



Rice Seed Sector Development in the Ayeyarwady Delta

Review of Lessons Learned

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Photo cover: U Ohn Thein, Welthungerhilfe Myanmar: Picture of Rice seed growers ordering and selling seeds online using Quality Seed app)

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List of abbreviations and acronyms

ACIAR	Australian Centre for International Agricultural Research
ADSP	Agricultural Development Support Program
BSK	Basket (an imperial volumetric measurement which for rice is about 22 kg)
DAR	Department of Agricultural Research
DOA	Department of Agriculture
DOC	Department of Co-operatives
DUS	Distinctness, Uniformity and Stability
CS	Certified Seed
EGS	Early Generation Seed
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
HH	Head of Household
IRRI	International Rice Research Institute
ISSD	Integrated Seed Sector Development
ISTA	International Seed Testing Association
JICA	Japan International Cooperation Agency
LIFT	Livelihoods and Food Security Trust Fund
MADB	Myanmar Agricultural Development Bank
MEAL	Monitoring, Evaluation, Accountability and Learning
MMK	Myanmar Kyat
MOALI	Ministry of Agriculture, Livestock and Irrigation
MRF	Myanmar Rice Federation
ODK	Open Data Kit
OPV	Open Pollinated Variety
QDS	Quality Declared Seed
PBR	Plant Breeders Rights
PGR	Plant Genetic Resources
PGS	Participatory Guarantee System
PGSS	Participatory Guarantee Seed System
PPP	Purchasing Power Parity
PVP	Plant Variety Protection
PVS	Participatory Variety Selection
RS	Registered Seed
RSC	Rice Specialisation Company
RSSD	Rice Seed Sector Development
SPA	Seed Producer Association
SPC	Seed Producer Cooperative
UNOPS	United Nations Office for Project Services
UPOV	International Union for Protection of new Varieties of Plants
USAID	United States Agency for International Development
USD	United States Dollar
VCU	Value for Cultivation and Use
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WHH	Welthungerhilfe
WUR	Wageningen University & Research

1 Introduction

1.1 RSSD project

The goal of the project on Rice Seed Sector Development in the Ayeyarwady Delta (RSSD project) is to contribute to increasing sustainable agricultural production by farmers by improving female and male farmers' access to and uptake of quality seed of improved and well adapted varieties. The project aims to strengthen the rice seed value chain, strengthening the performance of different operators and service providers, increasing demand orientation, and improving coordination among seed value chain actors. The project is implemented from October 2017 to June 2019 with a no-cost extension till September 2020.

The project has four components:

1. Supporting seed farms on Early Generation Seed (EGS) production
2. Supporting seed business development
3. Strengthening seed quality assurance
4. Strengthening seed sector coordination

The project is coordinated by a consortium of Welthungerhilfe (WHH) and Wageningen University & Research (WUR)-Wageningen Centre for Development Innovation (WCDI), with support from the associate technical partners Myanmar Rice Federation (MRF), Resilience B.V. and Mukushi Seeds. The project operates from the WHH office in Patheingyi. The project is supported by the Livelihoods and Food Security Fund (LIFT) in Myanmar.

1.2 This study

This study was commissioned by RSSD to review lessons learned on the following **learning questions**:

- a. How effective is EGS in meeting the expected market demand for Registered Seed (RS)?
- b. Have the key criteria selected for identifying key seed companies and producers been appropriate for selecting sustainable enterprises and farmers?
- c. Is the seed quality assurance system employed by the project (Participatory Guarantee System; PGS) appropriate, useful and acceptable for both seed farmers and enterprises and does it also provides a sustainable solution? And if not, what are the reasons and what could be possible alternatives?
- d. How effective and sustainable is the Ayeyarwady Seed Platform?
- e. Are the means of media employed by the project appropriate, effective and sustainable in sharing and dissemination of the project results within the seed sector leading to further upscaling?
- f. How effective is the project in providing value for money in the rice seed sector?
- g. To what extent has the project contributed to a more gender inclusive approach?
- h. Is the seed investment system effective and sustainable for government farms and what is its upscaling potential?

We have elaborated separate chapters on each of these learning questions. In addition, based on the learnings, a short **roadmap** has been elaborated with suggestions for scaling and replication pathways for the Myanmar Seed Sector based on RSSD lessons learned.

To answer the questions we reviewed and analysed project documents, studies and reports, including MEAL data and reports, along with project evaluation reports. In addition we studied information gathered by RSSD staff in Focus Group Discussions and from interviews by WCDI and the project team with key stakeholders during February and March 2020. Except for few visits in February 2020, the

entire study was conducted remotely using digital tools due to the measures followed to avoid COVID-19 spread.

2 EGS effectively meets market demand

In this chapter we address the question: *"How effective is EGS in meeting the expected market demand for RS?"*

The first RSSD project component aims to contribute to improving the capacity, infrastructure and management of the seed farms operating in the Ayeyarwady Delta. In this context RSSD developed an EGS demand forecasting system. The interface of this system is comprised of two mobile apps and one web-based platform. All interfaces fed-in and queried data from a single database. The app for registration of seed growers is exclusively owned and used by the Township Department of Agriculture (DOA) and Regional Seed Division. The other app (Quality Seed App) is an open app, available on Google play-store and is for ordering seeds, maintaining stocks, receiving information etc. RSSD also invested in hardware (tablets and computers) and data connectivity (mobile data and fibre optic connectivity). The question is whether the EGS app enhanced the effectiveness of EGS production and sales in the Ayeyarwady Delta.

We operationalized the learning question as indicated above into whether demand for registered seed in the Ayeyarwady Delta is increasingly being met by the seed farms and (~800) seed producers through support of the EGS app. We consulted three data sources:

1. The transaction data from the Quality Seed App as an indicator of seed supply
2. The seed order data from the Seed Web Portal as an indicator of seed demand
3. Information from an interview with staff of the Ayar Pathein seed company

The Quality Seed App started operating in February 2019. The app offers an easy way for farmers to order Certified Seed (CS), for seed growers to offer CS, for seed growers to order RS and for seed farmers to order RS from the seed farms (via the regional Seed Division). The key actors in the seed demand inventory and seed sales process were given data entry devices and internet connectivity. RSSD provided 26 Android tablets to 26 Township DOA personnel, along with data sim cards to upload data. Also, the regional DOA was equipped with a fibre optic high-speed internet connection with two computers to assist the data entry and back-end management. Five seed farms were also given laptops and internet connection dongles so that they could enter the data on seed demand and seed sales almost real time. The regional DOA and the regional Seed Division has been instrumental in urging the seed growers and farmers to use the app. In a few cases, WCDI through its Integrated Seed Sector Development (ISSD) Myanmar programme, has been instrumental in keeping the Union DOA Director General in the loop who in turn urged the Ayeyarwady regional DOA to transfer their seed ordering and logistics into this system.

We used the following indicators to assess effectiveness of the EGS app:

1. Volume of digital transactions;
2. Number of registered app and web portal users;
3. Supply of RS of preferred varieties; and
4. Timeliness of RS supply.

2.1 Volume of digital transactions

Analysing the demand and supply data, it was seen that almost 20,000 baskets of rice CS were transacted (inventoried, sold etc.) through the Quality Seed App in 2019 and 34,000 baskets in 2020. This is a 70% jump in the transactions through the app between 2019 and 2020 (see Table 1).

The RS demand for 2019 and 2020 can be obtained from the web portal ordering system. In 2019 there were orders coming from five townships with a total of 447 baskets of RS. This grew to

696 baskets of RS of rice from seven Townships in 2020, resulting in a 56% increase in the order volumes through the web portal (see Table 1).


Table 1 Rice certified seed transactions and registered seed orders in the Ayeyarwady Delta

	2019 (baskets*)	2020 (baskets)	Increase (%)
Rice CS transacted – through the Quality Seed App	19,958	33,943	70%
Rice RS ordered - through the Web Portal	447	669	56%

* 1 basket = 22 kg

2.2 Number of registered app and web portal users

In total there were more than 2,000 downloads of the Quality Seed App, but as per 31 March 2020 there were 466 active users of this app (see Figure 1).

▲ App name	Active installs ?	Google Play rating ?	Last update	Status
 Quality Seeds com.nwt.seed	466	★ 4.83	31 Mar 2020	Published

Page 1 of 1

Figure 1 Website statistics on the use of the Quality Seed App

There are total 650 seed producers registered by the 26 townships in the Registration application as per the July 2020 data. Figure 2 shows the distribution of seed producers consisting of seed companies, individual seed growers and NGOs. Moreover, all the five seed farms in the region are using the Web Portal to enter the stock data, which enables the Seed Division to take decisions on the supply against the orders.

There are approximately 1,500 individual seed growers in the Ayeyarwady region so having more than 600 users shows a good penetration. Moreover, due to the fact that many mobile phones in the country run on Chinese generic motherboards and Chinese operating systems, there is a problem of getting the app installed. To circumvent this problem seed growers use the cluster-method to buy and sell seeds, meaning that with the one or few more working android devices in the village, many farmers cluster their orders and jointly put up their seeds for sale over this device, sharing the application. Therefore, the actual user penetration is basically higher than as appears from the data we get through the system database.

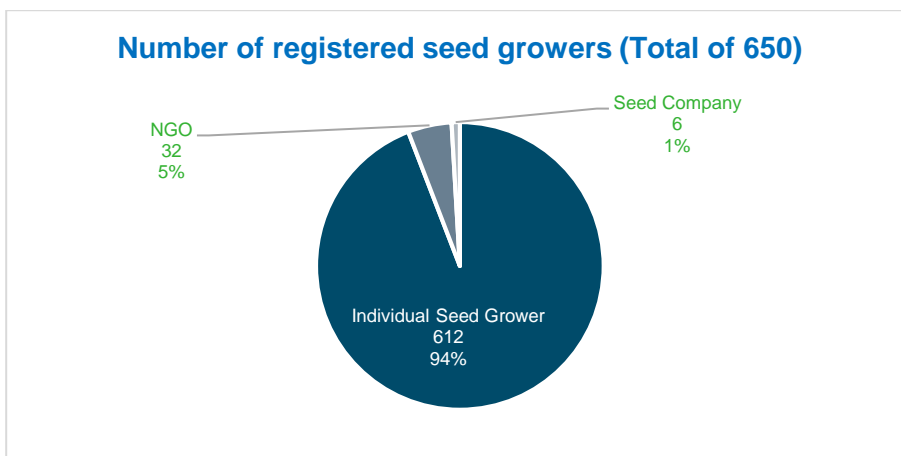


Figure 2 Type of registered seed growers in number and percentage recorded by the EGS app by the Township DOA

2.3 Supply of RS of preferred varieties

In an interview staff of Ayar Pathein seed company in February 2020 indicated that there has been a change over the past years in the varieties they are able to obtain from the government seed farms. Currently they get timely information on which varieties they will get, and also generally get the varieties they demanded. They indicate that the linkage with seed farms has been improved.

2.4 Timeliness of RS supply

In an interview staff of Ayar Pathein seed company in February 2020 indicated that where earlier they had to wait long for RS to be delivered, and they needed to 'push' and follow up; now RS supply is very smooth with the company receiving the seed soon after order. The relation between seed companies and the Regional DOA has improved. This is confirmed by RSSD staff.

The improved relationship between the seed companies and the regional DOA and government seed farms since the start of RSSD is also illustrated by company staff supporting the DOA field inspectors in field inspection if the seed crop.

2.5 Lessons learned

From the interview with the seed company as well as other discussions with seed growers, it was evident that the RS ordering system has been smoothened a lot as compared to the past. Before seed demand had to be made through orders by paper and the seed allocations were very late. Using the current EGS system and the mobile app, the regional DOA and the regional Seed Division is getting the orders right in time (in real-time) and is not dependent on the demand data registers reaching manually from 26 Townships to the regional Seed Division office in Pathein.

The system can also make allocations digitally, and the regional DOA seed staff are trained on how to do this. However, since the allocation approval always comes from the Union Seed Division the allocations are currently not done digitally yet. This app is currently not linked with the Union DOA or the Union Seed Division, so the allocations are still done manually, but using the data from the system. Therefore the RSSD project has invested on scaling up the system to the Union Seed Division, with more crops in its ambit to four more regions in the Dry Zone.

There are five DOA and one DAR seed farms in Delta. Two DOA seed farms out of five are under the management of Union DOA. In principle, these seed farms must report their inventory to Union DOA directly and need to receive a 'go' by Union DOA to allocate the seed stock. Union DOA prioritizes the seed demand of Regional DOA rather than other demand outside of the region. Another (3) seed farms are under the management of Regional DOA but Regional DOA also needs to report the inventory of these seed farms to Union DOA. Only then can the Regional Director allocate the seed stock of these three seed farms. It is translated that some inventory of the seed farms still require approval from Union DOA. After scaling up the system and handing over to Seed Division of Union DOA, EGS demand forecasting will be more active and effective for both private and public sector. Since seed growers and seed company could not receive RS allocation through EGS application for the time being, the usage of this application by private sector is still not upto the mark and Regional DOA couldn't allocate RS digitally through the web portal owing to these complicated approval requirements.

3 Criteria to select seed companies and producers

This chapter focusses on the question: "Have the key criteria selected for identifying key seed companies and producers been appropriate for selecting sustainable enterprises and farmers?"

The second RSSD project component aimed to improve seed business performance of seed companies and smaller seed growers in the region. For this purpose the project selected seed growers in Labutta, Bogale, Mawlamyegyun and Pathein townships as well as larger domestic enterprises producing and marketing rice seed in the Ayeyarwady Delta. We have a closer look at the selection criteria and look at increase in seed production as an indicator for seed business sustainability.

3.1 Criteria used to select seed companies and seed producers

Selection of seed companies

With an investment budget available for five companies, and after careful scouting only five companies being found in the Ayeyarwady Delta, the project decided to work with all five of them. As per the planning, the companies were coached in the development of a business plan to make investments effective and sustainable, and providing value for money. On 16 October 2018 agreements were signed with the five companies as indicated in Table 2.

Table 2 Seed companies supported in business development

No.	Company name	Managing director	Proposed investments
1	Ayeyar Pathein Development Public Co. Ltd (APDP)	U Win Myint Hlaing	Processing Plants and Seed dryer
2	Ayeyar Tagon Construction Co. Ltd	U Myo Min Aung	Modernized warehouse
3	Kyeik Latt Seed Production Enterprise	U Aye Min Tun	Seed dryer, Diesel Burner (From Italy brand), Diesel Generator, Warehouse
4	Mone Thidar Seed Production Co. Ltd	U Htay Shein	Seed Dryer 12 Tons 1 unit and Farmer excursion trip to Pwint Phyu Seed farm
5	Moat Thone (Monsoon) Rural Development Foundation (MTRDF)	Dr. Thaug Htun	Paddy seed Dryer and Building Construction Seed Warehouse

The project followed a process called "Lead Firm Facilitation"¹. The targeted seed companies were asked to express their interest in participating in the project submitting their initial business ideas. Subsequently, they were invited to participate in business planning and orientation workshops in order to focus and review their investment proposal. The proposals were then subject of a due diligence process with field visits and bilateral discussions to achieve an investment plan, which is simpler than a full business plan and focused on the key bottleneck that the seed business wanted to address. Next, the investment plans were submitted to a selection committee and cost share agreements were developed for funding the investment plan or parts of it. Find the process visualized in Figure 3.

To be effective the approach needs to adhere to the following key principles:

- Being based on initial ideas of the seed companies;
- Intensive engagement during the planning and selection stage with training, exchanges, field visits and due diligence;
- Simplicity of the investment plan compared to formal business plan;

¹ McKague K., Siddiquee M. (2014) Lead Firms. In: Making Markets More Inclusive. Palgrave Macmillan, New York.

- Compulsory co-investment with a minimum of 25% of the company and maximum amount proportional to business size.

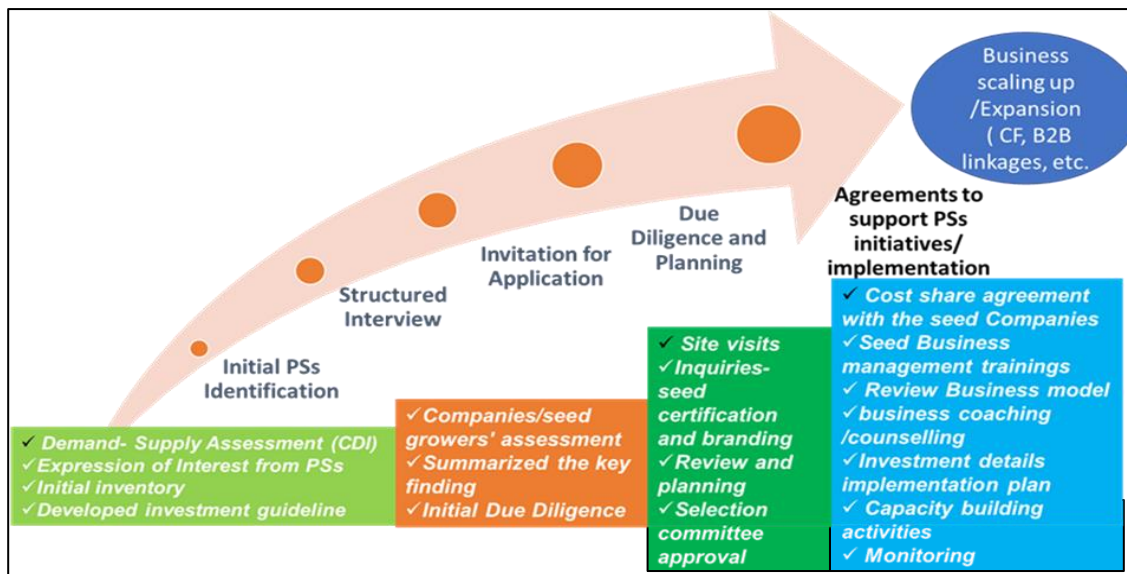


Figure 3 Overview of methodology to engage seed companies ²

Selection of seed growers

The project aimed to select 150 seed growers, which may be individual private seed growers or seed growers in groups supported by NGOs or in Seed Growers Associations supported by government. For reference, the total number of contact growers in 26 townships of the Ayeyarwady Delta is around 1,354. As mentioned above, RSSD focussed on four townships, i.e. Labutta, Bogale, Mawlamyegyun and Pathein. We aimed to select 150 seed producers for an assessment to finally select the 50 most potential ones for the development of a business plan. The initial group was selected based on criteria including:

- Willingness to work with the project
- Seed production area
- Equal division among the 4 townships (approximately 35 per township)
- Including seed growers with high seed business potential who are not seed contact growers to DOA
- Opportunity for eventual clustering of seed growers, to make collaboration easier

Finally 126 seed growers were selected and assessed using key performance indicators and scoring for success factors for seed business in the areas of being technically well equipped, market oriented, professionally organized, strategically linked³. Based on the assessment data, 50 seed growers were selected based on the following criteria:

1. Type of seed grower. Private, association, PGS etc.
2. Minimum of 3 years of experience in seed production (to adjust with seed production acres)
3. Minimum of 5 acreage
4. How much of the produce they sell as seed
5. Having a future vision on expanding the seed business
6. Having access to a warehouse to be able to store seed

RSSD asked the 50 selected seed producers to submit a business plan, with the intention to finally select 25. But even after rigorous coaching only 22 seed producers had a good enough business plan to continue with. Find one example of a farmer profile and business plan in Annex 1.

² VALUE CHAIN/MARKET SYSTEM DEVELOPMENT PROGRAMS, Online Repository of Documents and Tools. Action For Enterprise. weblink <http://afe-us.org/rep.php>. Action For Enterprise, 4600 North Fairfax Dr, Suite 304, Arlington, VA 22203, USA. Tel: +1 703 243 9172

³ Programme on Integrated Seed Sector Development in Ethiopia. 2015 Annual report. Wageningen UR, Centre for Development, April 2016; Report CDI-16-012 (weblink <https://edepot.wur.nl/395911>).

3.2 Sustainability of seed companies and seed producers

Performance of seed companies

In 2018, RSSD started coaching the seed companies; investment plans were laid out and investments were made. Table 3 and Figure 4 give the production details for the five before mentioned seed companies. Moreover from the sustainability point of view, 4 out of 5 companies increased their share of profit re-investment after the RSDD took over and coached them for creating business plans.

Table 3 Company seed production and profit reinvestment

	Seed production 2018 (baskets)	Seed production 2019 (baskets)	Profit reinvested Before RSSD	Profit reinvested After RSSD intervention	Change in production 2018-2019 (%)	Price of seed of different varieties (MMK/basket)	Special remarks
Ayer Pathein	14,200	17,000	50%	80%	19.7	Paw San Yin: 15,000 Thee Htet Yin: 12,000	They started contract farming with seed growers./Increased their own producing acres.
Kyeik Latt	25,500	46,000	50%	70%	80.4	Paw San Yin: 17,000 90 days: 11,700	They started contract farming with seed growers.
Moat Thone (Monsoon) Rural Development Foundation (MTRDF)	4,680	4,400	30%	60%	-6	Paw San Yin: 12,000 Sin Thu Kha: 10,000	They started contract farming with seed growers.
Mone Thidar	6,650	26,700	50%	90%	301.4	Paw San Yin: 25,000 90 days: 10,000	They started contract farming with seed growers./Increased their own producing acres.
Ayar Tagon	10,850	18,000	40%	40%	65.9	Ayar Min: 10,000	They used other business (During Covid-19 crisis)

1 baskets = approximately 22 kg of rice. Source: RSSD M&E data of the seed business team

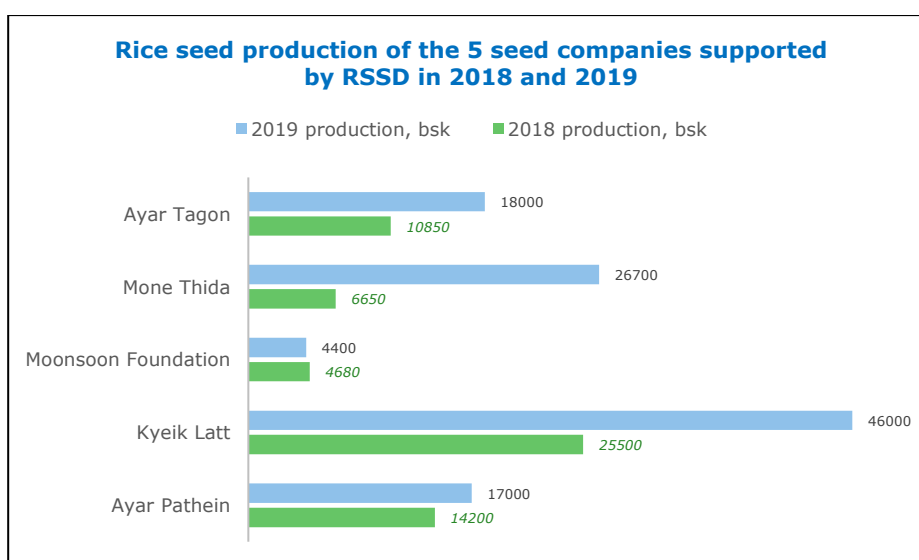


Figure 4 Company seed production in 2018 and 2019

Whereas Ayer Pathein and Ayer Tagon are older and well-established seed companies, the other three companies were new in seed business in 2017. With coaching in seed business management, which started in March 2018, four of the five companies increased seed production volumes from 2018 to 2019; the older companies also increased seed production volumes from 2017 to 2018.

Performance of seed growers

Considering the impact of investment by RSSD on the individual seed growers, the impacts were more qualitative, over and above quantitative. Find more details in Table 4, which show that seed production volumes increased after the project granted co-investments to the selected 22 seed growers with a business plan. Seed growers used this fund for different purposes; find an example in Appendix 2. In a meeting in February 2020 with 11 seed growers the team learnt a lot about the qualitative changes that happened during the course of the project, based on the support given to the seed growers.

Table 4 Certified seed production by seed growers

No	Name of seed grower	Seed prod. 2017 (bsk)	Seed prod. 2018 (bsk)	Seed prod. 2019 (bsk)	Profit reinvested Before RSSD	Profit re-invested after joining RSSD	Price of seed (of different varieties) (MMK/bsk)	2017 indicative income ('1000 MMK)	2018 indicative income ('1000 MMK)	2019 indicative income ('1000 MMK)
1	U Saw War Gae	230	200	0	No data	2%	12,000/bsk (Paw San Yin)	2,760	2,400	0
2	U Nay Soe		1,650	2,520	10%	30%	12,000/bsk (Paw San Yin)	0	19,800	30,240
3	U Aye Kyawe	1,800	1,275	2,000	20%	70%	12,000/bsk (Paw San Yin)	21,600	15,300	24,000
4	U Tin Aung Than	1,480	2200	2,000	70%	80%	Did not sell	17,760	26,400	24,000
5	U San Tun	230	660	1,400	30%	50%	7,000/bsk (Paw san Yin)	161	462	980
6	U Myo Myint Aung	480	1,120	950	10%	15%	Did not sell	336	784	0
7	U Kyaw Thura	2,500	915	900	30%	50%	10,000/bsk (Paw San Yin)	30,000	10,980	10,800
8	U Saw Gae La Mon	600	710	875	10%	20%	8,000/bsk (Thee Htet Yin)	4,800	5,680	7,000
9	U Kyaw Htay	480	702	780	20%	40%	12,000/bsk (Ayar Min)	5,760	8,424	9,360
10	U Thein Soe		1120	770	15%	50%	10,000/bsk (Ayar Min)	0	11,200	7,700
11	U Par La Kyi		630	640	5%	5%		0	7,560	7,680
12	U Saw Peter	250	650	600	20%	35%	15,000/bsk (Paw San Yin)	3,000	7,800	7,200
13	U Aung Zaw Moe	520	550	500	20%	20%	10,000/bsk (Ayar Min)	5,200	5,500	5,000
14	U Thet Naing Tun	350	420	350	-	-	8,000/bsk (Sin Thukha)	4,200	5,040	4,200
15	U Mg Kyi	84	80	300	20%	20%	Not sell	1,008	960	3600
16	Daw Aye Ei Ei Aung	180	355	260	5%	10%	8,000/bsk	1,440	2,840	2,080
17	U Sein Than	250	280	250	20%	20%	Did not sell	2,000	2,240	2,000
18	Daw Khin Htay Win	160	200	200	10%	20%	Did not sell	1,280	1,600	1,600
19	U Myint Aye	150	200	200	40%	50%	10,000/bsk (Paw San Yin)	1,500	2,000	2,000
20	U Soe Oo	165	360	200	20%	30%	15,000/bsk (Paw San Yin)	2,475	5,400	3,000
21	U Myint Oo	130	200	50	5%	10%	Did not sell	1,560	2,400	600
22	U Thar San	700	605	0	5%	20%	Did not sell	8,400	7,260	0
Total		10,509	14,882	15,745	Mean 18%	Mean 31%		115,240	1,152,030	153,040

Source: M&E data of the RSSD seed business team

Seed growers mentioned that the trainings on quality seed production and seed storage have been helping them to produce better quality seed and keep them safe in their warehouses. Their earnings become more as they can now wait while their seed is safe in the warehouses till the seed prices are high enough to gain increased profit on seed sales during the next planting season. The trainings on book-keeping and business management have equipped them with the knowledge and skills to run a healthy business where they can factor in all the overheads, expenses and profit. This also made the businesses sustainable since they allowed for re-investment of the profits into the business.

Based on all information gathered we conclude that the major factors enhancing the self-reliance of the seed growers are a basic experience in seed production and possession of a considerable land holdings giving them the flexibility to carry on seed production or grain production based on the market situation. The funds and training provided by RSSD made their endeavour more sustainable. We conclude that the selection process leading to support of the 22 seed growers with a feasible business plan has been effective.

3.3 Lessons learned

The indicators that prove the effectivity of the selection procedures (of both seed growers and companies) are highly empirical and indirectly quantitative. Empirically, the seed growers feel more empowered about their current status of knowledge and proximity to a good network of other seed growers. Due to these 'soft' gains they are less likely to quit seed business. Criteria of selection included 'membership of a seed association' and 'experience'; these criteria were indirectly beneficial to ascertain that the seed growers will benefit from the project grants.

Talking about the effectiveness in terms of indirect quantitative criteria, we saw change in production volumes after support of the project, which is quite a strong indicator seeming to show that companies and seed growers responded well towards 'investment-injection'. This envisages that the selection criteria were effective; such a response is not possible in poorly selected enterprises. Since all the five companies operational in the Ayeyarwady Delta were supported by the project, the question somewhat loses its significance.

4 Usefulness of the Participatory Guarantee Seed System and other QA interventions

This chapter elaborates the answer to the question "Is the seed quality assurance system employed by the project (Participatory Guarantee System) appropriate, useful, acceptable for both seed farmers and enterprises and also provides a sustainable solution? And if not, what are the reasons and what could be possible alternatives?"

The third project component supports strengthening of the seed quality assurance system, also looking into alternatives for seed certification. The Participatory Guarantee System (PGS) is an internal seed quality control mechanism that was adapted from a previously used system in organic certification. Basically, it is a peer-reviewed self-certification through peer-group field inspection by a group of seed producers who have assembled voluntarily to get their field inspected by the group itself. Even though it has been proposed as a process that will take away the load from the DOA seed inspectors because it requires less staff for field inspections, DOA had its reservations as they did not have confidence on quality of the field inspection conducted by the group members.

To obtain the buy in of DOA, a modified system was proposed. The modified system includes training the PGS group members in field inspection and data management, and also includes an audit of 5-10% of the PGS group member fields to be inspected by DOA field inspectors. The audits are a way to ascertain that the quality of the field inspections being done by the group members is as required. The group members use the same inspection procedures and documentation as the DOA seed inspectors use. Therefore, the data integration of the inspections is smooth. This modified PGS system is also known as Participatory Guarantee Seed System (PGSS) or PGS2.0. This modified system has been propagated by the RSSD project. The figure below states the scheme of operation for the PGSS.

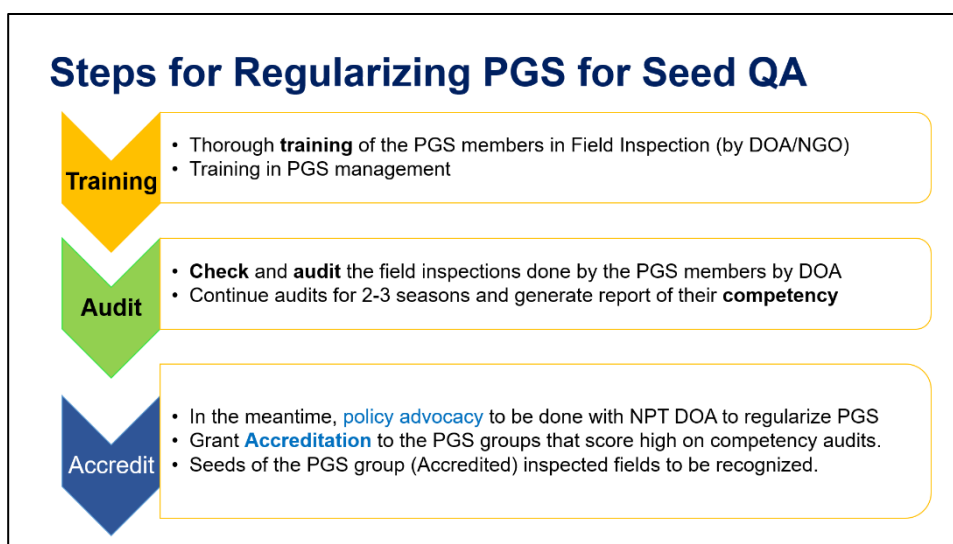


Figure 5 Steps in operationalizing the Participatory Guarantee Seed System

4.1 Appropriateness, usefulness and acceptability of the PGSS

The short duration of the project did not allow to pilot this system, but appropriateness, acceptability and usefulness of the system can be concluded from the workshops held, groups being formed, informal arrangements being practiced and government departments being interested to integrate the system in their work. The appropriateness and acceptability of the PGS for private seed growers is shown through the fact that it is extensively practiced in the Ayeyarwady Delta PGS with groups formed by individual seed producers. In some township there is already an informal agreement where DOA conducts the final field inspection while the guarantee system ensure the initial field controls⁴.

4.2 Sustainability of the PGSS

The PGS or PGSS system can only be sustainable when adopted by government. The appropriateness, usefulness and acceptability of the modified PGS for government was shown after a workshop in September 2019 in which the proposed system was presented to the Union DOA for a buy-in. The modified system (including PGS group training and audits) was very much liked by the Union DOA and they assigned the Department of Co-operatives (DOC) to work on this system for seed producing co-operatives, providing evidence of the modified system having approval of the government.

The informal arrangement in which DOA is doing the final field inspection and PGS groups are doing the initial field controls indicates that the DOA finds the modified PGS acceptable and useful. However, this is not yet a formal approval of the PGS since DOA is not in the position to delegate inspections formally, but indicates the interest of DOA to apply PGSS⁵.

Certain policy aspects need to be considered by the Union DOA to make this system fully operational after the first successful pilots; these are:

- Promotion of 'PGS certified seeds' which has standards similar to CS; with the DOA to recognize the PGSS groups;
- DOA approved methodologies for auditing, licencing and licence renewal procedures in place; these regulations and procedures can be placed as an annex to the Seed Law;
- Procedures/rules for monitoring of the PGSS groups. Every year 5% (or any other decided portion) of the area under PGS certification will be independently inspected by DOA and the results compared statistically with ranges of tolerance. Non-conformities beyond the allowable statistical range are liable to licence cancellation⁶.

4.3 Other QA interventions: Seed Lab and QA capacity

Pathein seed lab established so that all the seed samples in the Delta (Ayeyarwady region) are tested within the region and no time is lost to transport to the Yangon seed lab (200 KM away) which is already overburdened with the samples from more other regions. The lab is based on the Quality Management System as prescribed by the ISO:IEC 17025:2005 EC (International system for accreditation of laboratories), which makes it easier to obtain ISTA2 accreditation in the future.

Capacity of the Regional DOA seed inspectors

⁴ Source: Geilfus, F., 2019. Final evaluation of the project Support to Rice Seed Sector Development (RSSD) in the Ayeyarwady Delta, Myanmar. UNOPS LIFT, Yangon.

⁵ Source: Geilfus, F., 2019. Final evaluation of the project Support to Rice Seed Sector Development (RSSD) in the Ayeyarwady Delta, Myanmar. UNOPS LIFT, Yangon.

⁶ More details can be found in the PGSS manual as developed by the project:
<https://www.dropbox.com/s/qyjbmq94w9hweib/PGS%20MANUAL%20Ar nab%202020.docx?dl=0>

Seed Inspectors and seed staff of regional DOA trained in field inspections, Quality Assurance and Seed Lab operations. They were trained in the most modern methods of performing QA operations. A team of the Regional Seed Division was also flown to India to attend the ISTA Conference (Hyderabad) so that they know about the advances happening in the field of seed testing in the South East Asia and internationally as well.

The QA System

The 3 interventions made by the project is currently being referred to as the QA system. The effectiveness, usefulness and appropriateness of this system will be discussed in the next chapter. As per the theory of change for the project, the activities were concentrating mainly on the identified gaps in the seed QA scenario. The planned strategy contributed towards the realization of some quick but long term solutions focussed to these gaps.

Is the system appropriate and useful?

The seed lab is the most important addition to the force of the regional DOA seed division. Now the Ayeyarwady region has its own seed testing lab and the samples need not travel to the Yangon seed lab to get them the seed certificate. The Ayeyarwady region is the largest rice seed producer in the country (80%)³ and all the samples certification used to be delayed due to the Yangon lab logistics, which caused delayed results and seed growers had to sell seeds (uncertified) at low prices. This system is appropriate and useful in terms of the quality service provision to the seed growing farmers in the delta.

Looking into the training (onsite) capacity building, the , more than 100 DOA staff and Regional Seed Division staff were trained in different aspects of seed quality assurance, starting from, internal quality control, PGS system, seed testing, ISTA methods etc. A total of 10 training sessions comprising of >20 days were conducted by specialists in seed quality assurance.

4.4 Lessons learned

The PGSS with its inherent qualities has high potential to enhance the quantity of quality seed that is produced first in the Ayeyarwady Delta, and later in the whole of Myanmar. The primary hindrance to the very skilled seed inspectors to assure the seed quality is logistics and budget. The PGSS system practically decentralizes a part of the quality assurance system, but still the main power to grant accreditation lies with the DOA or Seed Division. Monitoring and audit also happens in front of the DOA's eyes, so the confidence level of the DOA on the PGSS groups is quite high.

The DOC currently implementing the system under their own review, is a big step towards creating high level buy-in. In summary:

- PGSS is necessary to increase the area under quality seed production;
- The system is voluntary but highly technical;
- The system does not yet have DOA accreditation, so needs further policy interventions;
- Through the 3 proposed steps as indicated in Figure 4 above, PGSS may be mainstreamed for running in parallel with the regular DOA seed certification system as an internal quality control mechanism.

The capacity building programmes of the DOA staff in Seed testing, Seed Certification had been very effective in increasing their knowledge and awareness about seed quality assurance nationally and internationally. The visit to India for the ISTA Conference exposed the Regional DOA Seed Team to the international players in seed testing. A detailed report can be found in the link here⁴. Four staff from the Regional Seed Division (along with a project seed expert) visited the ISTA conference to gain knowledge on the recent advances on seed testing.

5 Effectiveness and sustainability of the Ayeyarwady Seed Platform

In this chapter we look into the question: "*How effective and sustainable is the Ayeyarwady Seed Platform*".

Seed sector stakeholders in the region experience lack of coordination and collaboration in the rice seed value chain. As a result, there is a mismatch between demand and supply of different classes of seed and varieties. The fourth project component supported the establishment of a seed sector platform to support sharing of experiences and innovations, alignment of investments and activities, improve collaboration, avoidance of overlap of interventions and increased efficiency.

The platform aimed to bring together more than 60 participants from the private sector, public sector and development partners to improve seed sector coordination in the Ayeyarwady Delta. The platform had the objectives to develop a joint action agenda guiding seed sector development in the region, elaborating and implementing actions that arose from the Platform Meetings, facilitating partnerships to solve seed sector bottlenecks, sharing information and experiences, linking seed demand with seed supply and contributing to the National Seed Sector Platform Agenda.

Prior to the first Platform Meeting, a Platform Secretariat was constituted under the auspices of the Regional DOA. Six problem areas and bottlenecks in the seed sector of the Ayeyarwady Delta had been pre-identified by the Secretariat; six working groups were then put together and prompted to find solutions and developed actions for the prioritized problems. Till the end of the project there were 5 platform meetings (one being virtual) and 10 Secretariat meetings. Find below a discussion on the effectiveness of the platform with specific indicators and evidence.

5.1 The action agenda

The Action Agenda for the Regional Seed Platform (Ayeyarwady Delta) was drafted in the 1st Ayeyarwady Seed Platform meeting on 14 June 2018. It was adopted by the Platform Secretariat on 20 September 2018 and endorsed by the Regional Directorate on 25/09/2018. The action agenda elaborates the bottlenecks in the Regional Seed Sector and the steps that can be taken to absolve these hurdles. The deliberations were discussed, pros & cons debated, and the team finally arrived at the final Action Agenda. These agendas will pave the way for a smooth running of the Regional Seed Sector and help the marginal rice farmers of this region to have access to better quality seeds and diverse markets. The government sector will also benefit by proper operational guidelines in the seed farms, township seed divisions and Regional Directorate, to function and serve in a seamless way. There were 6 thematic areas of the action agenda and all rice stakeholders, including the policy makers joined forces to address the bottlenecks.

Theme 1: Increasing the uptake of quality seed of improved varieties through variety promotion

Theme 2: Incentivizing the private sector to invest in seed production, cleaning and storage

Theme 3: Ensuring adequate field inspections and fast seed testing for seed producers

Theme 4: Increasing the production of early generation seed at the seed farms

Theme 5: Involving rice traders and rice millers in the seed-value-chain

Theme 6: Stimulating local seed production and creating market linkages

In all the platform meetings, who does what, when, aspects of the bottlenecks were discussed and some very concrete action plans were implemented. These agendas and discussions were very broad, an example of a theme is presented in Annexe 2 for more insights.

The project, together with the MRF, fully utilized the recommendation of the two studies

- a. Contract Farming Models and
- b. Private-Public Partnership (PPP) incentive mechanisms.

A national information sharing event was organized by the project and MRF, based on the findings of the contract farming study and the study of incentive mechanism for seed sector – this activity has been incorporated in the Agreement Extension with MRF,. Some very important activities were implemented through collaboration with the MRF. The first is a contract farming study and national meeting. MRF and RSSD jointly organized a successful policy advocacy forum on this topic. MOALI has already drafted SOP standards on contract farming by incorporating some of the key recommendations from this national level stakeholders meeting. This is one of the big breakthroughs on policy advocacy issues for rice sector development in Myanmar in general. In addition, this collaboration published a popular **seed production manual** and distributed about 20,000 copies to small holders farmers nationally. MRF member companies voluntarily contributed about 15,000 USD to publish an additional 15,000 copies of the manual. This was published in Myanmar language and English language as well.

5.2 Appreciation and sustainability of the seed platform

So far RSSD organized five regional seed sector platform meetings and ten Platform Secretariat meetings. The participation level increased over the course of the meetings, from 78 to 87 with a jump to 99 participants in the 3rd meeting and 116 in the 4th meeting and 42 in the 5th virtual meeting. This shows the popularity of the Ayeyarwady Seed Sector Platform among rice value chain actors. Since it was supported by the DOA, we have seen a large participation of DOA staff from the beginning. But from numbers of participating seed companies and farmers steadily increasing since the first meeting, we conclude that the platform has a function in linking seed sector stakeholders including seed suppliers and seed users. This shows a sustainable model of an activity which has been initiated by policy makers (DOA in this case) and carried forward by other value chain actors (companies, farmers, seed growers etc.).

MRF is in the process of embedding the seed sector platform within its regular annual plan. MRF was planning to organize a national platform meeting in 2020; however, it was proposed to be held in May for the monsoon paddy season and in November for the summer paddy season. Seed Sector Platform Meetings can be held in conjunction with the Seed Fair to reduce costs and increase the potential for sponsorship by companies and private entrepreneurs. Seed companies and private entrepreneurs should sponsor regional seed fair in the future including considering charges for hiring booths to ensure cost recovery. The annual seed fair could be held on National Farmers Day normally at the end of February to directly link with government sponsored events.

MRF is discussing with the regional DOA and its regional network on how to organize seed platforms meetings in future, looking also for potential linkages to international fora to support future collaboration (Indian Seed Congress, Asian Seed Congress by APSA, SRP forum, etc.).

5.3 Lessons learned

Exit strategy

It is assumed that the approach mentioned above will ensure institutional sustainability and self-perpetuating higher productivity in the rice sector. The exit strategy is clear, since the project operates within given limited time and budgetary frames, the integration of the DOA (Government) in the ownership and planning processes will help sustaining the activities. Mentioning a few, the seed lab and the EGS Demand forecasting system will be completely owned by the Regional DOA. It becomes a Government mandate to absorb and maintain these facilities to serve the poor and marginal rice seed and grain farmers. The Ayeyarwady Regional Seed Platform is being planned to be handed over to Regional DOA for strategical interlinking rice stakeholders in the Ayeyarwady Region which is a primary mandate for the PPP model if the Union government too. This again ensures

sustainability as MRF will continue the work the action agendas which are adopted in the platform meetings.

Self-reliance

The Rice seed sector now have big levels of confidence and self-reliance owing to the networking and open communication channels laid down by the regional seed platform. It has given a sense of ownership, irrespective of the stakeholder hierarchy. The plat having its own logo and brandings adds to this feeling. Through the platform, the regional issues on rice sector has gained a voice and the stakeholders are being represented (via the regional platform) in different meetings including the National Seed Platforms. This is a big lesson learned which elaborates further the necessity of similar platforms in other regions.

Products

The Seed Production manual produced by this platform is of an excellent quality. It has more illustrations than text so very motivating for farmers to read and follow. The studies on incentive mechanisms and contract farming model are highly relevant and the platform had aptly propagated this to other stakeholders.

6 Effective media employment

The next learning question assesses media use: "Are the means of media employed by the project appropriate, effective and sustainable in sharing and dissemination of the project results with the seed sector leading to further upscaling"? We try to answer this question in this chapter.

There were several media and communication tools deployed for various reasons. Notably, to communicate, spread awareness, engage discussions, promote co-operation, among others. The elements/tools that were deployed, were:

- Website⁷
- Facebook page⁸
- LinkedIn account
- Newsletters
- Seed Fairs
- Face-to-face trainings

6.1 Website

The website was developed with the easy site builder called wix.com and was the primary engagement media that was used as a primary reference platform for the general public. The website had information on the activities, goals, news and even some useful reference materials (manuals, policy papers etc.). The website was used to send bulk emails to relevant stakeholders on the happenings, programmes and new releases. Find a picture of the webpage below.



Figure 6 Picture of the RSSD webpage

Looking into the analytics data from Google Analytics®, we have more than 1,100 visitors for the website with a wide distribution of geographical locations for the logins (see Figure 7). The site is not

⁷ Find the website at: www.riceseedsector.com

⁸ Find the Facebook page at: <https://www.facebook.com/RSSDMyanmar/>

just popular in Myanmar, it is equally used in the USA, India, Netherlands, Germany, Finland and even places in Africa. This clearly indicates the global concern that the RSSD has been providing information and solutions for the gaps in the seed sector.

Country ?	Acquisition		
	Users ? ↓	New Users ?	Sessions ?
	643 % of Total: 100.00% (643)	648 % of Total: 100.00% (648)	1,207 % of Total: 100.00% (1,207)
1. Myanmar (Burma)	329 (50.00%)	330 (50.93%)	755 (62.55%)
2. United States	102 (15.50%)	102 (15.74%)	102 (8.45%)
3. India	44 (6.69%)	42 (6.48%)	54 (4.47%)
4. Netherlands	44 (6.69%)	43 (6.64%)	103 (8.53%)
5. Germany	17 (2.58%)	17 (2.62%)	44 (3.65%)
6. Finland	15 (2.28%)	15 (2.31%)	15 (1.24%)
7. France	7 (1.06%)	7 (1.08%)	7 (0.58%)
8. Uganda	7 (1.06%)	6 (0.93%)	10 (0.83%)
9. Austria	6 (0.91%)	6 (0.93%)	6 (0.50%)
10. Switzerland	5 (0.76%)	5 (0.77%)	10 (0.83%)
11. China	5 (0.76%)	5 (0.77%)	5 (0.41%)
12. Japan	5 (0.76%)	5 (0.77%)	6 (0.50%)
13. Singapore	5 (0.76%)	4 (0.62%)	5 (0.41%)

Figure 7 Website statistics on users of the RSSD website

The website also had more turnout with the young generation who are considered as the very potent age group who can make a difference and bring about systemic change among their peer group. Note that more than 60% of the visitors were below the age of 44 (see Figure 8). Please note that 45.1% of the website visitors was female.

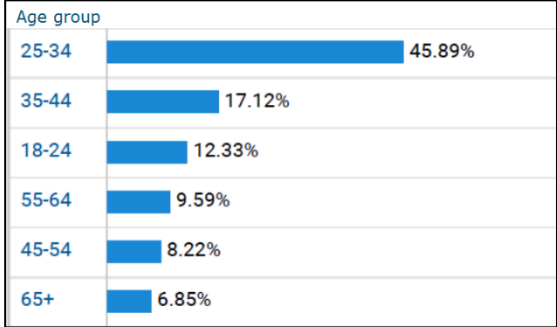


Figure 8 Statistics age of users of the RSSD website

6.2 Facebook page

The Facebook page called “Rice Seed Sector Development” was created in July 2018 (see Figure 9) and since then has been followed by 764 followers engaging in different capacities (see Figure 10). The page has very vigorous engagements with the audience and many stakeholders including the beneficiary seed companies like the page and post in it. There are more than 30 seed growers who are liking the page and following the updates; most of the time the farmers sons or daughters are a member.



Figure 9 Picture of the RSSD Facebook page

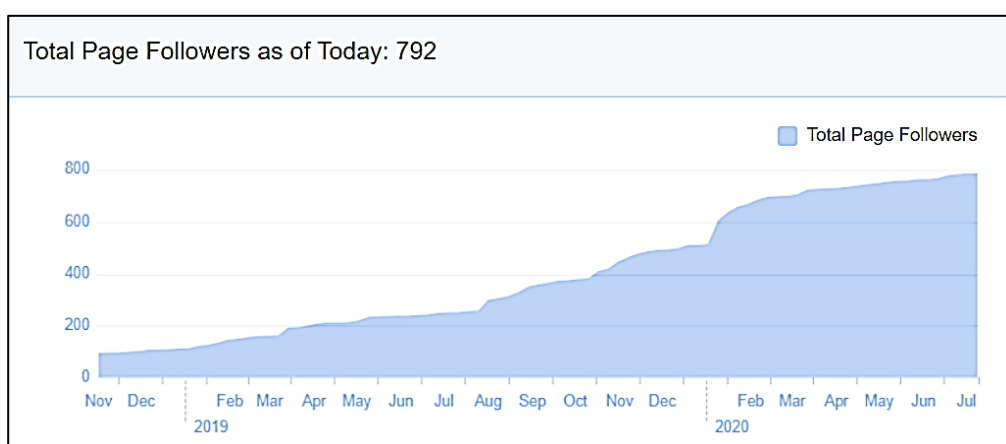


Figure 10 Numbers of RSSD Facebook page followers

6.3 Lessons learned

Taking into consideration the situation of Myanmar where approximately 80% of small and marginal commerce happens through Facebook pages and 90% of digital communication happens through weChat® or Viber®, the deployment of project activities and subsequent updates are quite appropriate through the mentioned media⁹. There are more than 22 million Facebook users in Myanmar and the figure is on the increase. So, for a popular and quick means to spread any information, Facebook is one of the bigger tools.

Links to the website are always there in the Facebook page so a lot of traffic is diverted to the website through the Facebook channel.

Moreover, the website was developed using the tool wix.com which allows email campaigns. This tool enables to compose brilliantly visually attractive news items, event invitations via email to many users. This increased the interest of the viewers and receivers.

The project continuously gets focussed in the Myanmar based local Television channels (Sky TV, MNTV, Myawady TV, MRTV etc). the most highlighted activities that got aired were the Seed Fairs, signing ceremony of the RSSD with the Women Led seed grower initiative, the platform meetings

⁹ Source: ecommerceIQ.com and Myanmar Times.



7 Value for money

The question "How effective is the project in providing value for money in the rice seed sector?" is addressed in the current chapter.

Evidence of cost effectiveness is primary to show that investment in seed production is profitable and a good "value for money". The project has monitored the increase of sales of seed (quantity, price and profit) by local seed businesses and companies (see chapter 3) compared to investment to evaluate a direct input/output ratio. The project is currently developing a simple procedure booking system so that the seed growers will be trained to systematically store all the records. Also, it is developing a seed inventory system for companies, which will help them to get the data systematically. The yield/ha and price/kg of paddy rice from farmers accessing quality seed will also be monitored (via samples) to create an indirect cost/benefit ratio. Three years projections will also be made to calculate the estimated direct and indirect cost/benefit ratio¹⁰.

Proving this can stimulate further investment. This should be achieved in the most effective way, which then could serve as best practice and be scaled up to other regions. However, from all this one will not be able to conclude reliably whether the agricultural productivity of smallholder farmers can be sustainably increased, in other words: whether the targeted high-level outcomes of the project will be achieved. Two growing seasons will be too short to make precise reliable statements (though plausible, partially evidence-based assumptions).

7.1 Key elements good value for money

Selected key elements of RSSD are likely to prove good value for money. We further elaborate them below.

The EGS platform was designed at a competitive cost by a Myanmar based company (Global New Wave tech) and can now be scaled up at national level as the piloting was successful. Starting with rice is now being adapted to other crops.

The business facilitation approach has proven its potential for brokering private and farmer investment; it is also highly reproduceable provided other development interventions chose to adopt it and spread its philosophy, until formal finance can take the process up.

The total investment in establishing the seed testing laboratory (project management costs not included) is around 18,000 USD. This indicates the possibility of easily replicating similar investments with other existing seed laboratories, at an improved cost effectiveness considering that quality procedures and IT system have already been developed. Since the lab management is based on ISTA and ISO:IEC 17025:2005 EC protocols, the system is highly self-sustaining and self-correcting¹⁰

Existing seed producers (both farmer producers supported by DOA and commercial companies) face difficulties to provide seeds in adequate quantity and quality and there is a need to experiment and develop the most efficient and cost-effective business models for seed production and distribution. RSSD has addressed this bottleneck using an innovative and efficient approach (see Chapter 3) to support an array of seed producers from small scale farmers to large commercial companies.

¹⁰ Final Evaluation Report for "Support to Rice Seed Sector Development (RSSD) in the Ayeyarwady Delta, Myanmar" Implemented by Welthungerhilfe (WHH) / Wageningen Centre for Development Innovation (CDI), GRANT: R 1.7 010 2017. **April 2019**. Prepared by Frans Geilfus, Consultant for UNOPS, LIFT (available in the following ftp <https://bit.ly/3iOg98B>)

The quality assurance system constitutes an additional bottleneck for the expansion of rice seed business: lack of resources limits the number of field inspectors, and the capacity of the Yangon Seed Laboratory seriously constrains the certification process. Seed producers are willing to improve their quality need an efficient process of certification and the project has zoomed in on the initiative of DOA to enable the set up and organization of the Pathein Seed Laboratory under its component 3. This will rapidly relieve this key bottleneck while solutions to the other more complex issues of quality assurance are addressed.

7.2 Lessons learned

Most projects suffer from a too ambitious, blueprint approach to value chain development. In most cases the available time does not allow for the long learning and adjustment curve necessary to identify the best interventions, and a lot of time and resources may be wasted.

RSSD had an extremely short time span and any such intervention would have been a failure without an appropriate focus. By identifying key bottlenecks and investments likely to achieve “fast results” it has demonstrated an array of viable solutions, with a potential for later up-scaling and replication.

Due to the nature and short duration of this project with its long-time objectives, only a rough appraisal of “value for money” will be possible towards the end of the project. However, with so much staff turnover and considering the short duration, the project has achieved some commendable milestones which proves the efficiency standards are high in the team. With no communications consultant (as planned for the project), the team has developed a small webpage, a regularly updated Facebook page and published a newsletter. In terms of physics, this was “big output with less input”. Furthermore, the milestones such as the seed lab, trainings, investments were on track and as per the initial work plan even considering staff attrition and delayed start. This adds another star for efficiency and value for money.

8 Contribution to gender inclusive approach

In this chapter we aim to answer the question *"To what extent has the project contributed to a more gender inclusive approach?"*

This question is not related to a specific component of the programme, as gender mainstreaming is considered as crosscutting in all components of the project. This question is difficult to answer when taken literally. We assume that the question aims at getting lessons learned on whether the project has increasingly adopted and implemented a gender inclusive approach. In the project proposal, the following has been foreseen in relation to gender mainstreaming

- At the beginning of the project, a gender analysis will be carried out in order to identify challenges but also opportunities for women in the framework of this intervention.
- Based on these findings, a Gender Strategy will be elaborated which will guide the implementation and which is closely linked to the MEAL framework.
- In particular the MEAL team will be responsible to provide information on Gender aspects by including gender sensitive data in the M&E plan and reporting on gender issues. The project intends to develop success stories, preferably in form of a video clip.
- Women are strongly encouraged to participate in all parts of the project planning as well as implementation. Trainings and other project related events will be scheduled and designed in accordance with women's needs (e.g. location, time or content).
- The project will furthermore seek to increase and ensure appropriate women representation in decision making bodies.
- The project itself will act as a role model and is expected to consist of an equal share of women and men. Women are expected to be adequately represented in the project's PAC and PMC in order to, amongst other things, add and influence gender sensitive issues.

8.1 Gender analysis

As planned, a gender analysis was carried out, although not at the beginning of the project but half way the planned project period, in September 2018.

The baseline study for the project, conducted in 2017, already included questions on gender roles in rice seed management practices and rice grain production. Farmers interviewed were asked about gender roles in the household with regard to seed management practices around rice seed. It was found that decisions on seed purchase and seed recycling were made by the head of the household (12% of households interviewed were female headed. When asked about women's roles in rice cultivation, farmers reported that in rice production women participate in the broadcasting of seed, transplanting as well as the harvest and the cleaning.¹¹

The gender study team, consisting of an international consultant, the RSSD gender focal person and the national MEAL expert, notes that "to ensure gender inclusiveness, a gender approach needs to be integrated in the whole project cycle; planning, implementation, monitoring and evaluation."¹²

For RSSD, a gender transformation agenda was not part of the Theory of Change. It then makes sense to not include specific pathways for gender transformation addressing changing gender based power relations. The gender roles that were identified in the baseline.

¹¹ The Rice Seed Supply and Demand System in the Delta, Myanmar. Study report. Subedi, A. Thijssen, M.H. Audet-Bélangier, G. Maung Shwe, T. Lin Oo, Wageningen Centre for Development Innovation, Wageningen University & Research, Wageningen, 2017.

¹² Gender Analysis for the Project "Support to Rice Seed Sector Development (RSSD) in the Ayeyarwady Delta", Åsa C Johansson, October 2018.

However, in the gender analysis team rightfully highlights that a gender sensitive implementation strategy would have avoided that the selection process of seed producers have potentially been gender biased. A more thorough gender analysis, going beyond men's and women's role in decisions on seed management and women's role in rice production, but also including women's role and access to formal and informal networks, could have informed the process of selecting the seed growers to support. According to the gender analysis report, female farmers who would have been interested and would have qualified for support were not informed of the opportunities because the communication went through government RS providers and networks to which women farmers do not have access.

Also linked to women's limited access to formal and informal seed value chain related networks, when interviewed in the context of the gender analysis study, the head of the DOA seed division suggests that in general male seed farmers perform better than female seed farmers because the latter have more difficulties in obtaining registered seed than men. The reason mentioned for this is (again) women's limited strategic linkages: their limited access to formal and informal networks. The baseline study interestingly does not show a yield difference between rice fields cultivated by male or female headed households.

Applying a gender analysis would probably also have made the training process more effective. It would have highlighted that women seed farmers are often registered in their husbands name, so when calling the persons registered for a training, the actual seed farmer is not being invited and trained, and the project training does not reach the intended training participants. A gender analysis also would have informed that actual female seed farmers will not be able to attend technical and business trainings when organized in Patheingyi. Trainings organized in villages do allow women farmers to participate. In its annual report on 2018 RSSD, discussing the findings in the gender study, notes that it was initially planned to schedule and design trainings and other project related events in accordance with women's needs (e.g. location, time or content), but that this idea was dropped since more than 95% of RSSD's direct beneficiaries at that time were male.¹³

The gender study made recommendations at three levels:

At **organisational level** the main recommendation is to identify a gender core team, and to organise regular training to strengthen the organisational capacity on gender.

At **community level**, the project is advised to network and collaborate with local women's rights organisations, to raise awareness through training in communities on opportunities for women start seed businesses, and to support the development of Female Farmers Associations.

At **programme level** the study recommends to revise the theory of change and add a new objective in relation to gender. This has not been adopted by the project, which is understandable, because the recommendation came at a point where the project was expected to just have another 14 months to go before closing down. The recommendation to include more female seed farmers in the programme has been taken up by the project when applying for a no cost extension.¹⁴ It is reported that 50,000 USD have been reallocated as investment funds for women-led seed enterprises. A women led seed producers group was identified in 2019 with 10 ladies in a group. They underwent the same training and coaching procedures and this group produced 1200 baskets of rice certified seeds in 2019 end. Another recommendation was to shift to village locations for technical training and business management training. This recommendation has not been taken up by the project, because the majority of trainees (95%) is men. The gender study also recommends that the Regional Seed Sector Platform should play an active role in gender inclusion. This has been taken up by the project. In the document describing the proposed no cost extension, the project proposes it will integrate more gender related issues in the fourth upcoming platform meeting and do more to push for a gender agenda at the level of the platform.

Moreover, women seed growers were promoted and encouraged in the seed fair by arranging the exhibition of specific booths on their achievements under the co-incentive grant scheme. Regional

¹³ Support to Rice Seed Sector Development (RSSD) in the Ayeyarwady Delta, Myanmar, Agreement GSA R 1.7 0101 2017. Annual Narrative Progress report. Reporting Period January 1 to December 31, 2018. Welthungerhilfe, February 2019.

¹⁴ No-cost extension request for the period between July 1, 2019 and March 31, 2020, Welthungerhilfe, May 2019.

government recognized this and will encourage and support this in future events. For the promotion of women's participation in seed related activities, the project set aside another grant for business development for 'women-led seed business'.

The Monitoring, Evaluation and Learning (MEAL) system of WHH collects indicators on reaching farmers in a sex disaggregated way. The gender study recommended to include gender specific indicators. Apart from the relevant data already being collected in a sex disaggregated way, this is difficult to implement. Because there are no specific gender related impact pathways there were and there are no gender transformation specific indicators. A gender strategy for the project was operationalized by listing activities together with a very detailed list of indicators. Because the project did not accept to change the ToC and take up additional gender goals, it makes sense that the existing MEAL system did also not include additional indicators to monitor progress of the gender strategy.

8.2 Lessons learned

When designing the project, a choice was made not to include gender transformative. In order to be gender responsive, it would have been advisable to do a more thorough gender analysis before the start of the project, to be able to proportionally have women benefit from project interventions. A timely gender analysis would have indicated that special efforts, in addition to contacting potential beneficiaries through existing seed value chain networks, were needed to also reach women with information on the opportunity to have their seed business be selected for support.

Trying to change the (3 year) project direction halfway from a seed sector development project to a project with a gender transformation objective focusing on women's rights was not realistic. It is positive that in an non budgetary extension some of the concerns raised by the gender study (addressing female seed producers and mainstreaming gender in the seed platform) are being addressed.

The project promoted and empowered the female seed growers role and their network and quality products of female seed grower in Second Regional Seed Fair. Regional government recognize the female seed growers and Female Seed Growers will be encouraged and supported by Regional Government in the future.



9 Effective and sustainable seed farm investments

This chapter addresses the question "Is the seed investment system effective and sustainable for government farms and what is its upscaling potential?"

There are so many cross-interfering reasons that may affect the correct evaluation for the effectiveness of the investments in the government seed farms. The conditions of the seed farms in the Ayeyarwady Delta are quite variable in terms of geographical location, funding patterns, acreage and management efficiency. It was quite a challenge to evaluate the impact of the investments in the four seed farms that have been supported through RSSD in component 1, but that's why we resorted to very neutral indicators like bulk production, acreages, supply and productivity. Note there are five seed farms in the Ayeyarwady Delta, but four were chosen for investment after many rounds of negotiation with the Union DOA and Regional DOA. The initial available funds were 175,000 USD, which were later increased to 225,000 USD, and the list of infrastructures that needed modernization, was long. Refer to the document "seed farm investment guidelines"¹⁵ for in-depth details, since in this section, we will only discuss the impact of the seed farm investments in terms of their performance.

Since there was one farm (Tagon Taing Seed Farm) which did not receive any investment, we will consider that farm as the control or baseline and compare the changes in the output/performance. We have seed production data from 2016 till 2019/2020. The project started providing the investments in 2018 and most of the seed farms structural works were over in the early 2019. Though it is difficult (statistically) to analyse impacts in 1 or 2 years of monitoring, we really have some interesting findings to share, which prove that the seed farm investments have a very positive effect and are effective.

9.1 Performance of seed farms

The data aggregates the summer and monsoon productions and the varietal data too. The primary objective is to see the impact of performance of the seed farms after the investments were done and infrastructures in the seed farm were modernized. The raw data is available for scrutiny in the link here¹⁶. In these tables, the average values till 2018 serve as a baseline (before investments) and the 2019 data is the data after the infrastructure investments were made.

EGS production

Table 5 EGS production by seed farms

Seed farm	Production in 2016 (baskets)	Production in 2017 (baskets)	Production in 2018 (baskets)	Average of production in 2016-2018	Production in 2019 baskets	% change after investments
Ta Gon Taing (Control)	3,753	3,706	3,781	3,746	3,121	-16.7
Tha Young Chaung	4,405	4,812	5,172	4,796	5,386	12.3
Auk Kwin Gyi	2,707	2,957	2,800	2,821	2,690	-4.7
Myaung Mya	1,890	3,126	2,936	2,651	3,070	15.8
Shwe Laung (1)	2,150	1,450	5,000	2,867	3,625	26.5
Total	11152.48	12,345	15,908	13,135	14,771	12.5

¹⁵ Guidelines about Seed Farm Investment Fund for Government Seed Farms in Ayeyarwady Delta under Component 1 of RSSD: Supporting Seed Farms on EGS Production (Output 1.4). Weblink to cloud storage https://www.dropbox.com/s/ek6q8lrmg7dsg9/Guidelines%20for%20Investment%20funds%20for%20the%20Seed%20Farms_submit%20to%20NPT.pdf?dl=0

¹⁶ <https://www.dropbox.com/s/0largpjp23tap7k/2-1%20Seed%20Farms%27%20Data.xlsx?dl=0>

In Table 5 we can see a steady increase in the production capacity of the seed farms Tha Yaung Chaung, Myaung Mya and Shwe Laung. Auk Kwin Gyi farm showed a lower trend, however, note that infrastructural improvements took a longer time and the implementations were delayed. Only in early 2020 the construction works were finished in this farm, so we will be needing to analyse the performance of this farm at a later stage. In these tables too, the average values till 2018 serve as a baseline (before investments) and the 2019 data is the data after the infrastructure investments were made.

EGS supply

Table 6 EGS supply by seed farms

Seed farm	Supply in 2016 (baskets)	Supply in 2017 (baskets)	Supply in 2018 (baskets)	Average of supply in 2016-2018	Supply in 2019 (baskets)	% change after investments
Ta Gon Taing (Control)	2,648	3,300	3,266	3,071	2,483	-19.2%
Tha Yaung Chaung	3,568	3,532	4,500	3,867	4,640	20.0%
Auk Kwin Gyi	1,101	1,807	1,700	1,536	2,610	69.9%
Myaung Mya	1,767	3,037	2,936	2,580	3,018	17.0%
Shwe Laung (1)	1,050	1,200	2,100	1,450	1,400	-3.4%
Total	7,486	9,576	11,236	9,433	11,668	23.7%

Looking into the EGS supply again, in Table 6 we see a positive trend as compared to the control, with exception to Shwe Laung, which was probably due to the bad weather that prevailed during that time in the Wakema Region which restricted the supply channels and reduced the quality of the harvested seeds.

Acreage of EGS

Table 7 EGS production acreage at seed farms

Seed farm	Acreage in 2016 (acres)	Acreage in 2017 (acres)	Acreage in 2018 (acres)	Average of 2016-2018	Acreage in 2019 (acres)	% change after investments
Ta Gon Taing (Control)	74	74	74	74	74	0.0%
Tha Yaung Chaung	104	108	108	107	108	1.3%
Auk Kwin Gyi	67	72	67	69	67	-2.4%
Myaung Mya	30	45	47	41	51	26.6%
Shwe Laung (1)	60	120	150	110	150	36.4%
Total	261	345	372	326	376	16.1%

Not all seed farms have the capability to increase the EGS acreage. If we look at the investment pattern, then we will find that the Myaung Mya Seed Farm and the Shwe laung Seed farms have been funded for drainage and irrigation channels with embankment walls. The primary problem of the Ayeyarwady Delta is floods so the drainage channels and embankment walls help to increase acreages under cultivation as these infrastructures keep the flood water away from the seed production plots. So, the figures in Table 7 are quite consistent with a positive impact of the investments.

Seed crop productivity

Table 8 EGS crop productivity at seed farms

Seed farm	Productivity in 2016 (baskets/ acre)	Productivity in 2017 (baskets/ acre)	Productivity in 2018 (baskets/ acre)	Average of productivity 2016-2018	Productivity in 2019 (baskets/ acre)	% change after investments
Ta Gon Taing (Control)	50.6	51.0	51.1	50.9	42.6	-16.2%
Tha Yaung Chaung	42.6	44.7	48.2	45.2	50.2	11.1%
Auk Kwin Gyi	40.4	41.1	41.8	41.1	40.2	-2.3%
Myaung Mya	65.0	70.4	64.0	66.5	59.9	-9.9%
Shwe Laung (1)	43.0	13.2	50.0	35.4	48.3	36.6%
Total	44.6	36.7	49.8	43.7	49.2	12.5%

Productivity, is not a very robust indicator in this context. However, it does provide an insight into the difference with the control/baseline. The year 2019 was a flood year and most of the seed farms were affected. But what is remarkable that even under such meteorological circumstances, two seed farms performed better in this aspect than in 2018 (Table 8). While all the seed farms were exposed to the same natural vagaries, their performance was better than the control farm (without the investments).

In conclusion, considering the performance of the seed farms in terms of the agri-output indicators, against the control seed farm, the investments were effective. since in all the cases we see a performance higher than the control. There could have been more intricate statistical studies into the indicators, but this will require more seasons of data which ultimately goes out of the project duration. However, considering the above results, it can be positively concluded that the seed farm investments made by RSSD had a high positive impact on the effectiveness of output delivery by the seed farms.

9.2 Perspective of seed farm managers

During the period February - March 2020, the RSSD team interviewed the Seed Farm Managers with some specific questions on their future plans for the seed farms, how effective they consider the assistance by the project, and how far they can take this forward. The team developed and asked a set questions related to these topics and recorded the responses. Questions were mainly based on the infrastructural support provided; find in Appendix 4 their responses. Moreover, seed farm managers were what would have been the situation if the project support was not there, and their sustainability plan. Table 9 shows their responses which are a powerful indicator of the perceived sustainability plan.

Table 9 *Seed farm investments and perspectives of the managers*

Seed farm	Investment	Situation without RSSD support	Sustainability plan
Tha Yaung Chaung	Embankment wall, irrigation/drainage channel, warehouse, tractor and water pumps	If the project weren't here, the seed farm can't do the optimum land preparation in time. When the production fields would have been flooded and the plants lodged, it will be difficult to drain as soon as possible. If the water management can't be done in time, the yields and the quality will go down like the previous years. There also will be rodent damage in the warehouses.	The seed farm manager proposed the maintenance budget to the Seed Division of the Union DOA for sustainability.
Auk Kwin Gyi	Embankment wall, seed warehouse, drying shed and tractor	Before RSSD, the seed farm faced flooding yearly and the production acreage was damaged. It was difficult to carry the harvested seeds and the quality of seeds was low. The seed farms couldn't sell all the produced baskets as seeds. By implementation of RSSD, the quality of produced seeds is increased and the rate of seed supply is also increased.	The seed farm manager takes care of the tractor by regular checking and cleaning. He will also monitor the embankment wall conditions and maintain it.
Myaung Mya	Embankment wall, irrigation/drainage channel and cold storage	If the project didn't provide the investment fund, research work will not be affected. But it will still have difficulties for seed production. Without embankment wall, the yield will be reduced as in the past. The productivity in summer will be the same as the past.	These items are already put in seed farm's assets list. The seed farm manager will propose the maintenance cost to the Union DAR as per the requirement.
Shwe Laung (1)	Irrigation/drainage channel, warehouse, drying shed and tractor	If RSSD wasn't here, the seed farms won't get the effectiveness as required.	This inventory list will be registered as seed farm's assets. The seed farm manager will propose the maintenance cost to the Regional DOA year by year.

So as per the sustainability plan, the seed farms have unanimously agreed to negotiate more budget for the maintenance of the fixed and moveable assets that was handed over to the farm. RSSD has also imparted a training on the maintenance plan and handed over a maintenance audit document which can be effective to monitor and prevent any kind of glitches due to maintenance. See the document (Maintenance plan for seed farms) here¹⁷.

9.3 Upscaling potential of seed farm investment grants

In the above discussion we argued that seed farm investments were positively impactful; we assume that the probability of getting bigger outputs with bigger investments is high. The "seed farm investment plan" document²¹ shows a bigger list of items and services that needed modernization so as to improve the EGS supply for rice in the Ayeyarwady Delta. However, since the budget was limited, the project team had multiple discussions with the DOA and the seed farms on how to utilize the available funds so that we get the maximum impact. There is also a list of upgradings/modifications that could not be done. So, taking a cue from there, the DOA (through the MOALI) can make the remaining investments into the seed farms as they now have a concrete document and quantitative evidence that investing in seed farms has impactful quantitative advantage towards the enhancement to supply of EGS. More evidence from the seed farm assessment documents where we can actually see the immense work done by the seed farms to develop a sales/ production projections with the modified/ upgraded infrastructures. Also see section 9.4 for a new follow up project addressing this.

Find the files here¹⁸.

¹⁷ Maintenance plan for seed farms: Weblink to cloud storage: <https://bit.ly/3bH1mZi>

¹⁸ Individual seed farm assessment reports folder weblink <https://bit.ly/2LCoeif>

9.4 Lessons learned

This activity is the most budget intensive endeavour of this project. Four seed farms are granted 220K USD to modernize their infrastructure. The main learning here is that any investment should not only be made in terms of money or equipments. It should go with training and business management coachings. This is exactly what was done here. Not just hardware, the seed farm managers and other seed staff were trained by international team, expert on seed business management.

Then again, the investments were not made as a general formula. Every seed farm had different issues and the investments were directed toward specific needs. In addition to this, the EGS application is currently capturing the RS production and supply data, which enables easy allocation of RS to seed growers and companies. So the seed farms system was benefitted by 2 activities in the project which is being clearly shown in the enhancement in the acreages and production volumes.

Moreover, as explained in chapter 5.3, the confidence and self-reliance of these seed farms had also increased. They are confident that they can further graduate the seed farms into highly efficient, self-sustaining business units, with a slight help from the Government authorities. This process is elaborated more in the next chapter (Chapter 10).

As per the recent development, this project is adding an activity with the funding from the same donors, called the "Cash for Work" scheme (CfW). This Cash for Work pilot initiative under RSSD will expand the infrastructure further at the seed farms with focus on embankments and irrigation channels and also will include the Ta Gon Taking control seed farm (control farm) under the investment ambit.



10 Road Map

This chapter presents a short roadmap which elaborates options for scaling and replication based on the lessons learnt in the earlier chapters. Next to the ambition for each scaling and replication pathway (see Table 10), we provide the context, steps to reach the ambition and stakeholders to involve.

Table 10 *Scaling and replication pathways for the Myanmar Seed Sector based on RSSD lessons learned*

Scaling and replication Pathway (SRP)	Ambition for scaling / replicating	Based on which lessons learnt
SRP 1: Scale the EGS demand forecasting system to national level and replicate to other crops	Myanmar seed sector (public and private) sector is using the EGS system to order seeds, maintain stocks, sell/allocate seeds and plan productions in advance. We wish to have this operational for all the major crops.	Chapter 2: EGS
SRP 2: Scale the modified participatory guarantee seed system developed by the project to national level	The PGSS is a recognized, assistive quality assurance mechanism where the seed growing co-operatives (or PGSS groups), trained by the Seed Divisions, perform their own peer-inspections (with 5% audited by the Seed Division, DOA) and thereby easing the pressure of the seed inspectors during the season. There are provisions in the seed law to recognize these PGSS co-operative-produced seeds as quality seeds and procedures & manuals for administration and technicalities are developed and published.	Chapter 4: Seed quality control
SRP 3: Replicate seed platforms and Seed Fairs to other regions and other seed value chains	The Ayeyarwady seed platform is basically a Rice based platform where the major stakeholders in rice as a commodity have aggregated for sorting out common problems. The Regional seed platform bringing together different stakeholders in the rice seed value chain in the delta has proven to be an important vehicle for seed sector development. A national Seed Platform attends to the seed issues nationally. There should be more of such platforms in other regions.	Chapter 5: Seed platform
SRP 4: Fine-tune and scale up coaching of government seed farms to make them sustainable businesses	Government seed farms are functioning like a seed enterprise but owned by the government. They generate their own funds and no longer depend on the Union DOA for operational budget. The DOA only sends the staff salaries and a small revolving fund. The day to day operations and input purchases, contractual labors, all are arranged from the profits generated from the seed sales.	Chapter 9: investment in seed farms
SRP 5: Increase co-investment by DOA in government seed farms	We have clearly seen from analysis that the model of co-investment and time-to-time infrastructure top ups can go a long way towards supporting the functioning and output of the seed farms. Annual budget plans of the DOA should include the same pathway as deployed by the project in 4 farms. This model can prove to be very effective in transforming the seed farms into efficient seed supplying entities owned by the government. The investments included warehouses, Farm machinery, irrigation / drainage conduits, drying sheds etc.	Chapter 9: investment in seed farms
SRP 6: Replicate approach of supporting seed businesses	This novel technique, which is a pioneering process used to select and coach businesses for grant award, was adapted by the project to the local context and characteristics of the rice seed value chain. This process has proven its value where it was seen to be extremely effective to identify, engage and mobilize seed growers and seed enterprises. However, for the sake of sustainability, an evolution of this method needs to happen. Like, moving towards bank-linkage, linking seed companies to bank loans based on submission of sound business plans, collaterals etc. There are a number of hurdles in the process in making this a reality and a strong dialogue with financial institutes s will make this vision sustainable.	Chapter 3: Criteria to select seed companies

SRP 1		Scale the EGS demand forecasting system to the national level and replicate to other crops
Ambition (where will we go)	Myanmar seed sector (public and private) is using the EGS system to order seeds, maintain stocks, sell/allocate seeds and plan productions in advance. We wish to have this operational for all the major crops.	
Context (where are we now)	The RSSD project in Pathein has developed this system with 2 apps and 1 web platform for rice in the Ayeyarwady Delta. The system is currently operational in one region and for one crop. With the RSSD budget, the developers are already coding a scaled up application for the Dry Zone with 7 more crops included.	
Steps (how to get there)	<ol style="list-style-type: none"> 1. Analyze the scaling parameters in terms of regions, crops, varieties, also seed farms and companies (stakeholders and users) 2. Prepare the algorithms with consultation of the Union Seed Division 3. Develop the scale up apps and perform tests 4. Organize workshops to train staff and stakeholders in the use of the app 5. Perform remote monitoring and modifications if needed 	
Stakeholders	<ul style="list-style-type: none"> • DOA and Seed Division • DOA and DAR Seed Farms • Seed Companies • NGO, private seed growers, seed multiplying co-operatives • ISSD Myanmar as support and developing agency as tech provider 	
SRP 2		Scale the modified Participatory Guarantee Seed System (PGSS) developed by the project to national level
Ambition (where will we go)	The PGSS is a recognized, assistive quality assurance mechanism where the seed growing co-operatives (or PGSS groups), trained by the Seed Divisions, perform their own peer-inspections (with 5% audited by the Seed Division, DOA) and thereby easing the pressure of the seed inspectors during the season. There are provisions in the seed law to recognize these PGSS co-operative-produced seeds as quality seeds and procedures & manuals for administration and technicalities are developed and published.	
Context (where are we now)	The Union DOA and the DOC (Dept of Cooperatives) are very enthusiastic about this 'new' system which is derived from an older version known as the PGS, primarily used in organic certification systems. The RSSD project had 2 regional workshops where the system was explained and PGSS groups were formed. The PGSS (or PGS version 2.0) system and the procedures have also been presented in the National Seed Platform meeting where it received very positive responses. Due to the short project duration, it could not be piloted, but this piloting responsibility can be taken over by the DOC who had showed quite good interest.	
Steps (how to get there)	<ol style="list-style-type: none"> 1. Train some of the SPCs (Seed Producing Co-operatives) by DOA on field inspection. JICA also imparts training on field inspections, so they can be taken in this loop in a planned manner. 2. Audit their performance and skills in field inspection on 5-10% of the area planted by the SPC. Continue this audit for 2 seasons. 3. Based on the performance, grant accreditation to the SPC 4. The National Seed Committee and the Technical Seed Committee to approve the procedures for audit and accreditation 5. SPC produced PGSS derived seeds fetch a higher price in the market as they are 'guaranteed' by the system 	
Stakeholders	<ul style="list-style-type: none"> • DOA and Seed Inspectors • Seed growers • Seed Producing Co-operatives • Other training partners (JICA, WHH etc.) 	

SRP 3	Replicate seed platforms and Seed Fairsto other regions and other seed value chains
Ambition (where will we go)	The Ayeyarwady seed platform is basically a Rice based platform where the major stakeholders in rice as a commodity have aggregated for sorting out common problems. The Regional seed platform bringing together different stakeholders in the rice seed value chain in the delta has proven to be an important vehicle for seed sector development. A national Seed Platform attends to the seed issues nationally. There should be more of such platforms in other regions. The seed fairs also need to be a regular event monitored by the Seed Platform
Context (where are we now)	As far as the seed platforms are concerned, one National Seed Platform exists as a central body and more recently, the Ayeyarwady Seed Platform was established in the delta with a primary focus on Rice seed.
Steps (how to get there)	<ol style="list-style-type: none"> 1. Discussions with different stakeholders and finalize the crop types 2. Meeting the specific stakeholders in the concerned regions and drafting out a set of action agendas 3. Creation of a Executive or a Steering Committee to oversee the activities 4. Organize a launch meeting of the regional seed platform and present the action agenda. Invite the members to formulate an action plan on the action agenda, along with a follow-up plan 5. Hold steering committee meeting every 2 months and platform meetings every year 6. Represent the regional platform members in the National Platform 7. Budget the attending of some members of the regional seed platform in the nearby international seed association congresses (eg. APSA, NSAI, etc.) for experience.
Stakeholders	<ul style="list-style-type: none"> • Seed companies • DOA and Agriculture Universities • Seed related NGOs (Metta Foundation, JiCA, KOICA, Mercy Corps etc.) • Commodity based organizations • Input suppliers (fertilizer, tractor, biotech etc.)
SRP 4	Fine-tune and scale up coaching of government seed farms to make them sustainable businesses
Ambition (where will we go)	Government seed farms are functioning like a seed enterprise but owned by the government. They generate their own funds and no longer depend on the Union DOA for operational budget. The DOA only sends the staff salaries and a small revolving fund. The day to day operations and input purchases, contractual labors, all are arranged from the profits generated from the seed sales.
Context (where are we now)	The seed farms currently send a budget request and receive the budget the following year. A real time planning and financing system is absent. They are always at a dearth of budget and even the seed sales money is sent to the Union DOA or Seed Division (or DOR, depending on the farm type). The knowledge to function as a business unit is lacking. RSSD has conducted several training workshops/ coaching sessions to instigate a business-like operational management system. ISSD Myanmar is also having several policy level dialogues with the government to modify the financial policies for the seed farms.
Steps (how to get there)	<ol style="list-style-type: none"> 1. Training of seed farm staff in seed business management 2. Pilot one seed farm as a separate business unit for 2 to 3 seasons (with a small initial investment) and analyze the outcomes 3. Positive outcomes to be shared with the government with full operational protocols, manuals and management systems impeccably drafted. These need to be discussed and amended. 4. Policy amendments and again single region pilot by government for a season. 5. Nationwide roll out. 6. Periodic monitoring and audits. Modification of resource documents based on the audit reports.
Stakeholders	<ul style="list-style-type: none"> • DOA, DAR, Seed Division with the National Seed Committee • Seed Farms (DOA and DAR) • ISSD Myanmar/external trainers for seed business management

SRP 5	Increase co-investment by DOA in government seed farms
Ambition (where will we go)	We have clearly seen from analysis that the model of co-investment and time-to-time infrastructure top ups can go a long way towards supporting the functioning and output of the seed farms. Annual budget plans of the DOA should include the same pathway as deployed by the project in 4 farms. This model can prove to be very effective in transforming the seed farms into efficient seed supplying entities owned by the government. The investments included warehouses, Farm machinery, irrigation / drainage conduits, drying sheds etc.
Context (where are we now)	Investing in the infrastructure of government seed farms has proven successful in view of improving the EGS supply in the delta. Additional investments have been proposed to be prioritized in seed farm investment plans of the DOA.
Steps (how to get there)	<ol style="list-style-type: none"> 1. Assess the real increase in efficiency of the investments in the 4 seed farms in the Ayeyarwady Delta 2. Draft similar investment plans for other seed farms (e.g. of the Dry Zone) 3. Present the success stories and bottlenecks in National Seed Committee meetings and propose the budget 4. Liaise with the Department of Finance (DOF) to explain the investment plan including the sustainability plan 5. Receive grants and follow the deployment procedures as per the plan 6. Follow up and monitor processes (construction, purchase, trainings) 7. Audit
Stakeholders	<ul style="list-style-type: none"> • DOA, DAR, DOF • Seed Farms • Seed Division • Equipment suppliers • Construction contractors

SRP 6	Replicate approach of supporting seed businesses (“Lead Firm Facilitation”)
Ambition (where will we go)	This novel technique, which is a pioneering process used to select and coach businesses for grant award, was adapted by the project to the local context and characteristics of the rice seed value chain. This process has proven its value where it was seen to be extremely effective to identify, engage and mobilize seed growers and seed enterprises. However, for the sake of sustainability, an evolution of this method needs to happen. Like, moving towards bank-linkage, linking seed companies to bank loans based on submission of sound business plans, collaterals etc. There are a number of hurdles in the process in making this a reality and a strong dialogue with financial institutes s will make this vision sustainable.
Context (where are we now)	The basic mechanisms of seed sector investment are not yet formalized or well laid-out. The DOA still struggles to invest in their own seed farms, which are also in need for similar investment processes.in addition, there are questions in sustainability after the RSSD project expires.
Steps (how to get there)	<ol style="list-style-type: none"> 1. Workshop with the DOA to elaborate the process and the need of private sector investments (which will attract investments from private sector too). Draft guidelines for this process. 2. Roundtable with financial institutions (Banks) to carve out seed sector loans as a mandate.¹⁹ 3. Add this method to the already existing programme of PPP (Public Private Partnership) and help Banks to draft terms & Conditions for seed sector loans (currently they have only for input suppliers and traders) 4. The DOA and Banks after agreement follows the guidelines to identify, engage and mobilize the seed enterprises 5. DOA and Banks for a consortia and receive the business plans and review them. Audits by the consortium can also be done of the stocks and premises. 6. Constitute an observer committee (OC) who follows up the deployment. 7. Monitor regularly and scrutinize well the project completion report 8. Draft audit formats for maintenance and sustainability

¹⁹ See the “**Discussion Note ; Business Round Table Discussion**” held on 11 March 2020 during the Second Ayeyarwady Seed Fair. This is a project internal document and can be found in the private FTP link <https://bit.ly/2Y7horu>

Stakeholders

- DOA, DOF
 - Banks (Yoma, Aya, VISION etc)
 - Seed Companies, enterprises, startups
 - Service providers
-

Appendix 1: Discussion guide seed company interview

Have there been any changes over the past 2 years in the way that you have been served by the government seed farms?

Are you able to obtain the varieties you prefer with the government seed farms?

Any changes in the quantity of EGS you can get in past 2 years? Which?

Any changes in timeliness of supply (is EGS supplied to you in time)? Which?

Have you seen any other changes in your seed environment in past 2 years? Which?

What bottlenecks should still be solved to help make your company more successful?

If investments would not have been available/done, what/how would you been doing now? Would you still be in business? Would you earn less / more?

How do you see the sustainability? Will the investment still have effect in the coming years?

Appendix 2: Example of an investment fund application by a seed grower

Investment Fund Application Submitted to RSSD Project

Name - Saw Gae La Mon
 Year seed growers registered with DOA -
 Seed grower's registration number -
 Contact details (Location/Phone number) - Moe Goke Village, Pathein Township
 - Ph no. 09260249517
 Submission Date -

Experience

He learnt the advantages of using of quality seeds and trained for seed production process by DOA staffs. In 2016, they organized MGSFO- Moe Goke Small Farmers Organization in their village and he is also one of the members, linked with other members in their organization to sell certified seeds. He got more profit than grain production and if he failed in seed production, he can get extra price more than grain price. It is a good business for him because it is a profitable business.

Seed Production Details

Year	Season	Variety Name	Acre	Yield /ac	Total basket	Sale as seed	Seed Price	Sale as grain	Grain Price	Remark
2016	Summer	THY	7	70	490	490	6500			
2017	Monsoon	AM	4	60	240	240	8500			
		PSBK	5	50	250	250	12000			
		PTY	5	80	400			400	6500	RS seed received for FOC from DOA. He sold as grains because it is not registered variety

Plan for 2018

Year	Season	Variety Name	Acre	RS demand (bsk)	RS received (bsk)	RS source	Remark
2018	Monsoon	PSBK	13	6	6	Thayaungchaung seed farm	Verified by technical team
		PKSW	1	1.5	1.5	DAR	

References:

THY - Thee Htet Yin
 AM - Ayar Minn
 PSBK - Paw San Bay Kyar
 PTY - Pyi Taw Yin
 PKSW - Pa Khan Shwe Wah

Personal

His educational qualification is Grade-4 and he has 4 family members. He never attends any training organized DOA but DOA staffs visited and shared the seed production techniques to him. There are 14 acres in total for production and all are for seed production.

Details role and responsibilities

No	Production	Responsible person	Remark	Marketing	Responsible person	Remark
1	Salt Water Treatment	Self + family members		Direct sold (Farmer to Farmer)	Self & Family members	
2	Seed Bed Preparation	Self + family members		Linking with the DOA	Self & Family members	
3	Transplanting	Hire labors				
4	Rouging	Hire labors				
5	Harvesting	Hire labors				
6	Threshing & Storage	Self +family members				
7	Packaging	Self +family members				

Problem Analysis Rice Seed Business

Insufficient capital resulted in stagnancy of cash flow. With no money in hand, the seed cannot be held to sell in the next growing season, for about 6 months. In most cases, it needs to be sold out at the market price. Transplanting can be delayed at times because the land is prepared using only a hand tractor, in the absence of efficient farm machineries. There are some difficulties as in, seed gets wet by sudden rain when it cannot be harvested on time because of labor scarcity at times of harvest. A combined harvester is needed to resolve this labor scarcity problem. Although I have a warehouse (3000 baskets in capacity), it is not for seed storage alone, the seed and grain are stored together in it for now. I have to put certain measure and effort in great caution not to mix the seed and grain in when the bags are destroyed by rodents.

Proposed Initiatives and Impact

I will hire some lands to increase the production acres. The seed quality will be maintained by complying guidelines for quality seed production. The increased quantity of seed produced by increasing growing acres, will be traded through DOA offices, Millers and traders' associations. If the proposed tractor and harvester were invested, the seed business will be benefited in enabling to transplant and harvest in a timely manner.

Sustainability

Lands needs to be prepared and applied with farm manure because nutrients are gradually depleted by continuous use of land for agriculture. Advanced and modernized technologies will be learned and applied to produce seed in good quality. The seed samples will be submitted to get them tested and certified every year because the seed with the certification label can be sold at a good price. Seed market will always be observed and the varieties in market demand will be selectively produced. I will cooperate with Millers, DOA offices and trader associations for trading seed in a larger scale. Seed sales and obtaining Registered Seed will be cooperated with MGSFO for this village.

Budget and Contribution

Proposed activities	Seed Growers' Contribution: (20%)	RSSD Contribution (80%)	Total (100%)
Rotatory weeder	320,000	1,280,000	1,600,000
Hand harvester	800,000	1,600,000	2,000,000
Hand tractor (Thailand made)	740,000	2,960,000	3,700,000
Harrowing machine	200,000	800,000	1,000,000
TOTAL	1,660,000	6,640,000	8,300,000

Note: As per the technical team M&E visits and verification, the above seed grower is following the minimum seed production practices including field inspection timely, spacing is order, he generally orders RS seed from DOA. So, he is a **potential farmer**.

Appendix 3: Example of 2 themes of the Action agenda of the Ayeyarwady Regional seed Platform

Theme 2: Incentivizing the private sector to invest in seed production, cleaning and storage

The number of private seed companies and independent seed growers in the Delta is still limited. In order to increase the production and availability of quality seed more investments of the private sector in the seed sector are required. This group will discuss what is needed to increase private sector participation in the Ayeyarwady Delta. Key questions are:

- What are the main challenges that seed companies face in terms of the production, processing and storage of seed?
- What can be done to stimulate private sector investments? E.g. financial incentives, trade missions, capacity building and business planning

The following three topics and actions have been prioritized:

Topic	Action	Who to involve	When
Investment in seed processing	Repair and operationalize public seed drying equipment	DOA, seed companies, farmer association, farmer seed growers	November 2018
Description			
Townships have public seed processing facilities; however, the status of the equipment is not known. The plan is to assess the status of the machinery in four townships, i.e. Labutta, Bogale, Mawlamyaing Gyun and Pathein, and repair facilities if necessary. Through a public-private partnership arrangement seed grower may make use of this equipment to increase seed quality. This activity was further emphasized by the Regional Minister for Agriculture, to look for seed dryers in the seed farms or with seed companies.			

Topic	Action	Who to involve	When
Stabilize the seed price	Develop an EGS demand forecasting system application	WHH-RSSD with Govt.	September 2018
Description			
The EGS demand forecasting system is under development. This is a digital platform, owned by the DOA /Seed Division and developed with WHH support. This will provide real time information on the seed inventory and seed demand (CS &RS) for the DOA and the seed producers to act on. Farmers ordering CS and Seed Growers ordering RS will do so on mobile apps in a simple way. DOA and seed farms get the information in a seamless manner. This system should go online in September 2018. The information will enable the prediction of inventory (supply), thus facilitating proper seed price fixing (meaning: in line with a transparent market).			

Topic	Action	Who to involve	When
Increase access to finance	Expand the inventory credit system	GRET, WHH and seed producer groups	Period between seed harvesting and planting time
Description			
GRET and WHH have ample experience with the establishment of inventory credit systems (revolving funds) for seed farmer groups. Expanding this system might largely solve farmers' financial problems in the period between seed harvesting and planting time, allowing storage of seed and getting a higher seed price by selling seed only shortly before planting time.			

Theme 3: Ensuring adequate field inspections and fast seed testing for seed producers

At the moment, field inspectors have difficulties in reaching all seed producers and companies, at the different stages of plant growth and seed maturing. Moreover, not all seed that is produced by seed

growers is being tested in the seed laboratories. And the seed that arrives at the laboratory takes a long time to be tested – and after that a long time to receive the certificate. Key questions are:

- What are the main challenges with respect to the government’s seed quality assurance system of field inspection and seed laboratories? (staff, facilities and mobility)
- For the local production of seed, can quality assurance also be undertaken at township level, and how could extension be involved in this?

The following two topics and three actions have been prioritized:

Topic	Action	Who to involve	When
Improve capacity of seed testing lab	Upgrade the facilities of the Pathein seed laboratory	Regional Government, WHH-RSSD and seed inspectors of DOA	October 2018
Description			
A new seed lab in Pathein has been established. Lab partitioning has been done to create the walk-in-germinator. Currently this lab disposes of few equipment, hence, WHH has made a plan to add critical equipment and establish a fully operational lab. The next step is to train the lab personnel with the help of Quality Manuals, Work Instructions and Workflow Procedures as per the ISTA and ISO: IEC:17025 EC. The lab will be able to issue certificates and handle all samples for the delta. There is a plan developed to create a seed sampling team who will go to the production fields to draw the "submitted sample". Currently this is done in a non-technical way by the farmers themselves.			

Topic	Action	Who to involve	When
Improve capacity of seed testing lab	Introduce fee for field inspection	Regional Government, with WHH-RSSD	Every June, August, and October 2018 for monsoon, every December and February for summer
Description			
Introduce a fee for seed growers for field inspection to cover the logistics and transportation costs involved in the field inspections, allowing them to take samples. This is a RSSD pilot scheme being designed to analyse and compare the effectiveness of the three Quality Assurance systems: (a) the PGS system and (b) the normal field inspection, but the inspectors being assisted with mobility arrangements, so they can reach the seed growing field in time and within the growth phase and (c) the existing, no-intervention as control. The 3 systems will be compared based on the field and seed quality; recommendations will be made post-analysis. The hypothesis is that, if the inspectors are supported with good logistical arrangements, the field inspections will be conducted seamlessly. The introduction of a small fee for field inspection will help the township/regional DOA to sustain this activity.			

Topic	Action	Who to involve	When
Skills of seed lab staff	Build capacity of seed lab staff in Pathein	DOA, with WHH-RSSD	October 2018 and beyond
Description			
RSSD will be setting up the Pathein Seed Lab with all the necessary equipment as per International Seed Testing Association (ISTA) rules. Moreover, the workflow and quality management documents has been prepared based on the ISO: IEC 17025:2017 with special reference to Manpower, Responsibilities, Document control and Technical Competency. The staff will be trained on 3 aspects, namely, (a) Technical Procedures of seed testing, (b) maintenance and calibration of test equipment and (c) Document handling. A smooth functioning of a testing laboratory depends on how the staff understands the essence of Total Quality Management (TQM), which will enable not only accurate results, but also handling of non-conformities and "continuous improvement". Training modules have been designed based on these criteria and the staff in the seed lab will be trained on these aspects.			

Appendix 4: Perspectives of Government Seed Farm managers on investment support by RSSD

Tha Young Chaung Seed Farm

- **Embankment wall:** Tha Young Chaung seed farm is surrounded by the stream named as "Tha Young Chaung". It faces flooding every monsoon rice season especially transplanting and tillering stages because of heavy rainfall in July & August, tide and upstream flow. Because the water from Tha Young Chaung stream enters the production fields during the flooding period and the stream level is higher than the field level, it is difficult to drain the water from the production field and damage the production fields. RSSD provided the embankment wall with the dimension (6508' x 5' x 10'). By having this embankment wall, the production process can be done on time and the damage can be reduced because the water from the stream can't enter anymore.
- **Irrigation/Drainage Channel:** The drainage channels couldn't be worked properly in the past and the flooded water from the production fields couldn't drain easily. For now, the water can be drained smoothly when it is needed to drain because RSSD excavated these drainage channels.
- **Warehouse:** Although there is the building as a warehouse, it is not standardized as a seed warehouse. In the past, there is rat interference and losses in not only quantity but also quality of rice seed. By renovation of this warehouse by the project, it met with the standardized warehouse and rats couldn't enter in it. WHH provided the linoleum carpets and big fans to use in the warehouse. But the seed farm still needs to put them in it because it is needed to set up the electricity in the warehouse. The seed farm is going to store the foundation seed class for 3 varieties in this warehouse. In the past, they stored all seed classes in one warehouse. The warehouse was built based on international guidelines specifically for seed warehouses.
- **Tractor:** In the previous, there is only one partially functionalized tractor and one fully functionalized hand tractor for land preparation. These are not enough for land preparation in time and the seed farm needs to hire the outsource. It is costly and then, the land preparation couldn't get in good condition. If the seed farm used its tractor and hand tractor, the land preparation work was delayed because the tractors were needed to repair very often during the process. By having Kubota Tractor(50hp) provided by WHH, the land preparation could be done on time at optimum conditions for seed production.
- **Water Pumps:** By providing water pumps, the seed farm could drain the flooded water from the production fields in August (because of heavy rain for 4days continuously) and irrigate the production fields at booting and flowering times in September and October because of drought.

Myaung Mya Research Farm

- **Embankment wall:** The embankment wall can protect the flooding because the river is adjacent with seed farm border.
- **Irrigation/Drainage Channel:** Although the seed farm has the sand irrigation canals, it was difficult to irrigate to some fields that is far from the source. Sometimes, it is difficult for water management. They need to renovate these irrigation channels yearly. By having the concrete irrigation channels, it is effective for water management plot by plot. They can save time and diesel cost as well because they need to pump water from the river. This is more effective for summer rice production.
- **Cold Storage:** By having cold storage, they can store EGS seeds (specially Breeder seeds) for long term.

Shwe Laung (1) Farm

- **Irrigation/Drainage Channel:** By having the irrigation channels, the production areas (50ac) in summer is increased. In the past, they couldn't produce the summer rice in large scale. The yield is also low.
- **Warehouse:** By having the systematic warehouse, the seeds can store safely in this because the seeds in this seed farm used to be destroyed by rats and sparrow in the past time. The warehouse was built based on international guidelines specifically for SEED warehouses.

-
- **Drying Shed:** In the drying shed with the transparent sheet, about 400 baskets of seeds can be dried at the same time to get the optimum seed moisture content. They don't need to worry for labor force at the unexpected weather condition.
 - **Tractor:** In the previous, the seed farm needs to hire the tractor at land preparation time. Now the seed farm can do land preparation for 100 acres effectively and efficiently.

Auk Kwin Gyi Seed Farm

- **Embankment wall:** This embankment wall could prevent flooding in 2019 Monsoon. The seed farm could transplant in time and the loss is lesser than the previous years. The embankment wall could be used as a path to carry the harvested seeds from the fields to the drying shed.
- **Seed Warehouse:** The seeds could be stored systematically and could be stored separately by different varieties because of the warehouse has two chambers. The wooden pallets are also useful to maintain the quality of seeds. No need to worry for purity as well.
- **Drying Shed:** In the past, the seed farm could not do the drying process in time. Although the seed farm has another one drying shed. It is a little far from the warehouse. Sometimes, it is difficult to carry the dried seeds to warehouse under unexpected rain. Now, the drying shed is opposite of warehouse and it is easier to keep in it. The seed farm won't need to hire much labor. The drying shed is 100ft*50ft long. The drying for one variety can do effectively. It doesn't need to worry for seed mixture. Also, there is 30ft*50ft*12ft transparent roof in drying shed and the seeds can be dried under the sheet. Moreover, the seed bags can put under it at evening and night. The seed quality was improved because of timely transport and drying.
- **Tractor:** By having the tractor, the seed farm can operate land preparation in time. In the past, they used to hire the outside and needed to wait the available time.



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