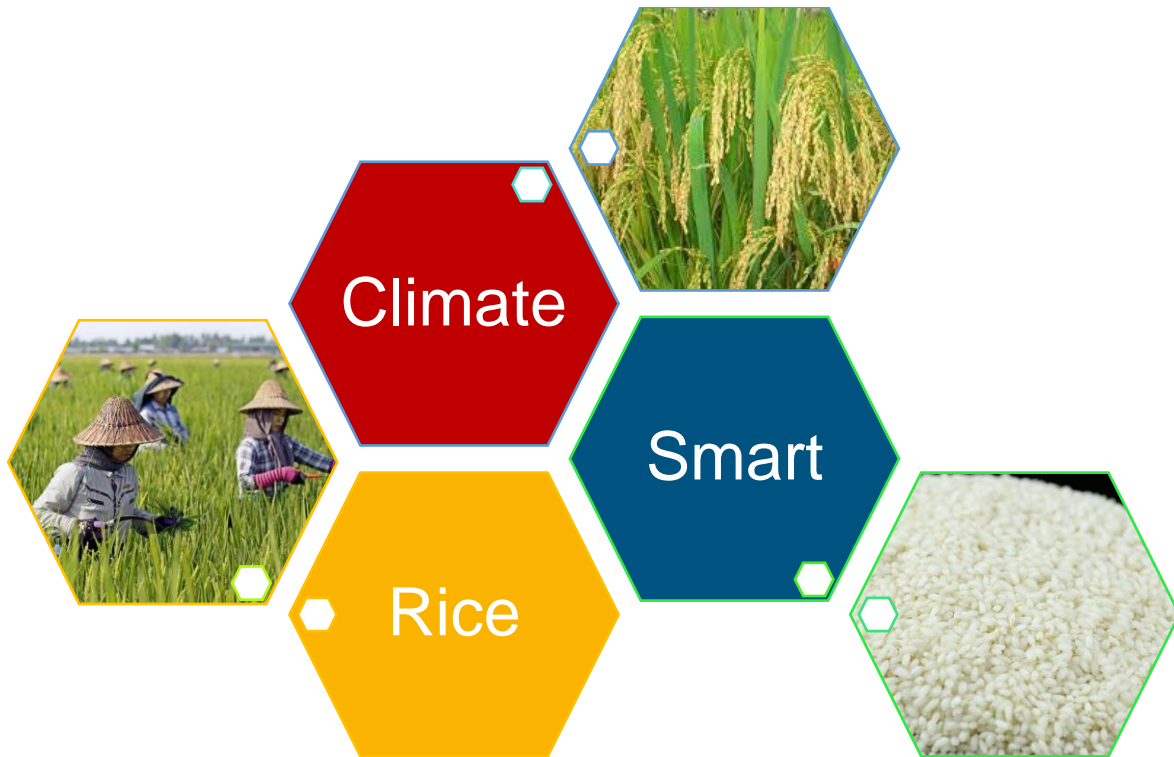




Climate Smart Rice Project

Rice Value Chain Analysis



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Abbreviations

ADS	Agriculture Development Strategy
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine
ASEAN	Association of Southeast Asian Nations
CFR	Cost and Freight
CIF	Cost, Insurance and Freight
DAR	Department of Agricultural Research
DoA	Department of Agriculture
DRI	Department of Research and Innovation
EGS	Early Generation Seed
FDA	Food and Drug Association
FOB	Free on Board
GAP	Good Agriculture Practices
GHG	Green House Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Points
IEC	International Electrotechnical Commission
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
ISO	International Organization for Standardization
MAPCO	Myanmar Agribusiness Public Cooperation
MoC	Ministry of Commerce
MPPA	Myanmar Paddy Producers Association
MRF	Myanmar Rice Federation
MTP	Medium Term Program
NES	National Export Strategy
NIM	National Institute of Meteorology
NORAD	Norwegian Agency for Development Cooperation
NQI	National Quality Infrastructure
NSQD	National Standard and Quality Department
SAC	Singapore Accreditation Counsel
SIE	Sustainable and Inclusive Economy
SOE	State Own Enterprises
SRP	Sustainable Rice Platform
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
VCA	Value Chain Assessment

Unit Conversions

1 kilogram (Kg) = 2.2 pounds (lb)

1 hectare (ha) = 2.4 acres (ac)

1 basket of paddy = 20.7 Kg or 46 lb

1 basket of milled rice = 34.01 Kg or 75 lb

US\$1.00 = MMK 1,401

Executive Summary

The overall objective of this rice value chain study is to examine the structure of Myanmar's rice market, in order to confirm and identify key value chain actors and processes, pricing structures and technical/economic drivers and constraints to competitiveness, both domestically and in its main export markets.

Research methodology included desk review, field assessment in the selected regions and organization of a stakeholder workshop to validate and develop joint strategy to upgrade rice value chain. Field assessment for the study was conducted in Mandalay region (Kyaukse and Sint Kai Townships), Shan State (Yak Sauk and Nyaung Shwe Townships), Bago region (Waw and Thanatpin Township) and Mon State (Paung and Belin Townships). Due to Covid-19 pandemic restrictions, it was not possible to organize workshops but discussions via telephone and online with selected stakeholders were organized to validate the findings and SWOT analysis matrix.

The key actors in the rice value chain in the study areas are identified as input suppliers, farmers, rice millers, wholesalers, and exporters. Major challenges at the production level were changing weather patterns, flooding, lower rainfall, inadequate water supply from irrigation system (in Mandalay and Bago), scarcity of labor and higher cost of farm inputs. Farmers sell in the conventional markets to local collectors or rice millers and no formal contract farming system is in place.

About 59 % of the farmers in the study areas purchased rice seed while the rest used part of their own harvest as seed source in the next season. Farmers in all study areas use chemical fertilizers such as Urea (46.0.0) and compound fertilizer, such as DAP (10-10-15) as a basal application, 2-3 times foliar spraying of NPK compound and only a few farmers in Bago applied farmyard manure without using chemical fertilizers.

Technical services and input advice are mostly provided by agro-chemical company staff but rarely by the government extension services. The study showed that 82% of farmers borrowed money for rice cultivation out of which 93% borrowed money from the Myanmar Agricultural Development Bank (MADB) while 12% of farmers also received loan from other sources such as rice traders, millers and micro-finance service providers.

Gross marginal analysis for Ayamin and Emahta rice with share of margins for key value chain actors was conducted. Farmers and rice millers have the larger share of margin as they are the key actors along the value chain involved in several functions. Margin analysis of different key actors for Ayamin rice showed that the gross profit for farmers was 244,067 MMK/MT (USD 174.21/MT) of paddy, millers got 103,589 MMK/ MT (USD 73.94/MT), wholesaler 70,096 MMK/ MT (USD 50.03/MT) and the retailers received 16,9234 MMK/MT (USD 120.8/MT).

Specialty rice such as Nature rice, Parboiled rice, Organic rice and Fortified are sold in the high-end markets as new market segments in the urban areas. Three potential market segments for SRP verified rice are identified as 1) Domestic market in the region as per current practice, 2) Domestic high-end urban markets in the country and 3) Export market by the companies through contract farming. Rice millers have the potential to engage in contract farming mechanism and

access high-end domestic market through value addition (cleaning, color sorting, packaging, SRP branding).

Based on the findings and conclusions of the study, following recommendations are provided.

- Supply of certified seed and registered agro-chemicals to farmers should be ensured in the production of SRP verified rice through contract farming mechanism.
- Rice yields in all project target area can be improved by optimum and more efficient utilization of quality farm inputs (including certified seeds) and following sustainable production practices as per the SRP Standard.
- Working with and strengthening farmer's group and organizations can support to increase the number of farmers adopting SRP practices to get a marketable quantity of quality rice.
- High yielding varieties and hybrid rice varieties are increasingly grown in the study areas. However, for sustainability, it is recommended to promote local varieties with market potential, which are genetically purified in collaboration with DoA and DAR as the farmers cannot afford to purchase new seeds every year.
- Contract farming should be formalized to produce SRP verified rice. Through contract farming, farmers should have access to quality inputs, extension services and market access.
- Rice millers should be encouraged to invest in improvement of post-harvest facilities especially, efficient paddy dryers and storage facilities. Rice millers and/or traders should be encouraged to explore value addition of milled rice (cleaning, sorting, branding and packaging, including SRP certified label) so that they get access to high end domestic and export market.
- Policy advocacy for scaling up sustainability in rice sector and inclusion of SRP Standard at the national level should be facilitated in collaboration with the National Standard and Quality Department and the Myanmar Rice Federation.
- High-end markets such as in the Middle east countries and EU market should be explored for the export of rice. The quality of product as well as process along the rice value chain should meet the requirements of the technical regulations and buyers' requirements.
- Scaling up to reach out more farmers and value chain actors on sustainable rice production and marketing should be done in collaboration with other potential donors and organizations. For example, IFC is interested in scaling up of SRP program in Myanmar for high value production and expansion market opportunities.
- The target location for the development of high-quality rice value chain should be appropriately selected. One of the potential areas could be Shwebo in Sagain Region where they produce premium quality rice. The adoption rate of new technologies by farmers are quite good and the readiness of private sector (millers) are better than other parts of the country. Shwebo Paw San rice, a premium quality rice in the domestic market could also be value-added with SRP verification.

1. Introduction

1.1. Background

Myanmar is one of the leading rice producing countries in the world. Rice accounts for the largest area of crop grown in Myanmar, over 7 million hectares, or 30% of the total cropped area of 23.5 million ha producing 28.1 million MT (MMT) of paddy in 2018. About half of total rice export was to China through border trade¹. In 2017/18, Myanmar exported 3.5 MMT rice due to higher demand from European Union and African countries. Myanmar exported rice to 60 countries and extended markets to 22 new countries. However, export volume in 2018/19 decreased to 2.35 MMT and volume of border trade with China also decreased with strict enforcement of food safety requirements in the border trade.

Myanmar generally exports rice to China, Bangladesh, India, Middle East, Africa and the EU. China is a large importer of Myanmar rice through border trade. White long grain was the largest type of rice exported which was about 44% of total export in 2016/17 and reduced to 34% in 2018/19 with the increase in export of shorter grain and broken rice. The major buyers of Myanmar white rice were China and Bangladesh.

Myanmar so far is one of the cheapest rice exporter and efforts are needed to raise the quality standard of rice by improving milling and creating more consistent product as part of a multi-pronged effort that involves government and the private sector. Leading rice-exporting countries are India, Thailand, Vietnam, Pakistan, Myanmar, United States, China, Cambodia, Uruguay and Brazil and there is very high competition between neighboring rice exporting countries in Asia. Thailand and Vietnam have successfully transformed their rice export from quantity to quality oriented. On the other hand, the demand for rice is increasing continuously but global market demands vary by countries as well as by the type of product based on the quality. The basic quality requirements (technical and regulatory requirements) for rice have been set addressing the food safety issues. Even for the border trade with China, the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) has been adopted and Myanmar need to adhere to the quality requirements.

Myanmar still has lower rice yields compared to other rice producing countries such as Vietnam, Thailand or India. Several studies conducted in Myanmar identifies weaknesses at various stages of the rice value chain. At the farm level, the accessibility to quality seeds, poor water management, misuse of fertilizers and pesticides, seasonal labor shortages, poor harvest and post-harvest practices and poor access to credit and lack of infrastructure such as farm roads are some of the main constraints for lower rice yields. Lack of investment in pre-processing and processing facilities and lack of finance are constraints throughout the whole rice value chain. Consequently, inconsistent quality supply as well as a higher post-harvest loss in terms of quality and quantity, lack of diversification further affects the rice sector. The post-production costs are higher compared to other Asian exporters, which partly explains Myanmar's relatively low competitiveness of the rice sector. Rice production in Myanmar is also challenged by its high demand for water, land, fertilizer and pesticides and its own environmental impact, including a significant contribution to greenhouse

¹ Ministry of Commerce, 2018

gas emissions.

Besides, there are issues with respect to climate change, infrequent and unexpected rainfall especially for summer rice harvesting season. Late or early onset of monsoon season, longer dry spells, erratic rainfall, increasing temperature, heavy rains, stronger typhoons and flooding are common climate conditions that have been occurring more frequently in the recent decade. Summer rice produced in about 2 million ha contributes to one third of the total rice production. Harvesting season is from March to May in Lower Myanmar and from June to August in Upper Myanmar. There are high crop losses due to lack of drying facilities and quality deterioration due to higher grain moisture contents .

The Climate Smart Rice Project (CSR) aims to support the Government of Myanmar, the agri-business sector and smallholder rice farmers to stimulate transformation of the rice sector towards sustainability. Focusing on rice-inclusive farming systems, the project prioritizes enhancement of the livelihoods of smallholders through private sector development and partnerships promoting climate smart and resource-efficient best practices. The main approach applied by the project is known as "Push-Pull-Policy" with the following outcomes.

- **Outcome A:** Rice based resilient farming systems widely adopted, leading to improved farmers livelihoods (Push)
- **Outcome B:** Certified export and sustainable domestic rice value chains established and functioning (Pull)
- **Outcome C:** Policy and regulatory framework strengthened to support the national rice sector development strategy (Policy)

This project is funded by the Norwegian Agency for Development Cooperation (NORAD) and the Swiss Agency for Development Cooperation (SDC). The project supports participating farmers and other actors in the rice value chain to adopt Sustainable Rice Platform (SRP) Standard which is a global voluntary standard for sustainable rice cultivation. Adoption of SRP Standard has been shown to boost rice productivity by increasing resource efficiency and improve resiliency to climate change safeguarding the livelihoods.

1.2. Objectives of the Study

The overall objective of this rice value chain study is to examine the structure of Myanmar's rice market, in order to confirm and identify key value chain actors and processes, pricing structures and technical/economic drivers and constraints to competitiveness, both domestically and in its main export markets.

The specific objectives of the study are:

- To identify the key rice value chain actors and their roles and influence (governance) along the value chain in project target areas.
- To assess the current practices comprising the inputs, production, post-harvest handling, milling and marketing (both domestics and export) and provide recommendations for improvements to comply with SRP Standard.
- To evaluate and compare the cost and margin for all stakeholders throughout the rice value

chain.

- To investigate the services required by various actors along the value chain.
- To investigate the policy environment and bottlenecks in rice value chain; and
- To assess the potential for SRP- compliance rice in domestic and export markets.

MyanSEED Agribusiness Consultancy Limited was contracted to conduct the rice value chain study in project target areas of central dry zone (Mandalay Region), hilly region (Southern Shan State) and the coastal zone (Mon State and Bago Region).

1.3. Methodology

The study methodology consisted of 1. desk review, including review of secondary, and historical data of rice production, price and cost, 2. field assessment in the selected project target areas to obtain primary data and information and 3. organization of consultation workshop to validate the findings and to craft concrete actions to be taken in promoting sustainable best practices in the rice value chain.

1.3.1. Desk Review

The study team reviewed related documents to establish the baseline of the existing rice value chain in Myanmar, allowing to identify the strategic entry points.

1.3.2. Field Assessment

Field assessment was organized in Yangon, Mandalay, Bago, Southern Shan and Mon State from 14th February to 7th March 2020 to conduct interviews with the targeted rice value chain actors and stakeholders. The study team visited Kyaukse and Sint Kai Townships in Mandalay Region; Yak Sauk and Nyaung Shwe Townships in Southern Shan State; Waw and Thanatpin Townships in Bago region; and Paung and Bilin Townships in Mon State. The location of the study area is shown in Figure 1 and participants met is given in Table 1. The approach and methodology for the field assessment included

- **Key Informant Interviews (KIIs):** Key Informant Interviews were held with 26 respondents who are key market actors such as rice farmers, millers, rice wholesalers, exporters and retailers, and stakeholders such as DoA officials, Myanmar Rice Federation (MRF) and related associations through semi - structured questionnaires and checklist. The questionnaires are given in Annex 1.
- **Focus Group Discussion (FGDs):** Focus Group Discussions were organized with key farmers in selected study villages for overall understanding of the situation in relation to the rice production and aiming to triangulate the findings of the individual survey results.
- **Individual Interviews:** Individual interviews with 34 rice farmers in 4 project target Regions and States were carried out.



Focus group discussion with rice farmers

Table 1. Number of respondents in field assessment

States/ Region	Townships	No of Farmers	No of Traders	No of Processors	Other stakeholders	No of phone interviewed
Mandalay	Kyaukse and Sink Kai	7	4	4	6	2 (1 farmer and 1 Miller)
Mon	Paung and Belin	7	2	4	5	2 (1 farmer and 1 Miller)
Bago	Thanatpin and Waw	11	2	5	5	1 Farmer
Shan	Nyaung Shwe and Yaksauk	11	3	3	5	1 Farmer
Yangon	Yangon		5	2	5	2 MRF representatives
	Total	36	16	18	26	6

Table 2. Villages for field assessment

	Villages	Township	Zone		Villages	Township	Zone
1	Dan Tai	Kyaukse	Mandalay	9	Chaung Wa	Thanatpin	Bago
2	Myaung Gyi			10	Nyan Kyun		
3	Sin Phyu Kone	Sintkai		11	Lat Pan	Waw	
4	Let We			12	Kawt Win		
5	Youngchi Oo	Yausauk	Shan	13	Kan Tharyar	Belin	Mon
6	Yaksauk			14	Mu Thin		
7	Ywa Thar Yar	Nyaung Shwe		15	Tha Byu Chaung	Paung	
8	Nyaung Shwe			16	Yinn Nyein Taung		

1.3.3. Stakeholder Consultation Workshops

Based on analysis of data collected from field assessment through KII, FDGs and IDIs, the study team was expected to facilitate two regional level Stakeholder Diagnosis and Consultation Workshops in order to validate the study's findings and identify the most important hotspots along the rice value chain, opportunities and new potential market segments for SRP verified rice through participatory approach. However, due to Covid-19 pandemic during the study, it was not possible to

organize a group of people for the workshop. Telephone discussion with the selected stakeholders in person to validate the findings and SWOT analysis matrix was organized.

1.3.4. Data Analysis

Data analysis was done in terms of 1) Value Chain Mapping 2) Functional Analysis, 3) SWOT analysis and 4) the Margin analysis. In the Marginal analysis, the following functions were applied in the calculations.

$$1. \text{Revenue (Kyat/ac)} = \text{Price (Kyat/basket)} \times \text{Yield (baskets/ac)}$$

Price means weighted average selling price (WASP) that is used to calculate the revenue since farmers sell their produce more than one time and different volume. They do not sell out all the produce in one time. Moreover, price for different variety is different even it is grown in the same season.

$$2. \text{WASP} = ((\text{Yield of Variety A} \times \text{Price of Variety A}) + (\text{Yield of Variety B} \times \text{Price of Variety B}) + (\text{Yield of Variety C} \times \text{Price of Variety C}) / \text{Number of rice varieties}) / \text{Average yield}$$

A gross profit margin refers to the total income derived from on-farm price received per unit sold multiplied by the number of units produced per acre, less the total variable costs. Market prices can vary significantly during a season, generally decreasing as supply increases, and vice versa. Therefore, the actual price that the farmers receive by selling the crop is used to calculate the gross margin.

$$3. \text{Gross Profit} = \text{Revenue} - \text{Total Variable Cash Cost (TVC)}$$

$$4. \text{Net Profit} = \text{Revenue} - \text{Total Cost (Including Opportunity Costs)}$$

1.3.5. Limitations of the Study

The study areas and sample location for the field assessment was recommended by HELVETAS Myanmar (Project Management Unit) as a strategic entry point for the study. However, the study is limited at geographical locations and some limitations are described as follows:

- The study did not cover some rice value chain actors and service providers such as rice seed growers, service providers such as credit and inputs suppliers and retailers in urban market due to limited time schedule.
- Farmers visited for field assessment in Bago region were adversely affected by unfavorable weather conditions and flooding last year and it does not represent the normal yield conditions.
- Sown acres, yield, price, cost, and benefit analysis are mainly based on the harvested crop of the previous year (2019).
- Stakeholder workshops to validate the findings and brainstorming to identify opportunities for SRP verified rice in the field couldn't be organized due to Covid-19 pandemic restrictions. However, validation and further information were collected through follow up telephone calls. Collective group discussions and reflections could not be organized via individual telephone conversations.

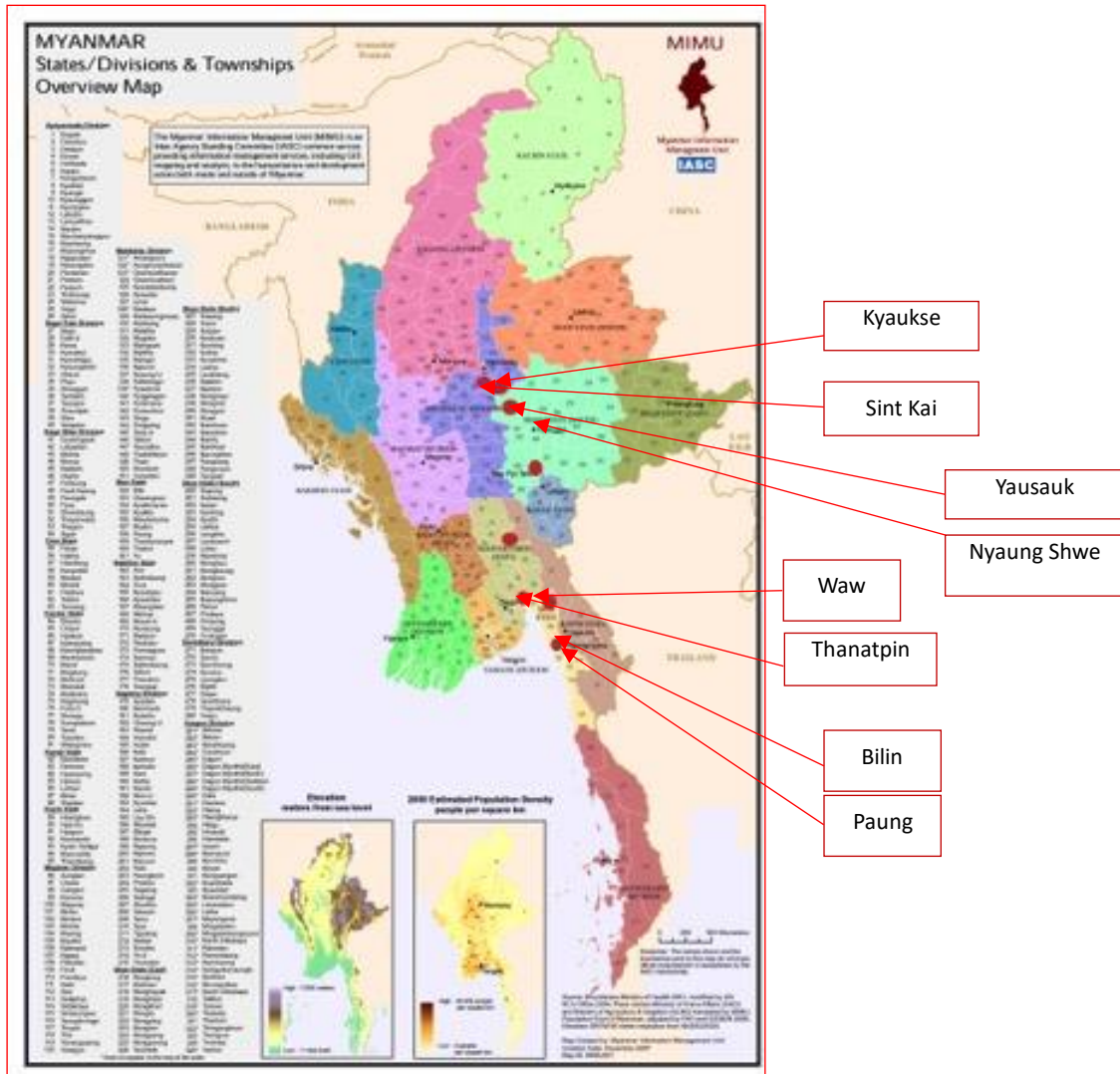


Figure 1. Location of study areas

2. Current Status of Rice Sector

2.1. Policies Promoting Rice in Myanmar

2.1.1. Myanmar Agricultural Development Strategy (2018-2023)

The Myanmar Agricultural Development Strategy (ADS) and Investment Plan 2018-2023 is “a guidebook” for inclusive development of agriculture in Myanmar that is based on the cooperation between government, farmers and private businesses. The vision of ADS is “an inclusive, competitive, food and nutrition secure and sustainable agricultural system contributing to the socio-economic well-being of farmers and rural people and further development of the national economy”. The ADS have three objectives corresponding to the three strategic pillars of governance, productivity, and competitiveness; 1. Enhanced governance and capacity of institutions responsible for agricultural development, 2. Increased productivity and farmers’ income and 3. Enhanced market linkages and competitiveness. The ADS aim to promote adoption of sustainable good agriculture practices that enhance farmers’ income. Rice is a prioritized commodity in ADS which seeks to increase competitiveness and stakeholder participation in rice value chain.

2.1.2. Myanmar Rice Sector Development Strategy (2015)

The Myanmar Rice Sector Development Strategy (MRSDS) presents a clear vision and aligns with the strategic objectives of Millennium Development Goal (MDG) 1, which is eradicating extreme poverty and hunger. The MRSDS will guide the government in prioritizing its investments and improve the structural weaknesses along the rice value chain. The MRSDS envisions “food-secure farmers and consumers enjoying the economic benefits provided by a transformed, dynamic, environmentally sustainable and internationally competitive rice sector.” Sustainable rice intensification using efficient and effective natural resource management for increasing rice productivity and profitability will be the cornerstone in achieving this goal by 2030. It is envisioned that the future rice system will be highly market-oriented where the farmers and the private sector are actively engaged in a transparent and vertically integrated rice value chain. The MRSDS highlights 10 key themes that ought to guide developing the rice sector. These themes are (1) sustainable increase in rice productivity, (2) increased farm mechanization, (3) adaptation to climate change, (4) efficient and sustainable management of natural resources, (5) postharvest loss reduction, (6) increased access to credit, (7) capacity building, (8) increased investments in agriculture, (9) quality control and safety in rice production and marketing, and (10) enhanced rice research and development.

2.1.3. National Export Strategy for Rice (2020-2025)

The first phase of the implementation of National Export Strategy (NES) 2015-2019 contributed to a surge in exports earnings in 2017-18, largely driven by higher demand from African countries and facilitated by trade agreements with Sri Lanka and Bangladesh. 40 trade development projects contributed to the rice strategy implementation especially in Mandalay, Yangon, Ayarwaddy and Sagaing. NES 2020-25 is under development, the first NES Symposium organized in March 2019 and its visions and strategic objectives were well identified as ‘High-quality and environmentally sustainable growth in rice production and export for rural development and income generation’. In this regards, SRP rice program is in line with its objectives. To achieve the strategic objectives,

short term (0 to 3 years) and medium to long term (+3 years) developing options and action plans have been set.

2.2. Sustainable Rice Initiatives

The Sustainable Rice Platform (SRP) is a multi-stakeholder partnership to promote resource efficiency and sustainability both on-farm and throughout the rice value chain. The SRP has developed a range of tools to promote sustainable rice cultivation, including the SRP Standard for Sustainable Rice Cultivation, SRP Performance Indicators and SRP Assurance system². These tools can be used either separately or together as appropriate to the context of the project areas for preliminary assessment of rice value chains. The SRP Standard for Sustainable Rice Cultivation v.2.1 and SRP Performance Indicators (PIs), have been developed through the multi-stakeholder process.

The Sustainable Rice Landscapes Consortium was established as a unique consortium led by UNEP, FAO, SRP, WBCSD, GIZ, IRRI and private partners to promote the adoption of proven landscape-level solutions for rice sustainability. The initiative will contribute to meeting national GHG reduction targets under the Paris Agreement, as well as restoring degraded landscapes and conserving biodiversity.

Several projects to promote sustainable rice cultivation are implemented at varying scales in Africa, Asia, Europe, and the Americas. A total of 25 member-led projects are active across 21 countries, reaching 500,000 rice smallholders. SRP Standard for Sustainable Rice Production is the world's first rice sustainability standard. In 2018, SRP partners from 24 countries reached almost 700,000 farmers and over 319,000 hectares of rice production. In Thailand, GIZ, Olam and SRP launched the Thai Rice NAMA project with 11 Thai government agencies in 2018. Mars Food, Ebro Foods, GIZ and the Thai Rice Department launched the Sustainable Aromatic Rice Initiative – Thailand (SARIT) in the same year with an aim of building the capacity of 1,200 Thai rice growers in Roi Et province in adopting sustainable best practices. In Cambodia, Wildlife Conservation Society Cambodia (WCS) launched an SRP trial in collaboration with Sansom Mlup Prey (SMP), Battambang Rice Investment Company (BRICO), Mars Food and Critical Ecosystem Partnership Fund (CEPF) in 2016 and in 2018, a total of 350 participating households produced 1,400MT of jasmine paddy in accordance with the SRP Standard. In Pakistan and India, SRP members - Helvetas, Mars Food, Rice Partners Ltd and WWF-Pakistan is implementing a project on water management in rice and cotton, funded by the Swiss Agency for Development and Cooperation. The project has seen significant reductions in use of water and agrochemicals, as well as higher incomes for rice farmers.

In Myanmar SRP has been introduced to relevant Ministries and other stakeholders over the past 4 years, with recent efforts being focused more specifically through implementation of the Climate Smart Rice Project by UNEP, Helvetas, Prime Agri and SRP. Under this project, farmers and agri-technicians have undergone specific training on the SRP Standard and Performance Indicators, and local-language training materials have also been introduced.

² All SRP tools are in the public domain and available for download at www.sustainable-rice.org

2.3. Covid-19 pandemic and Myanmar rice sector

With the restriction measures taken due to Covid-19, the Myanmar Rice Federation (MRF) reported that the summer rice production process faced some difficulties in harvesting, drying, and storage due to the restrictions in mobility, availability and mobilization of labor, affecting the quality of rice which may lead to rice traders and millers receiving lower quality paddy from farmers this summer season. Physical distancing and curfew regulations have further exacerbated the impact of Covid-19, leading to shortage of skilled labor and further affecting the day-to-day operations of rice mills. Panic buying by consumers led to an increase in the demand and price of rice at the beginning. However, with the restrictions in mobility, millers could not sell all the milled rice and faced challenges with cash flow with higher volume of rice stock.

Government announced its COVID-19 Economic Relief Plan (CERP) on April 28, 2020 in which the actions include monetary stimulus for easing the impact to the private sector through SME loans. The Government temporarily stopped to issue rice export licenses in April but honored existing export licenses³. However, according to the information from Ministry of Commerce, rice export quotas were issued very carefully and 10% of export volume was kept as the stockpile for domestic market. The demand for rice increased from the ASEAN countries such as Malaysia, Indonesia and the Philippines and Myanmar is considering exporting more but has also committed to stockpiling more rice to safeguard its supply in the domestic market.

³ <https://www.rfa.org/english/news/myanmar/rice-04012020193852.html>

3. Findings

3.1. Rice Cropping Seasons

Rice cropping systems in the study areas are very diverse according to the availability and accessibility of water for irrigation, soil condition and rainfall. In Mandalay, Sint Kai Township, three crops of chickpea + summer sesame or pulses + summer sesame or chickpea + summer paddy was followed by a monsoon paddy cultivation. In Kyaukse Township, monsoon paddy is followed by onion as a winter crop. In Thanatpin and Waw Townships in Bago Region, mung bean and black-eyed beans are major winter crops grown. They grow monsoon rice, but its yield is affected by seasonal flooding. The income from mung bean and winter crop is higher than the monsoon rice. In Mon State, rice is the major crop, which is produced in the lowlands. In Southern Shan, corn is the main crop and few farmers who have lowland grow rice.

In all areas, it was found that that the areas for monsoon season rice production were larger than summer season. For summer paddy, farmers need irrigation water (e.g. from Moe Inn Gyi dam in Bago) but did not have adequate access to water. In 2019 summer season in Mandalay, Kyaukse Township, farmers could not produce summer season due to lack of water for irrigation.

Table 3. Rice cropping seasons in project target areas

Region	Crop Calendar	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mandalay	Monsoon rice	H						P					H
	Summer rice				P		H	H					
Mon	Monsoon rice							P					H
	Summer rice			H									P
Bago	Monsoon rice					P						H	
	Summer rice			H								P	
Shan	Monsoon rice						P						H
	Summer rice	P			H								

P - Planting (sowing), H - Harvesting

3.2. Rice Value Chain Mapping

The rice value chain map for the project target areas is shown in Figure 2 and 3.

Figure 2. Value Chain map of rice in Mandalay and Coastal region

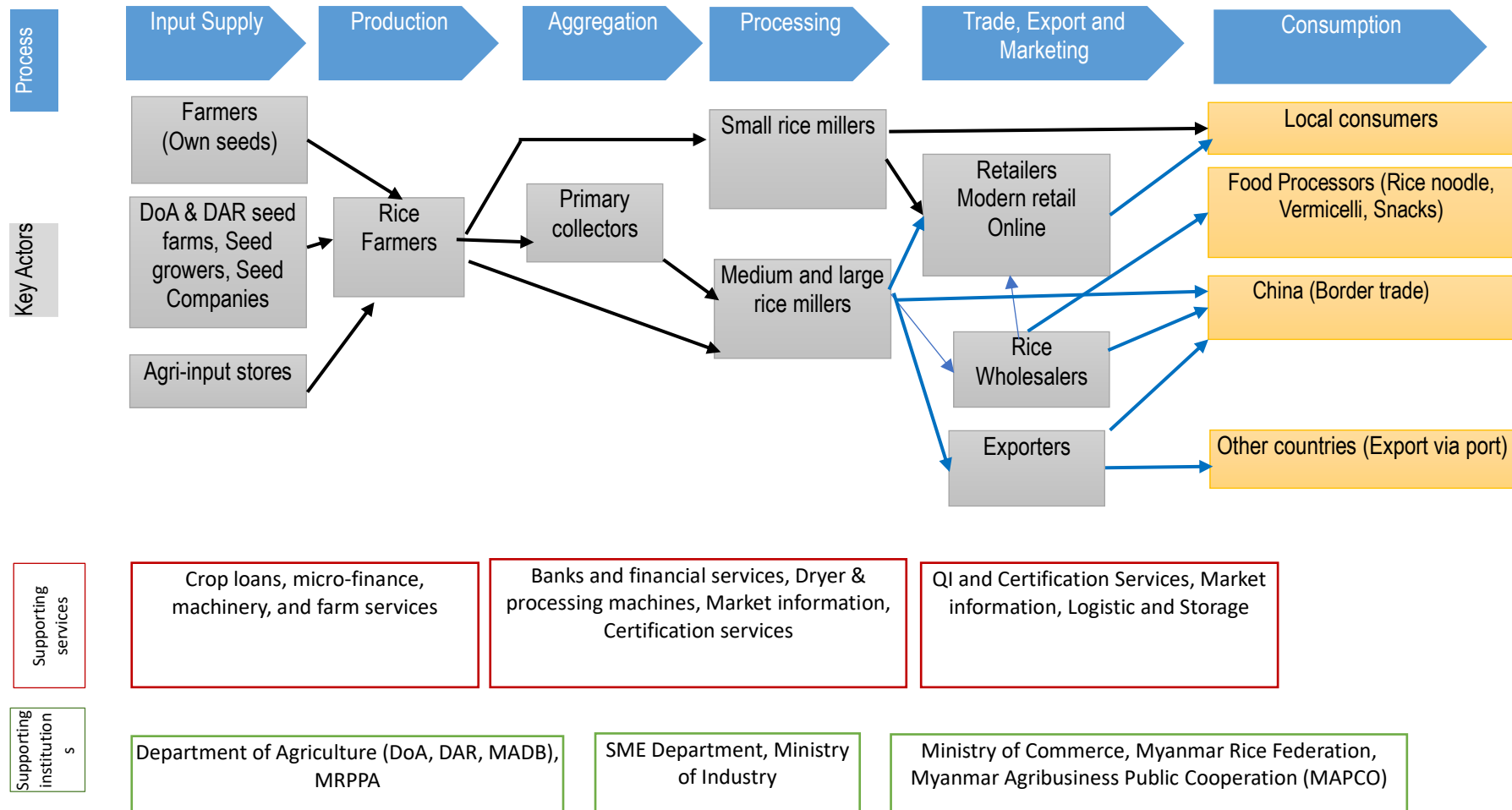
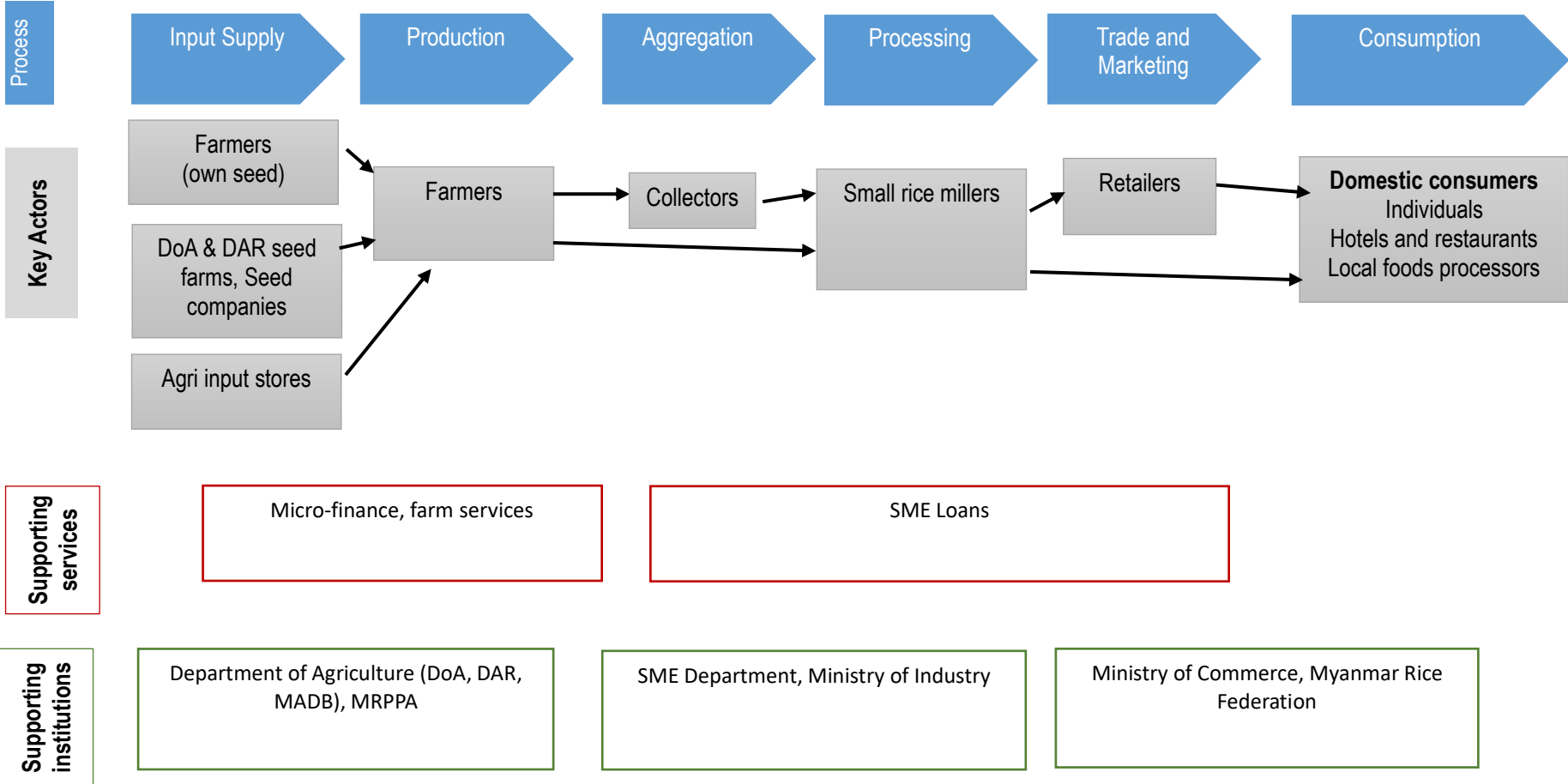


Figure 3. Value Chain map of rice in Southern Shan



3.3. Rice Value Chain Actors and Functional Analysis

3.3.1. Input Suppliers

- **Rice Varieties**

According to the Department of Agriculture (DOA), about 90% of the total cultivated rice in monsoon is Ayamin (also known as Ayapadaythar) in Kyaukse and Sint Kai Townships. In Mandalay, farmers mostly grow Ayamin variety, while in Bago region they grow Kyar Pyan, Thet Kyi, Pathein Yar Kyaw and Manor Ei varieties. Farmers in Mon grow Kyar Pyan, Paw San, Ayamon and Kamarkyi varieties and farmers in Shan mostly grow DU 12 and DU 16 varieties. In general, paddy varieties grown in Monsoon season such as Ayamin, Paw San, Kyar Pyan are regarded as medium quality/ good eating quality rice varieties and mainly produced for domestic consumption.

For summer paddy, most of HYV varieties such as 90 days, Lone Thwe and Shwe Manaw varieties are grown in Mandalay region, 90 days variety, Sinthukha, Sin Thwe Yin, Pyaut Thukha varieties are found in Bago region and Shwe Thwe Yin, Shwe Wah Htun and 90 days varieties are grown in Mon, on the other hand, Yak Sauk is grown in only monsoon paddy Nyaung Shwe are grown in but both monsoon and summer paddy. Most of summer paddy varieties are for the export and commercial uses. Percentage of sample respondents who grow different varieties of rice are listed in Table 4.

Table 4. Rice varieties produced in project target areas

	Monsoon Paddy		Summer Paddy	
Region	Rice Variety	% of Sample Respondents	Rice Variety	% of Sample Respondents
Mandalay	Ayamin	100%	90 days	40%
			Lone Thwe	60%
			Shwe Manaw	6%
Bago	Kyar Pyan	29%	90 days	43%
	Manor Ei	6%	Sinthukha	57%
	Shwe Thwe Yin	29%		
	Pyaut Thukha	29%		
	Thet Kyi/ PatheinYar Kyaw	14%		
Mon	Kyar Pyan	36%	Shwe Thwe Yin	9%
	Paw San	100%	Shwe Wah Htun	18%
	Ayamin	18%	90 days	55%
	Kamar Kyi	27%		
Shan	DU 12	36%	DU 16	64 %

- **Sources of rice seed**

About 59% of the famers in the study areas purchased paddy seed while 41% of the farmers used part of their own harvest as seed source in the next season. Out of 59% who purchase seed, 53% purchased from DoA's seed farms while 6% purchased seed from companies and farmers. Certified seed is normally distributed by DoA seed farms and DAR. DoA has the mandate to monitor fields

for breeder, foundation, registered and certified seed, as well as to monitor seed markets for quality control across the country. In the study areas, individual seed growers, private seed companies/ farms also produce certified or good quality paddy seeds in accordance with the newly amended Seed Law (Pyidaungsu Hluttaw Law No.5, 2015). Although paddy seed is produced by the private companies, quality assurance is the mandate of the Seed Division. Seed Division operates seed laboratories (i.e., central and 6 states and regional level laboratories) in Myanmar. DAR and research farms do their own seed quality assurance system for Early Generation Seeds (EGS) and it is not under the DOA's seed quality assurance system.

In Mandalay, there are few commercial seed farms and private seed growers producing and distributing paddy seeds to farmers. Some farmers in Sint Kai Township source paddy seed from the registered seed company “Mya Wut Yee” and seed farmers who belong to Seed Growers’ Association. In Kyaukse Township, Shwe Nan Taw seed farm distribute Ayamin variety seeds, but Seed Growers’ Association is not functional.

Several seed growers are producing good quality seeds in Bago region. Some rice millers provide seed to selected farmers and farmers have to pay back the cost of inputs while selling the paddy. In Shan, farmers mostly rely on DoA seed farms (i.e., Yak Sauk and Nyaung Shwe). Farmers in Mon usually buy seed for their own use and sometimes get from other farmers. The cost of rice seed in Mon from private companies ranges from 13,000-16,000 MMK per basket (USD 0.44 - 0.55 / kg) while seed from DoA cost about 14,000 MMK per basket (USD 0.48 / Kg). The perception of farmers on the quality of seed they use in terms of germination rate and purity is presented in Table 5.

Table 5. Perception of price of seeds in relation to germination and purity

Region / State	Germination			Purity		
	Good	Moderate	Poor	Good	Moderate	Poor
Mandalay	20%	80%	-	20%	80%	-
Bago	100%	-	-	100%	-	-
Mon	100%	-	-	100%	-	-
Shan	9%	91%	-	27%	73%	-

• **Agro Chemicals (Fertilizers, foliar, pesticides and herbicides)**

Farmers in all the study areas use chemical fertilizers in rice production but rarely used pesticides, fungicides and herbicides. Some amount of pesticides is used only for summer paddy. Farmers in Mandalay use urea (40-0-0) and compound fertilizer such as DAP 10-10-15 as a basal application. The study found that, farmers, in average applied 20.4 kg of urea, 2.5 kg of T-Super and 20.5 kg of compound fertilizer for monsoon paddy and about 17.2 kg of urea, 2.1 kg of T-Super, 6.5 kg of potash and 13.2 kg of compound fertilizer in summer paddy production. AWBA and ARMO are the most popular brands of fertilizers in Kyaukse and Sint Kai Townships. Foliar (liquid fertilizer specialized for paddy) spraying is done about 2-3 times during the planting and flowering stages.

Few farmers in Bago use 50 bags⁴ per acre of organic manure instead of chemical fertilizers. Farmers in Bago emphasized that they usually do not use fertilizers and pesticides in the monsoon

⁴ 1 bag is 25 – 30 kg

season due to higher risks related to uncertain weather conditions. Farmers in Shan use more fertilizers than farmers in other regions. Farmers have to buy chemical fertilizers from distributors (mostly local agro-dealer shops) in nearby township market with cash payment. Farmers in the study areas mentioned that they cannot get agri-inputs in credit as they use relatively smaller quantities of agrochemicals in paddy fields.

3.3.2. Rice farmers

The project and its partners have trained 1,368 farmers on SRP Standard from 2019 monsoon season. Trained farmers are gradually adopting SRP practices. According to the information of PRIME, a total of 56 farmers in Shan State are SRP verified (Level 3).

Table 6. SRP trained and verified farmers

Location	Farmers Trained on SRP Standard	SRP verified farmers
Shan	708	56
Mandalay	174	0
Bago and Mon	486	0
Total	1,368	56

Source: CSR Project, Helvetas

- **Farm size for rice production**

The farm size for rice production varied from each region to region. The average farm size was 17.3 acre. The average farm size was the highest in Bago (35.1 ac) followed by in Mon State (20.1 ac). The smallest was in Shan although some farmers produced up to 78 ac while others planted in 1 acre. Table 6 shows the average farm size in different locations.

Table 7. Average Farming Size in the Regions

Region	No of Sampled farmers	Average Farm Size (ac)
Mandalay	11	10.3
Bago	5	35.1
Mon	7	20.1
Shan	11	3.7
Average		17.3

- **Average yields**

The average yield of rice varies depending on the variety and production season. In general, the average yield in summer season is higher than the monsoon season. The rice yields in Thanatpin and Waw Townships in Bago was the lowest, especially in the monsoon season. The yield of different varieties is shown in Table 8. Thet Kyi, Pyawt Thukha, Laik Ma Lay which are local varieties that can grow in deep water / submerged area have the lowest yield. This was likely due to last year's saltwater intrusion, in addition to water scarcity and quality of seeds. In Mon, according to the interviewees' responses, local people prefer to eat Kamar Kyi for their daily consumption. On the other hand, farmers have to select proper variety to maximize its profit margin according to the season. Choice of suitable varieties is critical for farmer's livelihood, considering marketable quality, land, and local weather conditions.

Table 8. Average Yield of Monsoon Rice by Regions (2019)

Region	Variety	Yield (Baskets/ac)	Yields (Kg/ac)
Mandalay	Ayamin	76.0	1,596
Shan	DU 12	63.0	1,323
	DU 16	61.7	1,296
Bago	Pyawt Thukha	30.0	630
	Laik Ma Lay	30.0	630
	Kyar Pyan	30.0	630
	Thet Kyi/Pathein Yar Kyaw	20.0	420
	Manaw Ei	45.0	945
Mon	Kyar Pyan	38.3	804
	Thet Kyi/Pathein Yar Kyaw	30.0	630
	Paw San	44.4	932
	Kamar Kyi	60.7	1,275
	Taung Pyan	40.0	840

Table 9. Average Yield of Summer Rice by Regions (2019)

Region	Variety	Yields (Baskets/ac)	Yields (Kg/ac)
Mandalay	Lone Thwe	100.0	2,100
	Hnan Kauk	100.0	2,100
Shan	DU 16	61.7	1,296
Bago	90 Days	60.0	1,260
Mon	Shwe Wah Htun	95.0	1,995
	90 Days	75.0	1,575

- **Cost of Production**

Farmers in the study areas reported that total variable cost of rice production amounted to MMK 233,610/ac (USD 167/ac) in monsoon and MMK 287,830/ac (USD 205/ac) in the summer season.

In the monsoon season, average cost of seed was MMK 21,199/ac (USD 15.1/ac), cost of labor MMK 95,675/ac (USD 68.29/ac), fertilizers MMK 52,623/ac (USD 37.5/ac), pesticides MMK 11,563/ac (USD 8.25/ac), fuel and others MMK 10,192/ac (USD 7.27/ac) and farm machinery amounted to MMK 61,707/ac (USD 44.05 /ac). Average total variable cash cost was MMK 233,610/ac (USD 166.75/ac). Cost of seed was lower as most of farmers used part of the last harvest as seed in the next season. TVC in Mandalay region was the highest among 4 different agroecological areas while the TVC in Bago was the lowest.

Table 10 and 11 shows production costs as Total Variable Cost (TVC) for monsoon rice and summer rice in different studied areas.

Table 10. Production Cost for Monsoon Paddy (MMK/ac)

	Seed	Labor	Fertilizer	Pesticides	Fuel and others	Farm Machinery	TVC (MMK/ac)	TVC (USD/ac)
Mandalay	24,000	91,000	40,000	5,800	-	107,400	268,200	191.43
Bago	14,500	54,400	34,900	11,100	8,433	51,938	175,271	125.10
Mon	23,750	65,919	58,682	7,350	9,667	60,000	225,368	160.86
Shan	22,545	127,479	66,909	12,000	16,667	20,000	265,600	189.58
Average	21,199	95,675	52,623	11,563	10,192	61,707	233,610	166.75
% of TVC	9%	41%	23%	5%	4%	26%		

For summer rice, the average cost of seed was MMK 20,367/ac (USD 14.5/ac), cost of farm labor (for planting, weeding and harvesting) was MMK 94,237/ac (USD 67.3/ac), cost of fertilizers was MMK 71,073/ac (USD 50.7/ac), cost of pesticides and herbicides was MMK 8,924/ac (USD 6.4/ac), cost of fuel and others was MMK 20,455/ac (USD 14.6/ac) and cost of farm machinery was MMK 59,180/ac (USD 42.7/ac). The average total variable cash cost for summer paddy was MMK 274,862/ac (USD 196.19/ac).

Table 11. Production Cost for Summer Paddy (MMK/ac)

	Seed	Labor	Fertilizer	Pesticides	Fuel and others	Farm Machinery	TVC (MMK/ac)	TVC (USD/ac)
Mandalay	20,000	58,125	45,800	7,325		100,750	232,000	165.60
Bago	17,667	62,724	46,400	12,400	16,364	60,143	215,698	153.96
Mon	19,800	40,533	124,000	4,400	45,631	55,825	290,189	207.13
Shan	24,000	218,043	68,005	11,502	20,006	20,000	361,556	258.07
Average	20,367	94,237	71,073	8,924	20,455	59,180	274,862	196.19
% of TVC	7%	34%	26%	3%	7%	22%		

- **Selling by farmers**

Farmers sell rice to small rice mills; from which milled rice is directly sold to the consumers in the domestic market (including farmers, individual households or mass consumers such as small restaurants in the region).

Farmers also sell to the primary collectors, who supply rice to bigger rice mills. They sometimes work with the money invested by the rice millers and get the commission fees (MMK 100 / basket of rice in Mandalay and Bago) upon delivering rice to rice millers. In Shan, there are not many bigger rice mills and farmers mostly sell directly to the rice mills.

Farmers also sell directly to bigger rice mills. The bigger rice mills in Mandalay and Bago export milled rice to China through Muse border trade. Sometimes, retailers within the region or other States and Regions buy from them. In most cases, bigger rice millers in Bago supply milled rice to the rice wholesalers in Mandalay, Yangon and Mawlamyine. From the rice wholesalers, rice is supplied to various rice retailers, food processors or sometimes to Muse border areas. 90 days, Yezin Lone Thwe and the other HYV varieties are mostly rice Wholesalers in Mandalay supply rice

to other States and Regions where rice is not sufficiently grown.

- **Constraints and Problems faced by the Farmers**

Lower rainfall and unfavorable weather for rice cultivation is the main problem as reported by 74% of the farmers. This year, summer paddy production was limited in Mandalay, Bago and Shan due to inadequate water for irrigation.

About 68% of the farmers mentioned that labor scarcity is one of the major challenges in paddy farming. The scarcity of farm labor in transplanting and harvesting specially in Sink Kai and Kyaukse area were reported as these are industrial area and there are other employment opportunities. Difficulties of farm labors due to out migration was reported in other areas. 62% of the farmers also reported lack of rice-based extension services as one of the major constraints. Other constraints as reported by 56% of the farmers included lack of irrigation facility, saltwater intrusion, flooding, poor land leveling, higher cost of farm inputs, flooding and infestation of golden apple snails in the paddy field.

Flooding generally occurs in Mon during early monsoon season. Some farmers mentioned that they can drain out the excess water within few days, thanks to water outlets near their plots. However, most farmers with their plots away from these outlets have to wait a longer time to drain and their yields are affected.

According to the concept of CSR project, farmers trained on SRP will have improved access to market through contract farming with Prime and rice millers. In Shan and Mandalay PRIME will lead for marketing of SRP rice. So far, farmers (including the SRP verified) sold out in the conventional markets as mentioned above and don't have access to improved market as contract farming is not implemented yet.

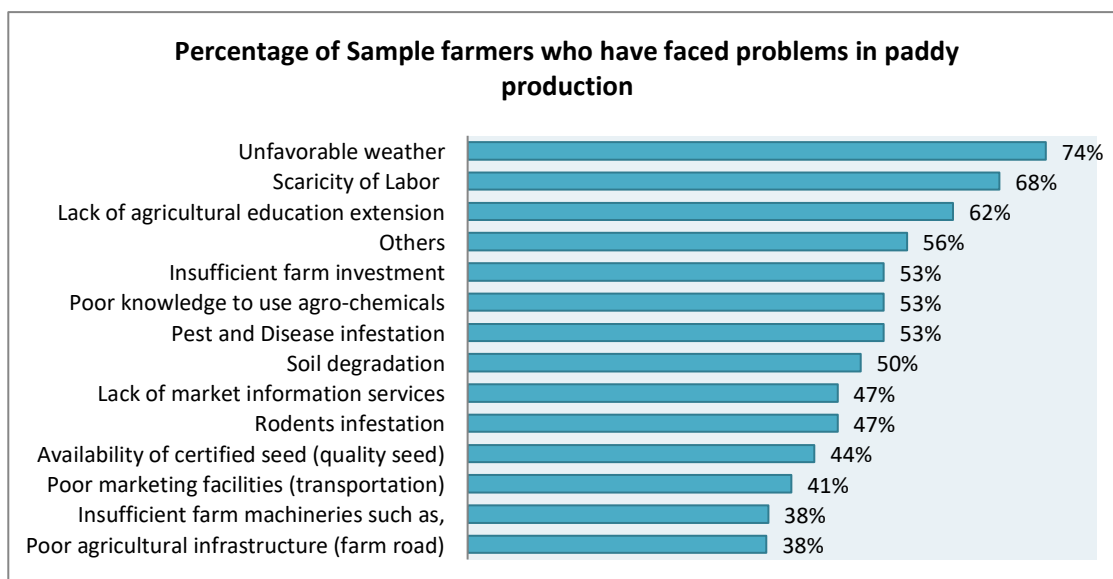


Figure 4. Constraints faced by farmers in rice production

3.3.3. Primary Collectors

Primary collectors buy rice at the farm gate price⁵ although some farmers directly sell their paddy to millers in township at individual level. Some collectors (commission agent / middlemen for the miller) buy paddy from farmers with the price fixed by the millers and send to the millers to get the commission fees from the millers. Collectors bought paddy from villages, near villages, fixed places to buy paddy and directly from farmers. Mostly collectors buy paddy from farmers directly and supply to millers in the town. Some collectors they mill the collected paddy at the rice mill (pay service fees to the miller), get rice and sell the rice to the other markets. Paddy collectors in Mandalay get MMK 100 per basket as the commission paid by the rice millers. They buy paddy at the price defined by the millers. In general, primary collectors are not powerful market actors but they bridge the relationship between farmers and rice millers. Aggregation of paddy from different farmers cause mixing of different variety and qualities of paddy produced by different farmers⁶.

Primary collectors have less constraint than the other actors, but they mentioned that they have limited financial capacity and they do not operate every year according to the demand offered by the rice millers.

3.3.4. Rice Millers

Rice millers are one of the key actors in the rice value chain. The capacity of rice millers varies from region to region. In Mandalay region, there are small rice mills which have less than 15 MT/day capacity at the village level and these small mills mainly perform milling for home or domestic consumption. Rice millers contribute a vital role in the market chain of rice since their function is not only for milling, but also buying rice from farmers, resell to landless or non-farmer households, involving in rice trade and even export through the border trade.

Rice millers are acting to bridge upstream and downstream transformation of rice value chain. In the upstream, millers provide seeds, fertilizers and mechanization services through formal or informal contract farming according to the long-term mutual relationship. Rice mills are sometimes the major rice market points at the villages for consumers from the same village or from the neighboring villages.

Millers announce buying price of different varieties of paddy and selling price of the milled rice. There are at least 2 to 3 rice mills in the major rice producing villages, with operating hours very much dependent on seasons. In general, the end of October to Feb-March is regarded as busy months for monsoon and from April-May to June-July for summer paddy.

At township level, there are few large mills in Kyaukse (100 MT/day) and medium size rice mills in Sint Kai. There are about 150 rice mills in Kyaukse Township, 19 rice mills in Nyaung Shwe township but only 2 rice mills in Yak Sauk. Bago region is also one of rice surplus areas but larger rice mills are mostly located in the West part of Bago.

⁵ Price for farmers selling at their farm, farmers do not have to pay transportation cost.

⁶ Number of collectors active in each study areas could not be specified during the study. Collectors can be seasonal and not all are registered company or enterprises.

Table 12. Size and numbers of Millers by Region (2017-18)

Location	Small Size Miller (15-20 MT/day)	Mid-large Size Millers (20 MT/day to >100MT/day)
Mandalay	564	12
Bago	1065	245
Mon	512	26
Shan	435	-



Figure 5. A medium size rice in mill in Mandalay (30MT/day)



Figure 6. A medium size rice mill in Bago



Figure 7. A large rice mill in Bago

- **Milling Recovery**

The milling recovery rate is generally about 50% - 65% greatly depending on the quality of paddy, variety of paddy, moisture of paddy and capacity of rice mill. Moreover, milling output also depend on the quality of head rice percentage. Regarding the quality of rice, millers classify according to the market demand. For Paw San variety of rice, it is generally classified as Paw San Hmwe SQ (Special Quality), Paw San Hmwe 5%, and Paw San Hmwe medium quality. For Ematha group including 90 days, Hnan Kauk, Sin Thu Kha, Manaw Thu Kha varieties, as Ematha Super 10%, Emahta 25%, Emahta 35%, are generally classified. Milling recovery of paddy for Emahta 25% is 28 bags of rice, 6 bags of broken rice, 7 bags of bran, 1bsk of chaff and 100 lb of husk from 100 basket paddy. Also, the milling recovery of paddy for Paw San is 30 bags of rice, 6 bags of broken rice, 7 bags of bran, 1 lbs of chaff and 100 lb of husk in 100 baskets of paddy. Table 13 shows milling recovery rate of rice of different varieties and different quality of rice in the study areas.

Table 13. Milling Outturn of Average Quality Rice

Variety/ Quality of rice	Paddy/ raw	Rice	Broken rice	Rice bran	Chaff
Ayamin	100 %	59%	9%	1%	32%
Paw San	100 %	60%	8%	6%	26%
Emehta 25%	100 %	65%	5%	5%	25%
Emehta 10%	100 %	55%	15%	5%	25%
DU 12	100 %	55%	15%	4%	26%

- **Selling by rice millers**

Rice Millers sell milled rice for retailing in the wet market, supply to exporters in Yangon, trade to Border through Muse and export to the international markets. There are 5 major market segments for rice millers; (1) Yangon Wholesalers, (2) Wholesalers and retailers in different regions, (3) Export Companies, (4) Trad to China through Muse border trade and (5) direct selling to the consumers.

Rice millers in Kyaukse and Sint Kai sell Ayamin variety of rice to Mandalay for domestic market where distributes throughout the upper regions of Myanmar through wholesalers and retailers. 90 days, Manawthukha and other HYVs variety are sold to traders in Muse directly or via the traders/

wholesalers in Mandalay who export rice to China market. Rice millers in Shan sell DU 16 variety of rice to the traders from Muse to export to Chinese market.

- **Constraints faced by the Rice Millers**

In Mandalay, the constraints of rice millers are 1) higher competition between the millers in Sink Kai and Kyaukse because millers need to purchase and stock enough paddy as raw materials. 2) lack of technical support for rice millers and 3) lack of coordination and support by the rice miller's association.

As for rice millers for the coastal regions, the major constraints are 1) higher cost for electricity 2) higher moisture content of paddy at the time that they purchase (up to 25%) and they cannot dry all as they don't have proper paddy dryers 3) Financial risks since the millers has to give loans to farmers as farm advance and get the money back after harvest 4) Limited capital investment, 5) Purity of paddy seeds are poor 6) Insufficient and poor storage facilities and 6) Lack of technical support for them.

3.3.5. Rice Traders/Wholesalers

The major rice wholesale market is nearby Zay Cho / Kai Tan market in Mandalay. There are about a hundred trading houses/ wholesalers who collect rice from the millers, distribute throughout the country as well as involve in cross border trade through Muse. Rice wholesalers and retailers from other wet markets in the city or from the other regions use to offer by phone or buy in person. Buyers arrange the transport / vehicles and wholesalers take responsibility to get the rice bags on these vehicles. Trading capacity varies from one wholesaler to the others as well as from year to year. Similar to Mandalay, rice wholesalers in Bago distribute rice to Yangon for export and within domestic retail markets.

According to the discussion with rice wholesalers in Mandalay, about 50% of the rice supplies from nearby areas goes to China through Muse border trade. The unstable policies and orders of the Chinese government is the major constraints for them. China frequently blocks the rice export at the border trade area by several reasons (sometimes no reason) and it is very difficult to know the policy of China. The other constraint is that most of them have no experience in buying and selling of high quality / certified rice. When Chinese government set SPS requirements (AQSIQ certification) for the export of rice, they don't know how they can get the certification.

3.3.6. Exporters

In 2019, China changed the rice import policy and set the quality requirements through registration and certification from the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ). Rice millers and exporters must be registered with AQSIQ and food safety standard requirements. Currently, only 11 quality rice mills had the permit to export rice to China.

In the rice export, it is mostly on Free on Board (FOB) terms, however, Cost and Freight (CFR) and Cost, Insurance and Freight (CIF) term also can be supplied depending on the requirements and conditions of the buyers. In this regard, the payment is by both Letter of Credit (LC) and Telegraphic Transfer (TT) from the international banks. FOB prices for different quality grades of rice from Myanmar are summarized in Table 14.

Table 14. FOB price of different qualities of rice (2014-2019)

No	Rice Type/ Rice Grading	USD/MT					
		2014	2015	2016	2017	2018	2019
White rice							
1	E-5% (Super long grain)	430-440	420-430	420-430	380-385	370-375	335-340
2	E-5% (long grain)	415-420	400-410	400-410	370-375	355-360	335-345
3	E-10%	395-405	390-400	390-400	360-365	350-355	330-335
4	E-15%	375-390	375-390	375-390	345-350	345-350	325-330
5	E-25%(well-milled)	340-355	330-340	325-330	320-325	325-330	300-305
6	E-25% (reasonable well-milled)	330-340	310-320	295-300	290-300	290-295	310-315
Broken rice							
1	A 1:2	310=320	290-300	290-300	280-285	285-290	270-275
2	B 12 (sortexed)	290-300	265-280	250-260	250-255	270-275	255-265
3	B 1:2 (non-sortexed)						245-250
4	B 2:3:4 (non-sortexed)	285-290	260-275	260-270	245-250	265-270	240-245
Pawsan Rice							
1	Pawsan 100%	780-800	780-800	780-800	780-800		
2	Pawsan 5%	760-770	760-770	760-770	670-680		575
3	Pawsan 10%						560
4	Pawsan 15%						550

Source: MRF, 2020

The transaction cost for the exporters to get rice on the ship for export is about MMK 30,000 per MT (about USD 20/MT) of rice, which is comparatively higher than any other ASEAN countries. According to the information from MRF, exporters need huge capital to procure paddy, stockpile, mill and then supply to domestic and international markets but the interest rate of commercial loan is very high.

3.4. Supporting Services

3.4.1. Technical Services

The DoA has the mandate to project technical services (e.g. extension services) to rice farmers, farmers rarely receive extension services on rice production from the Government. Farmers also receive training on how to use fertilizers or pesticides from the staffs of agro-chemical companies. In the study areas, Myanmar Paddy Producers Association (MPPA) in collaboration with DOA provided some technical services to the farmers in terms of 1) testing soil nutrients and giving advice accordingly; and (b) providing training and education on improved farming knowledge and cultivation methods such as using quality seeds, soil nutrients management, water management and integrated pest management. MPPA also directly supports the farmers by (1) advising the farmers to purchase suitable farm machinery, (2) organizing farm machineries exhibitions and (3) supporting farmers to participate in research and seed production programs in collaboration with international organizations. Farmers in the study area also mentioned that they get technical assistance on sustainable rice production from the private sector partners of the CSR project.

3.4.2. Farm Machinery

Government and private companies provide mechanization services for land preparation, threshing

and combined harvesting. Services include hiring tractors for land preparation and combined harvesting. For land preparation, farmers use animal traction, power tillers to 70-90 HP tractors according to their capacity. The Good Brothers Company, Kubota (Japan), Sonalika (India), Indofarm (India), John Deere, Zetor (Europe), New Holland companies' products are the most used in the study area.

3.4.3. Financial Services

About 82% of the sample farmers indicated they borrowed money for investment in rice production. Amongst, 93% of the total farmers claimed that they borrowed money from Myanmar Agricultural Development Bank (MADB) only. The other 12% have received loan from the other rice millers, traders and micro finance services. In Kyaukse, Good Brothers Company Ltd came to lend money to the farmers, however, the farmers did not take loan from them since farmers did not find advantage of their service. Farmers didn't borrow from micro-finance in Mandalay as the amount of loan was too small and term of payback is monthly basic. Mya Kyun Thar, Sahtaparnar, AneeKat, and Maha Awba are micro-finance services working in Mandalay and Shan areas, Hay Man, Dawn are operating in Coastal areas.

In general, farmers receive MMK 150,000/ac (USD 107/ac) as a seasonal loan from MADB up to the maximum amount of MMK 1,500,000 (up to 10 acres) with the annual interest rate of 6.5%. Payback period is 6 months. After paying back to MADB, farmers take seasonal loans for summer paddy again. It is the same amount and same interest rate applied for monsoon paddy.

3.4.4. Market Information

All the sampled farmers in Mandalay, Mon and Bago and 64% of the farmers in Shan responded as they know the paddy price at their village market. However, only 18% of the farmers in Mon responded that they know the paddy price at township market frequently. They exchange market information by contacting with brokers and shared from farmers to farmers. Government extension services rarely provide market information to the farmers.

As for traders and millers, they look at the market information of milled rice in the major wholesale markets (Yangon and Mandalay). Rice millers in Shan rarely get the information of paddy and rice from Yangon, Mandalay and other major wholesale markets.

Market information dissemination is mainly centered at the rice exchange centers and flows to through the major wholesale markets.

3.4.5. Infrastructure

Farm infrastructure, such as dam, irrigation and drainage channels are mostly provided by Government. According to the FGDs and KIIs, Mandalay region especially in Sink Kai and Kyaukse townships, irrigation is accessible since several years ago. Irrigated water is available in Kyaukse and Sink Kai since 11th Century during the King Anawrahta era. Farmers are still thankful to King Anawrahta for his efforts to establish systematic irrigation system in the dry zone. However, for this year, summer paddy couldn't be grown as irrigation water was not enough due to climate change and water being more scarce resources. In Bago, farmers access irrigation water for summer paddy, and charge MMK 9,000 per acre. In Yak Sauk, farmers grow paddy under rain-fed condition and there is no irrigation scheme. In Bilin, irrigation water is not available in all areas. In Paung, if

irrigation water from the dam is needed for summer paddy, farmers have to pay a fee of MMK 2,000 – 2,500 per acre (USD 1.43 -1.78/ac).



Figure 8. Irrigation canal in Sint Kai Township with lower level of water

3.4.6. Quality and Certification Services

- **Quality Specification and Standard**

In the local marketing, the quality of rice is based on the eating quality (most of local variety such as Paw San, Lone Thwe varieties are better eating quality than Emata group of rice) and milling quality which is based on the moisture, purity, broken rice percentage and color. For the Export market, Myanmar use the terms such as Emata (5% for better quality with lower percentage of broken rice), Emata (10%), Emata (15%) and Emata (25%).

A standard measurement system has also been tried to be the weighing system in “pound (lb)”. The standard of Government is fixed at 46 pounds (20.9 kg) equal to one basket of paddy. But some rice varieties such as Paw San weights 52 - 54 pounds (23.6-24.5 kg) per basket and still discussing on. It is in fact not in line with the international standard of rice compared to other countries. Myanmar Rice Federation is working to draft standards and specifications for rice and paddy, in collaboration of NSQD and supported by IMF which is in a draft stage.

- **National Quality Infrastructure (NQI) and QI services**

NQI is recently developed in Myanmar although it was briefly introduced in 1852 by the British Government by enforcing law on weight and measures in lower Burma. In 1954, a blueprint for developing quality Infrastructure in Myanmar by a US Foundation was developed but the progress of development, adoption and application was uncertain.

As of 2018, the Department of Research and Innovation (DRI) is focal for developing and coordinating the National Quality Infrastructure (NQI) with all departments, ministries and stakeholders in Myanmar. National Standard and Quality Department (NSQD) under DRI, with its three divisions namely, National Standards Body, National Accreditation Body and National Metrology Institute, is a member of International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), Technical Barriers to Trade (TBT-WTO) and

ASEAN Consultative Committee on Standards and Quality (ACCSQ). According to the Standardization Law, National Standard Council where senior officials from several ministries are member and chaired by the Minister for Education was formed and that council has been developed standards of various commodities including rice which are also in line with international standards of ISO, WHO, IEC, ITU and CODEX. So far, SRP Standard is not yet published under NSQD. Other Component of NQI, responsible institution and main functions are summarized in the table below.

Table 15. National Quality Infrastructure Services

NQI	Institution	Functions
Standardization	National Standards and Quality Department (NSQD), Technical Committee (TC)	According to ISO Guide, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their result. Agro-based products standardized technical committee is currently formulating Myanmar Standards for high export demanded agro-based products including Rice.
Calibration	National Institute of Metrology (NIMM), MOC	To calibrate moisture testers of paddy, volume, mass and temperature measurement devices throughout the country
Testing service	National Analytical Lab (NAL) under Department of Research and Innovation (DRI), SAC, Plant Protection Department (PPD)'s lab under DoA, FDA's lab, FIOSL, MITS, SAG	Conformity assessment/ testing of different parameters at different labs. Some of labs have been accredited ISO 17025 and some of them are in progress. National Analytical lab (NAL) is testing chemical residues and micro-biological things. Plant Protection Department's lab can test chemical residues. Private conformity assessment bodies and certification services are also working in Myanmar such as SGS, Control Union, etc.
Accreditation	DRI	Collaboration with Singapore Accreditation Counsel (SAC) for accreditation services.

Apart from National Quality Infrastructure bodies, private run international QI services are also operating in Myanmar such as Control Union, USDA for organic certification, SGS, OMIC, etc. for GAP, HACCP, GMP certification.

3.5. Myanmar Rice Markets

This section describes the market segments in relation to rice value chain specifically in the study areas. As illustrated in the value chain map, there are three different end markets for Myanmar rice.

- Domestic market
- China through Muse border trade
- Export markets through normal trade

3.5.1. Domestic Markets

- Conventional domestic market

Rice is the staple food in Myanmar which contributes to about 66% of the population's daily calorie

intake. Myanmar is one of the highest rice consuming country per capita. People in Myanmar consume rice for daily diet and rice- based snack such as rice vermicelli, rice noodles, and rice based traditional snacks are widely consumed in urban and rural area. Total Union rice consumption is estimated to about 8 million metric ton per year.

In the study areas, Mandalay is the main hub for domestic rice trade connecting upper and lower Myanmar as well as fulfilling to the rice demand from the deficit areas by aggregating the supply from the main producing areas. Villages in Kyaukse township are not rice specialized area and in fact onion is their priority crop for the farmers. Although, Bago is not the hub at regional level, it has easy access to Yangon by highway road and railway. Rice from Bago is sent to Yangon wholesale. In Mon, Mawlamyine is the major rice market for the coastal regions of lower Myanmar, connected to the Thai - Myanmar border town through Myawaddy via Kawkareik and very near to the offshore of Mawlamyine. It is the major trade areas of rice and many commodities. Shan it is not the major rice surplus area hence rice produced in the region is mostly consumed domestically.

- **High-end urban market in the domestic market**

Special quality rice such as Eco-rice (ecological friendly rice), GAP rice, Nature rice, Parboiled rice, Organic rice and Fortified rice are sold as new market segments. The following are some of the high-end markets dealing with quality rice at local market.

(a) Organic Market

In Yangon and Mandalay, there are some organic markets and stalls operating in recent years. "Farmers Market" is one of the famous organic markets that is held on every Saturday. "Sein So Nyein Aye" organic market has been operating in every Wednesday in Yangon. In Mandalay City, "34 Mandalay" organic shop is distributing organic products, sourcing from Pyin Oo Lwin and Sagaing region.

(b) Supermarkets

Supermarkets are popular in pre-urban areas and for urban dwellers. City Mart Supermarket, Marketplace and City Express Convenience Stores (70 outlets) by City Mart Holding company. Others are ABC Convenience Stores (about 100 outlets in Yangon in all key strategic locations and townships in Yangon), Grab & Go (around 300 outlets), One Stop Mart (100 outlets), Gamone Pwint Departmental Stores, Gandamar Wholesale, Orange Supermarkets, Ocean Super Center, Ruby Mart Supermarkets, Star Mart Supermarkets, GQ Convenience Stores, KumuDra Convenience Store, Shwe Paline Mini Mart, Pyae Wa General Stores, and Union Mini Mart. Various varieties and qualities of rice are sold in these retail stores. Not only local varieties, but also internationally popular rice varieties such as Japonica rice, Basmati rice, Jasmine rice, local premium quality / varieties such as "Shan" rice, parboiled rice, fortified rice, super 100% rice, For ecological rice, organic rice and natural rice, there is a room for the interest of the urban people.

(c) Online urban market

Online marketing of various products including rice has become more popular in Myanmar. They target urban dwellers by linking with delivery services. Metro Wholesale or METRO Cash & Carry is a German multinational wholesale chain operating in Myanmar since in 2019. METRO Wholesale Myanmar has its modern warehouse in Yangon and empowered by its efficient digital ordering and delivery services, to local customers as well as hospitality and tourism sectors. Makro Thailand has

also been operating in Myanmar recently distributing over thousands of food products sourcing from international markets.

3.5.2. Export to China through Muse Border Trade

China is a large importer of Myanmar rice through border trade. Rice exports to China amount to approximately 1 to 1.7 million tons per year; however, China has recently reduced importation of rice from Myanmar since May 2019. Only qualified exporters (11 out of 59 companies that applied for a permit) can export a set quota 200,000 MT of rice in 2019-20 to China. The number of qualified rice exporters to China have recently increased to 43 in 2020-21. The import quotas provided by China for import of rice from Myanmar fluctuates every year depending on its own production. Whenever China's domestic production is higher, imports from Myanmar are reduced. Reduction of China's rice import volumes results in significant reductions in paddy prices. Yearly export volumes of rice to China through border trade is summarized in Table 16.

Some of the rice millers in Kyaukse also exported rice to China through Muse border trade before adoption of AQSIQ registration.

3.5.3. Export Markets through Normal Trade

Approximately 10% of the total rice produced in Myanmar is exported. Myanmar was the world's largest rice exporter in 1930s and its annual export of milled rice were about 3 million tons. White long grain was the largest type of rice exported, accounting to 43.83% of total export in 2016/17. 65.6% of the total rice export was through normal trade in 2018/19. Most of the buyer countries are African countries, EU countries and other Asian countries.

Table 16. Rice Export from Myanmar (2019/20)

No	Country/ Group	Export volume of Rice (MT)	Export volume of Broken Rice (MT)	Total Export (MT)	Percentage
1	China and border trade countries	767,926.75	425,63.00	810,489.75	34.4%
2	EU countries	181,559.81	311,241.50	492,801.31	20.9%
3	African market	52,9579.00	34,487.00	564,066.00	23.9%
4	Others	357,800.39	130,743.00	488,543.39	20.7%
	Total	1,836,865.95	519,034.50	2,355,900.45	

Source: MRF, 2020

Myanmar exported 3.15 MMT of rice in 2017/18 due to larger demand from EU and African countries. In 2017/18, Myanmar exported rice to 60 countries and extended markets to 22 new countries. As for 2018/19 the export volume was reduced to 2.36 MMT due to the decreased import of China.

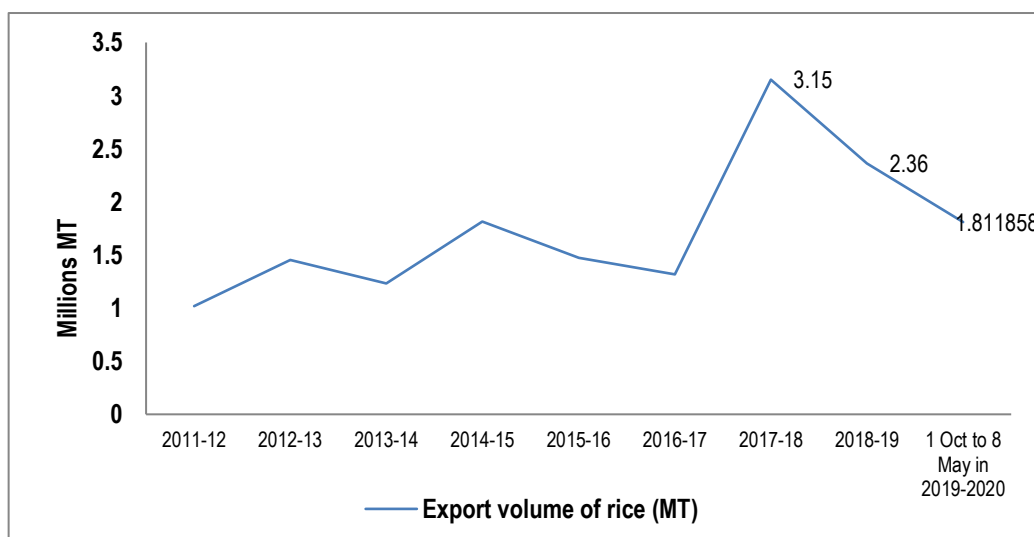


Figure 9. Export volume of rice

Ayamin variety, which is also called “Ayarpadaithar”, is a premium rice in Mandalay and upper Myanmar markets due to good eating quality. High yielding varieties (HYVs) of Shwemanaw, Manawthukha and Shwethweyin, 90 days are medium quality rice with high demand for export markets are sold to wholesalers and retailers of various townships in Mandalay Region. These rice varieties are named as “Emehta group” for export. Paw San is one of the best varieties of rice and popular in both lower and upper Myanmar.

3.6. Gross Margin Analysis

3.6.1. Gross Margin for Farmers

Revenues from rice depend on various factors and is different for different rice varieties. Weighted Average Selling Price (WASP) was used to calculate revenues by multiplying by the average yield. Table 17 and 18 describes the calculation of gross margin for monsoon and summer season in different study area.

Table 17. Gross margin of rice by different regions for monsoon paddy
(In MMK)

Region / State	Yield (basket/ac)	WASP (MMK/basket)	Revenue (MMK/ac)	TVC (MMK/ac)	Gross Profit (MMK/ac)
Mandalay	76	8,600	656,000	268,200	387,800
Bago	39	6,117	238,546	175,271	63,275
Mon	47	7,070	337,966	225,368	112,598
Shan	61	8,263	504,060	265,600	238,460

(In USD)

Region / State	Yield (kg/ac)	WASP (USD/kg)	Revenue (USD/ac)	TVC (USD/ac)	Gross Profit (USD/ac)
Mandalay	1,585.4	0.29	468	191	277
Bago	813.5	0.21	170	125	45
Mon	980.4	0.24	241	161	80
Shan	1272.5	0.28	360	190	170

Table 18. Gross Margin of Rice by Different Region for Summer Paddy

In MMK					
Region / State	Yield (basket/ac)	WASP (MMK/basket)	Revenue (MMK/ac)	TVC (MMK/ac)	Gross Profit (MMK/ac)
Mandalay	100	5,667	566,667	232,000	334,667
Bago	90	4,733	425,970	215,698	210,272
Mon	80	4,700	377,260	290,189	87,071
Shan	62	12,000	740,571	361,556	379,015
In USD					
Region / State	Yield (kg/ac)	WASP (USD/kg)	Revenue (USD/ac)	TVC (USD/ac)	Gross Profit (USD/ac)
Mandalay	2,086.00	0.19	404.47	165.6	238.87
Bago	1,877.40	0.16	304.05	153.96	150.09
Mon	1,668.80	0.16	269.28	207.13	62.15
Shan	1,293.30	0.41	528.60	258.07	270.53

The cost of capital with the interest rate of 3% for 4 months, including the total variable cash cost (TVC) and the opportunity cost of family labor are considered in the calculation.

Table 19. Net Profit for Monsoon and Summer Rice

	Monsoon Paddy		Summer Paddy	
	USD/ac	MMK/ac	USD/ac	MMK/ac
1 Opportunity Cost of Labor	17.84	25,000	10.71	15,000
2 Opportunity cost of interest	20.05	28,089	24.26	33,984
3 Total Cost	204.97	287,162	237.10	332,183
4 Revenue	310.21	434,607	343.77	481,625
5 Net Profit = Revenue – Total Cost	105.24	147,444	106.67	149,441

Based on gross profit margin, break-even price, break even yield and return on the investment are calculated in the following table.

Table 20. Breakeven and Return on Investment of Monsoon Paddy

(in MMK)					
Region / State	Revenue (MMK/ac)	TVC (MMK/ac)	Break Even Price (MMK/basket)	Break Even Yield (Basket/ac)	Rol
Mandalay	656,000	268,200	3,529	31.2	2.4
Bago	234,500	175,271	4,494	28.7	1.4
Mon	337,966	225,368	4,795	31.9	1.5
Shan	509,960	265,600	4,35	32.1	1.9
(in USD)					
Region / State	Revenue (USD/ac)	TVC (USD/ac)	Break Even Price (USD/kg)	Break Even Yield (kg/ac)	Rol
Mandalay	468	191	0.12	650.83	2.4
Bago	170	125	0.15	602.85	1.4
Mon	241	161	0.16	665.43	1.5
Shan	360	190	0.15	744.70	1.9

Table 21. Breakeven and Return on Investment of Summer Paddy
(In MMK)

Region / State	Revenue	TVC	Break Even Price	Break Even Yield	Rol
	(MMK/ac)	(MMK/ac)	(MMK/basket)	(Basket/ac)	
Mandalay	566,667	232,000	2,320	40.9	2.4
Bago	425,970	215,698	2,397	45.6	2.0
Mon	377,260	290,189	3,627	61.7	1.3
Shan	740,571	361,556	5,832	30.1	2.0

Region / State	Revenue	TVC	Break Even Price	Break Even Yield	Rol
	(MMK/ac)	(USD/ac)	(USD/kg)	(kg/ac)	
Mandalay	404.47	165.60	0.08	872	2.4
Bago	304.05	153.96	0.08	962	2.0
Mon	269.28	207.13	0.12	1,295	1.3
Shan	528.60	258.07	0.20	629	2.0

According to the findings, when the farmers in Mandalay invest 1 unit money in rice production, the total return is estimated as 2.4% for monsoon paddy and summer paddy. For Bago, Rol is estimated as 1.4% for monsoon paddy and 2.0 % for summer paddy. In Mon, Rol is 1.5% for monsoon paddy and 1.3% for summer paddy. For Shan, Rol is 1.9 % in monsoon season and 2.0 % in summer season.

3.6.2. Gross margin for rice millers

Gross marginal analysis of rice millers⁷ is explained in Table 22.

Table 22. Milling recovery rate, selling price and by-products

	Paddy	Rice	Broken rice	Big Broken rice	Bran	Husk
Weight (kg)	2070	1215	72.9	97.2	14.4	650.5
Recovery rate (%)	100%	59%	4%	5%	1%	32%
Selling Price (MMK)	9,000 (per basket)	43,000 (per bag)	13,000 (per bag)	15,000 (per bag)	8,000 (per bag)	
Selling Price (USD/kg)	0.31	1.47	0.44	0.51	0.27	0.065
Value of recovery from 100 baskets of paddy (MMK)	900,000	1,075,000	19,500	30,000	32,000	10,000
Value of recovery from 2070 kg of paddy (USD)	642.40	767.31	13.92	21.41	22.84	7.14
Total value after milling		USD 1,475.02 for 100 baskets of paddy MMK 1,166,500 for 100 baskets of paddy				
Gross Profit of miller		1,166,500 – (900,000 + 20,100) = MMK 246,400 for 100 baskets of paddy 1,475.02 – (642.40 + 14.35) = USD 175.87 for 100 baskets of paddy				
Gross Profit of miller		+ MMK 117,894 / MT of paddy + USD 84.15 /MT of paddy				

⁷ milling recovery rate depend on the quality of paddy, and price of rice is always changing. The calculation is mainly based at the time of the survey. Consequently, profit margin of rice miller is different based on the milling recovery rate from the paddy, buying price of paddy and selling price of milled rice.

Table 23. Gross Margin of Rice Millers by Regions

Region State	Variety	Buying Price of paddy (MMK/basket)	Operation cost (MMK/basket)	Selling Price of rice (MMK/bag)	Total income from rice and rice products (MMK/100 baskets)	Gross Margin for 100 baskets of paddy (MMK)	Gross Margin for 1 MT paddy (MMK)	Gross Margin for 1 MT of paddy (USD)
Mandalay	Ayamin	9,000	201	43,000	1,166,500	246,400	117,895	84.2
Bago	90 days	4,733	250	22,000	663,000	164,700	78,804	56.2
Mon	Paw San	9,000	250	48,000	1,298,222	373,222	178,578	127.5
Shan	DU 12	8,000	400	35,000	912,000	72,000	34,450	24.6
Average Gross Margin						+214,100	+102,440	+73.1

In average, gross margin of rice millers for one basket of paddy is MMK +2,141, which is equivalent to USD 73.12 per MT. This calculation doesn't include fixed costs and opportunity costs of investment and millers' management costs.

3.6.3. Gross margin analysis for rice exporters

Gross Marginal Analysis of Rice Exporters is shown in Table 23 which is based on the Emehta rice⁸. Exporters get higher gross margin for Emehta 10% quality and lower margin for lower quality of Emehta 25%.

Table 24. Gross Margin of Rice Exporters

Cost (MMK) for 1 MT of rice	Emehta 10% ⁹	Emehta 25%
Buying Price	328.34	285.51
Transport cost from township to Yangon	7.85	7.85
Transport from Warehouse to the port	5.71	5.71
Labor cost at the port	1.43	1.43
Ready Cargo cost	21.41	21.41
Total cost of FoB including 2% of tax	357.83	317.61
FoB price of rice (USD/MT)	385	335
Gross Profit of Exporters (USD/ MT)	27	17

3.6.4. Gross Marginal Analysis in rice value chain

Gross marginal analysis of key actors along Ayamin rice value chain is shown the Table 25. Farmer's gross profit is estimated at 174.21 USD/MT of paddy while the rice millers get 73.94 USD / MT of paddy as a gross profit. When it is sold to the rice wholesaler, its gross margin is 50.03 USD/MT (based on paddy) and gross margin of the retailer is estimated at 120.8 USD/MT of paddy.

⁸ Myanmar traditional varieties are classified into five major groups based on the length and breadth of the grain, namely, Emehta, Letwezin, Ngasein, Medon, and Byat (R.A. Beale, 1927).

⁹ Emehta 10%- Fair Average Quality/ first class with 10% broken rice and 90% head rice Emehta 25% - Fair Average Quality with 75% whole kernel and head rice

Table 25. Gross Margin Analysis of Key Actors for Ayamin Rice Variety in Mandalay

	MMK/basket of paddy	USD/MT of paddy
Farm Gate Price/ WASP	8,630	294.73
TVC/ Break Even Price	3,529	120.52
Gross profit farmer	+ 5,101	+174.21
Margin for Primary Collectors	100	3.42
Operation and marketing Cost of Rice miller	500	17.08
Buying price of miller	9,000	307.37
Selling price of milled rice by miller	11,665	398.38
Gross Profit of millers	+ 2,165	+ 73.94
Marketing Costs of wholesaler	300	10.25
Selling price of wholesalers	14,314	488.85
Gross Profit of wholesaler	+ 1465	+ 50.03
Selling price of Retailers	18667	637.51
Gross Profit of Retailers	+ 3537	+ 120.80

Based on the table, price and margins of different actors along Ayamin Variety Rice value chain is illustrated in the Figure 12.

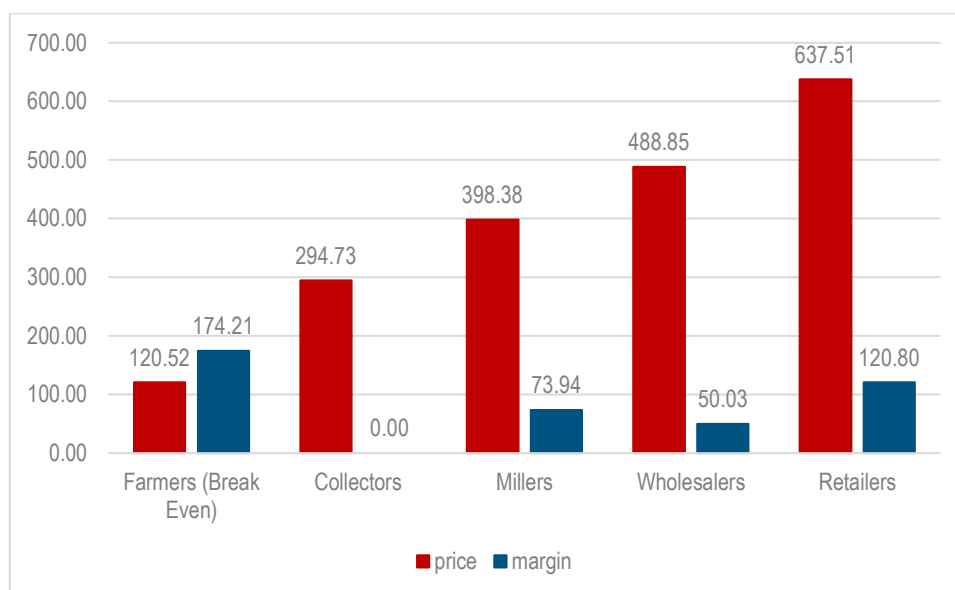


Figure 10: Price and Marginal Analysis along the Value Chain of Ayamin Rice (USD/MT)

Similarly, for Emehta rice variety (90 days in Bago), gross marginal analysis is done for key actor along the value chain. Price and marginal analysis of Emehta rice variety along the value chain is

illustrated in Table 26 and Figure 11.

Table 26. Margin Analysis of Different Key Actors for Emehta Rice Variety in Bago

	MMK/basket of paddy	USD/MT of Paddy
Farm Gate Price/ WASP	4,733	161.64
TVC/ Break Even Price	5,401	184.45
Gross profit farmer	+1606	+ 54.86
Gross Profit for Primary Collectors	+250	+ 8.54
Operation and marketing Cost of Rice miller	220	7.51
Buying price of miller	5,000	170.76
Selling price of milled rice by miller	6,630	226.43
Gross Profit of millers	+1,647	+56.25
Transaction of Exporters	3,400	116.12
FoB Price of Emehta rice	10,938	373.57
Gross Profit of Exporter	+908	+ 31.01

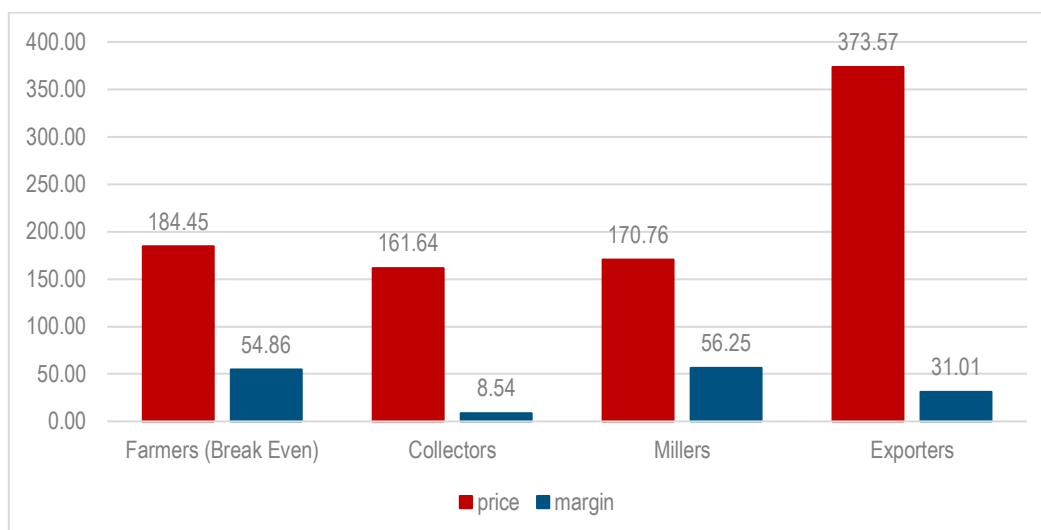


Figure 11. Price and Marginal Analysis along the Value Chain of Emehta Rice

4. Stakeholder Validation and Consultation

During the Covid-19 pandemic, stakeholder consultation workshop could not be done since a large group of participants cannot be gathered in a place. In this regard, stakeholder consultation was done with some representative farmers in the study areas, interested rice millers and advisor of Myanmar Rice Federation by phone conversation. During the pandemic situation, it was the best way to validate the findings and find out potential solutions and concrete recommendations.

A. Proposed value chain for SRP verified rice

Following value chain map was proposed by the stakeholders for SRP verified rice.

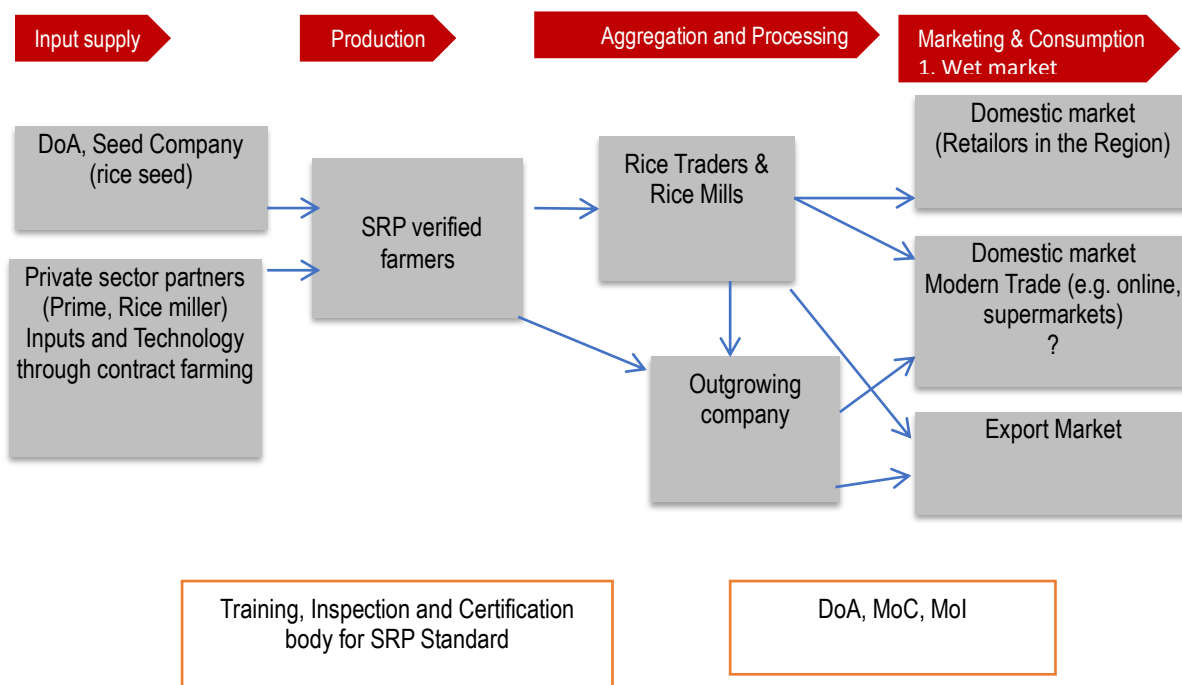


Figure 12. Proposed value chain map for SRP verified rice

B. Target market and penetration

As mentioned in the above value chain map, there are three potential market segments proposed for SRP verified rice.

- 1) Domestic market in the region
- 2) Domestic market – high end premium quality in urban markets
- 3) Export market by the company through contract farming

Currently, SRP trained farmers are only selling their products in the domestic market, to the rice mills or rice traders. Some rice millers pay a premium price of about MMK 10,000/MT (USD 7.1/MT) than the conventional rice for the improved quality (variety with good eating quality, uniform variety) and logistics (collect more quantity from the same location). In these regards, rice millers can also be potential buyer and if few value addition (cleaning, color sorting, packaging, branding, labeling) can be done by the rice millers, there would be opportunity for them to target the high end domestic market. It is necessary to support to the rice millers and traders through some incentives such as consumer awareness, branding and advertisement for penetrating the high-end domestic market for SRP verified rice.

Private companies such as Prime should become involve in contract farming / outgrowing schemes with SRP farmers and market in domestic and international markets.

According to the discussion with the stakeholders, the major bottleneck is the lack of market access for SRP verified rice. The business environments for the rice sector are quite favorable although there are some challenges and limitations. If there is a market demand for SRP verified rice, farmers are willing to participate. It is necessary to identify a pioneer to penetrate SRP verified rice in the market.

C. Interaction Matrix of adoption of SRP Standard of rice

The matrix of adoption of SRP Standard for sustainable rice production was also validated to the key actors during the conversation. Pre-conditions were modified based on their discussions.

Table 25. Benefits, Costs, Opportunities and Risk of producing SRP rice

<p>Benefits</p> <ul style="list-style-type: none"> • Quality improvements • Potential for value addition • Reduced vulnerability to climate change and risks • Improved food safety standard • Efficient use of inputs and lower production costs • Use of improve technology (e.g. farm mechanization) and reduction of labor • Farmers in Bago received MMK 200 /basket higher than prevailing market prices based on quality 	<p>Costs</p> <ul style="list-style-type: none"> • Higher initial costs associated with the establishment, training, education and costs for the spreading of the developed knowledge • Land preparation costs • Extension services • Monitoring and inspection • IMS / documentation for certification and then Audit / Certification cost • Traceability • Marketing cost • Operational cost for documentation, certification and inspection adds to the cost of production
<p>Opportunity</p> <ul style="list-style-type: none"> • Local rice varieties available • Global market access due to better quality and environmental benefits • Optimum price for quality proved products • Increased competitiveness in the global markets • Domestic premium market access • Sustainable production and market • Green development 	<p>Risks</p> <ul style="list-style-type: none"> • Uncertain market demand for SRP verified rice • Uncertainty in export markets under Covid-19 pandemic • The process of inspection and certification is complicated • High externalities, since the investment will create benefits for other players • Less interest by township collectors and marginalized farmers to adopt the SRP Standard • Less interest by the private sector if they see the cost rather than the incentive price

5. Conclusions

5.1. Input Supply

Performance of HYVs grown in lower Myanmar in summer season becomes deteriorated due to frequent use of previously harvested paddy as seed, which leads to seed degeneration over time as well as affected by the climate change. Farmers in Shan also have difficulties to access

adequate certified seeds. Farmer have access to agro-chemicals suppliers, but the concern is on the quality of agro-chemicals, for example; the price of fertilizer is dependent on the quality. The cost of agro-inputs has the largest contribution (34%) in the total variable cost of rice production. Only a very few micro finance institutions provide tailored micro finance services for rice production while other micro-finance schemes do not have specific loan product for paddy production.

5.2. Production

Some of the villages selected for SRP rice production (e.g. in Kyaukse Township) are not the major rice producing areas and farmers are more interested in other crops such as onion and chili. Although farmers are gradually adopting SRP practices, there is no contract farming mechanism with the company. Yield of rice, especially in Bago is very low due to several factors such as saltwater intrusion and flooding. Farmers in Mandalay receive a higher yield and gross profit margin as they grow premium quality rice with comparatively higher yield. Yield of farmers in Mandalay for summer paddy was also high which contributed the highest income compared to the other regions. Production level of rice following SRP compliance has not reached a marketable volume yet. It is necessary to have incentive mechanism such as price, market linkage for the farmers to share the risks and to follow the guidelines of SRP Standard.

5.3. Processing and Trading

Rice millers are the most strategic market actors who bridge the producers and the market. They are involved in many functions of the rice value chain such as informal contracting for the provision of inputs, procurement of paddy, processing/ milling of rice, value addition, as well as trading to various domestic markets as well as China Border trade. Most of the millers also store paddy to get enough raw paddy supply. Profit margin of rice millers is also comparatively higher than the other market actors. Commodity Exchange Centers (CEXC) are functioning in some cities but it does not cover all of the study areas. Currently, some rice millers buy paddy from SRP trained farmers with a bit higher price depending on the quality of paddy.

5.4. Policy Context

Rice is the most favored commodity in Myanmar and policies encourage to promote sustainable production and marketing of rice. Government promotes contract farming between companies and rice producers and a Standard Operational Procedure (SOP) for Contract Farming was been launched in 2019. Enabling business environments are for rice production and marketing is continuously improved by the government with support from international donors, initiation of private sector and farmers. The National Export Strategy whose strategic vision is “sustainable export-led growth and prosperity for emerging Myanmar” also encourage SRP rice initiatives. The involvement of Central Bank of Myanmar effects the interest rate on loan to traders, rice millers and exporters and indirectly impact on the financial accessibility of the private sector in the rice sector. Travel restriction and quota for rice exports during Covid-19 has caused difficulties to access market and a higher transaction cost.

5.5. Market Potential

Market drivers and trend indicate that there are potentials to expand and scaling up of SRP rice. Although cross-border trade to China has been the major market outlet for Myanmar rice, there are always some uncertainties in the cross-border trade. For the export of SRP rice, Middle east countries and EU market are not fully tapped yet, substituting for Chinese market reduction. However, normal trade export (logistics) was adversely affected by Covid-19 restriction. Retailing and distribution in the domestic market should be considered for SRP rice by a group of SRP farmers or private sectors. Digital commerce and online marketing as well as modern / urban trade could be a new potential market segments for SRP verified rice. Contract farming could be done with PRIME as well as other modern retailers such as Metro Wholesale/ City Marts. According to the findings, so far there is no identified market for SRP verified rice yet and no price incentives for the farmers. Similarly, it is still early to say about market growth of SRP and GAP. For the export of SRP rice to China, since Chinese control rice import from their side and it is difficult to manage.

6. Recommendations

Based on the study findings and conclusions, following recommendations are provided.

6.1. Input Supply

- It is necessary to ensure farmers are accessing quality seeds of marketable varieties based on their different ecological zones. Regular supply of certified seed to farmers should be ensured in the production of SRP verified rice. Private sector led seed supply mechanism with support from the public sector on research and creating an enabling environment should be promoted. Existing certified seed growers and seed companies should be encouraged and linked with SRP farmers.
- In areas prone to flooding, drought or problems with salt intrusion, climate resilient rice varieties (salt and floor tolerant) with good market potentials in both domestic and export market should be promoted by the project.
- The quantity of agro-chemicals used in rice is much less compared with other horticulture or cash crops. Agro-dealers don't provide inputs on credit to farmers for rice production. Connecting farmers' groups, rice millers or companies with higher scale of operation directly with the fertilizer companies for provision of fertilizers in credit to farmers.
- In operating contract farming, input supply including certified rice seed and registered agro-chemicals should be a part of contract farming mechanism in order to make sure the access to and only quality and registered inputs are efficiently used.
- Small farm implements and machines for land preparation and sowing / transplanting such as drum seeder, pedal weeder etc. should be introduced so that farmers can save the labor requirement.

6.2. Production

- The focus on production should be on increasing the productivity of rice by optimum utilization of farm inputs following sustainable production practices as called for in the SRP Standard. Yields of paddy in Mon, Shan and Bago can be increased. Average yield of Ayamin variety in

Mandalay can also be increased.

- Strengthen SRP farmers community / organization as the regional level association by increased number of farmers adopting SRP practices to get a marketable supply of the quality product.
- Expansion of SRP practices in rice production can benefit any communities in Myanmar, but for the commercial production, the location should be carefully selected. Access to infrastructure such as irrigation plays an essential role in realizing economic growth and unlocking business potentials through the global markets access.
- Strengthen the capacities of value chain actors on awareness and adoption of SRP Standard. HYV and hybrid rice varieties like DU 12 and DU 16 are already grown in the region. However, for sustainability, it is also recommended to grow local varieties with market potential, which are genetically purified in collaboration with DoA / DAR as the farmers cannot afford to purchase the seed every year.
- Contract farming mechanism should be promoted to produce SRP verified rice. Through contracts, farmers should have access to quality input, extension services and market access.

6.3. Post Harvesting and Processing

- Rice millers should be encouraged to invest in the improvement of primary processing facilities especially, paddy dryers and storage facilities are needed for the rice millers. Efficient grain dryer should be used according to their capacity of procurement of paddy in a season. Rice millers or traders should be encouraged for the value addition of milled rice (cleaning, sorting, branding and packaging) so that they get modern domestic market share.
- Most of the rice millers in the study areas have less experience in advancing the technology and buying and selling of high value/ certified rice. Capacity building and incentives to take and share risks in marketing of SRP rice since they are the most strategic market actors who bridge the producers and the market. They already involve in many functions of rice value chain such as informal contracting for the provision of inputs, procurement of paddy, processing/ milling of rice. Formal contract farming should be initiated with the rice millers and SRP farmers complying with the SoP of contract farming. The incentives for the rice millers can be technical and market information, better market opportunities and linkages to finance for upgrading their mills.

6.4. Policy Implications

- Policy advice for the inclusion / development of SRP Standard of rice at National Level should be done by the project. National Standard and Quality Department and MRF would be focal contact for this standardization.
- Policy advocacy should be done for scaling up activities of SRP programs, which aligns with the vision and objective of NES and for the support of regional government for the promotion of SRP rice.

6.5. Market Potential

- At this moment, domestic premium markets are driving a high value chain although the supply and demand does not match yet as well as the exportable volume. Digital commerce and online market approach as well as Modern trade could be the new market segments for SRP. For this

linkage, farmers can get the digital marketplaces on the existing APPs such as shop.com.mm or green way mobile applications.

- It is necessary to create SRP market by the Consumers or the project could initiate with the support of regional Government for SRP rice, provided with attractive selling price for farmers.
- For the export of SRP rice, Middle East countries and EU market should be explored. The quality of product as well as process along the rice value chain should meet the requirements of the technical regulations and buyers' requirements. For scaling up, contract farming would be the best incentive for the farmers in compliance with SRP guidelines.
- SRP Standard should be integrated in existing rice value chains with other rice millers or companies which are engaged in contract farming mechanism with farmers. This will help to improve the quality, reduce costs and production of SRP compliance rice in larger volumes to supply in the market.

6.6. General Recommendation

- Scaling up of SRP program should be done in collaboration with other potential donors and organizations. For example, IFC is interested in scaling up of SRP program in Myanmar for high value production and expansion of niche market opportunities.
- The target location for the development of higher quality rice value chain should be appropriately selected. One of the potential areas could be in Shwebo areas in Sagain Region. The adoption rate of new technologies by farmers are quite good and the readiness of private sector (millers) are better than other parts on the country. Shwebo Paw San could also be value-added as SRP verified Shwebo Paw San rice. Further, assessment of the consumers in the domestic market on preference and willingness to pay for "sustainability" should be conducted.

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