FEED THE FUTURE
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SIX-MONTHLY REPORT

(OCTOBER 2020-MARCH 2021)

Cereal Systems Initiative for South Asia-Mechanization Extension Activity (CSISA-MEA)

USAID
আমেরিকার জনগণের পক্ষ থেকে

CSISA-MEA

CIMMYT
International Maize and Wheat Improvement Center

iDE

Georgia Tech

Report and Activity Details

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Acronyms and abbreviations

ABLE	Agriculture-based light engineering
ADO	Agriculture Development Officer
AFP	Axial flow pump
ASA	Association for Social Advancement
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BCSIR	Bangladesh Council of Scientific and Industrial Research
BDO	Business Development Officer
BEIOA	Bangladesh Light Engineering Owners Association
BITAC	Bangladesh Industrial and Technical Assistance Center
BRAC	Bangladesh Rural Advancement Committee
CSISA-MEA	Cereal Systems Initiative in South Asia – Mechanization Extension Activity
CSISA-MI	Cereal Systems Initiative in South Asia - Mechanization and Irrigation
CAD	Computer-aided design
CIMMYT	The International Maize and Wheat Improvement Center
CXB	Cox's Bazar
DAE	Department of Agriculture Extension
EOI	Expression of Interest
FAO	Food and Agriculture Organization
FBA	Farm Business Advisor
FFD	Farmer Field Day
FSI	Financial services institution
GT	Georgia Institute of Technology
iDE	International Development Enterprise
IDLC	Industrial Development Leasing Company
iDQA	Internal Data Quality Assessment
IPDC	Industrial Promotion and Development Company
IT	Information technology
JCF	Jagoroni Chakra Foundation
JVA	Joint venture agreement
LE	Light engineering
LLA	Local level agreement
LSP	Local service provider
LPIN	Livestock Production for Improved Nutrition
MFI	Micro finance institution
MCH	Medium combine harvester
MEL	Monitoring, evaluation and learning
MDO	Mechanization Development Officer
MSA	Market system analysis
MSME	Micro, small and medium enterprises
MSP	Machinery solution provider
NBFI	Non-bank financial institution

NGO	Non-governmental organization
NRE	New Rifat Engineering
PPE	Personal protective equipment
PTOS	Power tiller-operated seeder
RDC	Rice and Diversified Crops Activity
RRF	Rural Reconstruction Foundation
RT	Rice transplanter
SAAO	Sub Assistant Agriculture Officer
SKS	*Shombhabbo Kreta Shomabesh* (Meeting for Potential Buyers)
SME	Small and medium enterprises
SMS	Short message service
SO	Strategic objective
TML	The Metal (Pvt.) Limited
TMSS	*Thengamara Mohila Sabuj Sangha* (Thengamara Women's Green Association)
TOT	Training of Trainers
TVET	Technical and Vocational Education Training
US	United States
USA	United States of America
USAID	United States Agency for International Development
USG	United States Government
ZOI	Zone of Influence
ZOR	Zone of Resilience

Executive Summary

This report covers the six months from the 1st of October 2020 to 31st March 2021 of the USAID/Bangladesh supported Cereal Systems imitative for South Asia – Mechanization and Extension (CSISA-MEA) Activity. Although the Activity was considerably constrained and challenged by the COVID-19 pandemic, which led to restrictions in travel, meeting sizes and training activities, a number of significant interventions leading to successes were nevertheless initiated in this reporting period.

Partnering with the private sector to accelerate access to appropriate agricultural machinery: Agreements with nine lead firms (including two banks) to encourage the use of new agricultural machinery, provide financial services, expand dealerships and initiate machine and spare parts manufacture were signed and initiated during these six months. The activities included in these agreements are as follows:

- Four agreements (with Alim Industries, Abedin Equipment, The Metal (Pvt) Ltd (TML) and ACI Motors) cover training of combine harvester mechanics and drivers.
- Two agreements (with Abedin Equipment and TML) provide training in rice seedling production for rice transplanters and promotion of the use of rice transplanters.
- Three agreements (with TML, Janata Engineering and RK Metal) cover establishment of new machinery dealerships in underserved areas of the Feed the Future Zone of Influence (ZOI) and in the Cox's Bazar Zone of Resilience (ZOR).
- Two lead firms (TML and ACI Motors) are working to identify agriculture-based light engineering (ABLE) small and medium enterprises (SMEs) capable of producing spare parts for combine harvesters and tractor attachments.
- BRAC Bank has signed an agreement to develop systems for financing agricultural machinery manufacturing and marketing, and ILDC has signed an agreement to provide ABLE SMEs with training in financial transaction and record-keeping.
- A lead firm (RK Metal) and an international NGO (Practical Action) have signed agreements to develop, with technical support from CSISA-MEA partner Georgia Institute of Technology (Georgia Tech), onion and garlic planting and harvesting machinery, and jute fiber extraction machines.

Reducing drudgery and farmers' production costs with rice transplanters: Agreements are pending signature with three regional seed companies (to support them train growers of rice seedlings for rice transplanters and promote the use of rice transplanters) and two lead firms that provide groups of farmers managed by machinery solutions providers (MSPs) – rural entrepreneurs who offer their farmer-clients access to machinery services on an affordable fee-for-service basis – with input supply, output marketing and financial services. In addition, three agreements are under development to support lead firms to develop expanded markets for combine harvesters, rice transplanters and other machines.

Collaboration with USAID's implementing partners to boost impact: During the reporting period, the Activity, with cooperation from the USAID Feed the Future Bangladesh Rice and Diversified Crops Activity, also facilitated training by private sector partners and DAE in raising seedlings to transplant using rice transplanters. In doing this a total of 35 staff who were from the DAE and the private sector were trained. They went on to train 203 farmers and MSPs. In these training events, special attention was given to encouraging women and youth to participate. This resulted in 43 women and youth being trained in the mat method of rice seedling raising, and the establishment of rice seedling nurseries which produced enough seedlings to establish 203.2 ha of rice using rice transplanters. Through demonstrations and meetings facilitated by CSISA-MEA, that were led by private sector partners, eight rice transplanters have been sold and at least 29 prospective buyers have applied to DAE for subsidy payments with a view to buying transplanters.

The use of machine-driven fodder choppers is a relatively new technology which saves women's time and effort. In the Cox's Bazar ZOR, CSISA-MEA and the USAID Feed the Future Bangladesh Livestock Production for Improved Nutrition (LPIN) Activity have facilitated demonstrations of the fodder chopper, supporting ZOI-based machinery manufacturers RK Metal and Janata Engineering to support their dealers to market fodder choppers. To date, this has resulted in the sale of seven fodder choppers in Cox's Bazar.

Partnering with 53 ABLE SMEs: Of the 53 ABLE SMEs which began to work with CSISA-MEA, two have closed because of a drop in business caused by COVID-19 restrictions. Of the remaining 51 ABLE SMEs, 38 have signed agreements with CSISA-MEA through which they will receive technical support, training and links to finance. It is anticipated that the remaining 13 will sign agreements during the next six months. In addition, a further 60 ABLE SMEs have been identified who would form suitable partners for CSISA-MEA. Support for the ABLE SMEs has included work to support with the preparation of business plans, and technical support for the manufacture of spare parts new to the ABLE SMEs. These include parts for combine harvesters, rice transplanters, fodder choppers and trailer leaf springs. The Activity has also worked towards improving access to raw materials, such as steel of known and guaranteed quality. This is in addition to activities expanding ABLE SME markets by linking them with machinery and spare parts dealers and with lead firms such as TML and ACI Motors seeking new suppliers.

Access to smart finance for improved services: In addition, the Activity has worked during the reporting period towards facilitating access to finance. To date, six financial institutions have disbursed 13 loans worth USD 262,941 to 11 partner ABLE SMEs and two machinery dealers. The loans were provided by BRAC Bank (1), IDLC (3), IPDC (1) Jamuna Bank (1), Janata Bank (2) and MIDAS (5). Actions have also been taken to support the Bangladesh Light Engineering Industry Owners Association (BEIOA) so that they can provide their members with improved services.

Transformative training: After considerable effort through the COVID-19 lockdown to select and negotiate agreements with companies and NGOs, November 2020 saw the start of the planned training program delivered by partner NGOs Thengamara Mohila Sabuj Sangha (TMSS) in Bogura and Rural Reconstruction Foundation (RRF) in Jashore for light engineering staff in manufacturing skills and training programs. This has provided training for 46 staff from 33 ABLE SMEs in skills ranging from mathematics and technical drawing to welding, lathing, drilling, painting and workshop health and safety. A further 56 staff are currently being trained, and those staff already trained have now started, with support from the training services providers and CSISA-MEA engineers, to pass on to fellow workers in their enterprise the knowledge and skills they have received in training. In addition, Georgia Tech has begun a program to provide ABLE engineers and CSISA-MEA engineers with advanced manufacturing design training. This is delivered direct from Georgia Tech in Atlanta, USA and will enable engineers to give ABLE SMEs advice on how to manufacture the new spare parts and machines for which new markets have been identified by CSISA-MEA. These include parts for combine harvesters, rice transplanters and tractors.

Through agreements with lead firms (Alim Industries, Abedin Equipment and TML) eight company engineers, 120 mechanics and 117 combine harvester owners/operators have been trained and 60 combine harvesters have been given pre-season servicing. In Cox's Bazar, ZOI-based Janata Engineering supplied a machinery technician to the Activity to train 17 mechanics in the maintenance, repair and use of combine harvesters, reapers and rice transplanters. These trained mechanics then went on to train 13 owners of reapers, combine harvesters, rice transplanters and fodder choppers.

Actions into impact: CSISA-MEA's impact (for which the survey team visited 12,000 farmers) showed that a total of 40,528 farmers (13% woman) purchased mechanized land preparation, irrigation and harvesting services from 1,514 machinery solution providers (MSP) (22 irrigation, 1,286 power tiller-operated seeder (PTOS), 81 combine harvesters, 117 reapers and 8 rice transplanters). These services covered 13,124 ha, representing 90% of the Activity's annual target. In the reporting period, 115 MSP purchased 55 combine harvesters, 41 reapers, eight rice transplanters, seven fodder choppers and 4 PTOS, worth a total of USD 872,574. The Activity also supported 5 MSP to obtain loans worth USD 22,000 to purchase two combine harvesters, one rice transplanter, one reaper and one power tiller operated seeder (PTOS).

Machinery demand creation: CSISA-MEA also facilitated sales events that included machinery demonstrations. These were attended by lead firms, dealer, MSPs and farmers, and resulted in lead firm Abedin Equipment selling 10 combine harvesters, and wheat harvesting business worth USD 9,750 for TML combine harvester owners. In Cox's Bazar district, the Activity partnered with Department of Agricultural Extension (DAE) and facilitated 15 farmer field days that involved TML and ACI Motors. These raised demand for combine harvesters, reapers, rice transplanters and fodder choppers, and were attended by 490 farmers.

Supporting business diversification: Most MSPs are single machine businesses. To support them to diversify into new enterprises and to take advantage of their wide network of customers, CSISA-MEA has been seeking partnerships with lead firms who would be interested in partnering with LSPs to establish systems that provide farmers with a wide range of services. As a result, we are currently in discussion with two lead firms that are interested in linking machinery service providers with input supply, crop processing and marketing companies, and with financial service providers. In addition, CSISA-MEA field level staff have been supporting the expansion of MSP businesses in numerous ways. They have been facilitating links between regional businesses which own fleets of combine harvesters and who are seeking agents who can identify groups of farmers wanting harvesting services, and MSPs interested in doing this work using their networks of farmers. Similarly, they have also been linking lead firms seeking machinery sales agents and local companies seeking agents for the sale of second-hand machinery with MSPs interested in those types of business. The Activity has created one women- and nine youth-managed businesses by facilitating their recruitment as sales agents for ACI Motors.

Introduction and background

The USAID Feed the Future Bangladesh Cereal Systems Initiatives for South Asia - Mechanization Extension Activity (CSISA-MEA) is a five-year development Activity which started in October 2019. It aims to support the mechanization of agriculture in Bangladesh by developing the capacity of the private sector to develop, manufacture and market innovative new technologies which will enable the country's farmers to mechanize their agricultural production.

The CSISA-MEA Activity is a continuation and expansion of the work initiated by the CSISA Mechanization and Irrigation (CSISA-MI) Activity. CSISA-MI started in 2013 and supported the private sector to import and market planting and harvesting machinery at an aggregate private sector investment value of USD 6.9 million. Machinery was sold to 3,475 rural entrepreneurs who became what are commonly known as local service providers (LSPs) or 'machinery solutions providers' (MSPs) who used the machines to sell planting, irrigation and harvesting services to 94,661 farmers on an affordable fee-for-services basis. CSISA-MI was implemented by the International Maize and Wheat Improvement Center (CIMMYT) in partnership with International Development Enterprises (iDE).

CSISA-MEA's Core Objective is to enhance agricultural resilience through the development of agricultural machinery light engineering companies and to develop a youth and gender-inclusive workforce, with a special focus on the crisis-affected areas of Bangladesh. This is achieved through three sub-objectives:

- **Strategic Objective 1**: Boost the competitiveness and efficiency of domestic and private sector-led agricultural machinery manufacturing
- **Strategic Objective 2**: Enhance the institutional capacity for agricultural mechanization through the development of a skilled and youth workforce
- **Strategic Objective 3**: Improve access for farmers to agricultural machinery, production and marketing services

CSISA-MEA addresses constraints to the smooth functioning of machinery market systems through initiating partnerships with the private sector. To support the private sector to utilize public sector resources, it also facilitates partnerships between the two sectors.

Interventions implemented by the private sector with CSISA-MEA support should be innovative, new and readily scalable. Costs and activities are rationally shared between partners and, wherever possible, confined to the provision of technical support. CSISA-MEA does not engage directly in interventions but rather plays a market facilitating role by providing Activity funding, facilitating linkages to other organizations (such as DAE and national research institutions and universities) and the provision of technical expertise. As such, the Activity takes a markets systems approach, building systemic change that will continue even after the Activity ends.

As the CSISA-MI Activity progressed, a number of light engineering companies began to copy and manufacture some of the machinery imported by other companies. As this process of copying and manufacturing continued, it became clear that with technical and managerial support to the light engineering industry in Bangladesh, many machines and their spare parts could be manufactured in the country. As a result, CSISA-MEA has a strong emphasis on supporting Bangladesh's light engineering industry with manufacturing and managerial skills training, manufacturing systems design, links to markets and access to finance. To support CSISA-MEA partners to provide this, the Georgia Institute of Technology (Georgia Tech) has joined the Activity as a partner, in addition to iDE. CSISA-MEA has enlarged the scope of this work and as well as facilitating the introduction of agricultural mechanization technology by the private sector in the Feed the Future Feed the Future Zone of Influence (ZOI); it also works towards similar objectives in the Rohingya crisis-impacted Zone of Resilience (ZOR) in Cox's Bazar district.

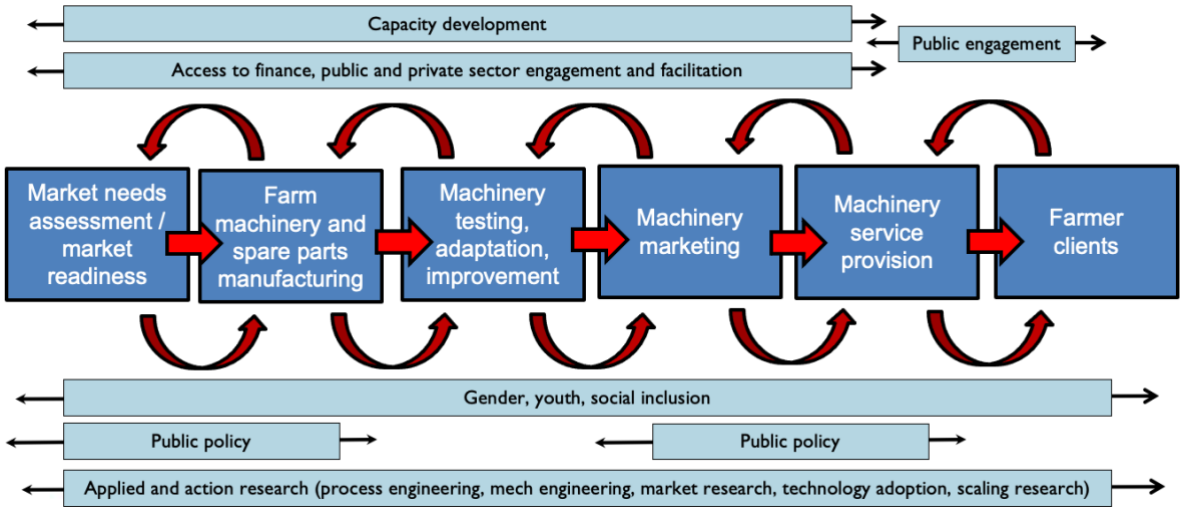


Figure 1: *Activities planned along the agricultural machinery value chain*

1.2 Scope of this report

This report covers the six months of the Cereal Systems Initiative for South Asia – Mechanization and Extension Activity (CSISA-MEA) from the 1st October 2020 to 31st March 2021 when, although CSISA-MEA activities continued to be constrained and challenged by the COVID-19 pandemic, a number of significant interventions were initiated. After the Activity's considerable effort through COVID-19 lockdowns and subsequent periods of reduced work to assure staff and partner safety, several key activities were still successful implemented. These included the selection and negotiation of agreements with partner companies and NGOs to facilitate training.

In November 2020, training programs delivered by TMSS and Rural Reconstruction Foundation (RRF) (both training service providers for CSISA-MEA) for light engineering staff in manufacturing skills and training programs resumed for the first time since the pandemic began. Also during the six-month period, agreements with nine lead firms (including two

banks) to develop new markets for agricultural machinery technology, provide financial services, expand dealerships and initiate machine and spare parts manufacture were signed and initiated. CSISA-MEA also worked closely with Bangladesh's Department of Agricultural Extension (DAE) at a district and sub-district office level to support it to initiate training and demonstrate new machinery technology, including rice transplanters and combine harvesters.

Towards the end of this six-month period, the Activity underwent major management changes, with the retirement of the interim Chief of Party, Timothy Russell, and the appointment of Dr. Timothy Krupnik as Chief of Party. There have also been changes in senior managerial staff in iDE: Jeremy Davis, Sameer Kirki and Abir Chowdhury left and Khaled Khan joined as the iDE team lead for CSISA-MEA.

Activity partners

Building upon the expertise and lessons learned from CSISA-MI, the following partnerships have been developed to implement the Activity:

The International Maize and Wheat Improvement Center (also known as *Centro Internacional de Mejoramiento de Maíz y Trigo*, or CIMMYT to use its Spanish acronym) is the Activity's prime. In addition to being responsible for the overall administration and financial management of the Activity, responsible for employing field staff with agricultural development and engineering skills. CIMMYT is also responsible for reporting to the donor on progress of the Activity, lessons learnt through its implementation, and its impact. For this it employs a Monitoring, Evaluation and Learning (MEL) team that collects monitoring data, conducts surveys to evaluate Activity progress, and conducts internal data quality assessments (iDQA) to ensure the data reported to USAID is accurate. CIMMYT is also responsible for maintaining and administering field offices (see below for their locations). From these offices, CIMMYT and iDE field staff design, implement and supervise the training and technical support given to MSMEs in the light engineering sector, to machinery service providers (MSPs) (also known as LSPs) and machinery dealers, and to the farmers. This work is done in partnership with the Government of Bangladesh and the private sector.

International Development Enterprises (iDE) was a partner in the implementation of the CSISA-MI Activity and is a key implementation partner for CSISA-MEA, where its responsibility is to design and implement market-driven

interventions in partnership with private sector firms. Within CSISA-MEA, iDE plays a pivotal role in facilitating partnerships between SMEs and larger firms to obtain process, technology and market improvements, and in leading the financial inclusion component of the Activity with a range of national and international partners.

Georgia Institute of Technology (Georgia Tech) is CSISA-MEA's core engineering adviser and educational partner. In the USA, Georgia Tech provides a technology focused education to undergraduate and graduate students in fields ranging from engineering, computing and sciences to business, design and the liberal arts. Within CSISA-MEA, Georgia Tech is leading efforts in the mechanization and industrialization activities and in the design and implementation of the apprenticeship program, as well as anchoring US-based industry collaborations. Specifically, Georgia Tech has been providing consultative services to CSISA-MEA for the design of training for light engineering MSMEs, and for the design of these MSMEs' products, processes and factories.

Activity Staffing

The Activity currently employs 52 staff members, of which 8 are shared with other programs, 15 are based in the Dhaka office and 37 in field offices; 3 are internationally recruited staff. The Activity currently engages five consultants on short-term assignments: a technical advisor, field activities and private sector alignment lead, industrial engineer, supply chain consultant and document editor.

Georgia Tech provides Professor Dr. Jon Colton as technical lead on the engineering aspects of the Activity. Georgia Tech postgraduate engineering students supervised by Professor Colton design machinery and conduct studies for the Activity as part of their course work. The administration and financial management support for the Activity is provided by a pool of staff that supports all programs implemented by CIMMYT and iDE. Current vacant positions include a market systems development manager, two senior technical specialists, an industrial engineer and a partnerships contract coordinator. Several of these positions are now in the process of being hired, and all positions are expected to be filled within the next six weeks. Annex 3 presents the CSISA-MEA key staffing matrix.

CSISA-MEA's approach:

From 2013 to 2019, CSISA-MEA's predecessor CSISA-MI created a demand for new labor-saving agricultural machinery by directly implementing a program of promotional events, at which the use and business value of new technology (power tiller operated seeders, or PTOS,

axial flow pumps and reapers) was demonstrated to farmers. At these events, customers for these machines were actively linked to local dealers selling the machines who attended awareness and demand creation events. After purchase, the new machine owners were provided with training in the use and maintenance of the machines and in business management, facilitated by the Activity and key lead firm private sector partners. The Activity supports lead firms through the joint venture agreements (JVAs) to facilitate imports and sales, and through co-sharing in the development of advertising and promotional materials including videos, posters. Importantly, the primary method used by CSISA-MI to attract private sector investment was through the provision and communication of data on machinery performance and potential for business sales, all of which was generated through the action research conducted by the Activity in partnership with the private sector and the Bangladesh Agricultural Research Institute (BARI).

Table 1: CSISA-MEA Activity staff overview

Location and Number of Positions			
Dhaka Office			
Chief of Party	1	Team Leader	1
Project Manager	1	Project Manager	1
Senior Agronomist	1	Senior Technical Specialists	2
Training Coordinator	1	Strategic Partnership Adviser	1
Training Specialist	1		
MEL Manager‡	1	Expert- Evidence and Analytics	1
Communication Coordinator	1	Communications Specialist	1
Project Assistant	1		
Total Dhaka office	**8**	**Total Dhaka office**	**7**
Field Offices (Jashore, Faridpur, Cox's Bazar and Bogura)			
Field Office Coordinator	4	Market Development Specialists	3
Agricultural Development Officer	8	Officer, Market Development	10
Machinery Development Officers (engineers)	5		
Senior MEL Officer	3		
Admin & Finance	4		
Total field offices	**24**	**Total field offices**	**13**
Total employed CSISA-MEA			**52**

CSISA-MEA continues with this market systems development approach by working to support companies or institutions to provide training, technical advice, financial services and business skills. The Activity works to broaden the market systems that support agricultural mechanization and machinery manufacturing, by facilitating links between market actors and technical advisers. In principle, this approach means that by the time CSISA-MEA comes to an end, any activities implemented by its partner companies should continue to be supported because they make good business sense to the company.

To this end, CSISA-MEA continues to rely on the use of JVAs with lead firms that were first initiated in CSISA-MI, although each JVA is now renegotiated on an annual basis and with a stronger focus on broader machinery and manufacturing market development than in the project's first phase. The Activity has also been actively facilitating collaboration between private sector and public sector actors, and encouraging private sector partners to participate in training and demonstration events organized by the DAE, with the expectation that this will lead to lasting working relationships between regional company representatives and district level DAE staff. Similarly, discussions with BAU and BARI about collaboration to develop new agricultural machinery technology has focused on how this could be done in partnership with the private sector.

Area of operations

CSISA-MEA maintains field offices in locations across Bangladesh that are crucial for USAID's interventions and also for the light engineering and manufacturing industry.

Khulna and Barisal Divisions (greater Jashore and Faridpur): This is where the main light engineering hubs in the Feed the Future ZOI are based. This is a major area for the commercial production of fine grain rice, vegetables, jute, pulses, maize and wheat, and where adoption of agricultural machinery technology such as tractors, powered tillers, combine harvesters, two-wheeled tractor planters, reapers and threshers is rising rapidly. There is also a growing interest in this zone in new technology such as rice transplanters. As this market for agricultural machinery grows, it attracts more companies to market their machines in these areas. By contrast, coastal districts in the south and Barisal division in the east of the ZOI where commercial production of crops is less intense have been exposed to less machinery marketing, resulting in farmers having less access to new agricultural machinery technologies. Providing companies with support to expand their operations into these districts has become a focus of CSISA-MEA interventions.

Bogura district*:* This is the main light engineering center outside Dhaka and where many machine manufacturing companies in the Feed the Future zone obtain parts and components for the machines they make.

Cox's Bazar district*:* This is close to the farming community that supplies farm products to the Rohingya refugee camps. Being remote from the major commercial center in northern and central Bangladesh and having limited agricultural resources, in the past it has not attracted commercial interest in terms of the marketing of agricultural inputs and machinery.

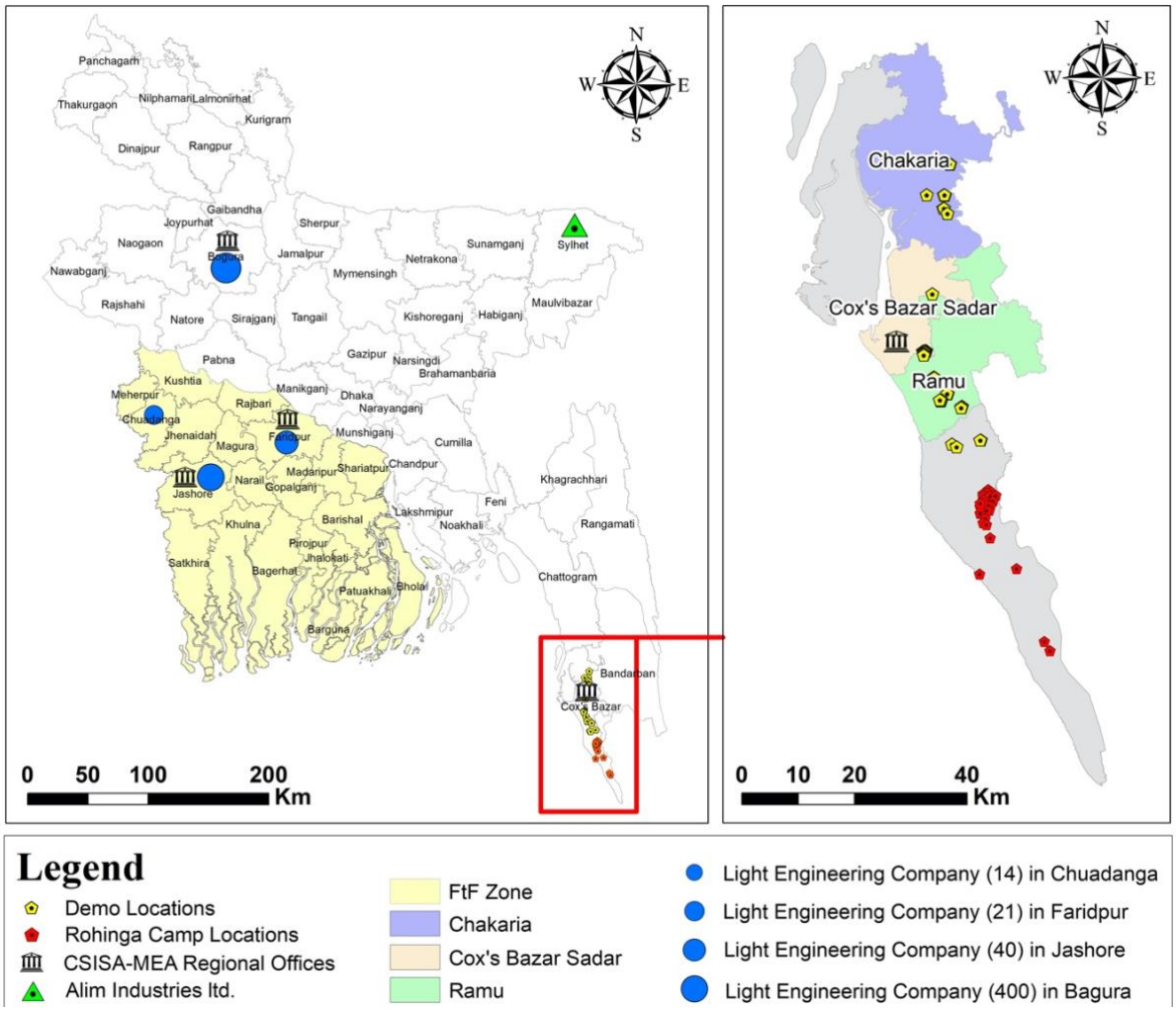


Figure 2: *Map showing location of CSISA-MEA working areas and partner companies*

Again, a major focus for CSISA-MEA has been to provide companies with support to establish machinery marketing systems in the Cox's Bazaar district. Through this intervention it is expected that increased agricultural mechanization will assist farmers to meet the growing demand for agricultural products created by the Rohingya refugee camps and supporting development agencies.

Visits, meetings and presentations

COVID-19 travel and meeting restrictions prevented travel by both Activity and USAID staff to observe CSISA-MEA activities for much of this six-month reporting period. An easing of travel restrictions from February 2021 allowed Activity staff to travel more freely and USAID staff to travel to Cox's Bazaar to see CSISA-MEA activities (March 22nd–24th). The visitors were: Jacob Morrin, Agriculture Development Officer, Aniruddha Roy, EG Office, Motasim Billah, MEL Specialist, Program Office, Munira Begum, Program Office.

Figure 3: *A machinery service provider demonstrating use of a power tiller operated seeder to USAID visitors in Cox's Bazar. March 2021. Photo credit: Syed-Ur-Rahman*

Their visit locations included Samia Motors, Ramu, Cox's Bazar where they met the owner, Mr. Sadid Jamil managing director of TML, Md. Ole Ullah owner of Janata Engineering, MSPs and agricultural machinery mechanics. They also met a representative from BRAC Bank, which provides finance for the purchase of farm machinery. This was in addition to Dulahazara Uttarpara, Chakaria, Cox's Bazar where they observed rice being transplanted using a rice transplanter, and met rice transplanter service providers and women who raised rice seedlings for sale to farmers who then had their rice planted using a rice transplanter. They observed training of MSPs on the operation, maintenance and repair of rice transplanters, given by TML.

Visitors were also shown demonstrations of the use of a PTOS for strip till planting of maize and a display of machinery including combine harvesters, reapers, reaper-binders, mini maize shellers, fodder choppers and weeders. Finally, the visitors also met DAE staff including the District Director and DAE extension staff. Finally, the USAID team visited dairy farmer associations where CSISA-MEA and the USAID Feed the Future Bangladesh Livestock Production for Improved Nutrition (LPIN) Activity are collaborating to introduce fodder chopping machinery through partnerships with Feed the Future ZOI-based machinery manufacturing companies.

Meetings with and presentations to USAID

In addition to field visits, the Activity maintained a consistent schedule of online meetings to brief USAID on activity progress during the reporting period. These are summarized below.

Table 2: List of meetings with and presentations to USAID

Date	Meeting purpose	Lead USAID contact	Presentation requirement
26 Oct 20	Update on Activity achievement and targets	Anar Khalil	PowerPoint presentation
23 Nov 20	Activity introduction meeting	Aniruddha Roy	Presentation not required
10 Dec 20	ZOR implementing partners meeting	-	Presentation not required
14 Dec 20	USAID meeting with government representative	Aniruddha Roy	Only preparation of meeting for USAID required
17 Jan 21	Data quality assessment meeting	Aniruddha Roy and USAID MEL team	PowerPoint presentation
01 Feb 21	Briefing on change in Activity leadership	Aniruddha Roy	Presentation not required
04 Feb 21	Update on Activity achievements and targets	Osagie C. Aimiuwu and Aniruddha Roy	PowerPoint presentation
10 Feb 21	Media engagement meeting	Osagie C. Aimiuwu and Aniruddha Roy	PowerPoint presentation
17 Feb 21	Update on Activity achievements and targets	Osagie C. Aimiuwu and Aniruddha Roy	PowerPoint presentation
18 Feb 21	Activity introduction meeting Activity leadership – part 1	Jacob Morrin	PowerPoint presentation
24 Feb 21	Activity introduction meeting Activity leadership – part 2	Jacob Morrin	PowerPoint presentation
21 Mar 21	Activity introduction meeting Full team	Jacob Morrin	PowerPoint presentation

Achievements during the reporting period

Annex I presents results achieved against targets for Activity Year 1 and the first six months of Activity Year 2. Full results from the 2020–21 reporting year will be made available in September 2021. Annex I show that targets for most indicators are being met and may exceed expectations by the time September arrives. Activities under agreements with private sector partners signed in December 2020 and January 2021 that will generate results for targets for EG.3.1-14 (Value of new USG commitments and private sector investment leveraged by the USG to support food security and nutrition) have only just been initiated in this reporting period and will provide data as these agreements reach fruition in the later part of the year. The training of agricultural-based light engineering (ABLE) small and medium-scale enterprise (SME) staff that began in November will expand through the next six-month period as those trained start to train others in the enterprises where they work. This will generate the numbers required to meet targets under Custom Indicators 1 and 2 which are concerned with improving the skills and employability of youth in the light engineering industry.

The following reports on progress made with implementing activities planned in the work plan that was presented to USAID for approval on the 15th November 2020. Activities are presented for each intervention planned under each strategic objective.

Strategic Objective 1: Competitiveness and efficiency of domestic and private sector-led agricultural machinery manufacturing boosted

Strategic Objective 1


Machine foundry in Jashore

Intervention 1.1 Developing the manufacturing capacity of agriculture-based light engineering small and medium scale enterprises

Bangladesh's light engineering sector is dominated by an extensive number of SMEs concentrated in industrial hubs in Bogura, Jashore and Dhaka. Their main business involves repairing machines, fabricating parts, and manufacturing small, simple machines, often copied from imported machines or from designs developed by government institutions. CSISA-MEA collaborates with ABLE SMEs to develop their competitiveness and efficiency in the manufacturing, assembly, use and servicing of agricultural machinery. The more improvements SMEs make to their manufacturing capacity, the greater the access of the region's farmers will be to quality machines and services. For most ABLE SMEs, their most critical constraints are access to markets for new products, technical training, reasonably priced and quality raw materials, and affordable finance. One of their core requirements is access to apposite information about how to manufacture machines and parts, and the equipment required to make them.

The specific objectives of the collaboration between CSISA-MEA and partner ABLE SMEs are to:

1. provide support for preparing periodic business plans, providing follow-up and mentorship;
2. provide access to market information especially about opportunities to manufacture new types of machines, machine parts or spare parts;
3. provide support enabling ABLE SMEs to access new markets for their existing portfolio of machines and parts and/or to access new types of machinery to manufacture or

produce parts for popular machineries. This may involve CSISA-MEA facilitating partnerships with national and international lead firms;

4. provide technical support for the design, introduction and development of more efficient machine manufacturing processes including advice on which equipment ABLE SMEs should purchase, and training them to use it;
5. develop the technical skills of the ABLE SME workforce including provision of Occupational Health and Safety training;
6. develop the business and financial management skills of ABLE SME managers; and
7. link ABLE SMEs to other support services including financial services.

Figure 4: *CSISA-MEA staff signing a contractual agreement with Wahab Engineering, Jashore, November 2020. Photo credit: Apurba*

Developing partnerships with ABLE SMEs: During the first year of CSISA-MEA, the Activity developed alliances with 53 ABLE SMEs, of which two did not survive the COVID-19 pandemic and have closed. Agreements to collaborate were signed with 38 of these enterprises, with a further 13 to be signed in the next six months. By the end of Year 2, CSISA-MEA will have expanded its alliances with ABLE SMEs to create a network of 80. So far, primary data has been collected from 60 new potential ABLE SME partners in Jashore and Bogura. In Jashore, this will involve a geographic expansion out of Jashore town to include machinery manufacturing hubs in other parts of Khulna division.

Business planning: To enable ABLE SMEs to make the best decisions about the types of investment to undertake, CSISA-MEA has provided ABLE SMEs with support in the form of technical training and improved linkages with engineering associations, as well as facilitating visits to the factory warehouses of lead firms. The Activity has drafted business plans with 35 ABLE SMEs in Jashore and Bogura, and a further 18 will be developed over the course of the next six months.

Some key examples of provision of technical support: CSISA-MEA staff provide technical support to ABLE SMEs, with the Activity's teams of engineers and market development officers supported technically by industrial processes engineers from Georgia Institute of Technology. To compete with inexpensive imports and on the global manufacturing market, ABLE SMEs need to be able to make parts for lead firms, dealers and MSPs. CSISA-MEA and Georgia Tech experts together assess ABLE SMEs equipment and manufacturing systems and facilitate improvements to parts, processes and process flows, improving the enterprises' ability to compete in the value chain. Some examples of the type of support CSISA-MEA is giving are presented below.

New Rifat Engineering workshop (NRE): This SME is allied with ACI Motors, a much larger agricultural machinery importer and reseller in Bangladesh. NRE currently produces a large range of parts for engines but in response to demand from owners of combine harvesters and rice transplanters, would like to expand into manufacturing spare parts (such as planting fingers and cylinder sleeves for rice transplanters, and combine harvester cutter bar assemblies). ACI Motors, after seeing the parts NRE had made for the rice transplanters and combines, placed orders for them. To support them to fulfill these orders, CSISA-MEA arranged for NRE to receive technical training and advice from Professor Dr. Jon Colton of Georgia Institute of Technology via video calls. One such call explained the production of combine harvest cutter blades at various production rates, as a result of which NRE has made a complete cutting unit and provided a combine harvester cutting unit repair service to 8 MSPs; it has also made 100 rice tranter planting fingers, which are an important spare part for this equipment, and has orders from ACI Motors for a further 300. NRE is now eyeing the

Figure 5: *New Rifat Engineering workshop, a CSISA-MEA partner firm, selling cutting units for combine harvesters in Jashore, October 2020. The activity assisted this workshop to manufacture cutter bars, which are important spare parts for Bangladesh's expanding combine market, in the reporting period. Photo credit: Hafijur Rahman*

market and anticipates a dramatic expansion of orders for spare parts from ACI and other leading firms in Bangladesh.

Mohammad Ali Engineering: This Jashore-based company has received CSISA-MEA support for the fabrication of a roller crank pin, a fast-moving spare part for combine harvesters. This is a heavy-duty part and huge frictional force is created due to the motion of the blade bar. The CSISA-MEA team developed dimensioned drawings and an exploded view of the assembly, a parts list, a bill of materials, a materials route sheet, a process flow chart and a cost model (Annex IV). Mohammad Ali Engineering is now in the process of adapting their engineering processes to improve manufacturing, using the technical information garnered with the assistance of the Activity.

Figure 5: *Mohammad Ali Engineering in Jashore improved its production system with a purchase of a new radial drill, facilitated by CSISA-MEA, March 2021. Photo credit: Md. Khalekuzzaman*

Designing manufacturing processes for spare parts with Shilpi Metal: CSISA-MEA is supporting Shilpi Metal and Foundry, based in Jashore, in the design of its new manufacturing facility. Currently a local foundry and machining workshop producing engine liners, brake drums, fodder chopper components, centrifugal pumps and pulleys, Shilpi Metal's new facility will be capable of producing leaf springs for small vehicles and power tiller-drawn trailers that are widely used for transport of agricultural goods in Bangladesh. CSISA-MEA provided the enterprise with an assessment of the capital machinery it will require, factory floor layout, and training on how to install the new machines, as well as a factory layout and process flow chart (Annex IV).

Picture 5&6: *(left) CSISA-MEA team preparing a parts list and bill of Materials for a Latif Engineering chopper machine, Jashore; (right) Fodder choppers ready for delivery to dealers in the Feed the Future Zone, 17th December 2020. Photo credit: Md. Hafijur Rahman*

Latif Engineering Workshop: Latif Engineering in Jashore supplies fodder chopper machines to dealers and farmers in the Feed the Future zone. During the reporting period, the CSISA-MEA team analyzed the entire chopper machine production process and prepared a bill of materials, process flow chart and cost of manufacturing for Latif Engineering. The Activity has enabled this firm to understand the importance of efficient machine set-up for reducing operation time and labor costs, and to increase quality, production and company profit. Discussions are ongoing with Latif Engineering to refine their manufacturing processes to improve efficiency and product quality.

Improved access to raw materials and metallurgical testing

Figure 6: *CSISA-MEA staff members consulting with Shilpi Metal & Foundry to facilitate a new factory layout in Jashore. March 2021. Photo credit: Ikram Hossain*

Most raw materials used by ABLE SMEs originate from scrap metal produced by the Bangladesh ship-breaking industry. The quality and price of this material, particularly of steel, vary considerably, making it difficult for small firms to make parts and machines of consistent price and quality. To assist ABLE SMEs to access steel of known and guaranteed quality, CSISA-MEA initiated a study to gain a better understanding of the supply chain for metal in Bangladesh and to try and develop a system that will supply raw materials with a certified quality. With this objective, raw materials markets in Dholaikhal and Jatrabari were inspected to gather information about the kinds of material available, their country of origin and their costs. The next step will be to determine the composition of the metals, currently listed only as mild steel, and stainless steel graded as A, B, C and D, rather than internationally recognized metal grading standards. This information will be used to develop recommendations for ABLE SMEs to support the fabrication of high quality parts and machinery.

Also during the reporting period, and prior to increased severity of the COVID-19 pandemic, CSISA-MEA staff also visited a number of metallurgical testing laboratories including Bangladesh University of Engineering and Technology (BUET) and Bangladesh Council of Scientific and Industrial Research (BCSIR) to determine the costs and time required to perform a number of tests including material composition, metallurgy, mechanical strength and hardness tests. As part of this activity, TML sent parts to BCSIR to be tested for material composition. Fuller results on the impact of these processes will be presented in the 2020–21 Annual Report.



Picture 8,9 &10 : *Dholaikhal Market was inspected to determine the quality of manufacturing materials available. Left to right: used bearings; used pinions and gears; workers cutting mild steel plate. Photo credit: Badrul Alam*

Linking ABLE SMEs and machinery and spare parts dealers

As part of its implementation strategy, CSISA-MEA arranges meetings to facilitate connections between ABLE SMEs and dealers. This is done with the objective of these linkage events being to enable agricultural machinery and related spare parts dealers to obtain equipment and spares from ABLE SMEs rather than from Dhaka or beyond. In so doing, their transactions costs can be reduced while at the same time boosting competitiveness and facilitating access to markets for smaller firms. During the last month of the reporting period, three linkage meetings were held in the Jashore region attended by 29 ABLE SMEs and dealers, where it was agreed to create a business relationship among themselves so that they can buy spare parts and machineries from Jashore-based ABLE SMEs. Progress on this work has however been slowed due to the increased rates of COVID-19 and resulting business lockdowns experienced in Bangladesh. Soon after work can fully resume, this activity will be accelerated, with the outcomes from this work detailed in the 2020–21 Annual Report.

Supporting light engineering associations to support association members

Supporting light engineering associations to improve the services they provide to their members can be an effective way to develop a self-financing and ideally sustainable way of providing light engineering enterprises with access to information on business and market development, capacity building, quality standards and raw materials testing, and the improvement of health and safety standards. These associations can also act as a conduit for members to take policy-related concerns to the government. In January 2021, the CSISA-MEA Jashore field office organized a meeting with the Jashore chapter of the Bangladesh Light Engineering Industry Owners Association (BEIOA) to support them improve the services they give to their members. The meeting with BEIOA opened doors for further collaboration, and CSISA-MEA is now working to develop methods to formally support member SMEs to respond to requests from itself for Expressions of Interest to enter into co-financed partnership with the Activity to improve SMEs' manufacturing processes. One of the anticipated outcomes of this work that will be detailed in the 2020–21 Annual Report is the development of supply chain services with BEOIA firms actively trading among themselves and supplying spare and component parts to lead manufacturing firms.

Picture 11: *Meeting between CSISA-MEA staff and Bangladesh Light Engineering Industry Owners Association, Jashore, January 2021. Photo credit: Md. Khalekuzzaman*

Facilitating the development, testing and marketing of new agricultural machinery technology

There are a number of ongoing activities ongoing in CSISA-MEA to support the development of machinery that will be produced in collaboration with ABLEs and lead firms to mechanize agricultural activities. This section provides key examples.

Jute fiber extraction machinery: Jute is a tall plant that can be cultivated for its fiber and used for fabric production, and forms a major agricultural industry in the Feed the Future zone. This part of Bangladesh produces 33% of all jute produced globally. Jute fiber is normally extracted from jute stems by first submerging the jute stems in water for about two weeks (a rotting process called retting), after which the fibers can be pulled away from the pith of the jute stick, leaving bundles of fiber and the pith, known as the jute stick. In addition to the fiber, jute sticks are widely used as fuel, fencing, and as supports for climbing plants. They are also utilized for sale to particle board manufacturers. The extraction of jute fiber is a very labor intensive process requiring considerable amounts of both family and hired labor.

Introducing machinery that can extract the fiber from jute would therefore have potential to reduce labor costs and increase profits for jute farmers. In this reporting period, CSISA-MEA has partnered with the company Practical Action Consulting Bangladesh (PAC) to support machinery manufacturing companies to design, test and market jute fiber extraction machines. PAC has supported a similar work in the past, to design and test a machine for extracting jute fiber from jute stems. They did this by working to re-engineer an imported machine that was given the name *Aashkol* (see below). In earlier PAC activities, four firms (TML, Nasim Engineering, Tahura Engineering and RK Metal) produced a number of these machines which,

as they reduced time and labor required for jute fiber extraction, were well received by farmers. However, the *Aashkol* breaks the jute pith (sticks) in the fiber extraction process, representing a loss of income to farmers. In response, CSISA-MEA is currently considering two options for resolving this problem; either developing a market for the broken jute sticks (chips) or producing an engineering design for a machine that produces whole sticks and fibers.

***Picture 12 & 13: Left**: the Aashkol machine. **Right**: extracting jute fibers from the jute stem*

In partnership with CSISA-MEA, PAC is now working on developing a system for marketing the chips produced from broken jute sticks. This is a multi-dimensional activity, and the first step is to determine whether the *Aashkol* machine produces chips that are acceptable to particle board manufacturers. CSISA-MEA staff are working with PAC to send a machine to Partex, a large particle board manufacturing company, to see if the resulting chips have the appropriate geometry for manufacturing. If this challenge is met, then a number of issues need to be addressed: collection and consolidation of the chips from the farmers, transport to the particle board manufacturers, storage along the value chain, drying to the correct moisture content, and, most importantly, the establishment of trust between the suppliers and end users (the particle board manufacturers) as to the quality of the chips. Currently it is relatively easy to inspect incoming jute sticks for quality, but it would be much harder to ensure the quality of truck- or boat-loads of chips, where poor quality chips can be hidden below higher quality chips.

The second part of the activity involves the designing of a machine to strip fresh jute plants of their fibers while at the same time keeping the sticks whole. During the spring semester 2021, the Georgia Tech professor and a team of undergraduate mechanical engineering students worked on this (see figure below for the preliminary design). If this machine works, CSISA-MEA will work with the four machinery manufacturers partnering with PAC to fabricate and test it during the 2021 jute harvest season (July and August).

Onion and garlic planters and harvesters: Vegetable crops are high value crops requiring considerable amounts of increasingly expensive labor to produce and market, which makes them suitable targets for mechanization. Onion and garlic are two of the most important vegetable crops produced in the Feed the Future ZOI. Quantitative surveys conducted in the onion and garlic growing region of the greater Faridpur region show that farmers spend almost 38% of their gross income on hiring labor for onion production, almost half of which is to pay for seedling transplanting. The introduction of machines that would allow onion and garlic

growers to mechanically transplant onion seedlings or plant garlic cloves would therefore be a popular addition to the market. The cost of hiring labor for inter-row cultivation and removing the leaves from harvested onions and garlic is for each of these operations approximately 6% each of gross income.

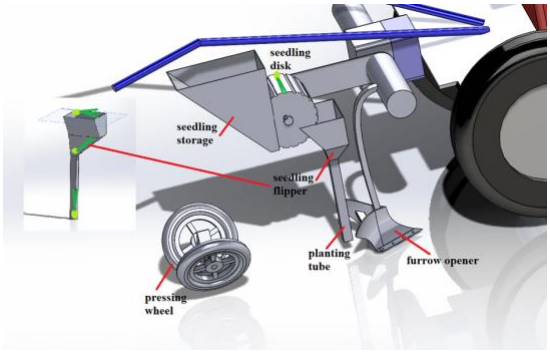
Onion and garlic planting and harvesting is done mechanically in many countries but finding machines that are appropriate in size, complexity and most importantly in cost for the Bangladesh market is challenging. CSISA-MEA plans to obtain examples of commercially available machinery with appropriate specifications (see figures, below) and support research institutes and RK Metal to test them. RK Metal is a Faridpur-based agricultural machinery manufacturing company and its JVA with the Activity provides it with support for the testing and marketing of new technology. RK Metal is also located in Faridpur, which along with jute is also a major horticultural producing region.

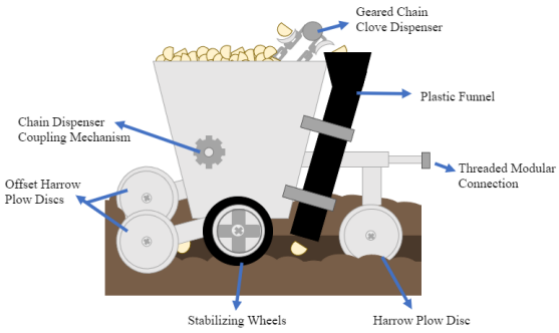
The second part of this activity will determine if rice transplanting machinery currently in use in Bangladesh can also be used to plant onion seedlings, which are similar in shape, although less likely to be easily transplanted as they are less hardy than grasses. To this end, CSISA-MEA staff is growing beds of onion seedlings, similar to the beds of rice seedlings used in these machines, for testing. These will be placed in the rice transplanter and the machine operated in puddled soil. The onion seedlings will then be inspected for damage. The transplanter's planting fingers may need modification to work correctly. If this phase is successful, then the same process will be attempted in more appropriate soil, recognizing that modifications to the rice transplanter may be necessary. If it is not successful, this activity will be dropped, with attention re-allocated to other mechanization options that are supported by strong business models to assure manufacturing investment.

Picture 14&15: *Examples of commercially available horticultural planters in other countries: (left) a commercial Japanese onion planter; (right) a garlic planter.*

The design and prototype of planting equipment for onion seedling and garlic clove planting are also the subjects for two teams of Georgia Tech undergraduates of mechanical engineering during the spring 2021 semester; their conceptual designs are shown below. If these devices

are successful, CSISA-MEA will work with its ABLE enterprise partners to prototype and test them later in 2021.





Picture 16 &17: *Georgia Tech conceptual designs: (left) an onion planter; (right) a garlic planter.*

Intervention 1.2 Developing the manufacturing capacity of lead firms

With the right technical support and training, Bangladesh's ABLE SMEs should be able to manufacture many of the spare parts and at least a portion of the agricultural machinery that is currently imported, including parts for tractors and engines as well as for recently introduced machines such as reapers. Because of challenges in clearing bureaucratic procedures and import processes, spare parts are often slow to arrive, and by the time they become available on the market, delays in repairing agricultural machinery have commonly been experienced. This results in a reduction of the number of days these machines are available to provide planting and harvesting services to farmers, which in turn results in delayed planting and harvesting that can have knock-one effects, reducing the yield of many crops.

Large firms importing agricultural machinery are aware of this problem and want to find suppliers in Bangladesh who can provide parts faster but at a quality and price comparative to imported parts and machinery. At the same time however, these firms are only prepared to do so where there are strong assurances of quality manufacturing. This is however a major challenge in Bangladesh, where product quality standards are either variable or poorly adhered to among light engineering firms.

This is where the Activity plays a strong role. In this reporting period, CSISA-MEA signed service agreements with ACI Motors and TML to support them to identify light engineering workshops in Bogura and Jashore that have the capacity to manufacture spare parts for combine harvesters and other machinery, and which at the same time are both cost-competitive and meet all the required product quality specifications. ABLE SMEs selected by the lead firms will negotiate a deal with the lead firms to provide the parts.

Picture 18: *Members of the CSISA-MEA team facilitate ACI Motors to access spare parts in from Activity-associated ABLE firms in Jashore. March 2021. Photo credit: Khalequzzaman*

To date, TML and ACI staff have engaged in business scoping meetings with seven ABLE SMEs in Bogura and eight in Jashore, although the process has been stalled due to the second wave of COVID-19 that swept Bangladesh in March 2021. When work is again fully possible, the next step is for ACI Motors to provide the selected ABLE SMEs with samples of the spare parts they would like them to manufacture, and provide the quality standards ACI requires. TML has already provided the selected ABLE SMEs with samples of the spare parts they would like them to make. CSISA-MEA's engineers will then work with the ABLE SMEs and supply technical support to improve the manufacturing process.

The Activity also supported seven ABLE SMEs (four from Bogura and three from Jashore) during the second half of the reporting period to visit the TML spare parts warehouse near Dhaka to see the spare parts that TML imports from India. This provided ABLE SMEs with an understanding of the type of spare parts that a company like TML would like to have made locally. The visit enabled the ABLE workers to identify 13 spare parts that they considered they could make with the right combination of demand and technical guidance. CSISA-MEA's role will be to support ABLE SMEs to develop their capacity to manufacture the parts, suggest the most appropriate techniques and equipment for making them, support them in accessing quality raw materials and testing facilities, and link them to finance. CSISA-MEA considers this the first step in a process that will result in ABLE SMEs being able to first manufacture high quality, cost-competitive spare parts, then manufacture machine components and eventually whole machines, such as combine harvesters. Outcomes from this work will be detailed in the 2020–21 Annual Report.

Intervention 1.3 Supporting foreign investment in agricultural machinery manufacture and marketing

The initial intention for this intervention was that partnerships with foreign and especially US-based machinery firms would lead to investment in Bangladesh-based agricultural machinery manufacturing companies by multinational companies. However, initial discussions with tractor companies such as John Deere did not produce a firm commitment during the reporting period. The impression gained was that many companies consider the Bangladesh market not sufficiently large to justify the investments of time and money required to develop agricultural machinery manufacturing capacity in Bangladesh, and that if they were to make investments in South Asia, these would be more likely to be in India. CSISA-MEA has therefore widened its scope to take two alternative approaches to attracting foreign investment.

Partnering with Bangladesh-based venture capital companies

Over the last five years, a growing number of venture capital investors have established offices in Bangladesh, attracted by the opportunity of investing in one of the fastest growing economies in the world. Initially most of these investments were in the garment industry but recently companies have begun to seek investments in ABLE SMEs. In December 2020, the USAID Mission in Bangladesh linked CSISA-MEA with Anchorless Bangladesh, a US-based early-stage venture investment fund focused on strengthening the startup ecosystem of the country. Discussions were had on potential collaboration with relevant companies in their portfolio and supporting them to reduce the risk for investors. Anchorless are also exploring collaborations with other stakeholders to help incubate companies in the agricultural mechanization or technology space. They, in turn, put CSISA-MEA management in contact with iFarmer, a new company seeking to develop input and output channels for groups of farmers. CSISA-MEA has since begun to pursue this partnership more aggressively, with updates discussed further under intervention 3.4.

Potential partnerships explored with Indian and African companies

As part of CSISA-MEA's trade and investment facilitation efforts, in this reporting period the Activity identified and met with a number of international companies.

Landforce, Amargarh: Landforce is a major Indian agricultural machinery manufacturer specializing in planters and harvesters. Its combine harvesters are probably not appropriate for Bangladesh conditions but its tractor-drawn Happy Seeder has considerable potential as a zero- or minimum-till planter. It showed an interest in pursuing a joint venture with one of CSISA-MEA's lead firms for the purpose of assembling their machines and also to export them to Bangladesh through that firm. Discussions with Landforce are ongoing, although reduced output of this firm due to COVID-19 has slowed the negotiation process.

Dasmesh Mechanical Works: Dahsmesh is a company from India that showed an interest in collaborating with a medium-size lead firm like Janata or RK Metal to be their importer and

distributor in Bangladesh. Discussions with Dashmesh are ongoing, with hopes that an initial partnership might facilitate early entry to the Bangladesh market with this well-known South Asian firm.

Distinct Horizon: This Indian company manufacturing a power tiller-drawn urea super granule applicator. Urea super granules are a slow-release form of urea, more efficiently utilized by rice than conventionally broadcast applied urea, and are applied as part of land preparation, just before rice seedling transplanting. However, an agreement could not be reached on how to share the costs of importing and demonstrating the use of the machine in Bangladesh, as Distinct Horizon wanted the activity to support all costs. This partnership therefore has not been further pursued.

Intervention 1.4: Developing financial services for ABLE SMEs and agricultural machinery marketing firms

Loans for ABLE SMEs: During the reporting period, financial services consultants working with CSISA-MEA developed a methodology of selection criteria which the Activity has used to identify 23 ABLE SMEs in Jashore and Bogura as enterprises with good business records that constitute low risk loan applicants. It then shared this data with bank branches in Jashore and Bogura. CSISA-MEA then facilitated 16 financial linkage workshops and seven functional linkage visits between ABLE SMEs and banks that showed most interest in providing loans. As a result from this, six financial institutions have disbursed 13 loans worth a total of USD 262,941 to 11 partner ABLE SMEs and two machinery dealers. The loans were provided by BRAC Bank (1), IDLC Finance Limited (3), IPDC Finance (1), Jamuna Bank Limited (1), Janata Bank (2) and MIDAS Financing Limited (5). Loans are being used to improve manufacturing facilities which is in turn expected to improve businesses for the Activity's ABLE partners.

Pic 13: *During the reporting period and as a result of the Activity's interventions, six financial institutions have disbursed 13 loans worth a total of USD 262,941 to 11 partner ABLE SMEs and two machinery dealers.*

These ABLE companies used these loans to expand their businesses by expanding their premises and buying new manufacturing machinery. For instance, one company owner told us, "I bought land to make a new warehouse and install a generator. This loan helps me cope with the losses I've suffered due to COVID-19." Some are investing in staff to improve aftersales services, such as machine maintenance mechanics, and others are using loans to increase sales through machinery sales events. One company representative said, "I never thought I'd be able to access such a big amount. I used to take out loans from the local

microfinance institutions, which were a maximum of BDT 2 lakhs[1]. I'll use this money to buy some new machines and for my business promotion," Some loans have been used to finance recovery from loss of business caused by reduced trading during the COVID-19 lockdown. Paying staff salaries, rent and utility bill arears will allow companies to start operating and generating business. This is how one company owner will use his loan in a time of crisis: "COVID-19 has ruined my business. Without this loan I wouldn't be able to cope with the losses. There were so many dues, like workers' salary, electricity bill – and the peak season for business is also coming. This loan will help me to buy the raw materials for next season."

Financial services for ABLE SMEs, dealers and lead firms: The Activity also facilitated several rounds of discussion exploring financing options of agricultural machinery dealers in the ZOI, and as a result a JVA with BRAC Bank has been signed that centers around screening low-risk clients (dealers and ABLEs) before deciding on disbursement. To progress this, CSISA-MEA has shared a list of 53 ABLEs and 21 dealers with BRAC Bank. In the reporting period, CSISA-MEA also signed a service agreement with IDLC, a non-bank financial institution (NBFI) to develop the capacity of ABLE SMEs to maintain financial transaction records. This will allow borrowers to demonstrate to prospective lenders the viability of their business and creditworthiness of the SMEs.

Picture 19: *Members of machinery manufacturing firms engaged in trainings facilitated by the Activity during the reporting period. Photo credit: Mahajabin Khan*

[1] About USD $277,500 at the time of writing.

In Focus

CSISA-MEA is changing lives through practical machinery skills training

The agricultural machinery manufacturing sector in Bangladesh is composed of hundreds of small enterprises producing simple machinery and parts. These often fail, in part due to the use of a low-skilled, poorly trained or untrained workforce, and machines which compete with imports in terms of price and quality. Their staff are usually young men who have left school early so that they can earn money to support their families. They learn the skills of their trade from fellow employees who themselves have gained what knowledge they have from other workers. Good and bad practices are thus passed on from worker to worker without ever being rectified. The USAID Feed the Future Bangladesh CSISA-MEA Activity is providing training to break this cycle. Starting in November 2020, CSISA-MEA delivered 108 hours of evening class training spread out over three evenings a week for 12 weeks to a total of 135 young machinery manufacturing workers.

Nineteen-year-old Mohammad Shams is one of them. He left school before completing primary-level education and has been working in a machinery manufacturing enterprise for three years. This is the first time he has had any training and the experience has been a revelation to him. Shams learned a lot of new things through the training but he is most proud of the 21-tooth gear that he made as a practical exercise during the milling machine training he received. These are practical skills that will equip this young man for life.

Picture 20: *Shams took part in the practical training session on machinery manufacturing to enhance workforce skills, facilitated by CSISA-MEA in Bogura. January 2021. Photo credit: Mahajabin Khan*

Strategic Objective 2: Enhanced institutional capacity for agricultural mechanization through the development of skilled and youth workforce

Strategic Objective II

Intervention 2.1: Providing skills training for ABLE company staff and management

In response to studies conducted in July and August 2020, the Activity developed a training program to meet the needs of staff employed in the 53 ABLE SMEs that responded to calls for Expressions of Interest to partner with CSISA-MEA. During the reporting period, the Activity provided 108 hours of training for staff working in machinery manufacturing enterprises, 42 hours of training for foundry workers, and a week-long residential training course for ABLE enterprise owners and managers. The following passages describe how this work was deployed.

Picture 21: *CSISA-MEA Project Manager, Ansar Ahammed Siddiquee briefing about the training at workforce training inauguration event in Bogura. November 2020. Photo credit: Touhidur Rahman*

Following a competitive selection process, CSISA-MEA contracted TMSS, a Bogura-based NGO, and Rural Reconstruction Foundation (RRF), a Jashore-based NGO to implement curricula and provide training for ABLE SMEs. These training service providers also provided technical support to both organizations to develop adapted learning modules for trainers and training handouts for the trainees. These are available to download from the CSISA website[2].

[2] https://csisa.org/wp-content/uploads/sites/2/2021/04/210117__Final-Trainees-Technical-Training-Handout_-Final-.pdf.
https://csisa.org/wp-content/uploads/sites/2/2021/04/210118_Final-_Trainers-Technical-Training-Module_.pdf.

Trainings were launched at workshops held in Bogura (11th October 2020) and Jashore (14th October 2020) which introduced partner ABLE SMEs to the training service providers and the training content. COVID-19 restrictions meant some of the SME owner trainees and CSISA-MEA staff participated virtually. The workshops provided a good forum for the SME owners to interact and talk about their common concerns about training, skill enhancement, production quality, constraints in productivity enhancement, and market and financial linkages. The Activity's communications unit circulated a USAID-approved press release, securing coverage of the training events in a number of local and national newspapers.

Picture 22: *Participants in workforce training session in Jashore. January 2021. Photo credit: Hafijur Rahman*

Picture 23: *A trainee in practical workforce training session in Jashore. January 2021. Photo credit: Mahajabin Khan*

Picture 24: *Painting session during workforce trainings in Jashore. January 2021. Photo credit: Hafijur Rahman*

Picture 25: *Wielding session during workforce training in Bogura. January 2021. Photo credit: Arifur Rahman*

CSISA-MEA also facilitated intensive hands-on trainings for 46 staff from 33 ABLE SMEs in Bogura and Jashore from November 2020–January 2021. To comply with CIMMYT's COVID-19 protocols and guidelines for maintaining social distancing, only 10 members (trainees plus one trainer) were permitted to participate in each training batch. Training was held in the evening for three hours, three days a week. At the time of writing, the next batch of training is currently underway, with 29 participants in Bogura and 27 in Jashore.

Occupational health and safety training: In all trainings conducted during the reporting period, CSISA-MEA ensured that Occupational Health and Safety was included in the training given to ABLE enterprise staff. Each participant learned how to operate a fire extinguisher, maintain personal health and safety in the workplace, the importance of and how to use of personal protective equipment (PPE) and clothing, and how to respond to emergencies in the workplace. The latter included PPE for COVID-19 safety as well as in terms of the operation of manufacturing machinery. To equip participants with the means to put into practice the occupational health and safety lessons learnt in training, the Activity provided a set of PPE to all trainees, consisting of a lab coat, welding shield, goggles, safety boots, cap, gloves, mask and hand sanitizer.

Training outcomes: Participants from the first batch of ABLE training completed pre-training and post-training tests, which allowed the CSISA-MEA training team to assess the effectiveness of the course. The tests asked 20 key "indicator" questions, designed to gauge participants' level of knowledge about the manufacturing skills taught during the training program. Table 3 shows that before the course, 74% of trainees could only answer 9 or less of the questions correctly but after the training, 100% were able to answer at least 15 out of 20 questions correctly, and 33% could answer all 20 questions correctly. Out of the 46 trainees who received training, four in Bogura and two in Jashore have started training their co-workers in their workshops.

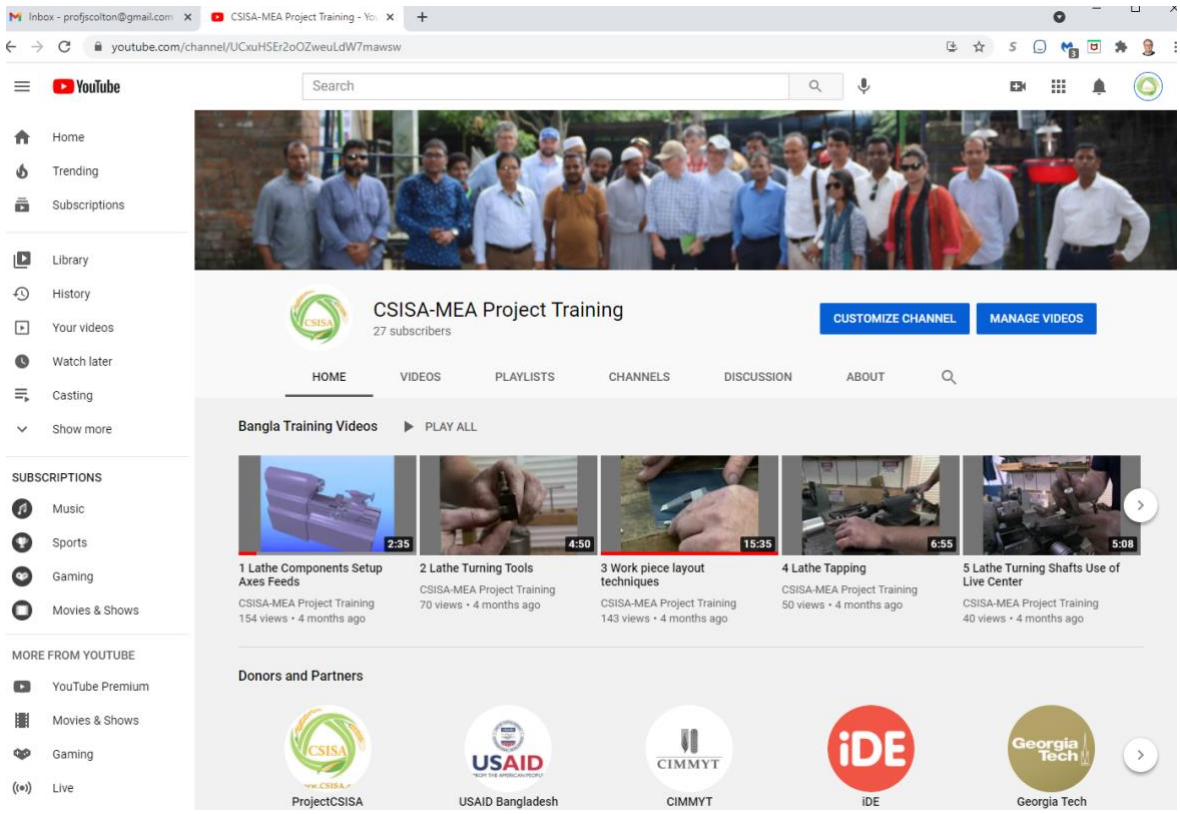
Table 3: Knowledge gained by the workforce through basic skills training

Score range	Number of trained ABLE staff	
	Pre-training score	Post-training score
0-9	34	0
10 to 14	11	0
15 to 19	1	31
20	0	15

Providing women who work in ABLE SMEs with training to improve their skills and working conditions: Although the light engineering sector in Bangladesh tends to be dominated by men and almost all ABLE enterprise employees are men, foundries also employ women. However, they tend to be employed to do low paid, unskilled work such as sorting metal, carrying coal, preparing sand molds and painting the finished products. As such, they work in extremely challenging and dangerous working conditions. To support these women CSISA-MEA obtained permission from foundry owners to train approximately 30 women in new or improved skills. Permissions were granted in March of 2021, but due to the second wave of COVID-19 in Bangladesh, these have not yet been initiated. They are however planned for the second half of the 2020–21 implementing year, and will commence as soon as conditions are safe to begin.

Intervention 2.2: Skills training for lead firm staff and dealers

During this reporting period, CSISA-MEA launched a YouTube channel to support the training of ABLE and lead firm engineers, technicians, and workshop staff and featuring training videos in both Bangla and English[3]. Most importantly, a set of nine videos detailing important machine shop skills has been dubbed into Bangla[4]. These are being advertised via the Activity's communication channels, as well as provided to the workshop staff who are receiving training facilitated by the Activity.



***Picture 26**: CSISA-MEA training videos can be found on YouTube, making them easily available to the Activity's partners.*

Advanced manufacturing design training

As the ABLE SMEs that CSISA-MEA is supporting are progressively linked to new markets and financial services, they will need advice on how to manufacture the new spare parts and machines linkages to lead firms will identify. As such, they will require advice from engineers with skills in manufacturing system design. Many of the ABLE SMEs that CSISA-MEA supports do not employ engineers or, if they do, the engineers do not have these skills. In response, and to provide these skills, the Activity's partner Georgia Institute of Technology has developed a range of training materials covering topics including products, manufacturing process and facility design, the economics of manufacturing, and machinery and materials specifications, dimensions, tolerances and surface finishes. These have been used to train ABLE

[3] https://www.youtube.com/channel/UCxuHSEr2oOZweuLdW7mawsw.
[4] https://www.youtube.com/playlist?list=PLClQM5N2SXXta62ghC08Uy3j3sMjAZBzA.

SMEs engineers to produce higher quality, interchangeable parts that do not require benchwork to fit into assemblies and machinery.

During the reporting period, CSISA-MEA also arranged a number of activities to reinforce the lecture material, which are scaffolded to support staff learning. The first set of activities focused on improving the ability of ABLE staff to understand and implement process design, thereby improving manufacturing quality and efficiency. The Activity also identified 13 key engineering staff from three lead firms (Alim Industries, Janata Engineering and TML) who are interested in upgrading their manufacturing skills. All 13 expressed an interest in learning how to draw designs using computer aided design (CAD). Half also wanted to learn more about operating basic machines, inventory control, quality standards and control, product design and factory design for the efficient manufacturing of parts and machines.

Importantly, each of these staff members are well-positioned to influence formal changes in manufacturing procedures and processes in their companies. Unfortunately, the second wave of COVID-19 in Bangladesh has meant that in-depth training for these staff members has been put on hold. The Activity is now assessing if it will be possible to conduct these trainings in a virtual learning session or if they must be completed in person. If the latter is necessary, this work will be prioritized as soon as the public health situation improves and it is possible to recommence field work.

Picture 27: *LSP harvesting wheat in Cox's Bazar with Combine Harvester. March 2021 Photo credit: Rawshaon*

Lastly, during the reporting period CSISA-MEA also designed a fully dedicated bespoke training program to instruct Alim Industry's internal engineering team on the proper maintenance and operation of combine harvesters. The purpose of this training program is to equip new trainers with the background knowledge, skills and practical experience to provide further training and technical assistance to the mechanics and operators of combine harvesters who are serving the customers. Already as a result, eight of Alim's in-house engineers have the necessary orientation, awareness and capabilities to perform a catalytic role as facilitators of change and modernization, thereby reaching a greater number of mechanics and operators with the skills needed to ensure a professional service to their customers. The outcomes of this work will be reported in detail in the 2020–21 Annual Report.

In Focus

An influencer for appropriate mechanization in Bangladesh: a woman drives her community to adapt new farming technologies

Pictures 28,29, 30, 31 & 32: *Ms. Mina Rani Begum presents her seedlings, grown on the homestead using the 'mat' method, ready for transplanting using a rice transplanter. Photo credit: Abdul Mabud*

Mina Rani has proved that being woman does not have to be a barrier to success.

"With the right mindset we can all be a part of change," she asserts.

Mina is in her sixties and with training from DAE, facilitated by CSISA-MEA, has for the last three seasons been growing seedlings in her backyard for transplanting using a rice transplanter. The success she has had with raising seedings and the ease of planting with a rice transplanter has inspired her neighbors to start growing seedlings for rice transplanter service providers, both for sale to farmers and for planting with a transplanter owned by the local transplanter owners.

Strategic Objective 3: Enhance farmer access to mechanization and other crop production and marketing services with particular emphasis on remote and underserved markets

Strategic Objective III

Intervention 3.1: Machinery solution providers offer farmers a wider range of labour and cost saving machinery services

For MSPs to be able provide farmers with a wide range of cost- and labor-saving machinery services, they and their farmer clients need information and training in the use and value of this technology. They also need to be able to purchase the machines from dealers close to their homes with, when needed, bank finance. To keep the machines operating they need to know how to operate and maintain the machines, buy spare parts and have available mechanics trained in the repair of these machines. If machines break down because an MSP has not been shown how to use or maintain the machine, or does not have access to the services of a trained mechanic and a supply of spare parts, then the machines will lay idle when they should be providing farmers with mechanization services when required. This intervention aims to support lead firms and MSPs to address these issues.

Through this intervention, CSISA-MEA has signed JVAs with six lead firms (ACI Motors, Abedin Equipment, The Metal Limited, Alim Industries, Janata Engineering, and RK Metal), two financial services providers (IDLC and BRAC Bank) and one international NGO (Practical Action). The Activity is also in the process of transforming informal arrangements with three regional seed companies into formal agreements, which will provide them with support for increasing rice transplanter use. CSISA-MEA will utilize the alliances that these agreements have forged to facilitate the development, testing and marketing of new machinery technology by these agricultural machinery manufacturing and marketing companies. These alliances will also facilitate the improvement of sales and service provision for the machines these companies sell. These service agreements cover (a) new machinery technology development and testing, and (b) technical training for mechanics and operators of the machines they sell. This will focus on combine harvesters and rice transplanters but will also include smaller machines such as reapers, PTOS machines, maize shellers and fodder choppers. In addition, agreements will support (c) pre-season maintenance of these machineries facilitated by the

companies that sold them as part of after-sales services, and (d) the development of video tutorials on how to operate these machineries. In addition, during 'this six-month reporting period, these strategic alliances have resulted in the sale to 115 machinery service providers of 55 combine harvesters, 41 reapers, 8 rice transplanters, 7 fodder choppers and 4 PTOS, worth a total of USD 872,574.

Training company engineers, mechanics and MSPs in the use of combine harvesters

Each of the JVAs described above have components of technical skill enhancement of company staff, dealers, agents, mechanics, MSPs and machinery operators. So far under the service agreements with lead firms:

- Alim has conducted a Training of Trainers (ToT) program for eight in-house trainers on maintaining and operating combine harvesters properly. These in-house trainers have then trained 50 mechanics and operators in combine harvester maintenance and repairs, and developed a video tutorial for new users of the combine harvester model they sell.
- Abedin has trained 50 mechanics and operators, developing their skills in repairing and maintaining Abedin's combine harvesters, and developed a video tutorial for new users of its combine harvester.
- The Metal Limited has developed a video training module for combine harvester mechanics, which is currently being reviewed; it has also put into operation a mobile servicing van for on-the-job training of combine harvester mechanics, which has so far resulted in 20 combine harvesters being serviced. TML has also been providing the MSPs with training on the rice transplanter's operation and maintenance.

Pre-season service campaigns for combine harvesters

The JVAs signed with these lead firms provided pre-season servicing of 60 combine harvesters located across the Feed the Future ZOI, from Meherpur, Chuadanga, through Faridpur to Bhola and Patuakhali in Barisal division. At the same times as servicing the combines, their engineers also showed 117 combine harvester owners and operators (where they were not the same person) how to maintain and drive their machines more effectively. This ensured that these combine harvesters and their operators were fully prepared for the wheat harvest season, enhancing the efficiency of the service they offered to farmers.

In addition, Abedin Equipment organized three field demonstrations of combine harvester use in coastal districts during the reporting period. The demonstrations were attended by 80 farmers and resulted in Abedin Equipment attracting ten new customers. The CSISA-MEA team is actively supporting these new customers with technical support and by linking them to new farmer clients. Additional outcomes from these activities will be reported in the end of year Annual Report.

In Focus

Harvesting is in full swing with the support of machinery solution providers in the USAID Feed the Future Zone

By harvesting one hectare of land with a combine harvester, farmers save at least USD 30 and more than a week's worth of tedious drudgery compared to manual harvesting. However, to ensure that combines can operate and farmers can benefit, these somewhat complex machines need to be serviced before the season starts. This is exactly what a range of private sector partners are doing as a result of joint venture agreements with the USAID-supported Cereal Systems Initiative for South Asia – Mechanization Extension Activity (CSISA-MEA). Through this market facilitation initiative, the Activity, together with The Metal Ltd and Abedin Equipment, has completed a series of pre-season maintenance workshops to boost sales of quality spare parts – which the Activity is working to increase the domestic manufacturing of – creating new markets in spares and repairs for these companies. Following pre-season maintenance events, 17 machinery solution providers, who offer farm equipment services to farmers on an affordable fee-for-service basis, have harvested 59 hectares of wheat across 8 sub-districts in the Feed the Future Zone. But this is just the start of the season. Within the next few weeks, over 100 hectares more will be harvested following agreements facilitated by CSISA-MEA with over 700 eager wheat farmers. "I've made more profit than in previous years helping farmers," said Mr. Habibur Rahman Mollah, a combine owner who benefits from the market facilitation work implemented by CSISA-MEA. Yet it is not only machinery owners who win from these arrangements: farmers also benefit significantly. "My harvesting costs have been reduced, as well as labor costs. Because all my family members usually get involved in the harvesting season, this season they're able to relax, as the machine is more efficient", said Mr. Masud Rana, a farmer in Jheneidah Sadar.

Picture 33& 34: (left) *The TML service team providing training on combine harvest maintenance, 18th January, 2021. Photo credit: Md. Hafijur Rahman;* ***(right)*** *Abedin Equipment team training combine harvester operators, 24th March, 2021. Photo credit: Md. Ikram Hossain*

During the last six months, CSISA-MEA also arranged for Janata Engineering to send their engineer from Jashore to Cox's Bazar to provide training for 17 mechanics on combine harvester, reaper and rice transplanter maintenance and use. Janata Engineering provided their mechanic free of cost. The 17 mechanics who were trained by the Janata Engineer mechanic in turn provided training to 13 owners of a range of reapers, combine harvesters, rice transplanters and fodder choppers on how to maintain and operate them.


Picture 35 & 36: *As part of its JVA with CSISA-MEA, Janata Engineering facilitated mechanics training. Ramu, Cox's Bazar. October 2020. Photo credit, left: Md. Ashraful Alam,. right: Md. Rafiqul Islam*

In Focus

Cost and time effective:
CSISA-MEA's market facilitation helps wheat farmers beat the heat and get crops to market more quickly

In the Feed the Future Zone, Jheneidah and Meherpur are key wheat growing areas. But each year, farmers in these districts face challenges. Manual harvesting is exhausting work – especially during hot years like this one – yet the push to deliver crops to the market as early is possible is crucial for securing good prices for wheat grain. Rapid, effective and drudgery-eliminating harvesting by mechanized combine machinery can help provide answers to this dilemma, although access to machinery is rare in these districts relative to other locations. Market facilitation and linking farmers to agricultural machinery services is however the specialty of the USAID-supported Cereal Systems Initiative for South Asia – Mechanization and Extension Activity (CSISA-MEA). In the last two weeks, CSISA-MEA has worked with nine machinery solution providers – rural entrepreneurs who own combines and offer harvesting services to farmers on an affordable custom-hire basis – to move across districts from their base in Jashore and Chauadanga Districts and assist farmers as business clients to harvest wheat and beat the heat in Shailkupa, Jheneidah and Gangni, Meherpur. This was achieved by working with 10 rural commission agents who, with assistance and referrals facilitated by CSISA-MEA, earned a healthy profit by helping to link combine owners previously trained by CSISA-MEA who were looking for clients, to farmers; 257 hectares of wheat have already been harvested, with 940 farmers benefiting. By harvesting one hectare of land with a combine harvester, farmers save at least USD 30 and more than a week's worth of tedious work. In aggregate, farmers saved USD 7,710 in the last two weeks, enabling them to deliver their crop quickly to markets, where it was snatched up by buyers at good prices. "I've made a huge profit this year and because of this work, more farmers decided to grow wheat next year. This is a change because harvesting was a big challenge for wheat production in this area, but now it's solved, we'll produce more wheat next season," said Dijen Biswas (45), Shailakupa, Jhinaidah.

Linking value chain actors: lead firms, dealers, MSPs, and farmers

During this reporting period, CSISA-MEA also facilitated the organization by Abedin Equipment of three field demonstrations on combine harvester use in coastal districts. These

were attended by 80 farmers and resulted in ten new combine harvester customers for the company.

Picture 37: *Machinery operators harvesting wheat in Faridpur District with a combine harvester marketed by The Metal Limited. March 2021. Photo credit: Rawshon Anis*

In March 2021, the CSISA-MEA field office in Faridpur facilitated meetings organized by TML that brought together MSPs who had bought their combine harvester, with wheat farmers. These meetings resulted in three combine owners securing work worth USD 9,750 for harvesting 60 ha of wheat. In the same month, in Cox's Bazar district the CSISA-MEA field office facilitated 15 farmer field days with the participation of DAE, lead firms and dealers. Four of these events demonstrated the use of combine harvesters, four demonstrated the reaper, six the rice transplanter, and one the fodder chopper machine. There was a total of 490 participants, including 36 women.

Facilitating the growth of rice transplanting by machinery service providers

To encourage the expansion of rice transplanter sales and uses, in this reporting period CSISA-MEA signed agreements with Abedin Equipment and TML, under which the firms have begun to provide training to MSPs in production of rice seedlings to be planted out using rice transplanters, and rice transplanter use and maintenance. Under these agreements, Abedin will train 30 MSPs and TML will train 100 MSPs in the next six months.

In Jashore, agreements were also reached with three regional seed companies, Konika Seed Company Limited, Ali Farms and Uzirpur Organic Multipurpose Cooperative Society Limited (UOMCSL), to provide training with support from Abedin Equipment and TML in seedling raising for rice transplanters. This involved providing training to 30 company staff at three training events, followed by the training of 130 farmers and MSPs through 13 events. To further raise awareness of the use of rice transplanters and cultivating rice seedlings for rice transplanters, 16 farmer field days attended by 160 participants were organised by the three seed companies, in this case in collaboration with the DAE. The three seed companies established demonstrations covering a total area of 2.67 ha on 80 farmers' fields in Jashore, Narail and Chuadanga districts with the technical assistance of CSISA-MEA. To further raise awareness of the value of using rice transplanters, the seed companies conducted road show

events (where rice transplanters were displayed in villages) and 40 meetings with prospective buyers of rice transplanters, resulting in 21 entrepreneurs expressing interest in buying a rice transplanter. CSISA-MEA staff also supported these seed companies in demonstrations to local DAE technical teams on how to raise seedlings using mat nursery methods, which are required for rice transplanters. This resulted in DAE conducting demonstrations on the use of rice transplanters to transplant rice mechanically in Narail, Satkhira, Jashore, Jhenaidah, Chuadanga and Meherpur districts. The demonstrations covered 41 ha of rice and were planted by 19 MSPs owning rice transplanters.

Under JVAs signed with TML and ACI Motors, CSISA-MEA's Faridpur field office also conducted two rice transplanter demonstrations in collaboration with DAE, resulting in five customers applying to DAE for rice transplanter subsidies. The Activity also provided a Faridpur-based seed company with training in rice seedling production to extend its rice seed production business.

Picture 38: *A large-scale rice demonstration of mechanical rice transplanting facilitated in Faridpur Sadar, January 2021. Photo credit: Abdul Mabud*

Strengthening synchronized rice cultivation program by involving the private sector

To make it easier to introduce mechanized technology, DAE has developed a program for "synchronizing" crop production. Cropped land in Bangladesh is composed of many small plots owned by many farmers, operating with minimal coordination with other farmers. The resulting blocks of land constitute a patchwork of many crops and crop varieties planted at different times. This makes it very difficult to introduce machines like combine harvesters and rice transplanters, which operate more efficiently when they can plant or harvest many plots in one block rather than in scattered, difficult-to-access plots. To try and develop collaboration between farmers so that they plant similar varieties of the same crop at the same time in large blocks, DAE has initiated a program that aims to show farmers the value of working together to synchronize their cropping patterns. To date, this DAE program has been introduced with minimal collaboration with the private sector. However, it is recognized that without the machines that the private sector sell, synchronized cropping patterns will provide little value to farmers. Similarly, without synchronized cropping patterns the use (and therefore sales) of agricultural machinery will be more difficult. There are therefore clear advantages for both parties to work together. CSISA-MEA recognized this and decided to facilitate collaboration between DAE and the private sector.

During the reporting period, CSISA-MEA and its private sector partners ACI, TML, Abedin Equipment and Alim Industries provided technical support to DAE staff, farmers and MSPs in

seedling raising, and the maintenance and repair of machines in Faridpur, Gopalganj and Rajbari districts. This resulted in three MSPs each being hired by farmers to plant blocks of 20 ha of rice using their rice transplanters for synchronized cultivation. Each earned USD 1,200 for each 20 ha block they planted. In addition, the CSISA-MEA team in Faridpur also persuaded influential community leaders including the Union Parishad chairman and the DAE Deputy Director to plant their rice using rice transplanters. Together they transplanted 1.5 ha, with the aim of convincing farmers in their communities that the technology works well. The Faridpur team arranged for ABLE SME owners, dealers, seedling growers and MSPs to visit the synchronized rice production plots in Rajbari district with DAE extension staff, as a result of which three participants have applied to DAE for government rice transplanter subsidies. Further outcomes from this new and innovative workstream will be given in the Year 2 Annual Report.

In Focus

Win-win business arrangements take the drudgery out of rice crop establishment

The recent signing of joint venture agreements (JVAs) with Abedin Equipment Ltd, Janata Engineering, Alim Industries and The Metal Pvt. Ltd meant that the Cereal Systems Initiative for South Asia – Mechanization and Extension (CSISA-MEA) Activity could help to facilitate the advertising and sale of eight mechanical rice transplanters, which have been used by their owners to provide labor-saving and drudgery-eliminating winter rice crop establishment, on an affordable fee-for-service basis in Bangladesh's Feed the Future Zone. New transplanter machine owners benefited from operation, maintenance and repair training provided by these companies under CSISA-MEA JVAs; as a consequence, 81 hectares were mechanically transplanted in January and February. Instead of manually plunging rice seedlings into the wet soil 250,000 or more times by hand – which for 81 hectares would require a staggering 202 eight-hour person days' equivalent – farmers achieved precision transplanting by purchasing machinery services. As a result, their fields were established in just a few days and largely without lifting a finger. Not only did this save them from the back-breaking drudgery of manual transplanting; it also resulted in significant production cost reductions, benefiting cash-strapped farmers. Compared to a per-hectare equivalent price of USD 175 for manual transplanting, machine transplanting costs were only USD 61 per hectare – allowing farmers to save USD 114 per hectare – and without an ounce of sweat. Both farmers and mechanical transplanter service providers benefit from these business arrangements, in addition to machinery companies, which are now eyeing the market and planning to ramp up sales dramatically.

Supporting women and youth develop rice seedling production businesses

With CSISA-MEA's support, MSPs in Faridpur identified 10 young farmers (two of whom were women) interested in starting a business raising rice seedlings for rice transplanter MSPs and farmers. CSISA-MEA arranged training in the mat method of rice seedling production to be given by an expert from USAID Feed the Future Bangladesh Rice and Diversified Crops (RDC) Activity.

Participants in the training program were the 10 young farmers, MSPs, DAE extension staff and representatives from three lead firms. To ensure the rice seedling producers had a market for their seedlings, this training was followed by three meetings with farmers and rice transplanter MSPs, where seedling prices and quality were negotiated. Three of the seedling growers found a market for sufficient seedlings to plant 60 ha of rice and others sufficient for planting a total of 6 ha. Further details on the outcomes of this work will appear in the 2020–21 Annual Report.

Picture 39: *Rice seedling raising training for Faridpur young rice seedling entrepreneurs, January 2021. Photo credit: Md. Abdul Mabud*

In the Cox's Bazar field office, CSISA-MEA facilitated training by lead firms on how to raise rice seedlings for use by rice transplanters using the mat method. Sixty-seven farmers participated, including 13 women, 11 youth, and 9 who were both women and youth. To assist them to find buyers for the seedlings, the Cox's Bazar field office held four meetings bringing together rice transplanter owners, farmers and seedling raising entrepreneurs, to facilitate negotiations between seedling growers and seedling buyers. These meetings resulted in the trained farmers obtaining orders for enough seedlings to plant 35 ha of rice, of which 32 ha was planted by rice transplanters. Seedlings sufficient to plant one hectare were sold for between USD 108 and USD 145. One woman sold seedlings worth USD 260, enough to plant 2.4 ha of rice. The Cox's Bazar team also provided nine DAE extension staff members with training in mat nursery rice seedling raising technology.

Developing financial services for machinery solution providers and dealers

Currently, Bangladesh's farm machinery marketing lead firms tend to provide buyers with credit worth at least 70% of the value of the machine when they purchase tractors, power tillers and combine harvesters. However, it is often difficult for these companies to collect the outstanding debt, and many have accumulated large amounts of outstanding credit. This makes it challenging for them to finance business development and expansion, which limits the number of machines that can be sold to machinery service providers.

CSISA-MEA has therefore sought to encourage financial services institutions (FSIs) including banks, but also non-bank financial institutions (NBFIs) and micro-finance institutions, to lend to machinery purchasers. During this reporting period, the Activity signed a JVA with BRAC Bank that supports the bank to establish systems which will allow them to finance agricultural machinery purchases profitably. The initial JVA is for one year. If successful, BRAC Bank will expand the program and the Activity expects that, following awareness-raising and information sharing with other FSIs, other banks will copy the model. At the same time, the

CSISA-MEA field office teams have used their local contacts with FSIs to bring them into the agricultural machinery financing business. Table 4 provides a full list of loans for machinery purchase acquired as a result of facilitation by CSISA-MEA. While loans remain important, the Activity also wishes to note to note that many aspiring MSPs are also accessing cost-offset support through governmental programming.

Picture 40: *Ms. Chandni Begum receiving loan documents from VPKA Foundation MFI for her purchase of a combine harvester from The Metal Limited.*

Table 4: Loans disbursed in Activity years 1 and 2 to machinery solutions providers for agricultural machinery purchases**.**

Machine		**Activity Year 1**		**Activity Year 2**	
	Financial service provider	Number of machines	Total value of loans (USD)	Number of machines	Total value of loans (USD)
Combine harvester	BRAC Bank	1	4,706		
	Krishi Bank			1	18,824
	JCF			1	1,176
	ASA	1	941		
PTOS	BRAC Bank	3	1,176	1	353
	Grameen Bank	1	24		
	ASA	1	235		
	Wave Foundation	1	447		
Reaper	BRAC Bank	1	587	1	1,176
	Grameen Bank	1	353		
Rice transplanter	BRAC Bank			1	471
	Wave Foundation	1	588		
	Agrani Bank Ltd	1	588		
Total			*9,645*		*22,000*

In Faridpur, the Activity also facilitated meetings between a local TML sales agent, one of its dealers, and VPKA Foundation. The latter is micro-finance institution, a relationship with which is being cultivated to access finance for the purchase of machinery by six of the dealer's customers. As part of this work, one innovative MSP (Ms. Chandni Begum) received a loan of USD 3,615 to enable her to purchase a combine harvester and operate it as a service provision business. Two other customers used finance from VPKA Foundation to buy rice transplanters.

Intervention 3.2: Machinery service providers are able to provide farmers with a wide range of income generating services in addition to machinery services

During the first phase of the Activity, CSISA-MI provided support to 3,474 MSPs to initiate businesses as machinery solutions providers to farmer clients. In the first 18 months of CSISA-MEA, the Activity supported a further 163 MSPS to establish a machinery service business. The businesses these MSPs manage focus primarily on the provision of machinery services, with several people owning more than one machine. Each MSP typically provides machinery services to between 50 and 100 farmers. These farmers could be given a wide range of other services if MSPS were linked with lead firms and dealers who offer farmers services.

For instance, if an MSP is providing planting services, they could also sell the farmers the seed they are planting or if they are harvesting a crop they could also link farmers to companies wanting to buy the crop. This would considerably broaden their business base and provide them with considerably more income. Farmers would also gain access to more services from somebody they know well and trust. Further details are provided comprehensively in Table 5, shown below.

Table 5: Agricultural machinery *and equipment* purchased by MSPs in CSISA-MI (2013–19) and CSISA-MEA (2019–20)

Machine name	CSISA-MI	CSISA-MEA		
		Year 1	Year 2	
	2013–19	2019–20	Oct 2020-Mar 2021	Total
Combine harvester	14	11	56	81
Reaper	875	9	41	925
PTOS	1,848	22	4	1,874
Rice transplanter		6	8	14
Fodder chopper			7	7
Axial flow pump	1,017			1,017
Bed planter	3			3
Total machines	*3,757*	*48*	*116*	*3,921*
Total number of MSPs	*3,474*	*48*	*115*	*3,637*

Lead firm partnerships

This intervention aims to assist MSPs to expand their business, either by expanding the range of machinery services they provide or through expansion of geographic area. Some of this assistance is being provided through agreements with lead firms and some through meetings

organized by CSISA-MEA, which facilitate links between MSPs and companies seeking agents by which to market their services to farmers. However, initial attempts, through a public request for Expressions of Interest, to find lead firms interested in developing MSPs as agents to market the firm's products or to supply them with crops, did not produce any positive replies. In response, and from discussion with lead firms in the agricultural inputs and marketing sectors, the Activity identified that the majority concern was that working directly with farmers through MSPs could damage the relationships with dealers and traders which the firms had spent many years developing. One organization which did respond to the CSISA-MEA call for Expressions of Interest was Bhalo Social Enterprises, which has a different model. Acting as a dealer or contractor for lead firms, Bhalo is interested in engaging MSPs as its commission agents, who in turn could use their network of farmers to market the services offered by Bhalo.

Bhalo Social Enterprises is one of the first aggregators in Bangladesh to offer a full range of inputs, farming services and credit facilities for farmers through logistics hubs, and sales and service staff. It collaborates with a number of agents/partner retail outlets and MSPs for inputs and farming services delivery. Bhalo has already partnered with leading agribusinesses (including Auto Crop Care, ACI Godrej and Renata) and served over 1,000 farmers (in livestock and crops) in northern Bangladesh. They have not worked significantly yet in the Feed the Future ZOI or ZOR, which is one of their reasons for being interested in partnering with CSISA-MEA.

Collaboration with CSISA-MEA is likely to involve Bhalo partnering with MSPs to diversify their businesses into input retailing, arranging finance for farmers and sourcing agro-produce. The MSPs will act as Bhalo's agent/partner retail outlets. Bhalo plans to bring in:

- a broad range of high-quality inputs (seeds, crop nutrition and protection products) through its partnership base with leading input companies;
- a broad range of agricultural machinery, spare parts and preferential linkage to the service centers by establishing partnerships with leading national and local machinery companies;
- additional capital to extend inputs and services on credit to the farmers through investment or partnership with financial institutions such as Bank Asia.

The Activity is working to facilitate the establishment of a business model that will involve a smartphone application and use data analytics and machine learning to manage the entire process of customer acquisition, inputs and services delivery, sales of farm produce, impact measurement, and credit management. Further updates on this work will be provided in the 2020–21 Annual Report.

Picture 41 : *Demonstrating a rice transplante after a CSISA-MEA facilitated a business expansion meeting, 17 Jan, 2021. Photo credit: Apurba Dubey*

Through the Activity's contacts at USAID, a second firm, iFarmer, was identified who uses a similar model and who would be interested in working with CSISA-MEA. iFarmer is an agriculture-based company registered in Bangladesh that links agricultural producers and processors with finance, inputs, advisors and markets using technology and data-enabled platforms. CSISA-MEA and iFarmer are working towards an agreement to (1) collaborate in the development and expansion of services provided by MSPs, and (2) develop the capacity of MSPs to provide a wide range of services to farmers. Particular emphasis will be given to supporting the development of businesses managed by women and/or youth. At the time of reporting, a draft Memorandum of Understanding has been exchanged between and iFarmer and CSISA-MEA. Again, further updates on this work will be provided in the 2020–21 Annual Report.

Direct support to MSPs to facilitate business expansion MSP machinery service marketing events

CSISA-MEA links MSPs offering machinery services with farmers seeking their services. During the reporting period, CSISA-MEA facilitated 12 meetings by MSPs (two held by combine harvester owners, ten by rice transplanter owners). In some cases, the MSPs demonstrated the use of these machines. The meetings engaged 129 farmers, 12 MSPs and ten DAE extension staff, and resulted in five rice transplanter owners planting 12 ha rice for 220 farmers, three combine harvester owners harvesting 34 ha wheat and four reaper owners harvesting 20 ha of wheat and mustard.

Linking the MSP network developed with support from CSISA-MEA with the combine harvester fleet service model

With the increase in purchase subsidy offered by the Government of Bangladesh for agricultural machinery, there is now emerging a number of entrepreneurs who own a fleet of machines, including combine harvesters and tractors. The Activity's Jashore and Faridpur teams have been facilitating combine harvester fleet owners to meet established MSPs capable of operating combines by arranging meetings between the two parties. Under this business arrangement, an MSP who works to operate a combine earns a commission from the

machinery owners for arranging with farmers for their land to be prepared by tractor or their crops to be harvested using a combine harvester. The MSP typically earn USD 40–50 per ha for providing this service.

MSPs act as machinery sales agents: In Jashore, the CSISA-MEA team facilitated seven meetings between machinery marketing lead firms Abedin Equipment Ltd, RK Metal and TML, and MSPs, mechanics and spare parts shop owners, with the objective of engaging them as commission agents for machinery sales. These meetings resulted in a total of 95 MSPs, mechanics and spare parts shop owners being engaged as commission agents.

MSPs act as marketing agents for second-hand machinery companies: The CSISA-MEA Jashore and Faridpur field offices have facilitated MSP access to the second-hand machinery market. They achieved this by linking 41 members of 4 MSP network groups and seven mechanics with seven second agricultural machine marketing companies. During the reporting period, this resulted in four secondhand diesel engines worth USD 420 being sold through MSPs.

Development of MSP networks: By working as groups, and participating in regular meetings, Facebook and messenger groups, MSPs can exchange information about technology and new markets. One group, for instance, worked together to provide combine harvester services in Bagerhat district, as area underserved by agricultural machinery services. In this way, the machines owned by MSPs are fully utilized and MSPs maximize their earning opportunities.

Intervention 3.3: Machinery service providers have improved access to machines from company sales in underserved coastal districts of Bangladesh including Cox's Bazar

Expanding dealerships into areas currently poorly served by the major machinery companies

There is a tendency among lead firms to focus their agricultural machinery sales in areas where machine sales are already high, meaning that even though a market might exist in a different area, because few machines have sold there, the firm is not willing to establish a dealership and initiate marketing activities.

Picture 42: *Wheat being harvested in Cox's Bazar by combine harvester.*

CSISA-MEA supports companies in the risk of opening dealerships and conducting machinery marketing activities in less well served areas, by sharing some of the costs they incur in setting up dealerships and conducting marketing exercises.

Picture 43 & 44: (left) *Samia Motors (a dealer of The Metal Pvt. Ltd and RK Metal): microphone advertising campaign, Ramu, Cox's Bazar. Photo credit: Md. Mosharof Hossain;* ***(right)*** *Bismillah Machinery Store (ACI Motors, Janata Engineering and RK Metal): microphone advertising campaign, Cox's Bazar Sadar. Photo credit: Md. Anwar Hossain*

Picture 45: *ACI rep and dealer sign an agreement with a youth and women's group to pay it commission on any machinery sales it arranges, March 2021. Photo credit: Rawshaon Anis*

In this reporting period, the Activity has signed agreements with two regional companies (RK Metal and Janata Engineering), to assist them to expand their dealership network within the Feed the Future ZOI, resulting in RK Metal establishing six new dealerships in Faridpur and Barisal divisions.

In the Cox's Bazar ZOR, CSISA-MEA has facilitated the establishment of dealership agreements between four dealers (Bismillah Machinery Store, Ma Machineries, Samia Motors and Maa Machineries) and TML, RK Metal, Janata Engineering and Krishibid Group. The JVAs signed with Janata Engineering, RK Metal and TML provide the Activity's support to conduct:

- a market assessment, to understand the need for their existing machineries in Cox's Bazar;
- the expansion of dealer network and strengthening the capacity building of the dealers;
- an aftersales service through capacity building of local mechanics and technicians;
- an awareness and promotional campaign, including support for machinery marketing by microphone advertising in small town markets.

Intervention 3.4: Farmers gain improved access to machinery services through creation of rural entrepreneurship and employment opportunities

A request for Expressions of Interest to work with CSISA-MEA to develop farmer service provision businesses managed by women or youth has been published and some very interesting proposals received. Discussions are currently under way to develop agreements. In addition to this effort, CSSIA-MEA worked during the reporting period to expand markets for livestock fodder choppers sold by companies located in the ZOI in the ZOR.

MSP fodder chopping service provision in Cox's Bazar

To reduce wastage and improve the digestibility of fodder grass and straw for cattle, it is usually necessary to cut the fodder into small pieces, work which is normally done by women using a sickle-type knife held tightly to the ground with their feet. This is a very laborious activity, occupying women of cattle-owning farming households for at least an hour each day. Mechanical fodder choppers, many of which are powered by electric motors, are relatively low cost machines (USD 420–660, averaging USD 438) that cost a small amount to hire to chop fodder, but which saves women many hours of tedious work. The Cox's Bazar team partnered with the Feed the Future LPIN Activity and supported local dealers during the second half of the reporting period to encourage the use of fodder choppers produced by the ZOI-based company, RK Metal at four marketing events. This was done in collaboration with the USAID Feed the Future Bangladesh LPIN Activity. To date, Cox Bazar dealers have sold

seven and received orders for six more fodder choppers which will be delivered to the owners at the beginning of the April.

In Focus

Synergies among Feed the Future implementing partners assist dairy farmers to overcome the problem of fodder production with appropriate mechanized solutions in Cox's Bazar:

In order for dairy cows to produce the best quality of milk and remain healthy, farmers need to manage the preparation of fodder carefully before feeding them. Chopping fodder into small digestible pieces, however, is tedious and laborious work. One of the best ways to overcome this challenge is the use of a mechanized fodder chopping machine, which CSISA-MEA is working to bring to the market and expand its availability and use in Cox's Bazar. One chopper machine costs USD 438 (BDT 35,000) and it can chop 800 kg of grass in one hour, whereas individual farmers can only cut 40-45 kg/day through back-breaking work and using methods that result in considerable wastage. To chop one ton of fodder by hand with a sickle costs USD 42 (BDT 3,335): with a chopper machine, it costs less than USD 2 (BDT 141). This saves farmers eight days of effort that they can make use of for more important activities. In addition, in Bangladesh women traditionally are responsible for raising cattle and chopping fodder; hiring a machinery service provider who can rent out the use of a chopper on an affordable fee-for-service basis can chop one day's fodder for her cattle ultrafast – in just five minutes.

To expand markets for fodder choppers, CSISA-MEA is collaborating with the Feed the Future-supported Livestock Production for Improved Nutrition (LPIN) Activity in Cox's Bazar. CSISA-MEA has worked to bring three key companies – RK Metal, Janata Engineering and The Metal Limited – who manufacture or resell fodder choppers, to this emerging market in Cox's Bazar. These companies are now offering early-buyer discounts for fodder choppers, with CSISA-MEA collaborating with LPIN to build on their beneficiaries and bring them to the next level, by facilitating machinery purchases among livestock service advisors and farmers and assuring companies train them to become viable fodder chopper service providers. This marketing effort, which began just last week, is starting to yield benefits: So far, seven fodder choppers have been snatched up from Samia Motors, which is selling these machine on behalf of RK Metal, which has their headquarters in the Feed the Future zone.

Picture 46 & 47: (left) *An MSP demonstrates his newly-purchased fodder chopper to dairy farmers in Cox's Bazar. March 2021. Photo credit: Ashraful Alam;* ***(right)*** *A dairy farmer in Cox's Bazar uses her newly purchased fodder chopper to prepare fodder for her cattle. March 2021. Photo credit: Anwar Hossain*

Through collaboration with LPIN, new fodder chopper purchasers are also being linked to farmers, through household level demonstrations of fodder choppers to create new clients for fodder chopper machinery owners. Although still early on in this marketing sprint, the prospects for fodder chopping machinery – both as a labor saving device and also as a key ingredient in improving the digestibility of fodder and improving milk production – are looking good. Osman Goni, who owns Samia Motors, a dealer for RK Metal that sells fodder choppers, commented that "The Cox's Bazar zone is a strong potential market for fodder chopper machines, as there's a significant number of dairy farmers who face challenges to process fodder for their cattle due to scarcity of labor.

Youth and women to work as a commission agents for lead firms

CSISA-MEA field office staff have also been linking agricultural machinery lead firms seeking entrepreneurs to work for them as sales agents with women and youth interested in this type of work. At a meeting in Faridpur between ACI Motors, ACI dealer Mozumder Machineries and 10 youths (including 1 woman), the ACI representative and dealer signed an agreement with them to become ACI's commission agents for the sale of its combine harvesters, reapers and rice transplanters. One group member, Ranu Begum (see picture 45, above) arranged for the sale of three tractor-mounted rotavators and earned a USD 12 commission on the sale.

Communications outreach

During this reporting period, CSISA-MEA has used SMS messaging, messenger groups, social media, blogs and newspapers to communicate the activities and achievements of the Activity to a wide audience. These are detailed below.

- The Activity sends weekly SMS messages to ABLE SMEs on a range of subjects including COVID-19 awareness, safety measures in the workshop and how to acquire loans. In this reporting period, CSISA-MEA sent 18 messages to workers and owners of 54 ABLE SMEs. SMS messaging also facilitated the sharing with the SMEs of the YouTube link to facilitate their access to tutorials on machine tools operations.
- CSISA-MEA published articles on the CIMMYT international website on International Rural Women's day and International Women's Day. *Women find a role in Bangladesh's mechanization sector* presents the success of the country's women in agriculture mechanization. See Power steering and Women in agricultural mechanization
- USAID/Bangladesh held a virtual meeting with journalists from Bangladesh's prominent print and electronic media on 10 February, 2021 to present the work of CSISA-MEA, in particular how the Activity supports the work of the Government of Bangladesh to facilitate the mechanization of agriculture in Bangladesh. In addition, John Smith-Sreen, Director, Office of Economic Growth, USAID/Bangladesh with Aniruddha Hom Roy, Private Sector Advisor, USAID/Bangladesh and Timothy Russell, CIMMYT Technical Advisor led the discussion with ten journalists from Bangladesh's print and electronic media. The following are links to coverage of the activity: (print media) The Business

Standard; The Daily Star; The Financial Express; Banik Barta; (electronic media) Jamuna TV. (Annex V).

Lessons learned during the reporting period

This section of the report describes the key operational lessons learned during the reporting period.

Firstly, ABLE SMEs find it difficult to identify markets for their products or even which products are in greatest demand for manufacturing. At the same time, lead firms which market complex imported machines (such as combine harvesters and tractors) find it difficult to find manufacturers able to supply them with spare parts. CSISA-MEA has responded by harnessing this challenge as an opportunity by facilitating JVAs (such as those recently signed with ACI Motors and TML) which support lead firms to identify ABLE SMEs capable of making and supplying the spare parts they need. This has initiated a process that not only will resolve this issue in the short-term but which will also lead to systemic change that will remain after the Activity ends.

Secondly, the Activity has identified a large market for relatively simple machinery, such as fodder choppers currently made by Feed the Future ZOI machinery manufacturers, in the Cox's Bazar Feed the Future ZOR. Partnerships brokered by CSISA-MEA with these manufacturers have enabled them to enter the Cox's Bazar Feed the Future ZOR market, which was also facilitated by partnerships with LPIN benefiting farmers in the ZOR and creating employment in the manufacturing industry in the ZOI.

Thirdly, financial service institutions (FSIs) have historically been reluctant to provide ABLE SMEs with loans, while ABLE SMEs in turn were reluctant to seek finance from formal FSIs. The result is that the ABLE SME sector has not expanded as rapidly as it could have, and machinery and spare parts have been imported instead of being manufactured in Bangladesh, losing employment opportunities for rural youth. Supporting FSIs to identify ABLE SME clients suitable for loans by using selection criteria developed by the Activity has proved to be an effective way of breaking this negative cycle of under-investment. In the last six months, credit worth almost a quarter of million dollars has been provided to ABLE SMEs.

Finally, supporting activities that encourage the DAE to partner with the private sector has improved the impact of activities for both parties. For instance, in the past the DAE had provided machinery to farmers without linking farmers to mechanics, with the result that many machines were under used, either because the recipient did not know how to use the machine or because it broke down. At the same time, the private sector found it difficult to market machines without support for marketing events where machines are demonstrated to farmers and potential customers. CSISA-MEA fills this gap – which has become even more important given increased subsidization of machinery – and facilitates communication between these actors, so that by inviting the private sector to participate in DAE events, machines have been sold to service providers, hand-in-hand with training in how to use them and links to

lead firm trained mechanics. As a result, DAE has been able to show increased adoption of the technology they promote, the private sector has increased sales and the machines are correctly used and well maintained.

Challenges encountered during the reporting period

COVID-19: The COVID-19 pandemic presented the Activity with its biggest challenge to date. Restrictions prevented free movement of staff to supervise activities, meet with beneficiaries and potential partners, network with stakeholders, and conduct monitoring and evaluation activities. It also restricted the size of training programs. Training in machinery manufacturing skills, for example, planned for batches of 20 trainees, had to be reduced to 10 (including trainers) to facilitate social distancing, severely reducing the number of ABLE SME staff, MSPs and farmers who could be trained. The Activity's target enterprises largely lack access to and knowledge of how to use modern digital communication systems, limiting CSISA-MEA's ability to provide online remote training and their scope to access social media for product marketing. Nevertheless, a combination of COVID-19 restrictions easing and Activity staff adopting social media and telephone-based means of communicating and training to some degree, meant that CSISA-MEA was able to implement a large part of its planned activities.

The COVID-19 pandemic also slowed demand for machinery at many dealer points, as potential customers decided to wait for the crisis to be resolved before making investments. Importing machinery was also constrained by supply problems. These factors resulted in companies not having the finance to buy more imports or imported machines not arriving on time. As a result, implementation of activity programs with lead firms has been constrained in many cases by lack of machines to sell to customers.

Yet although COVID-19 regulations restricted travel and visits to partners and beneficiaries, alternative ways (largely involving the use of information technology such as Zoom meetings and social media sites) allowed CSISA-MEA to continue to implement many of its activities. Field staff became very inventive when presented with this challenge. For instance, the Activity communications unit used the phone and social media to source the information and pictures they needed to communicate the Activity's achievements to partners, funders and other stakeholders, from ABLE SME owners, MSPs and farmers, who were encouraged to send CSISA-MEA's field staff photographs of the results of Activity interventions such as training. This has shown that in some cases implementation of programs could be done more efficiently via telephone and social media sites than through direct interaction with market system actors, and that this might be become the preferred approach for many activities after the COVID-19 crisis ends. The COVID-19 crisis has also forced researchers to identify methods for obtaining information without interviewing respondents directly. CSISA-MEA has successfully conducted surveys using the telephone with the result that it is likely to become a preferred survey method after the COVID-19 crisis ends.

Effective and self-financing training models: Beyond COVID-19, the Activity's program for training ABLE SMEs is currently fully financed by the Activity and is implemented by two NGOs. Although effective as a means of training ABLE SME staff, this is dependent on external funding which may not be available after the Activity ends. Finding a way of making this training program financed by the ABLE SMEs and the training participants has, however, been challenging. Firstly, ABLE SMEs are reluctant to pay for training. This is because training for light engineering workers has always been given free by the government or donors, and the workforce themselves are not paid enough to enable them to pay for training. The management of ABLE SMEs have also seen little value in training their staff, either because they consider themselves able to do it themselves or because they fear that trained staff will leave for other more remunerative employment. In response, CSISA-MEA is developing a business case for ABLE SMEs, demonstrating the benefits of investing in training; it will then develop systems that will stimulate the private sector to pay training fees in the future.

Providing training to the ABLE sector is limited by the shortage of skilled trainers. Most trainers need specific training themselves to be confident in using training methods suitable for use in training low literacy adults. In particular, there is a tendency to provide lectures rather than practical demonstrations. CSISA-MEA staff have provided training in training methods for technical skills trainers, but another approach would be to use the staff of some of the larger companies who have a core group of highly skilled workers. With support for the more theoretical issues in a course from staff of vocational training institutes, polytechnics and institutions such as Bangladesh Industrial and Technical Assistance Center (BITAC), a more practical training program could be developed.

Apart from management staff, most ABLE SME workers are hired as day laborers. This means that companies have little interest in building their skills, while the workers' need to earn extra income in the evenings takes precedence over attending skills enhancement classes. Lead firms have a large part of their capital held in loans to their customers. Lending to agricultural machinery service providers should be done by banks and not lead firms, but the financial services sector considers lending to agricultural machinery service providers very risky. This is partly because most machinery service providers do not have collateral, which FSIs request before they will provide loans. One way of resolving this problem is to lend to small businesses through larger businesses such as machinery dealers. This is an approach BRAC Bank with CSISA-MEA support intends to follow. Alternatively, support can be given to micro finance institutions (MFIs) to lend to agricultural machinery service providers. They have done this in the past, but the interest rates they charge are very high, the amount they will lend is small, and loan repayment schedules often do not match machinery service providers income generation, which tends to be some time after machine purchase and highly seasonal.

Empowering women and encouraging social inclusion: The light engineering sector and agricultural mechanization is strongly male-dominated, with very few women either in management roles or employed in these sectors. The Activity is seeking to support women

enter the agricultural machinery service provision business as enterprise owners and to support female students enter the manufacturing sector as interns with the expectation that they would be employed as engineers and managers.

Engaging youth: The image of work in the light engineering sector being manual, dirty and dangerous makes it difficult for the sector to attract educated youth. This makes it a bit more difficult to upgrade the capacity of ABLE SMEs to a level where they can effectively compete with importing companies. In response, the Activity will work with is working with ABLE sector business associations to develop videos and television programs that present to youth a more positive image and one which shows the rewards that could be gained from working in the sector.

Financial record-keeping: Most of the ABLE SMEs do not value the maintenance of proper records of financial transactions. This is because they have largely operated in informal manufacturing markets and with limited numbers of close clients. As a result, it is difficult for them to prove to FSIs that they have a viable business and would be a low risk candidate for loans. A recently-signed JVA with IDLC will support it to provide ABLE SMEs with training in financial record-keeping. More information on the outcomes of this JVA activity will be provided in the Annual Report.

Encouraging foreign and US firm investment: Attracting investments in Bangladesh-based companies by agricultural machinery companies in the United States has been challenging. Despite considerable effort by the Activity, firms do not yet consider the Bangladesh market large enough to justify the investment in time and money. This is especially the case in comparison to India and other countries with more favorable investment policies. Tin response, the Activity is seeking other ways of attracting investments such as through Bangladesh-based venture capital companies and through South Asian companies.

Expanding businesses to Cox's Bazar: Encouraging lead firms to establish dealerships and conduct machinery promotion activities in remote coastal districts still remains a challenge. Few companies consider this area an important or profitable market as it is a less developed and agriculturally under-invested region. Developing a better understanding of the market size in these areas and presenting that to lead firms will be done through surveys to be commissioned over the next six months.

Annex I: Activity targets and achievements

2019–2020			2020–2021 (Oct 2020–March 2021)		
Target	Achieved	Percentage achievement	Target	Achieved	Percentage achievement
EG.3-2 Number of individuals participating in USG food security programs					
25,620	43,011	168	42,421	40,741	96
EG.3.1-14 Value of new USG commitments and private sector investment leveraged by the USG to support food security and nutrition					
No target			620,000	-	-
EG.3.2-24: Number of individuals in the agriculture system who have applied improved management practices or technologies with USG assistance					
25,000	43,011	172	51,613	40,528	78
EG.3.2-25- Number of hectares under improved management practices or technologies with USG assistance					
7,143	12,235	171	14,682	13,124	89
EG.3.2-26 Value of annual sales of farms and firms receiving USG assistance					
260,242	278,980	107	594,940	872,574	146
EG.3.2-27: Value of agriculture-related financing accessed as a result of USG assistance					
50,000	9,647	19	300,000	284,941	95
GNDR-2 Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources					
11	22	202	11	11	100
YOUTH-3 Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29)					
15	18	121	15	11	73
Custom Indicator 1: Number of individuals with improved skills following completion of USG-assisted workforce development programs					
200	0	0	400	45	11
Custom Indicator-2: Number of individuals with new and/or improved employment following participation in USG-assisted workforce development programs.					
240	0	0	480	-	-

Annex II: Status of JVAs with lead firms in the Feed the Future ZOI and ZOR

Firm name	Location	Major activities	Status
The Metal (Pvt) Ltd	ZOI ZOR	• Video for users of combine harvesters • On-the-job training and in-house training for operators and mechanics of combine harvesters • Arrange metal warehouse visit for ABLE companies and Sample distribution of spare parts • Development of technical training modules for women seedling producer, MSP development program for rice transplanter and operator training program for combine harvesters • Training women seedling producers and youth for rice transplanter service provision • Lab and field test report of the spare parts and ABLE SMEs enlisted as vendor/spare parts suppliers and qualified ABLE SMEs received selected spare parts supply orders	Signed Implementation ongoing
Alim Industries	ZOI	• Develop video for users of combine harvesters • Training of Trainers for in-house engineering team • Training of operators and mechanics of combine harvesters	Signed Implementation completed
Janata Engineering	ZOI ZOR	• Module development for capacity-building training for local service providers (MSPs), company staff and mechanics • Conduct capacity building of company staff and dealer selection meeting • Develop designs signboards/festoon, product catalogues and leaflets promised under the budget • Develop 8 videos for promotional purpose • Capacity building training of MSPs • Technical training of mechanic, arrange roadshows and conduct method and result demonstration	Signed Implementation ongoing
Abedin Equipment	ZOI	• Develop technical and video training modules • In-house training for mechanic-cum-operators of combine harvesters for service providers • Develop technical and video training modules • Train rice transplanter service providers	Signed Implementation ongoing

		• Pre-season combine harvester maintenance support to service providers	
RK Metal	ZOI ZOR	• Conduct capacity building training of dealers • Develop designs of signboards, poster, festoons and leaflets • Capacity building training of MSPs • Technical training of mechanic and technician • Linkage meeting between MSPs, mechanics and technician, dealer coordination meeting • Courtyard meetings, arrange roadshows, conduct method and result demonstration, machinery video show using local cable operators	Signed Implementation ongoing
ACI Motors	ZOI	• Capacity building of combine harvester MSPs • Develop the training module for conducting capacity development workshops for MSPs of combine harvesters • Develop the module for conducting the technical training of drivers/operators • Develop the training manual for conducting capacity development workshops for mechanics/ operators of combine harvesters • Visit a total of at least 10 light engineering workshops in Bogura and Jashore • Provide samples of imported parts to the selected light engineering workshops in Bogura and Jashore • Assess the quality of the parts replicated by these workshops • Provide hands-on technical feedback and advice to the workshops • Carry out a laboratory test of the parts for quality inspection • Get customer feedback on the ground to be able to give a green signal on the quality of the parts	Signed Implementation ongoing
BRAC Bank	ZOI ZOR	• Promote its existing services among light engineering MSMEs and dealers from the pre-screened list provided by CSISA-MEA. • Develop a customized selection criterion for both light engineering MSMEs and agricultural machinery dealers, conduct its preliminary internal assessment of the light engineering MSMEs and dealers, and select a number of them, if any, that meet BRAC Bank's eligibility criteria for financing.	Signed

		• Modify its existing products or develop a new product specifically designed for the agriculture machinery sector depending on the user insights generated from the initial interactions with the clients.	
IDLC	ZOI ZOR	• Develop the training module for conducting the workshops • Deploy in-house trainers (IDLC staff) to conduct the workshop • Develop the training module for conducting the coaching sessions and & conduct the coaching sessions	Signed
Bhalo	ZOI ZOR	Bhalo proposes: • to become a one-stop solution for everything a farmer needs - inputs, services, finance and markets. • under the proposed activity, to partner with existing local service providers (MSPS) in two *upazilas* and strengthen their business models by adding input retail, credit/ finance and possibly sourcing of agro-produce. The MSPs or their close associates shall set up Bhalo's agent/partner retail outlets, and expand its offering to the farmers.	Submitted revised proposal; Discussion ongoing
iFarmer	ZOI ZOR	iFarmer proposes to: • collaborate in the development and expansion of finance and appropriate bundled inputs services provided by entrepreneurs who provide machinery services to farmers. • develop the capacity of entrepreneurs in the agriculture machinery service provision sector to provide a wide range of services to farmers, with particular emphasis on supporting the development of businesses managed by women and or youth.	Discussions ongoing
Practical Action Consulting	ZOI	• Through a partnership with 4 machinery manufacturing companies, develop, test and market with technical support from Georgia Tech jute fiber extraction machinery that will leave jute stick intact	Signed

Konika Seeds Ltd	ZOI	• Train MSPs and farmers in rice seedling production for rice transplanters and subsequently conduct demonstrations of the use of rice transplanters in collaboration with Abedin Equipment and TML. The ultimate aim is that they will become agents for lead firms and/or run a rice transplanter fleet service model	Contract signing being processed
Ali Seed Farms	ZOI	• Train MSPs and farmers in rice seedling production for rice transplanters and subsequently conduct demonstrations of the use of rice transplanters in collaboration with Abedin Equipment and TML. The ultimate aim is that they will become agents for lead firms and or run a rice transplanter fleet service model	Contract signing being processed
UOMCSL	ZOI	• Train MSPs and farmers in rice seedling production for rice transplanters and subsequently conduct demonstrations of the use of rice transplanters in collaboration with Abedin Equipment and TML. The ultimate aim is that they will become agents for lead firms and or run a rice transplanter fleet service model	Contract signing being processed
RFL	ZOI	• Study to determine the priority machine conducive for domestic manufacturing	NDA signed; discussion on hold
IFAD Autos Ltd.	ZOI	• Study to determine the business case of second-hand tractor refurbishment • Financial advisory support to improve supply chain credit risk assessment process and reduce payment delinquencies	NDA signed; agreement under review; discussion on hold
Energypac	ZOI	• Financial advisory support to improve supply chain credit risk assessment process and reduce payment delinquencies	NDA signed; discussion on hold

Annex III: CSISA-MEA Key Leadership Staff

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Name	Role	Institution	Address	Phone	Email
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Md. Rowshon Anis	Officer Market Development	iDE	Faridpur, Bangladesh	+88 0171 738 1399	rowshon.anis@ideglobal.org
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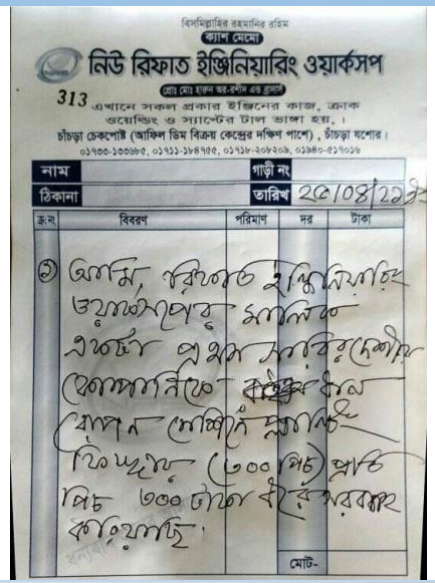
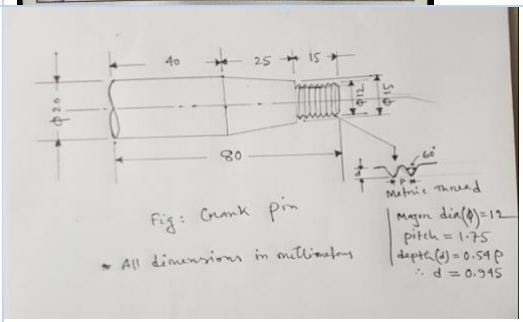
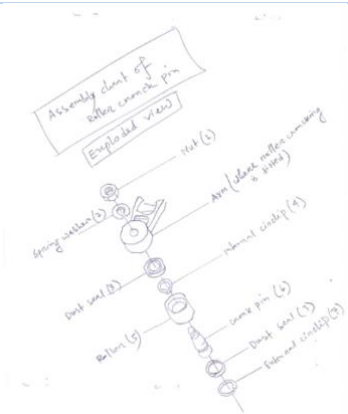
Annex IV: Designs and inventory of the products made by NRE, Mohammad Ali Engineering and Latif Engineering

Item	Evidence
NRE sold 300 RT fingers to a private company	
Drawing and exploded view of roller crank, made by Mohammod Ali Engineering	 

Cost of manufacturing roller crank by Mohammad Ali Engineering

Part / Component / Assembly Name	Crank Pin & Roller
Part / Component / Assembly Number	
Direct Materials Costs	
Raw material (list below with cost in BDT; add rows as	
Roller	50.4
Crank pin	24.75
Bought components (list below with cost in BDT; add rows as necessary)	
Nut	5
Washer	4
Dust seal	80
Internal circlip	20
External circlip	20
Expendibles - rags, oils, etc. (list below with cost in BDT; add rows as necessary)	
Greese/oils	5
Electricity bill	30
Total direct materials costs	239.15
Indirect Materials Costs	
Expendable tooling - drills, mills, brushes, etc. (list below with cost in BDT; add rows as necessary)	
Cutting saw	10
Drill bit	10
Cutting tool	50
Threading tool	10
Jhut(Wiping cloth)	5
Total indirect materials costs	85
Direct Labor Costs	
Set up time (mins)	39
Manufacturing processes time (list below with time in mins)	
Cutting	8.4
Facing	10.8
Turning	21
Drilling	4.2
Boring	6
Grooving	10.8
Cleaning	2
Threading	15
Assembly	5
Other operations (list below)	
Inspection	8
Total time (mins)	130.2
Labor rate (BDT/hour)	70
Total direct labor costs	152
Benefits rates (%)	0
Direct Labor Costs + Benefits (BDT)	152
Overhead rate (%)	0
Overhead (BDT)	0
Total Costs (BDT)	476
1-3-9 rule selling price (9 x direct materials cost) (BDT)	2152.35

Crank pin bill of materials by Mohammod Ali Engineers

Bill of Materials

Level	Part No.	Part Name	Drawing Number	No./Unit	Material Description	Unit WT (KG)	Total WT(KG)	Unit Cost (BDT)	Total Cost(TK)	Source (Make/Buy)
	1	Nut		1	MS	0.02	0.02	5	5	Buy
	2	Washer		2	MS	0.005	0.01	2	4	Buy
	3	Dust seal		2	Plastic	0.012	0.024	40	80	Buy
	4	Internal circlip		2	MS	0.01	0.02	10	20	Buy
	5	Roller		1	MS	0.56	0.56	90	50.4	Make
	6	Crank pin	1	1	MS	0.275	0.275	90	24.75	Make
	7	External circlip		1	MS	0.018	0.018	20	20	Buy
					Totals		**0.927**		**204.15**	

Picture ofcrank pin made by Mohammad Ali Engineers

Process chart of making crank pin and roller

Process Chart

Project: Manufacturing of Crank pin & Roller | Process: | State: Current | Chart type: Material

Step #	Activity description	Time (minutes)	Distance (meters)	Operation ○	Transport ⇨	Inspection □	Delay D	Storage ▽	VA.ENVA.NVA Value Category	Inputs, outputs, rejection points, remarks, ...
1	Stored in storeroom (raw materials)							x	ENVA	
2	Cutting of Shaft	6	3	x					VA	Manual labor
3	Facing	9	2	x					VA	
4	Outside turning	10	0	x					VA	
5	Inside drilling	6	0	x					VA	
6	Boring	10	0	x					VA	
7	Grooving for dust seal	8	0	x					VA	
8	Grooving for circlip	6	0	x					VA	
9	Inspection	3	0			x			ENVA	
10	Cutting of Shaft	6	3	x					VA	
11	Facing	10	4	x					VA	
12	Outside turning	9	0	x					VA	
13	Taper turning	15	0	x					VA	
14	Threading	20	0	x					VA	
15	Inspection	3	0			x			ENVA	
16	Assembly	5	2	x					VA	
17	Final Inspection	2				x			ENVA	
			Count:	13	0	2	0	1		
			Time per process step:	120	0	6	0	0		

Total VA	13		Total NVA	0		Total ENVA	3	
VA Time	120		NVA Time	0	Minutes	ENVA Time	6	Minutes
Distance traveled	14		Lead Time	126	Minutes		95.238%	

Continuous Improvement Toolkit . www.citoolkit.com

Guidelines:

A **Process Chart** is a table illustrating the sequence of actions within a process.

1st: List all activities within the process.

2nd: Identify the type of activities (operation, transport, inspection, delay or storage). Use only the character "X" under the symbols to identify the type of activity.

3rd: Classify each activity into value added, non-value added or essential non-value added (ENVA).

Parts list of Kubota CH roller pin crank assembly by Mohammad Ali Engineers

	A	B	C	D	E	F	G
1	**Part List of Kubota CH Roller Pin crank assembly**						
2	**Company: Mohammad Ali** Engineering Workshop, Jashore.						
3	**Product:** Crank pin assembly						
4	**Part No.**	**Part Name**	**Drawing Number**	**No./Unit**	**Material**	**Size (mm)**	**Make/Buy**
5	1	Nut		1	MS	18	Buy
6	2	Washer		2	MS	14	Buy
7	3	Dust seal		2	Plastic	35x20x7 & 32x20x7	Buy
8	4	Internal circlip		2	MS	20	Buy
9	5	Roller		1	MS	40	Make
10	6	Crank pin	1	1	MS	80	Make
11	7	External circlip		1	MS	32	Buy
12							
13							
14							
15							
16							
17							
18							

Bill of materials for fodder chopper by Latif Engineering workshop

Bill of Materials of Fooder Chopper

Latif Engineering Workshop, Jashore

Level	Part No.	Part Name	Drawing Number	No./Unit	Material Description	Unit WT (KG)	Unit Cost (BDT)	Source (Make/
	011	Driven pulley	001	1	CI	20	65	Make
	012	Motor pulley		1	CI	0.435	120	Buy
	013	Belt (v)		1	B-96	0.48	390	Buy
	014	Electric motor		1	1400 rpm, 2hp	36	7200	Buy
	015	Motor chasis		2	MS Angle (1"X2mm)	0.55	73	Buy
	016	Bevel pinion cover		1	MS Sheet	1.1	150	Buy
	017	Bearing		4	6205 2RS	0.115	52	Buy
	018	Bearing		1	6206 ZZ	0.182	120	Buy
	019	Bearing		1	6305 ZZ	0.212	120	Buy
		Nut-bolt, Lock Pin & Washer		25	0.5",1",1.5", No.	0.85	90	Buy
			Total WT (KG)= 100.3 (including electric motor)					
			Total Material Cost (BDT)= 15000 (including motor)					

Cost of manufacturing chopper by Latif Engineering workshop

NOTE: Only enter data into orange shaded cells	
Part / Component / Assembly Name	Fodder Chopper
Part / Component / Assembly Number	
Direct Materials Costs	
Raw material (list below with cost in BDT; add rows as	
Base frame	672.7
Feeding System Body	1117.5
Feed roller	149.5
Upper roller shaft	60.955
Driven pulley shaft	146
Lower roller shaft	89.352
Bearing housing	56.25
Bevel pinion	75
Bevel power shaft	117.6
Driven pulley	1300
Bought components (list below with cost in BDT; add rows as necessary)	
Cutting blade	350
Motor pulley	120
Belt (v)	390
Electric motor	7200
Motor chasis	40.15
Bevel pinion cover	165
Bearing	208
Bearing	120
Bearing	120
Nut-bolt & Washer	76.5
Expendibles - rags, oils, etc. (list below with cost in BDT; add rows as necessary)	
Welding rod	124
Total direct materials costs	12698.507
Indirect Materials Costs	
Expendable tooling - drills, mills, brushes, etc. (list below with cost in BDT; add rows as necessary)	
Grinding disk	100
Tapping tool	20
Cutting tool	100
Paint	300
Jhut(Wiping cloth)	20
Total indirect materials costs	540
Direct Labor Costs	
Set up time (mins)	0
Manufacturing processes time (list below with time in mins)	
Cutting	25
Welding	80
Turning	170
Grinding	30
Drilling	25
Cleaning	15
Tapping	20
Assembly	15
Painting	20
Other operations (list below)	
Total time (mins)	400
Labor rate (BDT/hour)	60
Total direct labor costs	400
Benefits rates (%)	0
Direct Labor Costs + Benefits (BDT)	400
Overhead rate (%)	0
Overhead (BDT)	0
Total Costs (BDT)	13639
1-3-9 rule selling price (9 x direct materials cost) (BDT)	114286.563
Electricity bill	350
Snacks bill	250
Total cost of one machine	14239
Note: 1-3-9 rule is not followed here regarding selling price.	
The actual wholesale price per machine.	16200
Avg profit per machine	1961

Parts list of chopper by Latif Engineering workshop

	A	B	C	D	E	F	G
1	**Part List of the Fodder Chopper**						
2	**Company:** Latif Engineering Workshop, Jashore.						
3	**Product:** Fodder Chopper						
4	**Part No.**	**Part Name**	**Drawing Number**	**No./Unit**	**Material**	**Size (mm)**	**Make/Buy**
5	001	Base frame		1	MS Angle (2"X3mm & 1"X2mm) & MS Flatbar (1"X2mm)	550 X 760	Make
6	002	Feeding System Body		1	MS cast iron, sheet & Plate	410 X 280 X 129	Make
7	003	Feed roller		2	MS cast iron	164 L X 78 ϕ	Make
8	004	Upper roller shaft		1	MS shaft	228 L X 24.5 ϕ	Make
9	005	Driven pulley shaft		1	MS shaft	380 L X 31 ϕ	Make
10	006	Lower roller shaft		1	MS shaft	330 L X 24.5 ϕ	Make
11	007	Bearing housing		2	MS cast iron	6206 zz & 6305 zz	Make
12	008	Bevel pinion		2	MS cast iron	112 OD X 8 teeth	Make
13	009	Bevel power shaft		1	MS shaft	131 L X 53 OD	Make
14	010	Cutting blade		1	Carbon steel	381 L X 140 W X 3 thick	Buy
15	011	Driven pulley	001	1	MS cast iron	47 thick X 634 OD	Make
16	012	Motor pulley		1	MS cast iron	63.5 OD	Buy
17	013	Belt (v)		1		B-96	Buy
18	014	Electric motor		1		2hp, 1400 rpm	Buy
19	015	Motor chasis		2	MS angle & flat bar	330 X 60 X 25	Make
20	016	Bevel pinion cover		1	GI sheet	322 X 148 X 131	Buy
21	017	Bearing (6205 2RS)		4	steel	6205 2RS	Buy
22	018	Bearing(6206 zz)		1	steel	6206 zz	Buy
23	019	Bearing (6305 zz)		1	steel	6305 zz	Buy
24	020	Nut-bolt (1.5" L X 3/8" dia)		8	MS	1.5" L X 3/8" ϕ	Buy
25	021	Nut-bolt (1" L X 3/8" dia)		9	MS	1" L X 3/8" ϕ	Buy
26	022	Nut-bolt (1" L X 4/8" dia)		1	MS	1" L X 4/8" ϕ	Buy
27	023	Carraige bolt 4" L X 3/8" dia)		1	MS	4" L X 3/8" ϕ	Buy
28	024	Nut-bolt (8 No.)		4	MS	8 No.	Buy
29	025	Nut-bolt (1" L X 2/8" dia)		2	MS	1" L X 2/8" ϕ	Buy
30	026	Nut-bolt (1/2" L X 2/8" dia)		2	MS	1/2" L X 2/8" ϕ	Buy
31	027	Nut-bolt (1" L X 2.5/8" dia)		2	MS	1" L X 2.5/8" ϕ	Buy
32	028	Nut-bolt (0.5" L X 2.5/8" dia)		2	MS	0.5" L X 2.5/8" ϕ	Buy
33	029	Shaft lock pin		5			Buy
34							

Annex V :Media engagement for mechanization

Name of Media	Link/coverage
CIMMYT international blog	https://www.cimmyt.org/news/women-find-a-role-in-bangladeshs-agricultural-mechanization-sector/-sector
The Business Standard	https://publisher.tbsnews.net/economy/agriculture/expand-mechanised-agriculture-tackle-worker-shortage-usaid-199858
The Daily Star	https://www.thedailystar.net/business/news/21m-usaid-project-boost-agriculture-mechanisation-2042813
The Financial Express	http://221.120.101.122/new_newsshell/pages/news_details/799092
The Banik Barta	https://bonikbarta.net/home/news_description/255663/আড়াই-লাখ-কৃষককে-যান্ত্রিকীকরণ-সুবিধা-দেবে-ইউএসএআইডি
Jamuna TV	https://drive.google.com/file/d/1BhLFZeqz1GsAnf3SCXnPqR0CdHQuppE-/view?usp=sharing
The Banik Barta	
Daily Asia	

The Daily Tribunal

Daily Bangladesh Shamachar

Daily Bogura

Daily Karotoa

The Daily Industry


Inaugural workshop for light agricultural machines engineering workforce held

The Daily Tribunal


The daily TRIBUNAL RIGHTS FOR THE PEOPLE


Skill enhancement training for light engineering workforce inaugurated in Bogura

The Weekly Smrity


স্মৃতি THE WEEKLY SMRITY