections and market monitoring. As for EGS, there was no seed certification system and certification body yet in Myanmar. EGSs were produced and maintained by DAR and respective private sector. National Seed Committee (NSC) was issuing new varietal released and registration.

As a result, there were low-quality seeds on the market from both private and public-sector even for EGSs. Some seed growers/ companies took advantage of this, skip the inspection and testing activities and sold as "good seed". That's why informal seed supply was still dominant and farmers did not trust on the quality of seed even from the government's seed farms.

This shows an urgent need to establish seed certification system and encourage to develop the capacity and infrastructure of seed testing services/ quality certification services in Myanmar.

3.4 Quality Assurance of Paddy Seed

Quality assurance permeated the whole seed programme from field production, processing, packaging, storage to marketing. According to the newly enacted seed legislation, the entire seed industry must respect and adhere to the provision of the seed legislation. Seed quality assurance in Myanmar was under the mandate of the Seed Division and Seed Division operated the seed laboratories in a central and regional levels of in Myanmar.

Central and regional seed laboratories and seed officers involved in the Seed Quality Control Unit and the overall responsibility was under the Seed Division of DoA. They coordinated national seed certification system. *The National Seed-related Committee also allows for application for a license a Seed Testing Laboratory after paying the license fees for the distribution of high-quality seeds of each seed class.*

According to the several consultation meetings, at every step of seed production, Regional, District and township DoA officers joined in. DoA assisted in sending seed samples to the seed labs and if it was passed, seed growers got seed certificate. They were just assisting to the farmers not authorized to certify or reject seed production fields. Seed testing laboratories were in Naypyitaw, Yangon and Mandalay, which have been operating under the seed quality control unit of the Seed Division.

The DAR and research farms had just done their own seed quality assurance system for EGS and it was not under the DOA's quality assurance system.

So far, the seed laboratories have not been accredited by the International Seed Testing Association (ISTA). The problems with old equipment and lack of skilled resource persons were also affecting on the quality of seed in the market and the trust of farmers in quality or certified seed. National Quality Infrastructure has also been developed with the help of GIZ and PTB.

According to the seed law, the Government encouraged the private sector to develop their own internal seed laboratories and other seed quality operations to support to the private sector. Private seed labs could also be partnership with the public seed certification agency. According to the policy, the seed quality control operations by the public seed quality agency would remain a public service.

3.5 Private Sector's Engagement with Public Sector

There was a wide range of definitions for PPP, reflecting the meaning of partnerships, arrangements and objectives according to the literature. General meaning is that PPPs are arrangements between public and private partners with a common interest, sharing of risks and responsibilities to achieve their goal.

PPP models can be a contractual relationship, a joint venture of a company and specific department of the Government, a formal or an informal relationship with multi-stakeholders for a common interest.

A public-private partnership is a contractual agreement between a public agency and a private sector entity. Through this agreement, skills and assets of each public and private sector are shared in delivering a service or a facility for the use of the general public. In addition to the sharing of the resources, each party shares risks and rewards potential in the delivery of the service and/or the facility.

In Myanmar, there were 11 active PPP projects and the total investment in active PPP is US$ M 3,707. The sectors, which involved in the active PPP were ITC, Electricity, Natural Gas and Port project. As for Agriculture sector, although the government encouraged to the private sector, the practically developed model and implementation of PPP project has not been yet.

According to the National Seed Policy (2016), public sector would assist private sector through the National Seed-related Committee and the Seed Division of DOA for seed enterprise development. Public sector would provide adequate incentives to expedite private sector entry into the seed business and these incentives might include provision of low-interest credit to establish seed processing facilities, consideration of tax holidays and reduced taxes on imported seed processing and handling machineries and equipment, etc.
The reasons of adopting PPP were basically to 1) reduce public capital investment, 2) Improve efficiency due to strong profit incentive, 3) Private sector taking the

accountability, 4) specialize in expertise, 5) sharing risk/responsibility, and 6) clear mandate and focus by each sector.

Formal public-private relationship in seed value chain

In the formal public-private system, DoA seed farms worked with contact farmers to produce CS from RS. In this partnership, DOA seed farms, through township DOA extension, provided RS to the contact farmers, who had seed production land at a good location such as along the road- side fields. Selection of the contact farmers was made by the township extension officer based on the capacity of farmers, his interest, trust on the performance of the farmers, and vast experiences, etc. Contact farmers sold seed to the other farmers. In this case, when the farmers did not have the capacity to store until the next growing season, he sold the seeds as the grain in the market. Otherwise, rice millers or sometimes, DoA officer bought the seeds and sold to the farmers prior to the next sowing season at higher price. This public-private system was very common in Myanmar. Some lessons learnt from this model are as follow:

- In this system, there was no field inspection and official quality control and certification procedure.
- Very much rely on the support of DoA in terms of getting RS, technical supervision and distribution, and less regards to the market.
- Insufficient number of government staffs and could not much focused on the quality
- Lack of trust by the fellow farmers on the quality of seeds

Formal private- private relationship

In this model, private companies were working with seed contract growers like MAPCO, Good Brothers so that the companies got the required certified seeds for their farmers. In this system, seed contract growers have to take responsibility of quality control by using the inputs provided by the company. There were some good points in this system : company could multiply the quality seeds for their specific required variety; according to the relevant agro-ecology zone, one specific variety could be specialized by improving the quality; having more incentives for the farmers by guaranteed the market; and, seed contract growers did not need to worry about the financing for seed production. Some lessons learnt from this system were:

- Less transparency of sharing responsibilities and risks between private company and government agency. DoA and government have to involve in supplying EGS, field inspection and certification activities. It should be contractual agreements between government and private of using these public goods
- Less technical supervision and monitoring can be done by the private sector
- Contractual agreements could be broken when it was contracted at the fixed market price. Seed Contract growers might sell outside or other farmers when the market price was higher than contracted price

- Less protection for the private sector by rules of law when there was a dispute due to crop disaster or broken the agreement from the side of the farmers or the company could not buy unqualified products
- This system was good if it was improved by the participation of the third party in terms of governance, technical assistance or dispute redressing by the participation of other different stakeholders
- Private sector could work with the limited number of farmers since they have limited financial capacity

Semi-formal Relationship

Rice millers in delta were also providing to the farmers by means of advance credits, farm machinery services, seeds and fertilizers then buying paddy back traditionally. Farmers have to pay interest rate for the use of these inputs. There might be a long-term relationship between the farmers and millers and there might be a basic contract between them. Mutual trust was the most important for this relationship. This system covered in many areas of the country where the rice millers were the most powerful in the value chain. In this system,

- There was no field inspection and official quality control and certification procedure. Poor quality assurance system and lack of trust on the quality of seed
- Millers suffered the high risk of getting back their money when the farmers did not pay back
- Millers could take advantage of getting quality grain and sometimes sell at higher price as the informal source of seeds to other farmers
- Poor infrastructure of seed production and processing facilities
- Lack of interest by the township rice millers to invest in formal contract farming

Joint Venture

The other PPP activities with large private companies and government have also been starting in Myanmar. DAR would be working with Tropical Bio-tech Company for producing quality seed of pulses and bean. DAR also have signed MoU with Asia Agriculture and Golden Sun Land companies for rice research and seed production activities. Funding system, benefit share, rules and regulations should be clear, transparent, accountable and reliable.

3.6 Policy and regulatory Frameworks for Paddy Seed Value Chain

3.6.1 PPP Policy

PPP policy in Myanmar is aimed to develop a substantive role for Public Private Partnership (PPPs) as a means for promoting private sector participation in the

provision of public infrastructure and public services. The definition of PPP in Myanmar PPP policy is that "A Public-Private Partnership (PPP) is a contract between a public entity and a private partner according to which the private partner delivers a public asset and/or a public service in accordance with the following features:"

- Project specifications focus on the end result - delivery of facilities or services at specified standards - rather than the inputs or means of delivery;
- Government payments to the private party, where required, should be based on the delivery of facilities or services consistent with performance standards that are clearly defined in the PPP contract;
- User charges, where applied, are specified in the PPP contract or subject to credible regulation;
- Substantial and appropriate risks related to the provision of the public asset and/or the public service are transferred to the private sector;
- The private partner is selected by utilizing open, transparent and competitive procurement procedures. Unsolicited proposals should be subject to strict conditions to preserve the competitive nature of the selection procedure

The Myanmar Investment Commission (MIC) might be considered as a candidate for holding the role of a PPP committee as it gathers the relevant ministries at a high level such as Ministry of Planning and Finance and the Attorney General. MIC is also already involved in reviewing and approving foreign investment licenses, which will be required in most PPP projects.

According to the PPP policy, in developing effective PPP model and incentive mechanisms, the role of public sector is to provide a catalytic role in seed research, breeder and foundation seed production, the overall seed quality assurance system and seed extension. In order to increase the public capacity ensuring timely supply of sufficient early generation seeds, increasing the number of seed laboratories and upgrade the existing laboratories, and recruiting more field inspectors to cover enough seed quality control mechanism. The role of private sector is to produce registered and certified seeds with an internal quality assurance as well as involve in official seed certification system. Through various incentive mechanisms, private sector seed growers are well progressed for scaling up their business opportunities in rice seed sector.

PPP models could include:

- User fee-based PPP – where a Private Partner builds and/or renovates a public asset by using its own funds or funds it has raised, operates it within the period specified in the PPP contract and collects fees from users of the public asset or service, and transfers the asset upon the expiration of the PPP Contract to the public entity in accordance with the conditions specified in the contract;

- Availability based PPP – where a Private Partner builds and/or renovates public assets by using its own funds or funds it has raised, operates it within the period specified in the PPP contract and receives regular performance-based payments from the public partner at regular intervals, and transfers the asset upon the expiration of the PPP Contract to the public entity in accordance with the conditions specified in the contract;
- Operating Concession, whereby the Private Partner has to operate a public asset and carry out maintenance at its own risk, depending on revenue from users - but the public entity remains the owner of the public asset, and is responsible for investment in it.

Above two models are more suitable for the other infrastructure projects and "Operation Concession" could be applied in the seed industry.

3.6.2 Regulatory Framework

Myanmar government focuses on PPPs and promoting the private sector in national development as part of the *Myanmar Sustainable Development Plan (MSDP).* The confidence of the investors is investing in Myanmar PPP projects through fairer competition and risk sharing with the Government. Laws and regulations that govern the PPP projects and Government's embarking on PPPs may need to adapt the existing legal framework to ensure at minimum that contracts for the delivery of public services by a private entity can be entered into.

Seed Policy

A new National seed policy, drafted with technical support from FAO, was approved in 2016; the existing Seed law, which was enacted in 2011, was amended in 2015; the National seed regulations were approved in 2016. The National Seed Policy effectively aimed to ensure that the Seed Division is strengthened to enhance its production of the early generation seed (foundation and registered seed) and further, to strongly support the private sector to take up responsibility for the production of the certified seed class.

Seed Law (enacted in 2011) focusing to produce crop with quality seed and to carry out seed business systematically under DoA, MOAI. Rules and regulations are related to seed sector for seed registration process, testing and monitoring, quality assurance, certification schemes under Technical Seed Committee (TSC) and National Seed Committee (NSC). The law also provides public sector or any person to produce or introduce a new variety or establish a seed testing facility.

The ***Plant Variety Protection Law (PVP)*** approved by the end of 2015 to protect breeder's right are somehow affecting the development of seed business in Myanmar. Drafted laws of ***Bio safety Law*** and ***Plant Varietal Protection Law*** According to the review of the seed law by FSWG, the law and regulation do not address the regulation on the interaction between the farmers and private seed suppliers (companies or

farmer groups) and more highlight on the interaction between the seed business, seed registration, seed labs and the Government. The PVP law provides intellectual property rights over number of years. The PVP regulations are still planned to be developed.

In addition, Myanmar has enacted a number of policies that are supportive to the seed sector, which include the ***Plant Pest Quarantine law*** of 1993; the ***Fertilizer law*** of 2002 and the ***Pesticide law*** of 1990.

Moreover, based on the above mentioned policy framework and other strategic documents, in 2016 a Seed Sector Development Road map has been developed and approved by MOALI.

Three Farm Land Laws, amended in 2012 encourage the investment of private sector and foreign investors by linking with Foreign Direct Investment (FDI). The ***Farmers Protection Law*** for the protection of the Farmers' Rights and enhancement of their benefits was enacted in 2013. ***The Contract Law*** refers to the Contract Act 1872 and it is not a perfect one for today agribusiness. ***The Public Debt Management Law*** (enacted in 6 January 2016, "the Law") restates and clarifies some of the existing rules with respect to government loans, bonds and guarantees. ***Public Procurement Rules*** are embedded in the PPP policy for the transparent process of tender/ bidding or awarding of the project to the private sector so that the notification creates clearer and more transparent pathway for investors interested in PPPs in Myanmar through some screening tool of significant criteria such as financial viability, project risks, socio-economic effectiveness and sustainability. The owner has exclusive rights on production or multiplication of the variety, offer to sell seed, seed sales in the local market, seed export to international markets, seed import and storage for business. ***Seed Sector Development Road Map*** for 2017-2020 has been approved in 2016 for short term, medium and long- term implementation of the projects for seed sector development. ***Agricultural Development Strategy*** (ADS, 2015-2020) has focused on public private partnership (PPP) approach in several areas by means of developing values chain.

In the White Paper, 'From Rice Bowl to Food Basket' highlighted for the "demand-led approach driven by domestic consumers and foreign markets with increased productivity throughout the sector by the linkages of the government, private sector and civil society with more harmonious and coordinated efforts.

3.7 Policy Gaps in Developing PPP

Lack of Law and Regulations: In order to promote PPP modality in agricultural sector in the country, all the relevant laws and regulations of the government should be conducive. Policy review comes to the analysis that many policies in agriculture are directly related to this concept.

PPP/Concession Laws enacted in various countries. PPP law in the Concession model of PPP, although there is the Contract Law, Contract farming law is not yet formed. For facilitating contract farming, SOP for the contract farming has been developing by MoALI for fair and sustainable contract between a private partner and a public entity. This legislation needs to be considered when developing PPP projects. The review explains that there is a need of market-driver policy for seed sector development as well as for improving PPPs in seed sector.

Insufficient budget allocation to Research and Development: Government's budget allocation on research and development is very small in Myanmar for many reasons. That's highlighted the involvement of private sector in the seed value chain.

Research & development and extension: When the new varieties are released, farmers must be adequately informed about their performance and characteristics of the new varieties. This education system needs to be in place in the practices apart from the policy. There are more than 17 new varieties of rice per year produced by the breeders from DAR but these cannot be marketed yet. Normally, these systems are operated by public sector from DoA extension services but DoA does not have enough resources to do that.

Lack of Transparency in taking responsibilities and having the rights from PPP: It is related to the public procurement policy of the government how public sector would inform to the private. Without transparency, corruption and weakness in the quality assurance may occurred.

Intellectual Property Rights (IPR) IPR would also be the incentives for investment in the development of new varieties of plant breeders and seed experts. Legislation on plant breeders' rights has played an important role in making new PVP law and it is still needed in the country.

Poor Policy and Law enforcement are also the major gap for the development of seed industry as well as PPP. Less protection on the private Investor/ private sector is also challenging on the development of PPP in Myanmar.

3.8 Pre-conditions for PPP

According to the qualitative analysis from several consultations, pre- conditions and necessary conditions are found out. A result is always produced when a condition occurs, then the condition should be a sufficient condition for the corresponding result.

3.8.1 Legal Framework

Most of the laws in Myanmar do not specifically mention about the ownership of the facilities whether by private sector or by public sector services. The laws may state vaguely on which government departments may cooperate with the private sector, either domestic or foreign. Legal framework is needed to be strengthen private sector

involvement in public services delivery. This would contribute in the facilitation to the private sector for using public services and public hold facilities under a contract with the Government. This is important that PPP in seed sector to be linked with foreign direct investment (FDI) law if foreign large companies are required to implement.

3.8.2 Land acquisition

Land acquisition is often heard as the greatest challenge for PPP projects in Myanmar especially in the infrastructure projects. A large area of land is needed to develop seed production and seed business. Land issue and acquisition problems often including legal and regulatory obstacles, are required to be addressed.

3.8.3 Dispute redressing mechanism:

Efficient dispute resolution mechanisms should be in place to deal with different stakeholders in the public and private partners. Farmers' protection law protects the rights of the farmers if there is a dispute between private company and the farmers. In the same way, the private sector will require mechanisms be in place to guarantee its rights for protection. The role of supporting institutions may carry out as the third party in solving the disputes. The government/ policies refer to go to the court to solve the problems.

3.8.4 Insurance

PPP projects, especially in the agriculture sector carry a number of risks such as crop disasters, bad weather and disease outbreak, market instability, price fluctuation, and effects of currency exchange rate, etc. The availability of insurance coverage and the terms of such coverage are important for the viability of PPP projects in the current legal framework with regards to insurance,

3.8.5 Risks and Risk Mitigation

Several considerable risks can be occurred in the PPP especially in the seed business due to several uncertainties in agriculture. Risk mitigation plans should be included in the development of PPP. Share of risks and share of responsibilities are the most important in the contractual agreements. NGOs or MRF or third party organization can help to have a fair agreement in terms of risk sharing and mitigation plan.

3.8.6 Seed quality assurance and certification

Seed quality assurance guarantee should be in placed with PPP model, through seed generations, varietal identity by means of appropriate crop field inspection techniques and laboratory testing services for the seed quality attributes and systemic certification system. The arrangements have to be in place to ensure that seed production and other activities in the seed value chain adhere to established rules and regulations. In several countries these rules and regulations are contained in formal seed legislation or seed laws and their ensuing regulations. It also requires an implementing and enforcing body and adequate facilities and resources, such as seed laboratories and trained staff, at all public expenses.

IV. How PPP be Started and Strengthened?

PPPs are common in other fields especially in the national infrastructure sector. Nonetheless, there is a less evidence of establishing PPPs in seed industry in Myanmar. PPPs would provide a valuable basis for crop breeding, seed multiplication and distribution through development of technologies and investment mechanisms. PPPs are needed to increase accessibility of modern technologies. The changing global climatic situation could have major impact on agriculture during the next decades. Co-operation and PPP in plant breeding, production of early generation seeds and involvement in the whole sector-wise value chain would be addressing the challenge of climate change in development. PPPs may be a valid approach to increase accessibility of technologies and specific services in this context.

Why it is important to develop PPP and incentives mechanism in seed value chain are:

- to create value-for-money in a number of ways, including:
- to catalyst private financing
- for bringing market driven private innovation, expertise and management to seed sector development
- to maximize the profits and scaling up commercial seed business in delta areas
- to establish sustainable relationship between private and public sectors in seed business

4.1 Recommended PPP Model

Multi-stakeholders' partnership is the best model of PPP for seed business at current situation in Myanmar. Formal contractual arrangements as contract farming and joint venturing would be recommended for rice seed business.

Formal contractual arrangement through Contract Farming : In this model, private seed companies work with small seed growers according to the contractual arrangements as developed in contract farming model. NGO supports the contract farming process for a long-term sustainable partnership.

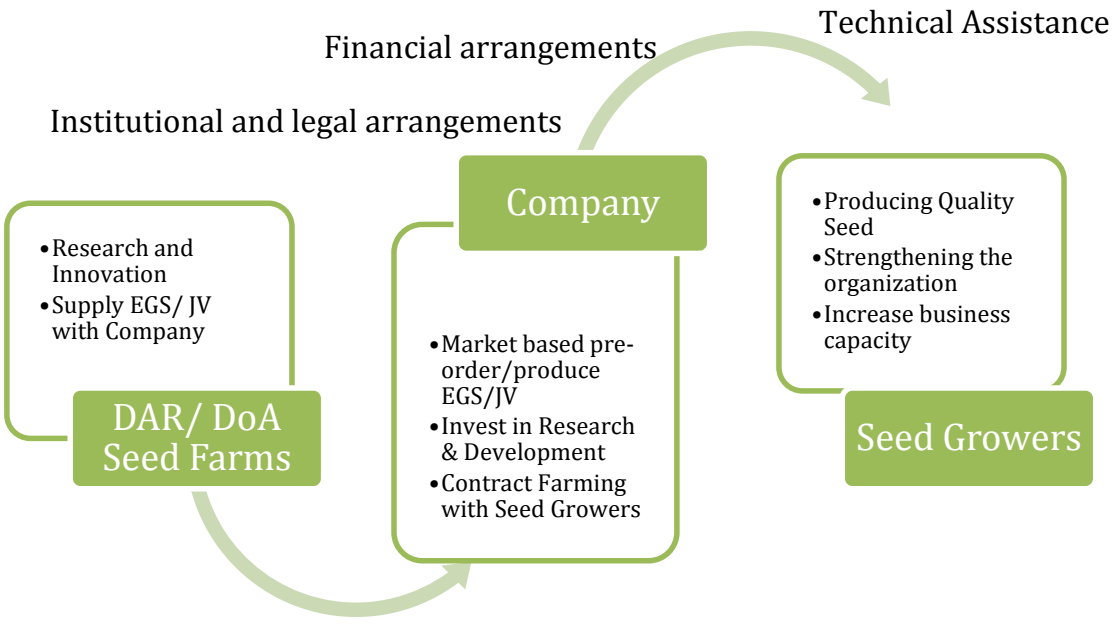

Figure 7- PPP model in Formal Contractual Arrangement

2) Joint ventures between private companies and Government: In this model, the private sector/ company with the support of MRF joints venture with DAR/ DoA seed farms for research and innovation, production of EGS, strengthening the quality infrastructure for certification process and quality assurance. Seed Farms should be upgraded with proper facilities for seed production and post harvesting process. Gravity separator, length and thickness grader, cleaner are needed. Government has land, skillful labors and resources as public goods.

4.2 Roles and Responsibilities

It is very important to define the roles and responsibilities of the partners/ Government/ Private sector and NGOs in implementing PPP in seed business. For Public and Private goods, it should be clarified what public/ private can do. Drivers are coming from the private sector and profit/ risks sharing to be cleared.

For the role of DOA, Agricultural Extension Division will provide adequate resources for training farmers on the use of quality seeds of improved varieties and conducting other seed use promotional programmes that will boost the seed demand and help expanding the seed industry through attracting private sector investment. DAR will be responsible for producing of Early Generation Seeds to provide to the seed growers through DOA. Research and Development activities should be done by the Government from the finance of the private sector/donors to create the linkage to generate EGS.

The role of the local and international development partners including MRF and Seed Growers Associations plays a vital role in developing the country's seed sector through capital investment, technical assistance, capacity building and in creating the right conditions for mutually beneficial public-private partnerships (PPPs) to flourish and in creating viable models for bringing together the interests of all parties in ways that are equitable and transparent. Development partners can work with public sector to help them create enable policy environments for PPP and provide the infrastructure to allow rural businesses to thrive. Moreover, NGOs can help small-farmers (Seed growers) and the private seed companies by supporting the inclusive and responsive environment and sustainable collaborations with funds of bilateral agencies. For example; sesame and mung bean projects, implemented by ICCO and NAG.

The role of private sector is to take a leadership role in seed production and supply, and provides all possible support to it, as specified in this policy or established in ensuing supportive protocols, upon the advice of the National Seed-related Committee. Private sector will provide demand information what varieties/ seeds to be produced based on the market destination (For example; no bold grains varieties seeds are produced and provided yet although the demand of Africa and China becomes higher for this). Technical transfer should be carried out by the third-party organization. Pre-order/ demand should be provided to the public sector for EGS.

From the side of private sector:

- Private Seed Companies- should have transparency and transparency, accountability in PPP mechanism. It is important in this model to define how seed business/ companies share the profits with farmers/ contact farmers. Seed producers should be small farmers/ seed growers. Private Seed Company must have registration and should have contract agreement with Contact Seed Growers.
- Before contract agreement, how the company has been established in terms of finance, profit share, etc. to be explained by both parties. Cost of production to be calculated. Based on Cost of production of seeds, how profit sharing could be done for trust buildings.
- Even in the seed company, there is a constitution for rights for farmers and all members.
- For fair agreements, both parties should have the rights for negotiations.
- For seed growers, the profit should be higher than the production of grain.
- For cost effectiveness, buying farm inputs, hiring farm machines, etc. should be done with seed growers in collective manner transparently.
- Seed driers and storage facilities would be invested by the private companies and the total investment of these facilities should be transparent in this case.
- Cost of production of CS should be known by everybody so that price setting process could be done properly

Comparative roles of public and private sectors in seed supply chain need to be found out. Generally, the capacity and resources of public sector is good enough to produce the early generation seeds of paddy.

4.3 Incentives Mechanism

Incentives for Farmers to use good quality seed

- Reduced cost- by saving the amount of seeds used.
- Increased yield- at least 20-30% of the yield can be increased in paddy if a good quality of seed is used. These incremental volumes create the increased income and increased profit from paddy.
- Uniformity of crop and improved quality of paddy can be achieved by using a good seed, which can add the value of the product of the farmer produced.
- Increased price for better quality of seed can be achieved as well.

Incentives for Seed Growers to expand their scale and capacity:

- Hidden subsidies (free consultation services by extension)
- Differential price incentive for produce of certified seed users
- Economic Viability
- Financial Viability
- Supports of Development Partners

Incentives for Private Seed Company to involve in PPP in seed business

- Government Subsidies- By the information from the several consultations, it is obvious that government's subsidies of breeder seeds, upgrading of seed processing facilities and expansion of EGS production are not possible so far. However, if Government subsidizes for research and development and EGS with the contribution of private sector, it would be the biggest incentive for both public and private sectors.
- Tax -exemption- For the importation of seed processing facilities, lab facilities and technologies.
- Market Expansion
- Scaling up opportunities
- Maximizing the advantage of PPP
- Loan for the business expansion

Incentives for Public Sector

- Advancing in technologies
- HR development and build up the capacities

- Market
- Developed PPP and implemented the government's policies

4.4 Technical Assistance

Extension and Technical assistance play a leading role in the promotion of seed and to assist farmers in all aspects of seed use in order to engender crop productivity, but many extension activities have been unable to succeed due to budget limitations. Not only on-farm seed production technologies, but also farmers need financial literacy, farm management and planning, marketing and business knowledge. Private seed companies also need to have modernized farming techniques and business management capacities for their seed business. There are limited or lack of technical provision on business advisory services to the seed companies from both of public and private sites. Business and Private sector involvement in extension and varietal dissemination are increasingly important. Moreover, government's staffs also need to know/ update modern Post Harvest Management Techniques. NGO or MRF may take this role of providing technical assistance to private and public sectors through the supports of the international partners.

4.5 Perspectives of Financial Institutions

In general, government financial institutes such as Cooperatives, DRD and MADB have planned to support more on the seed production through the medium- term loan. Besides Department of Cooperative is interested in Warehouse receipt financing, Interests in private sector and skillful people are needed. Department of Cooperative is thinking of investing in Silos. Other members also may interest in it. Financial capacity is still needed by Co-op department so far.

According to the several consultation meetings, even commercial banks also become interested in investing in agri-business. Nonetheless, banks always consider to get back all the money they have borrowed but it takes several times. As commercial loans programs, loan amount is smaller but all the procedures are the same like other loans. Sue for the repayment costs a lot and takes the time as well. Mitigation plan is very important. Banks should have alternative mitigation process, and third party needs to negotiate the dispute. Supporting finance to the private sector should be liked with the insurance system. Inspection and monitoring are also needed by the side of the banks and it is also a big investment as well. Technical monitoring and quality assurance are also important not only for the farmers, but also for the seed growers, and it impacts on the whole sector. For example, the quality issue of rice in exporting to Ivory Coast also impacted on the banks. The whole supply chain should be well functioning/ transparent. Private sector including small seed growers should be smart and bankable actors to get more reliable finance. Interest rate policy of The Central Bank is also important. If the banks are provided the development loan from the international development banks, it is possible to borrow at 8.5% interest rate to

the farmers/ seed growers. Otherwise, it is not possible to reduce the interest rate from (10% +/- 2%) per year.

In the opinion of the banks, SME/ borrowers should have concrete business plan and financial literacy. Business advisory and financial management capacity are also needed. Banks can advise in business planning as well.

In the Future Plans of the private banks, they are willing to support farmers financing in many different ways. For example, Warehouse Receipt System or Pledge loan system.

For the warehouse receipt system, the implementer of warehouse management is very important. Warehouse Receipt System in Corn was not successful since Management of warehouse was not good enough. Policies of Central banks- regulations needs to be more stable on how to implement by the individual banks.

4.6 Lesson Learnt of PPP (Review on the Experience of Srijana tomato hybrid seed production in Nepal)

To meet the varietal demand for rainy season production, 22 exotic hybrids have been registered by private sector and about 500 kg of hybrid tomato seed of these varieties was imported in Nepal (CEAPRED 2013). To reduce the dependency on import of expensive hybrid tomato seeds, Horticulture Research Division (HRD) of NARC registered hybrid tomato Srijana in 2009. This was the first tomato hybrid variety developed in Nepal. The parental line of the hybrid was received by 20 actors in last three years (2011-2014) as the result of this program.

The roles and responsibilities of each actor in PPP model are given below.

NARC:

- ✓ Supply seed of inbred lines for commercial hybrid seed production to farmers on payment annually.
- ✓ Provide technical assistance at critical stages during the crop cycle as per the demand
- ✓ Provide hand-on training to technical staff and or collaborating farmers.

Private sectors:

- ✓ Demand the required quantity of inbred lines in the previous tomato season (prior to sowing season)
- ✓ Inform HRD and SQCC about area of seed multiplication plot and site well in advance,
- ✓ Request for technical assistance one week advance,

- ✓ Arrange three visits of SQCC staff at nursery, one month after transplanting, and first cluster setting stages
- ✓ Arrange four visits of HRD staff at nursery, one month after transplanting, first cluster setting and seed extraction stages
- ✓ Maintain security of the given inbred lines and not to use in other breeding program, should not obtain seeds from the inbred provided by HRD, Khumaltar

Financial arrangements

- ✓ Private sectors beard all costs related with hybrid seed production and had right to set price of the seed
- ✓ Private sectors have to pay 3 % of its annual seed sale value based on dealer price to NARC.
- ✓ Private sector provided the daily subsistence and travelling allowance of the breeders/technicians
- ✓ The material cost, staff costs of the technician and the resource person of HRD for hands on training were paid by the organization
- ✓ In this partnership, there were three different models;
  - ***Model 1:*** farmers group directly linked with NARC,
  - ***Model 2:*** NGOs were facilitating communit- based seed production organizations in terms of providing inbred lines from NARC and its marketing
  - ***Model 3:*** Private seed companies were also providing inbred lines to CBOs from NARC and purchased their produced seeds for its marketing.

The farmers were empowered by forming a cooperative and linked with the traders and agro-vets. CEAPRED was facilitating to make contract between the cooperatives and private sectors (seed companies, traders and agro-vets) before each production season and fixed the price. In the year 2011/12, farmers were getting only 50 thousands per Kg of seed.

V. Constraints and Recommendations

5.1 Constraints along Paddy Seed Value Chain for PPP

Several constraints at each level of the key actors and seed business environment were identified in the study. The main bottleneck among the various constraints and challenges in developing PPP and incentive mechanism was "Insufficient supply of early generation seeds (EGS)". If the bottleneck has been solved, the whole seed sector would be well functioning and most of general challenges could be overcome. A number of constraints are summarized as follow:

Sector/ level	Constraints
Production of EGSs and seed production management by Government	➢ Limited number of resource persons ➢ Lack of modern facilities for seed processing in their seed farms ➢ Limited storage capacity of the seeds before distribution ➢ Limited financial resource (budget) to increase producing of EGS ➢ Poor technical knowledge ➢ Poor coordination with private sector
Seed multiplication by private seed companies and seed growers	➢ Labor scarcity ➢ Requirement of Seed business License ➢ Low collaboration with departments (DoA, DAR) ➢ Limited Funds ➢ Higher cost of organizing field inspection and field events ➢ Higher transport cost from farm to warehouse for collective marketing ➢ Some warehouses are not in good condition ➢ Difficult to get enough amount of RS/ EGS ➢ Less financial capacity to store seed for 3-9 months ➢ Lack of Guarantee Market for pure variety grains/ quality grains and unstable price for seed ➢ Poor access to post harvest facilities, ➢ Problems in lab testing and quality assurance ➢ High interest rate if they borrow money (2-2.5%)
In PPPs	➢ Less transparency of sharing responsibilities and risks ➢ Less technical supervision and monitoring by the private sector ➢ Contractual agreements broken

	➢ Less protection for the private sector by rules of law when there is a dispute ➢ limited financial capacity of Private sector ➢ Lack of official quality control and certification procedure are poor. ➢ Poor infrastructure of Seed production and processing facilities ➢ Lack of interest by the township rice millers to invest in formal contract farming

5.2 Recommendations for adopting PPP in Rice Seed Business

The study would provide the followings based on the constraints, gaps and possible ways of solution for improving PPP and incentive mechanism for rice sector in Myanmar. These recommendations are:

1. Enforcing appropriate quality certification and product safety standards, and encourage the participation of domestic and foreign private-sector firms.
2. Reform Seed policy to permit private sector, more participation of private sector including international seed companies in the development of seeds industry. Adequate upgrading staff resources and laboratory facilities. Outsource certification functions, accredited private seed testing laboratories and certification bodies should be accepted.
3. Government may establish a national rice seed basket fund from the revenue of the rice export. This fund should provide incentives for PPP research and development on rice seed development and innovations

- ➢ The policy documents need to be improved for a good system of quality control for more competitiveness of the Myanmar seed sector within the wider ASEAN and global level. 'Truthful label seeds'(self-certified by the company) could be an alternative option with the new law and mandated certification through a proper lab process for all seeds,
- ➢ In developing PPP, it is necessary to determine clearer mandates between public & private. Roles and responsibilities, risks and rights should be cleared. TRANSPARANCY AND ACCOUNTABILTY would be most important incentives for the private sector
- ➢ Capacity Building of private sector on modern post-harvest facilities and quality services. Invest on the effective on-farm technical backstopping, supervision, and monitoring by private seed companies. Moreover, capacity development of government's staffs is also needed. Business advisory services are needed for supporting to the private seed companies and seed growers.
- ➢ Policy platform for the public- private dialogue should be organized to

attract private sector investors to the rice seed business

- National Seed Reserve facilities should be arranged by MoALI or CSR Program of MAPCO/ MRF so that seed can be supplied after big disaster or outbreaks
- Facilitate to private sector for the use of public facilities to expand the production of good quality EGS (JV/ Concession) through effective policy and legal framework. All the contractual agreements should be formal contractual agreements that regards to the market.
- Climate adaptive solutions should be in place in the context of plant breeding/ breeder seed production:
- Public Insurance system should be developed. Some of the private banks become interested in insurance system. However, in the insurance system, how pay back plan that's flexible for the farmers to be included.
- Seed business is very risky and it is not always sure that seed business is economically viable. How Government can subsidize for the infant stage of the companies should be considered. Special loans by MADB or tax exemption etc. should be offered to the private

5.3 Specific Recommendations for RSSD

For the considerations of the next phase of RSSD project, the following recommendations are provided based on the findings of the study:

WHH/ WRU/ MRF and the project:

- Technical supporting and training, and coaching on the development of seed business plan to the beneficiary seed companies.
- Capacity developing and strengthening Seed Growers/ Seed Growers associations in the delta areas.
- Support piloting a PPP project at regional level with the participation of DAR and DoA seed farms, one of the pioneer private seed company, contact seed growers and beneficiary farmers.
- Organizing policy advocacy and PPP dialogues at Union Level and regional level .
- Facilitating private sector to be linked with other financial sources, crop insurance system and the investment opportunities.
- Supporting in the development of policy framework that supports to PPP and contract farming.

Private Seed Companies and Seed Growers:

- Scaling up seed business by working with more stakeholders, improving the quality of seed by using quality assurance system (testing and accreditation/ certification services). Developing business plan (bankable) with the assistance of the project is needed for scaling up the business.

- Piloting PPP with DAR/ DoA for producing EGSs
- Piloting effective contract farming mechanism in working with contact seed farmers
- Investing in technical backstopping and monitoring in working with contact seed farmers/ contract farming
- MRF as a apex body of private sector should provide a Market place for its members by developing a B2B seed portal to support seed demand and supply gap in future . This digital B2B platform brings together Farmers and Industrial Buyers.
- Branding the products (Seeds), market expansion (for example; B to B with other MRF members/ exporters, etc.) and creating the demand on the quality seeds.

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Annex- 1 List of Interviewee

Sr.	Person Meet	Organization/ Company	Place
1.	U Ye Min Aung	Chair, MRF	Yangon
2.	Dr. Min Aung	Advisor, MRF	Yangon
3.	Mr. Eaknath Khatiwada	Seed Business Development Advisor, WHH	Yangon
4.	U Tin Htut Oo	Chairman, Agricultural Group, Chairman of the Agriculture Group, Yoma Strategic. Holdings Ltd	Yangon
5.	U Ba Hein	Former Minister of Agriculture in Ayeyarwady Region	Yangon
6.	U Yan Lin	Pyithu Hluttaw MP from Kyeik Lat Township and Chairman of Agriculture, Livestock and Rural Socio-Life Development Committee	Yangon
7.	Dr. Larry Wong	Advisor, IFC/World Bank	Yangon
8.	Daw Daphne Aye	Rice Market Specialist, IFC/ World Bank	Yangon
9.	Mr. David Chan	Chief Operating Officer, Golden Sun Land Co., Ltd.	Yangon
10.	Mr. Wahyu Nugruho	Program Manager, Mercy Corps	Yangon
11.	U Thaung Win	MD of MAPCCO Golden Lace	Kyeik Lat
12.	U Aye Than	Kyeiklat Co.ltd	Kyeik Lat
13.	U Kyaw San Oo	Seed Grower	Bogale
14.	U Tin Nwe Oo	Seed Grower	Kyeik Lat
15.	U Kyaw Kyaw Lin	Paddy Seed trader	Ma U Bin
16.	U Kyaw Kyaw Aung	Head of FFS and Manager, Monsoon Foundation	Kyoun Gone
17.	U Tin Aung Win	Regional Minster for Agriculture	Pathein
18.	U Kyaw Win Tun	PC, Welthungerhilfe	Pathein
19.	U Win Myint Hlaing	MD, Ayer Pathein Co.,ltd	Pathein

Sr.	Person Meet	Organization/ Company	Place
20.	U Kyaw Swa Oo	Director, Department of Cooperative	Pathein
21.	Daw Su Su Naing	Director, Department of Cooperative	Pathein
22.	Daw Su Su Naing	Dy Director, DRD	Pathein
23.		Shwe Khit Arrman, Seed Growers	Bogale
24.	U Tin Aung Than	Seed Grower, Ohn Pin Su village	Mawlamy inekyun
25.		Seed Growers	Labutta
26.	U Soe Myint	Technical Adviser, Good Brothers	Yay Kyi
27.		Evaluator, LIFT	Pathein
28.	U Thaung Tun	Manager, Ayar Dagon	Yay Kyi
29.	Dr. Paung Shin Gum	International Liaison Officer, DAR	Naypyitaw
30.	U Khin Maung Nyunt	Director, DOA	Naypyitaw
31.	U Ko Ko Gyi	Director, DoA	Naypyitaw
32.	Daw Myin Myint Aye	Deputy Director, DOA	
33.	U Aung Soe	Permanent Secretary, MoC	Naypyitaw
34.	U Myo Thu	Director, Myan Trade, MoC	Naypyitaw
35.	Dr. Khin Thanda Win	Kyushu University, Breeding Project, DAR	Naypyitaw
36.	U Nay Win Mg	Regional Director, UAB Bank	Yangon
37.	U Nanda Tin,	Marketing Manager, Agribusiness Finance, Yoma Bank	Yangon
38.	U Kyaw Naing Oo	Head of Agr-Finance, YOMA bank	Yangon
39.	U Ye Min Soe	MAPCO	Yangon
40.	U Zaw Moe Aung	MAB	Yangon
41.	U Kyaw Ni Khin	Chief Business Officer, MAB	Yangon

Annex- 2 Template Questions

1. For Seed Growers/ DoA/ DAR

1.	What is the role of your organization?
2.	What varieties of paddy seed are released/ produced?
3.	Who are the main seed buyers from your farm and how much yearly do you produce?
4.	What types of seed quality assurance mechanisms are used?
5.	How do you think of legislative and regulatory frameworks of seed laws, regula. tions and Intellectual property right?
6.	How do you see the governance of seed sector?
7.	What capacities/ investments are required to enhance seed production of paddy?
8.	Analysis of seed sector governance
9.	What are the main challenges and gaps in seed value chain?
10.	SWOT analysis of paddy seed value chain
11.	How does the financial structure of your seed business?
12.	What sorts of financial arrangements are needed to develop your seed business?
13.	Do you have any experience in contract farming with key farmers to multiply seed?
14.	Do you have any experience in contracting with private sector to supply the quality seed?
15.	What are you recommendations for effective PPP in seed business?
16.	How could you overcome current challenges and gaps?

2 For Financial Institutes

For Financial Institutes	
1.	Please share your advise on the process of negotiation, getting common interest, incentives and financial solution with public Institute/ community?
2.	Investment model of your business?
3.	Governance in investment model
5.	S WOT of existing contract farming model
6.	What do you think of Warehouse Receipt System?
7.	How your business can benefit through PPP?
8.	How small holders can be inclusive in PPP model?
9.	Feasibility of PPP?
10.	Weakness and possible risks of PPP?
11.	SWOT
10.	Things to be changed
11.	Laws/ Regulations/ Legislation
12.	Incentives for the investment
13.	Protections for the investments
14.	M & E Machanisms
16.	Risks and Risk management factors
17.	Roles of third party authorization
18.	Other possible PPP Models and Recommendations

3. For Rice Exporters/ Seed Companies

For Rice Exporters/ Seed Companies	
1.	What contract farming are you working on?
2.	Investment model of your business?
3.	Governance in investment model
4.	Supply Chain of your rice business
5.	What is its main area of work, its size (turnover, number of employees), etc.?
6.	What is the motive to start contract farming?
7.	What type of varieties/ quality will be involved?
8.	What services/inputs will be provided to the farmer?
9.	What is the target number of farmers? Are they in groups/associations?
10.	Pricing agreements/ policy
11.	S WOT of existing contract farming model
12.	What do you think of Warehouse Receipt System?
13.	How your business can benefit through PPP?
14.	How small holders can be inclusive in PPP model?
15.	Feasibility of PPP?
16.	Weakness and possible risks of PPP?
17.	SWOT
18.	Recommendations to develop PPP in Seed business
19.	Things to be changed
20.	Laws/ Regulations/ Legislation

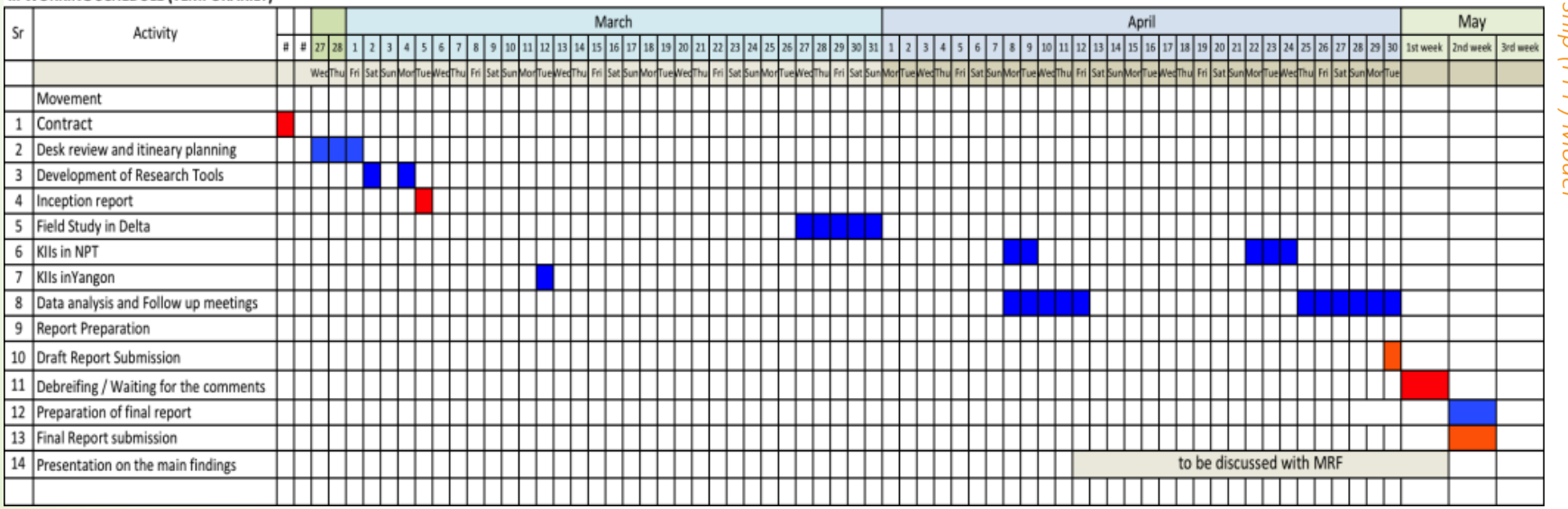
21.	Incentives for the investment
22.	Protections for the investments
23.	M & E Mechanisms
24.	Financial arrangements
25.	Risks and Risk management factors
26.	Roles of third party authorization
27.	Other possible PPP Models

4 For Farmers Groups

1.	What are current production and supply of paddy?
2.	What are challenges and gaps of paddy production in these years?
3.	How do you get the source of the seed and are there any difficulties to get the quality seed?
4.	How do you supply your product? Do you see any potential to get better market access?
5.	Pricing?
6.	What is your storability? Amount/ Duration/ Benefit?
7.	What sorts of post harvest facilities are used to maintain the quality of paddy?
8.	What do you think of Contract farming and Inventory credit/Warehouse Receipt System? Do you have any experience?
9.	What are the terms/ agreements to involve in these systems?
10.	What are the incentives for you to involve in?
11.	What are difficulties according to your experience in involving in these systems?
12.	Any comments and suggestions

Annex-3 Detailed Work Plan and Movement
(A bit flexible according to the availability of the Stakeholders)

II. WORKING SCHEDULE (TEMPORARILY)



Detailed work plan is attached with this report.

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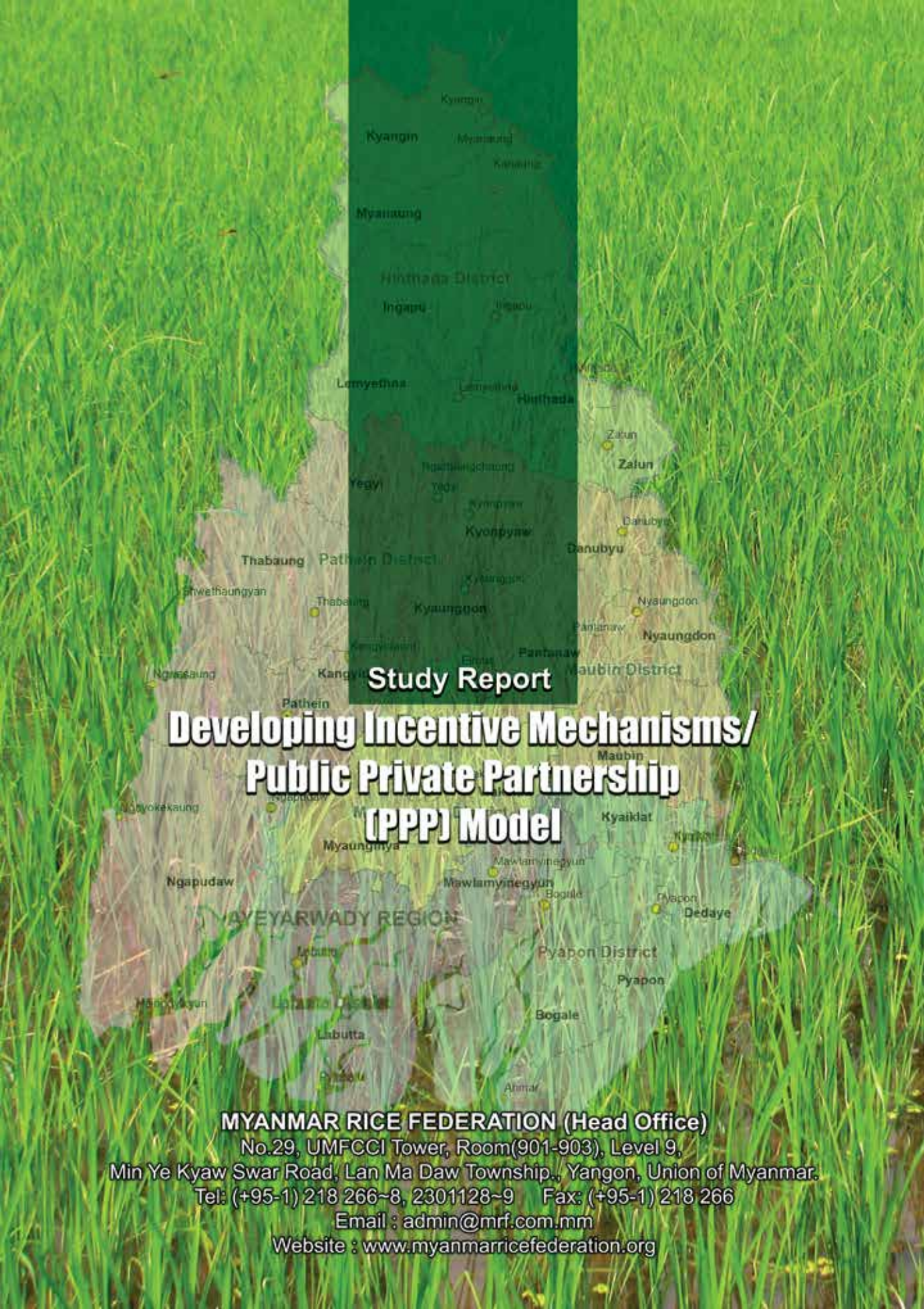
[i] Seed Sector Road Map document (2017-2020)
[ii] Myanmar National Seed Policy (2016)



Study Report

Developing Incentive Mechanisms/ Public Private Partnership (PPP) Model

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