

# Annual Report

October 2021 – September 2022

Cereal Systems Initiative for South Asia-Mechanization and Extension Activity





















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# **Acronyms and abbreviations**

**ABLE** Agriculture-Based Light Engineering Agriculture Development Officer **ADO** 

**AFP Axial Flow Pump** 

Bangladesh Agricultural Research Institute BARI

Bangladesh Agricultural University BAU

Bangladesh Council of Scientific and Industrial Research **BCSIR** 

**Business Development Officer BDO** 

**BEIOA** Bangladesh Light Engineering Owners Association **BITAC** Bangladesh Industrial and Technical Assistance Center

**BRAC** Bangladesh Rural Advancement Committee

BRRI Bangladesh Rice Research Institute

CSISA-MEA Cereal Systems Initiative in South Asia - Mechanization Extension Activity Cereal Systems Initiative in South Asia - Mechanization and Irrigation CSISA-MI

Conservation Agriculture CA CAD Computer-Aided Design

**CIMMYT** The International Maize and Wheat Improvement Center

CH Combine Harvester

**CNC** Computer Numerical Control

**CXB** Cox's Bazar

DAE Department of Agriculture Extension

EOI **Expressions of Interest** 

Food and Agriculture Organization FAO

**FFD** Farmer Field Day FI Finance Institution

FSI Financial Services Institution Georgia Tech Georgia Institute of Technology

**GUK** Gram Unnayan Karma

HAO Humanitarian Assistance Officer

HYV High Yield Variety

International Development Enterprise iDE Industrial Development Leasing Company **IDLC** 

**iDOA** Internal Data Quality Assessment

**INGO** International Non-Governmental Organization **IPDC** Industrial Promotion and Development Company

ΙT Information Technology

Japan International Cooperation Agency JICA

Joint Venture Agreement JVA

**KMP** Krishi Machine Porichiti (Introduction to Agricultural Machines)

LAN Livestock and Nutrition Activity

LE Light Engineering LLA Local Level Agreement

LPIN Livestock Production for Improved Nutrition

MFI Micro Finance Institution

MEL Monitoring, Evaluation and Learning MDO Machinery Development Officer **MSA** 

Market Systems Analysis?

Micro, Small and Medium Enterprises **MSME** 

MSF **Medium-Sized Factories** MSP Machinery Solution Provider NGO Non-Governmental Organization OHS Operational Health and Security OMD Officer Market Development

NRE New Rifat Engineering
PAC Practical Action Consulting
PPE Personal Protective Equipment
PSE Private Sector Enterprise
PTOS Power Tiller-Operated Seeder
RDA Rural Development Academy
RRF Rural Reconstruction Foundation

RT Rice Transplanter

SAAO Sub Assistant Agriculture Officer SME Small and Medium Enterprises

SMS Short Message Service
SPE Special Purpose Entity
SPV Special Purpose Vehicle
TML The Metal (Pvt.) Limited

TMSS Thengamara Mohila Sabuj Sangha

TOT Training of Trainers
TSP Training Service Provider

TVET Technical and Vocational Education Training

US United States

USA United States of America

USAID United States Agency for International Development

USD United States Dollar

USG United States Government
WFP World Food Program
ZOI Zone of Influence
ZOR Zone of Resilience
2WT Two-Wheel Tractor
4WT Four-Wheel Tractor

# **Executive Summary**



This report covers the twelve-month period from I October 2021 to 30 September 2022.

The USAID Feed the Future Bangladesh Cereal Systems Initiative for South Asia – Mechanization Extension Activity (CSISA–MEA) operates in the Feed the Future Zone of Influence (ZOI) in south-west Bangladesh and the Feed the Future Zone of Resilience (ZOR) in the Rohingya refugee crisis-impacted Cox's Bazar region in south-east Bangladesh. The Activity aims to support the mechanization of agriculture in Bangladesh by developing the capacity of the private

sector to develop, manufacture and market innovative, climate-smart technologies, which will enable the country's farmers to mechanize their agricultural production and increase their resilience to climate change. Through this it will achieve the core objective of enhancing agricultural resilience through the development of agriculture-based light engineering (ABLE) small and medium enterprises (SMEs) and develop a youth and gender-inclusive workforce with a special emphasis on crisis affected areas of Bangladesh. This core objective will be achieved through three intermediate results:

**Intermediate result I**: The competitiveness and efficiency of domestic and private sector-led agricultural machinery manufacturing boosted.

Since the beginning of the Activity, CSISA–MEA has supported 194 ABLE SMEs to develop and expand their business through the provision of training for staff, technical advice, and access to finance. In this reporting year, out of 125 ABLE SME submitting Expressions of Interest (EOI) in working with the Activity, 110 ABLE SMEs (40 of which are in the Feed the Future ZOR, 70 in the ZOI) signed consent letters agreeing to participate in training and technical support programs.

During Year 2 a key lesson learned about how best to support ABLE SMEs was that it was difficult to provide all enterprises with detailed support and that not all of them wanted that level of support. In Year 3 therefore, the support to ABLE SMEs divided into two stages. In the first stage, all ABLE SMEs participate in basic machinery manufacturing and business management skills training and are supported with product marketing. In the second stage, those with the capacity and interest in further developing and expanding their businesses receive more intense business development support including technical and marketing support. In Year 3, following an open and rigorous selection process, 16 ABLE SMEs (including two in the ZoR) have signed (or will soon sign) cost-sharing joint venture agreements (JVAs) with the Activity.

Support for the Activity's ABLE SMEs to supply spare parts to lead firms for some of the newest technologies to enter the agricultural machinery market in Bangladesh including combine harvesters and rice transplanters resulted in only a small number of orders being placed by the agricultural machinery importer lead firms. What became clear was that the market for these parts for the out of warranty period of servicing was through dealers and not through lead firms. A positive result was that many ABLE SMEs, with Activity technical support, learnt how to make the high-quality spare parts needed for these machines. The result was that when the Activity facilitated meetings between ABLE SMEs and dealers, the SMEs could offer spare parts that matched imported parts for quality and cost, and this resulted in substantial sales.

Through these meetings, 48 ABLE enterprises (19 in Jashore. two in Faridpur, six in Kushtia and 21 in Bogura) were linked with 68 dealers (39 in Jashore, 10 in Faridpur, six in Kushtia, six in Bogura and seven in Cox's Bazar). This resulted in sizable sales of a wide range of spare parts for machines ranging

from complex machines such as tractors, combine harvesters and power tillers to simpler machines including fodder choppers, irrigation pumps, crop threshers and maize shellers. In Bogura, 16 ABLE enterprises sold spare parts and machines worth USD 508,554.40 through 41 ZOI dealers and 9 ZOR (Cox's Bazar district) dealers. In Jashore, 12 ABLE enterprises sold spare parts in the ZOI worth USD 460,817.10. The total value of sales by ABLE enterprises to dealers through the links facilitated by the Activity was USD 969,371.50.

In Year 3, the Activity also sow strong interest by three local agricultural machinery manufacturing lead firms, RK Metal, Janata Engineering, and Alim Industries, to outsource some of their machinery part manufacturing to the ABLE SMEs. The Activity facilitated these lead firms through cost-sharing JVAs with the Activity and linkages with the ABLE SMEs. This support resulted in orders being placed for PTOSs, thresher parts and fodder choppers. We expect further orders in Year 4.

The technical support given to ABLE SMEs is beginning to result in major changes in the technology used. Some of this technology is simple but game changing. The introduction by the Activity of the use of digital calipers for making accurate measurements and hardness testing equipment for testing the quality of foundry products increases the quality of parts manufactured by ABLE SMEs. Other technology is more complex but equality important and includes electrically powered induction furnaces and computer guided cutting and drilling equipment. Following visits facilitated by the Activity to facilities in Dhaka where this equipment is being used and the building of links to Indian and US companies marketing this equipment, three ABLE SMEs have either installed or are in the process of installing a total of seven induction furnaces, and three ABLE SMEs in Bogura have ordered a total of five computer numerical control (CNC) lathes and milling machines from Haas, a United States of America (USA) company. Janata Engineering in the greater Jashore region has installed a computer-controlled press brake for sheet metal forming, a forging machine to punch and stamp parts, and a CNC plasma cutter with Activity technical support.

Engineering support from Activity partner Georgia Institute of Technology (Georgia Tech) has resulted in the design and testing of a jute decorticator that strips jute fiber from jute stems without breaking the stem pith, known as the jute stick. This is a major technical step forward from previous machines, which break the jute stick. Other machines developed are an onion seedling transplanter and a garlic clove planter.

To further support the development of the light engineering industry in Bangladesh, the Activity has sought to facilitate partnerships between international agricultural machinery companies and the Bangladesh light engineering industry. One of these partnerships is with the USA company Lincoln Electric and will support educational institutions to use their virtual reality training equipment. One piece of this equipment has been used by the Activity to train workforce staff in new welding techniques. The other important link is with LandForce, an Indian company, which manufactures tractor-drawn planters that can sow seed directly into crop stubble, conserving soil organic matter. Janata Engineering, a medium sized firm from the ZOI visited the LandForce factory in the Punjab, India and LandForce visited Bangladesh.

All this investment in manufacturing and equipment requires finance. During Year 3, the Activity facilitated links between 65 ABLE SMEs (33 in Jashore, one in Faridpur, 22 in Bogura, nine in Cox's Bazar), two dealers (one in Jashore) and 33 machinery solution providers (MSPs) (including 14 women) with financial institutions (Industrial Development Leasing Company (IDLC), BRAC Bank, City Bank, TMSS, RRF, Agrani Bank, Islamic Finance and Investment, and VPKA Foundation). Through these linkage events and the support provided by the Activity, USD 363,529 was disbursed to 12 ABLE SMEs in Jashore, USD 90,588 to five ABLE SMEs in Faridpur and USD 412,941 to 12 ABLE SMEs in Bogura. In addition, three dealers in the ZOR (Cox's Bazar) received loans facilitated by the Activity from BRAC Bank, NRBC Bank, and microfinance institute ASHA, worth USD 49,412.

In addition to the loans to ABLE SMEs, 14 MSPs in the greater Jashore and the greater Faridpur regions received loans totaling USD 6,472 and six MSPs in Cox's Bazar received loans totaling USD 12,353, giving a total of 20 loans provided worth USD 18,825. Of these, 17 were for female MSPs who received loans totaling USD 12,942.

**Intermediate result 2**: Institutional capacity for agricultural mechanization through the development of a skilled and youth workforce enhanced.

Since the start of the Activity to the end of this reporting year, CSISA–MEA has facilitated the training of 1,352 workforce staff from 194 ABLE SMEs in machinery manufacturing skills. Of these, 60% were under 29 years old (classed as youth) and 16% were women. In addition, 151 managers and owners from 133 ABLE SMEs received managerial skills training.

In Year 3, the Activity provided 760 workers with basic machining and foundry skills. To do this, it partnered with two NGO TSPs – GUK in Bogura and RRF in Jashore and Faridpur – and two agricultural machinery manufacturing companies – Janata Engineering in Chuadanga and Kushtia Engineering Works in Kushtia – to provide basic machine shop and foundry skills training to 520 workers from 110 ABLE SMEs. In the ZOR the Activity partnered with Bangladesh Industrial and Technical Assistance Center (BITAC) to provide 100 workers with training in basic machine shop skills. It also provided 140 foundry worker women with training in spray gun painting, grinding and fettling skills. The Activity also provided 151 ABLE SME owners and managers from 133 ABLE SMEs with training in technical, business management, customer management and marketing skills.

The success of this year's training program was based on key lessons learnt from the implementation of the program in the first two years of the Activity. These included provision of residential training at the weekend instead of training in the evenings after work, removing some courses that trainees and employees did not find relevant and, through this, shortening the hours of training from 108 to 72 hours (78 hours in Bogura).

A survey to assess the impact of the training provided from the start of the Activity to April 2022 showed that skills learnt in the training, even a year later had not been forgotten. It also showed that, when applied, the skills they learned supported workers to complete tasks quicker than before training, other employees could see that trained staff produced better quality products in higher volumes, and the trained workers were held in greater esteem by their managers, co-workers, and families. Finally, many of the trained workers surveyed secured increased salaries, promotions and, in some cases, better jobs as a result of the training provided by CSISA—MEA.

**Intermediate result 3**: Access for farmers to agricultural machinery, production and marketing services improved.

A study conducted by CSISA–MEA in Year 3 to assess the level of adoption and constraints to adoption of new agricultural mechanization technology showed that adoption of agricultural machinery technology was largely constrained by lack of knowledge about the machines and where to obtain machinery service provision. This finding has shown that the Activity should continue to focus on the dissemination of information about new agricultural mechanization technology to farmers, particularly in remoter areas of the ZOI and ZOR.

In Year 3, the Activity facilitated lead firms The Metal Private Limited (TML), ACI Motors, Abedin Equipment, Alim Industries, Janata Engineering and RK Metal to implement a program of demand creation events. These resulted in the sale of 145 combined harvesters (USD 2,303,267), one mini combine harvester (USD 5293), two Power Tiller-Operated Seeders (PTOSs) (USD 1873), 26 reapers (USD 22,102), 16 rice transplanters (USD 23,262) and 26 fodder choppers (USD 8535). The total value of sales in the ZOI and ZOR in the year 2021–22 was USD 2,365,017. The demand creation events included traditional demonstrations and farmers meetings as well as roadshows and local

television advertising. The roadshows and TV advertising were particularly valuable tools for reaching large numbers of farmers in remote areas of the ZOI. Other novel approaches to technology transfer were the use of commission earning agents to market machines for lead firms. Another approach was to use social enterprise companies and their commission agents to act as intermediaries between agricultural input, machinery and produce buyers. This approach was most effective when they also acted as intermediaries between financial services institutions (FSIs) and MSPs and farmers.

The Activity also partnered with regional seed companies in the ZOI and with lead firms and the Department of Agricultural Extension (DAE) in the ZOR to promote the use of rice transplanters. This was most successful when either the seed company was also the MSP or close support was given to rice transplanter MSPs and growers of rice seedlings for use in rice transplanters, provided by a combination of lead firm, DAE, and Activity staff.

Fodder choppers have also been a type of machine that has been strongly promoted by the Activity, both through support to ABLE SMEs to develop new designs and to ABLE SMEs and dealers to market fodder choppers. This machine saves considerable time, particularly for women, as fodder normally chopped manually by women can be chopped instead using a machine in minutes instead of hours.

Knowledge of how to use and maintain agricultural machinery is often lacking by MSPs (when they buy new machinery) and mechanics (who are needed to maintain and repair it). This is particularly true of the newest agricultural machinery to be introduced by the Activity: combine harvesters. To ensure these valuable machines function well and are able to work through a season without mechanical failure, the Activity partnered with the main lead firms importing combine harvesters and rice transplanters – TML, ACI Motors and Abedin Equipment – to facilitate the training of 133 MSPs and operators (42 in the ZOR) and 240 mechanics (25 in the ZOR). The lead firms also conducted 135 combine harvester, eight crop harvesting reaper, and one rice transplanter pre-season maintenance campaigns.

# Partnerships with USAID activities and donor funded projects

Fodder chopper demand creation events in the ZOI and ZOR were largely carried out in partnership with the USAID Feed the Future Bangladesh Livestock and Nutrition Activity (LAN). In the ZOR, the Activity also worked closely with other donor-funded activities, which included supporting the Food and Agriculture Organization (FAO) to train farmers in the use and maintenance of the farm machinery it provided. The Activity also supported the partnership between the Japan International Cooperation Agency (JICA) and DAE, which trained MSPs in rice transplanter, reaper, combine harvester and fodder chopper operation and maintenance.

### Workshop: Agricultural Mechanization in Bangladesh - the Future

In partnership with Bangladesh Agricultural University (BAU), the Activity held a workshop for agricultural mechanization value chain actors on "Agricultural Mechanization in Bangladesh – The Future" at Pan Pacific Sonargaon hotel, Dhaka (21–22 March, 2022). Its purpose was to review progress made in Bangladesh with agricultural mechanization, the impact this has had on the country's rural society, and how the increase in the availability of a rural labor force will support the industrialization of the Bangladesh economy.

The workshop was attended by 297 participants from a wide range of sectors including ABLE SMEs, machinery marketing companies, public and private sector finance institutions (Fls), micro finance institutions (MFls), the DAE, representatives of national agricultural research stations (NARS), the Ministry of Industries, international development organizations, USAID, and academia. The inaugural session was attended by the Honorable Minister Dr. Muhammad Abdur Razzaque, Member of Parliament, Ministry of Agriculture, Government of Bangladesh.

#### **Visitors**

The work in the ZOR was the focus of a number of high profile visits from the US Government including the United States Ambassador to Bangladesh, Mr. Peter Haas, USAID Bangladesh Feed the Future Director, Ms. Rebecca Moanikeala Robinson, a delegation from USAID regional offices led by Ms. Anjali Kaur, Deputy Assistant Administrator, USAID—Asia accompanied by Ms. Kathryn D. Stevens, Mission Director, USAID—Bangladesh, and finally USAID congressional staff delegation team members Mr. Sajit Gandhi, House Foreign Affairs Committee Senior Staffer, and Mr. Mark Akpaninyie, Professional Staff Member, House Foreign Affairs Committee.

In the ZOI the regional environmental adviser to USAID, Mr. Andrei D. Barannik, visited CSISA-MEA activities in ABLE SMEs in Jashore and MSP support work in the greater Jashore region.

#### Introduction

This annual report covers the twelve months from 1st October 2021 to 30th September 2022.

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 is implemented by The International Maize and Wheat Improvement Center (CIMMYT) in partnership with International Development Enterprises (iDE) and Georgia Institute of Technology (Georgia Tech). More information about the Activity's partners is provided in Annex I. The Activity aims to support the mechanization of agriculture in Bangladesh by developing the capacity of the private sector to develop, manufacture and market innovative, climate-smart technologies that will enable the country's farmers to mechanize their agricultural production and increase their resilience to climate change. Through this it will achieve the core objective of enhancing agricultural resilience through the development of ABLE SMEs and of a youth and gender-inclusive workforce with a special focus on the Rohingya refugee crisis-affected areas of Cox's Bazar and Bandarban districts. This will be achieved through three intermediate results:

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

By achieving these objectives, the Activity will have, by the end of this phase in 2024, enabled 200,000 farmers to gain access to new agricultural mechanization technology, encouraged agriculture-related businesses to make USD 7.7 million worth of new investments, facilitated the provision of USD 3 million worth of finance to actors along the agricultural mechanization value chain, and raised the skills of 2000 members of the country's light engineering workforce.

**Private sector engagement.** CSISA–MEA addresses constraints to the smooth functioning of agricultural machinery market systems by facilitating partnerships between actors in the agricultural machinery value chain. It does not engage directly in interventions but rather assumes a market facilitating role by funding activities, facilitating linkages to other organizations such as the Department of Agriculture Extension (DAE) and national research institutions and universities, and by the provision of technical expertise. 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. As such, the Activity takes a market systems approach, building systemic change that will continue even after the Activity ends.

CSISA-MEA places a strong emphasis on supporting the light engineering industry by facilitating training in manufacturing and managerial skills, manufacturing systems design, links to markets, and access to finance. This is in addition to facilitating the introduction of agricultural mechanization technology by the private sector to the Feed the Future ZOI and the Rohingya crisis-impacted ZOR.

# Area of operations

CSISA-MEA maintains field offices in locations across Bangladesh, crucial to USAID's activities and the light engineering and agricultural machinery manufacturing industry.

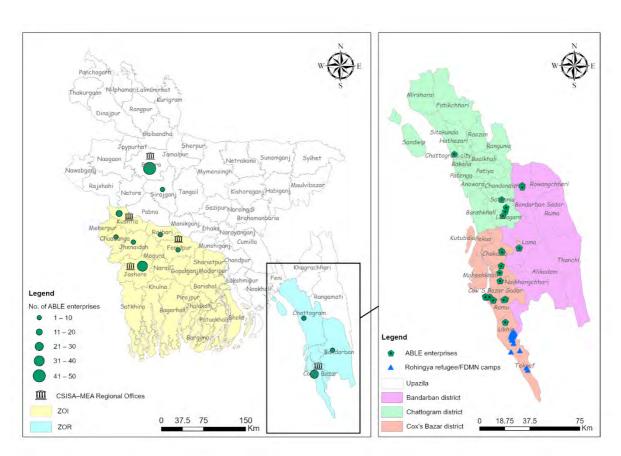
Khulna and Dhaka divisions (greater Jashore and greater Faridpur regions). This is where the main light engineering hubs in the Feed the Future ZOI are based. They constitute a major area for the commercial production of rice, vegetables, jute, pulses, maize, and wheat, and where adoption of

agricultural machinery technology such as tractors, powered tillers, combine harvesters, two-wheeled tractor planters, reapers and threshers is increasing rapidly. The recent opening of the Padma bridge will give this region easier access to markets in Dhaka, other regions in Bangladesh, and export markets through the seaport at Chattogram. It is anticipated that this will lead to a rapid expansion of the economy in south-western Bangladesh.

**Bogura district**. This is the main light engineering center outside Dhaka. It is also where many machine manufacturing enterprises in the Feed the Future zone obtain parts and components for the machines they make. Equally, many machine manufacturing enterprises in Bogura obtain parts from machine manufacturers in the ZOI.

Cox's Bazar and Bandarban districts. These districts are close to the Rohingya refugee camps and make up the USAID ZOR. Being remote from the major commercial centers in northern and central Bangladesh, they have not attracted significant commercial interest in terms of the manufacture and marketing of agricultural machinery. In the second year of the Activity emphasis was given by the Activity to the introduction of agricultural machinery technology by lead firms including ZOI-based companies, and to developing the capacity of ZOR-based light engineering enterprises to manufacture and market agricultural machines and spare parts through the provision of workforce skills training.

Figure 1: Maps showing location and size of ABLE SME hubs where CSISA–MEA and the USAID ZOI and ZOR are located.



\*ABLE – agriculture-based light engineering. CSISA–MEA - Cereal Systems Initiative in South Asia – Mechanization Extension Activity. FDMN – forcibly displaced Myanmar nationals. ZOI – Zone of Influence. ZOI. ZOR – Zone of Resilience.

# **Activity staffing**

Annex 2 presents details of Activity staffing.

The Activity currently employs 61 staff; 11 are shared with other programs, 21 are based in the Dhaka office and 40 in field offices; four are internationally recruited staff. The Activity also engages eight consultants on short-term assignments, four of whom are internationally recruited.

Georgia Tech provides Professor Dr. Jonathon Colton as technical lead on the engineering aspects of the Activity. Professor Colton supervises Georgia Tech postgraduate engineering students who design machinery and conduct studies for the Activity as part of their thesis research.

The administration and financial management support for the Activity is provided by a pool of staff, which also supports all the programs implemented by CIMMYT and iDE.

During the reporting period, Mr. Owen Calvert joined the Activity as Chief of Party and Ms. Elizabeth Lahiff joined iDE Bangladesh as its Team Leader for CSISA–MEA. CIMMYT also recruited four engineers as Machinery Development Officers to provide technical and engineering support to ABLE SMEs and MSPs. The Project Manager and Monitoring, Evaluation and Learning (MEL) Coordinator left the Activity to take up new positions. Mr. AKM Saiful Islam was appointed as the new MEL Coordinator and a new Project manager will be appointed in October 2022.

# Visitors to CSISA-MEA activities

During the reporting period the Activity welcomed visitors from USAID and the US Embassy to observe the work of CSISA-MEA and its partners.

Feed the Future Director, USAID-Bangladesh Ms. Rebecca Moanikeala Robinson, visited Chakaria, Cox's Bazar district on 14 December 2021, with other technical experts from USAID.

Deputy Assistant Administrator, USAID-Asia, Ms. Anjali Kaur, accompanied by Ms. Kathryn D. Stevens, Mission Director, USAID-Bangladesh visited CSISA-MEA activities in Chakaria, Cox's Bazar on 14 March 2022.

US Ambassador to Bangladesh, Mr. Peter Haas, accompanied by his wife, Mrs. Amy Haas, visited CSISA–MEA activities in Ukhiya, Cox's Bazar on 27 March 2022. Accompanying the Ambassador were Mr. Dustin Duong, Assistant Regional Security Officer, Mr. Sheik Shibly, Foreign Service National Investigator, Ms. Mackenzie Rowe, Regional Refugee Coordinator, PRM, Mr. Isteak Ahammed, Refugee Assistant, PRM, Ms. Sophia Meulenberg, Political Officer, Ms. Ellen de Guzman, Director, USAID Humanitarian Assistance Officer, and Mr. Mahadi Hasnat, Information Assistant



Above: US Ambassador, Mr. Peter Haas and others, observing an MSP, trained by an Activity lead firm partner, demonstrating the use of a rice transplanter, Ukhiya upazila, Cox's Bazar district, 22 March, 2022.

Photograph credit: Maruf Hossen Shanto, Agricultural Development Officer (ADO), CSISA-MEA, Cox's Bazar

USAID congressional staff delegation team members Mr.Sajit Gandhi, House Foreign Affairs Committee Senior Staffer and Mr. Mark Akpaninyie, Professional Staff Member, House Foreign Affairs Committee visited CSISA–MEA activities in Patoli village, PM Khali Union at Cox's Bazar Sadar on 7 September 2022. Accompanying the congressional staff delegation team members were Jacob Morrin, Deputy Director, Economic Growth, Ellen D'Guzman, Director, Humanitarian Affairs, Ashraful Haque, Environment Specialist, and Shahadat Shakil, Environment Specialist.

Regional Environmental Adviser USAID, Mr. Andrei D. Barannik visited CSISA–MEA activities at Chandpara, Kaligonj, Jhenaidah district on 28 Augus, 2022 and Wohab Engineering Works on 30 August 2022. He was accompanied by Kh. Farhad Hossain, Project Management Specialist, Market System Development, Economic Growth Office, USAID Bangladesh.

# Agricultural mechanization workshop



Above: "Agricultural Mechanization in Bangladesh – the Future" workshop, Pan Pacific Sonargaon hotel, Dhaka, 21–22 March, 2022.

Photograph credit: CIMMYT Bangladesh

In partnership with BAU, the Activity held a workshop for agricultural mechanization value chain actors on "Agricultural Mechanization in Bangladesh – The Future" at Pan Pacific Sonargaon hotel, Dhaka (21–22 March, 2022). Its purpose was to review the progress of agricultural mechanization in Bangladesh, its impact on the country's rural society, and how the increase in the availability of a rural labor force will support the industrialization of the Bangladesh economy.

The workshop had 297 participants from a wide range of sectors including ABLE SMEs, machinery marketing companies, public and private sector FSIs, MFIs, the DAE, representatives of NARS, the Ministry of Industries, international development organizations, USAID, and academia. The inaugural session was attended by the Honorable Minister Dr. Muhammad Abdur Razzaque, Member of Parliament, Ministry of Agriculture, Government of Bangladesh, and the sessions which followed were:

- 1. Agricultural mechanization in the context of economic development in Bangladesh.
- 2. What have we learnt about adoption of agricultural mechanization?
- 3. Manufacture of agricultural machines and spare parts.
- 4. Access to Finance and business development.

Each session was followed by a panel discussion led by a moderator and a panel of sector specialists, who also took questions from the audience. A copy of the workshop report can be downloaded through this link:

https://csisa.org/wp-content/uploads/sites/2/2022/08/AgricMechs\_bangladesh\_V03.pdf

# Achievements during the reporting period

The following sections report on the progress made with implementing activities against the work plan presented to USAID for approval in September 2021. Activities implemented under each Intermediate Result are presented below.

# Intermediate Result I: Competitiveness and efficiency of domestic and private sector-led agricultural machinery manufacturing boosted



The mechanization of agriculture in Bangladesh initially started in the 1960s with the introduction of government-managed low lift irrigation schemes. The pace of mechanization was, however, slow until machinery-importing markets were liberalized and import taxes reduced in the 1980s. This led to a rapid introduction of power tillers and privately managed shallow tubewell irrigation schemes. This was followed in the 1990s by the manufacture within Bangladesh of crop threshing machines and maize shellers, and later by the introduction of imported four-wheel tractors (4WT) and, most recently, combine harvesters. As agriculture mechanization grew in Bangladesh it stimulated the development of a flourishing light engineering sector, not only to manufacture and repair machines but also to manufacture spare parts.

Currently, the country's light engineering sector consists of about 50,000 SMEs meeting about 30% of the total domestic demand. About 2,000 to 2,500 are involved in manufacturing agro-machinery-related items, such as spare parts and simple machines such as crop threshers. The sector is characterized by a large number of micro and small businesses each employing an average of 20 workers; there are also medium-sized businesses representing 16% of the ABLE sector who employ, on average, more than 100 staff. Most ABLE enterprise staff generally have had no formal skills training, while the use of outdated machinery coupled with low workforce skills tend to result in the manufacture of machines and parts of suboptimal quality and providing low levels of productivity.

Taken altogether, this tends to make it difficult for the ABLE sector to compete with imported machines and parts in terms of both quality and price.

As agricultural mechanization expands and machines used grow more sophisticated, development of the light engineering sector into one with more advanced skills and using more efficient manufacturing technology would allow it to compete with imports and expand. This would create decent employment, particularly for women and youth, and support the transformation of the sector into one which is export oriented. At the same time, it would provide Bangladesh with a light engineering sector able to supply machinery service providers with agricultural mechanization technology, which will be used to provide farming communities with labor- and cost-saving mechanization services.

A major focus of the Activity has therefore been on developing the capacity of the ABLE sector to manufacture and market agricultural machinery and spare parts.

# Developing the manufacturing capacity of small- and medium-scale agriculture-based light engineering SMEs

Since the beginning of the Activity, CSISA-MEA has supported 194 ABLE SMEs to develop and expand their business through the provision of training for staff, technical advice, and access to finance.

During Year 2 of the Activity, CSISA–MEA provided technical, business and workforce support to 84 ABLE SMEs in the Feed the Future ZOI. During Year 2, a key lesson learned about how best to achieve this was that it was difficult to provide all enterprises with detailed support and that not all of them wanted it. In Year 3 of the Activity, CSISA–MEA therefore divided its support to ABLE SMEs into two stages.

In the first stage, technical assistance focused on raising the knowledge and skills of the workforce of all the ABLE SMEs partnering with CSISA-MEA. ABLE SMEs participating in stage I starts with the signing of consent letters by the ABLE SMEs, confirming their commitment to receiving training and general technical support from the Activity.

CSISA–MEA uses a rigorous selection process to identify which of the stage one ABLE SMEs might qualify to enter the second stage of the Activity. This involves the collection of information about the enterprise's current business, ambitions, needs, and capacity. The data collected are then used by field office engineers and market development officers to identify the ABLE SMEs best qualified to enter stage 2. To ensure the selection of stage 2 ABLE SMEs is fair and impartial, the process is first reviewed by the field office management team and then by the Dhaka-based management team. After that, a cost-sharing JVA between the ABLE SME and CSISA–MEA is developed and negotiated.

Implementing the second stage support involves:

- 1. conducting a detailed analysis of selected ABLE SMEs' capacity and commitment,
- 2. preparing a program of support that will stimulate the growth of the enterprise,
- 3. providing technical assistance for the identification and implementation of appropriate investments in new equipment, improved factory layout to improve production processes, expansion into new machinery and spare parts markets and, to finance all these investments, by improving access to finance, and
- 4. providing training in key business skills such as inventory control, keeping financial records, customer relations, marketing, and human resource management.

The figure in Annex 3 shows the ABLE SME screening, selection and JVA co-designing workflow process. This is designed to ensure an unbiased and transparent approach to providing ABLE SMEs with tailored support.

# ABLE engagement for stage I support

During its third year (October 2021–September 2022), the Activity expanded its geographic operations into Cox's Bazar and Bandarban districts of the ZOR. Within the ZOI there has been an expansion of activities out of Jashore town and into ABLE SMEs hubs in Faridpur, Kushtia, Khulna and Satkhira districts. A call for EOI in partnering with CSISA–MEA, published in the local media, was responded to by I25 ABLE SMEs. These ABLE SMEs were then invited to attend inaugural workshops (one each in Faridpur, Jashore and Kushtia, three in Cox's Bazar, two in Bogura) at which the CSISA–MEA team explained in detail the activities designed to support business expansion. As a result of these workshops, I10 ABLE SMEs (40 of which are in the Feed the Future ZOR) signed consent letters agreeing to participate in training and technical support programs, including access to markets and access to finance.

Facilitating ABLE enterprise business development though improved access to markets Support for stage one ABLE SMEs has not just been limited to provision of skills training. ABLE SMEs tend to follow a fairly passive marketing strategy, in that they wait for customers to come to them rather than actively seeking custom through advertising. This means their customer base is small, making them vulnerable to market losses if the latter finds another supplier. To help ABLE SMEs diversify their customer base, the Activity facilitated partnerships between ABLE SMEs, and lead firms and dealers, the two primary markets for their products.

# Supporting ABLE SMES to supply parts to lead firms

In Year 2 of CSISA–MEA, JVAs between the Activity, and ACI Motors and The Metal (Pvt) Limited (TML), enabled these two lead firms to visit ABLE SMEs, select the ones they considered would be reliable suppliers of parts, and provide them with samples of the parts they required. As a result, prototypes were made with technical support from CSISA–MEA engineers.

As a result of these agreements with lead firms, I I ABLE SMEs successfully created sales linkages with lead firms and produced quality spare parts in Year 3 of the Activity. However, tangible results in terms of firm orders have been mixed. TML placed orders for 4WT spare parts from four ABLE SMEs (two in Jashore, two in Bogura). ACI determined that the quality of the sample parts manufactured by most of the ABLE SMEs it selected for manufacture of prototype spare parts was good but to date has only placed one order (for 30 combine harvester sprockets) with one ABLE SME (Mohammad Ali Engineering Workshop, Jashore).



CSISA-MEA Jashore engineers show the owner of Mohammad Ali Engineering, Jashore how to use calipers to accurately measure the dimensions of parts he aims to produce for lead firms. Photo Credit: Jashore CSISA-MEA field office staff

More success has been achieved through facilitating the supply of machinery parts to ZOI based medium sized companies, RK Metal, (Faridpur based) and Janata Engineering (Chuadanga based). These fast-growing medium sized companies both manufacture and market relatively simple, low-priced machines such as crop threshers, maize shellers and fodder choppers. Although they can make most of the parts themselves it often makes business sense for them to outsource the manufacture of some parts to other ABLE SMEs.

During the reporting period, CSISA–MEA facilitated linkages between RK Metal and two ABLE light engineering companies in Jashore – Naimun Metal & Engineering Workshop and 3 Star Engineering Workshop – to supply spare parts, resulting in orders being placed for PTOSs, thresher parts and fodder choppers.

Janata Engineering took part in three linkage meetings (two in Jashore with 16 ABLE SMEs participating and one in Bogura with six ABLE SMEs). After the Jashore meetings, it distributed 17 sample spare parts to 13 ABLE SMEs to manufacture a prototype, and when quality standards have been met, it will place bulk orders. At the Bogura meeting it was agreed that the ABLE SMEs would visit the Janata Engineering facility in Chuadanga district.

Meetings were also held with Alim Industries, a major agricultural machinery manufacturer and marketing company from Sylhet in northern Bangladesh, which markets combine harvesters and a range of small machines in the ZOI. It provided 23 spare parts to five ABLE SMEs in Jashore and six in Bogura to copy and produce prototypes of each and send them to Alim for quality testing and ultimately the placement of orders for these parts.

Although support for ABLE SMEs to supply spare parts to lead firms resulted in only a small number of orders being placed by the lead firms a positive result was that many ABLE SMEs with Activity technical support learnt how to make the high-quality spare parts needed for machines such as combine harvesters. The result was, when the Activity facilitated meetings between ABLE SMEs and

dealers, that the ABLE SMEs could offer spare parts that matched imported parts for quality and cost. This resulted in substantial sales.

# **Supporting ABLE SMEs to supply parts to dealers**

During the reporting period, greater success has been achieved through links made between ABLE SMEs and dealers. This has been achieved through linkage events, at which the SMEs displayed their samples and provided information to dealers about the parts and how to reach them to place orders. Through these meetings, 48 ABLE SMEs (19 in Jashore, two in Faridpur, six in Kushtia and 21 in Bogura) were linked with 68 dealers (39 in Jashore, 10 in Faridpur, six each in Kushtia and Bogura, and seven in Cox's Bazar). This resulted in sizable sales of a wide range of spare parts for machines, ranging from tractors, combine harvesters and power tillers to fodder choppers, irrigation pumps, crop threshers and maize shellers. In Bogura, 16 ABLE SMEs sold spare parts and machines worth USD 508,554 through 41 ZOI dealers and nine ZOR (Cox's Bazar district) dealers. In Jashore, 12 ABLE SMEs sold spare parts in the ZOI worth a total of USD 460,817. These spare parts were for 4WTs, centrifugal pump, chopper machine, combine harvester, diesel engine, irrigation, mini power tiller, PTOS machine, brick pulverizing machines and multi crop threshers. This brings the total sales by ABLE SMEs to dealers through links facilitated by the Activity to USD 969,371.5

Other ways the Activity has supported ABLE SME business expansion has been to facilitate learning visits within the CSISA–MEA target regions. Six ABLE SMEs from Kushtia visited four ABLE SMEs in Jashore to increase collaboration and sales for foundry and combine harvester products; 16 dealers from Faridpur, 24 from Jashore and seven from the ZOR went to Bogura to meet ABLE SMEs. The Faridpur team has also been facilitating links between dealers and six ABLE SMEs within the greater Faridpur region and Kushtia. It has also been facilitating sales by RK Metal to Dhaka-based lead firms ACI Motors and Greenland GETCO. These sales were for power tillers, rotary tillers and multi-crop threshers. RK Metal also exported three Aashkol jute fiber extractors to India through a contact provided by CSISA–MEA.

The Activity also formed a WhatsApp group for each intervention district, to initiate collaboration and serve as a platform for self-learning and information-sharing. Each group comprises managers and owners of ABLE SMEs and members of their workforce. At the time of writing there are a total of 294 members including 107 in the Cox's Bazar group, 47 in the Faridpur group, 99 in the Jashore group, and 41 in the Bogura group.

# ABLE Engagement for stage 2 support

Of the 84 ABLE SMEs which participated in the Year 2 program, 16 have been selected as stage 2 program partners. Of these, eight in Jashore and three in Bogura have signed JVAs, while three in Bogura and two in Cox's Bazar have negotiated agreements with the Activity but have yet to sign a JVA.

Table 1: ABLE SMEs who have or will soon sign JVAs with CSISA-MEA

ABLE SMEs which signed JVAs in Year 3	ABLE SMEs yet to complete the JVA signing process:
Jashore	Bogura
Wohab Engineering Workshop	Sarkar Agro Engineering and Multiple Works
Shilpi Metal Foundry	Rony Engineering & Machineries
Ripon Engineering Workshop	Rahmaina Engineering Workshop
New Rifat Engineering Workshop	
Naimun Engineering Workshop and Foundry	
Latif Engineering Workshop	
Rahman Foundry and Engineering Workshop	
Mohammad Ali Engineering Workshop	
Bogura	Cox's Bazar

Sonny Trade & Engineering	MM Engineering Workshop
Hannan Engineering Workshop	Kazi Agritech
Mayer Doa Engineering and Iron Store	_

In Jashore, the Activity supported eight ABLE SMEs to assess their business development needs (inventory management, business linkages, soft skills training, and access to finance readiness) and technical support needs (heat treatment, sourcing of quality raw materials, pattern and dye support, and layout and installation support for capital machinery). The findings from these assessments guided the development of IVAs between the ABLE SMEs and CSISA–MEA.

### Provision of technical support to Stage 2 ABLE SMEs

### Access to capital machinery

#### Induction furnaces:

Foundries in the light engineering sector mainly use coal fired cupola (blast) furnaces to melt metal. An alternative is the electrically powered induction furnace, which is less polluting than the cupola (blast) furnace and also allows for better control of the chemical composition of metals. In addition, induction furnaces can be used for steel and aluminum, expanding the materials that these foundries can cast. To encourage a switch to induction furnace use, during the reporting period the Activity arranged for 10 ABLE enterprises (four from Jashore, six from Bogura) to attend a training program at 3 Star Engineering Workshop in Jashore where an induction furnace had recently been installed. The training was given by the India company who installed the furnace. As a result of this training, Reza Engineers, Al Madina Metal Works, and Kamal Metal Work from Bogura have ordered between them a total of five induction furnaces from India. Construction work is ongoing, and the installation of the furnaces will be completed in November 2022.



Newly installed induction furnace at 3 Star (SMR Agro Engineering), Jashore. Photo credit: Md. Khalekuzzaman, Officer Market Development (OMD), CSISA-MEA, Jashore

#### Other capital equipment

In Jashore, CSISA–MEA supported seven ABLE SMEs in the purchase and installation of 28 machines including lathes, hydraulic power presses, plasma cutters, sheet rolling machines and induction furnaces.

CNC-aided machines enable the accurate manufacture of expensive but fast-moving agricultural machinery spare parts currently not produced in Bangladesh. They save time, labor and input costs and reduce dependency on imports, creating employment for the Bangladesh workforce. Following a visit by 17 ABLE enterprises to the BITAC training center in Dhaka facilitated by CSISA–MEA to see CNC machines in action, three enterprises in Bogura – Reza Engineers, Al-Madina Metal Works, and Rony Engineering Workshop – have ordered five CNC lathes and milling machines from Haas, a USA company. Two CNC machines have already arrived from the USA, and it is anticipated that all five will be operational by November 2022. To operate the machines, these three enterprises have contracted five trained and skilled designers and CNC machine operators using contacts provided by CSISA–MEA.

Since joining the Activity in Year 3, Janata Engineering, Chuadanga district, has bought a press brake for sheet metal forming and a forging machine to punch and stamp parts from a manufacturer of these machines in Chattogram. It has also purchased a Chinese-manufactured CNC plasma cutter through Alim Industries in Sylhet, and has added a number of lathes and mills, some with digital readouts. CSISA–MEA has supported Janata with the selection and acquisition of these manufacturing machines. Janata Engineering is also one of CSISA–MEA's training providers, with a purpose-built training facility.





CNC plasma cutter installed at Janata Engineering, Chuadanga.

Photo credit: Abdul Kader, Machinery Development Officer (MDO), CSISA–MEA, Jashore

Developing new product lines by facilitating technical support for ABLE enterprises from public research and development institutions

CSISA-MEA facilitated partnerships between four ABLE SMEs in Jashore, lead firms, and Bangladesh Agricultural Research Institute (BARI) to support the workforce to make high quality standard parts for CH centrifugal irrigation pump parts, fodder choppers multi crop threshers and mini power tillers.

CSISA-MEA also facilitated a visit by the BARI farm mechanization unit to 3 Star Engineering Workshop to observe its manufacturing processes and capacity, product quality, and workforce capacity. During this visit BARI showed the ABLE SME how to apply for government subsidies.

In Bogura, the Activity supported two ABLE enterprises – Mayer Doya Iron Stor and Hannan Engineering – to obtain technical support from Rural Development Academy (RDA) in technical drawing, machinery design, and the design of manufacturing systems for fodder chopper and mechanical weeding machines. Through this support these enterprises were able to add these machines to their product lines.

The Activity team in Bogura facilitated the signing of an agreement between Sonny Trade & Engineering and the BITAC Bogura office to teach their staff how to read engineering drawings and select raw materials. As a result, they are now manufacturing seven different spare parts for diesel engines.

# Organizing study visits for ABLE SME managers to the public sector institutes

The Activity arranged for five ZOR-based ABLE enterprises to visit the farm mechanization units of Bangladesh Agricultural University (BAU), BARI and Bangladesh and Rice Research Institute (BRRI). They also visited the Nawabpur district of Dhaka to meet spare part wholesalers and service providers that offer 3D printers, CNC laser cutters, CNC milling and CNC turning machine services.



ABLE SME staff viewing farm machinery developed by BARI, Farm Machinery and Post-Harvest Division.

Photo credit: Shahabuddin Shihab, MDO, CSISA—MEA, CXB

ABLE SME staff viewing manufacturing machinery at BRRI, Farm Machinery and Post-Harvest Division.

Photo credit: Shahabuddin Shihab, MDO, CSISA-MEA, CXB

#### Steel heat treatment and hardness testing service providers

To improve the quality of steel products, it is often necessary to subject the metal to high temperatures, a process called heat treatment. Most ABLE enterprises do not have access to heat treatment facilities, as a result many of the parts they produce are of poor quality. In Bogura, the Activity team identified two organizations – BITAC and Wohab Engineering Workshop – who have heat treatment facilities and arranged for five ABLE SMEs supplying TML and ACI Motors with spare parts for heat treatment. In Jashore, two ABLE SMEs received heat treatment services from BITAC and KIAM Metal enabling them to produce improved sprockets for combine harvesters and pinions for reapers.

#### Mold pattern service providers

In Jashore, eight ABLE SMEs were linked with two foundry mold pattern developers – Mofiz Pattern and Akbar Pattern Works – for the production of mold patterns. This support allowed the ABLE SMEs to fabricate for the first time 36 different types of spare parts for combine harvesters and 4WTs.

# Supporting ABLE SMEs to gain access to quality raw materials

Raw materials are an issue in both metal machining and casting processes. Due to the high import taxes and duties on imported metals, the bulk of metal raw materials in Bangladesh are obtained from shipbreaking operations in Chattogram. However, at the point of purchase, their composition is unknown, which, as most ABLE SMEs have no test laboratory, leads to difficulties in producing quality castings and products. A report commissioned by the Activity from consulting company Inspira showed that large amounts of ferrous and non-ferrous materials of unknown composition are used by foundries and machine shops in Bogura and Jashore areas; this leads to reduced quality of the finished parts, reducing their desirability in the marketplace. National-level policy changes are required to allow the introduction of metal certification standards for metals from shipbreakers and to reduce import

taxes and duties. These actions would enable ABLE SMEs to manufacture higher quality products that meet domestic and international market expectations and hence increase sales, the competitiveness of ABLE SMEs and lead firms, and the economy of Bangladesh.

Findings from the study were used by the Activity to improve access to raw materials for ABLE SMEs, and to identify cost-appropriate procurement options. Through support from CSISA–MEA, four ABLE SMEs in Jashore were linked to 26 sources of higher-quality raw materials from which they now regularly order supplies.

# Developing the capacity of ABLE SMEs to supply lead firms with parts for machines they sell

Diversifying the customer base of ABLE enterprises by linking them with lead firms, dealers, and MSPs seeking a supplier of machines and spare parts is only part of the support ABLE enterprises need. They also require support for the manufacturing of these parts. The Activity is developing the manufacturing capacity of ABLE enterprises by direct engineering consultation and the design of factories.

### Direct engineering consultation.

The recent introduction of 4WTs, combine harvesters, and rice transplanters has created a demand for spare parts for these machines; however, these are currently largely imported, which is a lengthy and costly process. ABLE enterprises responding to demand from MSPs have tried to fabricate some of the most commonly required parts: the combine harvester cutter bar blades and the rice transplanter seedling planting claw. As the figure below shows, ABLE enterprises are unable to reproduce the combine cutter bar blades to the quality required. To facilitate ABLE enterprises to manufacture these spare parts, a graduate student at Georgia Tech was engaged as part of his Master's degree thesis to analyze the manufacturing processes for them. This work required the reverse engineering of the components to determine the type of metal and the processes used. Economic and technical analyses were performed to determine the most appropriate set of processes for the Activity's lead firms and ABLE SMEs to use. These analyses were performed for different production levels: low volume which translates into mostly manual operations; medium volume which combines manual operations with some automatic equipment such as CNC; and high volume which relies mostly on CNC and automatic machinery. Forming dies were also designed, analyzed, fabricated, and tested at Georgia Tech to prove the designs. This work is described in Schalch, W. (2022) "Analysis of Manufacturing Methods and Die Design for Agricultural Parts in Bangladesh," M.S.M.E. thesis, Georgia Institute of Technology and be found through this link: <a href="http://hdl.handle.net/1853/67284">http://hdl.handle.net/1853/67284</a>



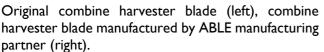
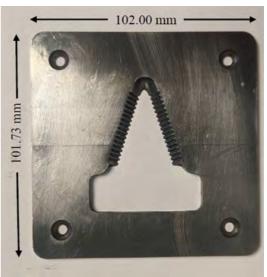


Photo credit: W. Schalch, post graduate student, Georgia Tech, USA



Combine harvest cutter blade forging punch plate.

Photo credit: W. Schalch, post graduate student, Georgia Tech, USA



Prototype cutter blade made at Georgia Tech. Photo credit: W. Schalch, post-graduate student, Georgia Tech, USA

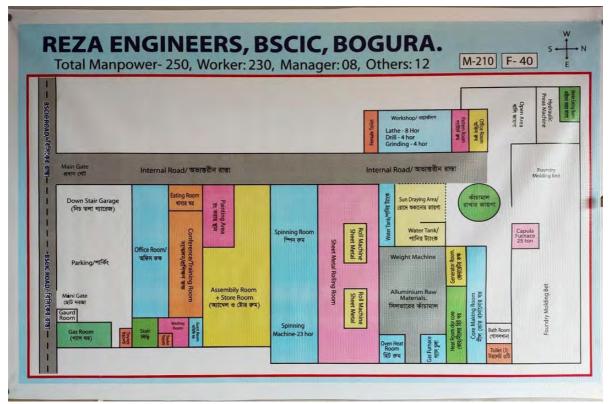


Original cutter blade supplied by CH manufacturer.
Photo credit: W. Schalch, post-graduate student

#### Factory design.

CSISA-MEA staff have also supported the design of new factories being erected by MSFs and ABLE enterprises. Reza Engineering Limited, Bogura, a potential CSISA-MEA stage 2 partner, is re-organizing its entire facility, including the machine shop, metal working shop and foundry. It is adding a separate section exclusively for the use of women to work in sand casting mold preparation, which will include separate toilets, a changing room, and child-care facilities.

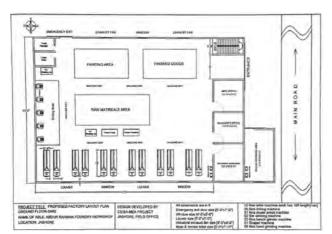
Georgia Tech, USA



The new layout for the Reza Engineers workshop in Bogura produced with support from CSISA-MEA engineers.

Photo credit: Arifur Rahman, MDO, CSISA-MEA, Bogura

Similarly, A. Rahman Foundry, Jashore, is constructing a new machine shop. With the help of Georgia Tech-trained CSISA-MEA engineers, the foundry's management has co-designed its layout. This facility will expand the company's ability to be more productive and manufacture products at a higher level of quality than could previously be achieved.





CSISA-MEA Engineers (right) discuss with the owner of A. Rahman Foundry's the layout (left) of the new machine shop building currently under construction, Jashore. Photo credit: J. Colton, Professor, Georgia Tech, USA

After participating in management training, Kushtia Engineering Works significantly upgraded its factory, raising and leveling the floor, installing brick flooring, installing concrete foundations underneath the machines, and spacing the machine tools to provide a safer and better work environment. Kushtia Engineering Works is now one of CSISA–MEA training providers and reports a happier and more productive workforce and increased profits.



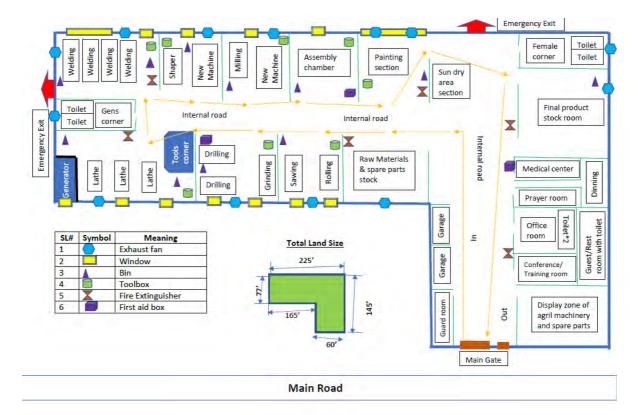
The renovated workshop at Kushtia Engineering Works showing a recently purchased lathe.

Photo credit: J. Colton, Georgia Tech, USA

#### Climate-smart factory design.

The Activity is working with RK Metal to develop a climate-smart factory design for a new factory it plans to build. Currently in Bangladesh, a typical factory is fabricated from steel beams and concrete blocks, with corrugated metal sheets for the sides and roof. While this is relatively inexpensive, it is not environmentally sound and provides little relief from the intense heat and humidity for the workers toiling inside. CSISA–MEA will facilitate a design that is softer on the environment by working with forward-thinking architects to create buildings that take advantage of natural ventilation to cool the buildings and remove smoke and other pollutants and use materials such as mud brick to disperse the heat and keep the building cool. The factory design will also incorporate solar panels on the building's roof to reduce its dependency on unreliable national grid electricity supplies and diesel-powered generators. Finally, and very importantly, CSISA–MEA will take this opportunity to design the facility to be welcoming and inclusive for women, youth, and the differently-abled.

Activity engineers and Prof. Colton have produced two iterations of potential factory layouts and will work with RK Metal and the architects as the project progresses in Year 4. The aim will be to create a showcase climate-smart factory that could be copied by other ABLE SMEs across Bangladesh.



Preliminary factory floor layout prepared by CSISA-MEA engineers in collaboration with RK Metal owners for the new climate-smart factory that RK Metal plan to build near Faridpur before the end of the year. Photo credit: K. Tamanna, MDO, CSISA-MEA, Faridpur

#### Utilizing light engineering waste to reduce environmental impact

Slag is a by-product of the foundry casting process and consists of glassy oxides. A major use of slag is to construct roads, but much of it is disposed of in the countryside, thereby damaging and degrading the environment. ZH Star Bricks and Blocks in Bogura is collecting this material from foundries to replace half of the stones used in making construction bricks and paving blocks. Compared to clay bricks, these blocks are less expensive (BDT I–2 per block) and, because they are larger, fewer blocks are needed to build a structure. In Activity Year 3, CSISA–MEA staff developed a computer program to optimize the routing of trucks to collect the slag based upon cost (if any), the amount needed, and the distance between the block manufacturer and foundries in the Bogura area. This reduces the cost and time required to provide the raw material, potentially increasing profitability and reducing environmental damage.



Equipment to manufacture cement blocks using slag at ZH Star Bricks, Bogura. Photo credit: J. Colton, Professor, Georgia Tech, USA



CSISA-MEA logistics optimization tool screenshot. Photo credit: A. Al Faisal, Computer Technician CSISA-MEA, Dhaka

# **Developing financial services for ABLE SMEs**

During its third year, the Activity facilitated loans from nine financial service institutions totaling USD935,295 to 29 ABLE SMEs, two dealers and 20 MSPs, 17 of whom were women. This brings the total amount of finance accessed the Activity through the facilitation of links between FSIs and ABLE enterprises, dealers and MSPs by the activity to USD1,492,236.

#### Access to Finance study

For many banks and other financial institutions, financing the relatively small loans that regionally based ABLE SME businesses need is costly and, given they are often financially insecure, risky. In addition, the financial records of ABLE SMEs are often not good enough for them to demonstrate to lenders that they have a viable business capable of repaying loans. From the perspective of ABLE SMEs, the need to provide collateral, often in the form of a property mortgage, deters owners from taking out a bank loan. As a consequence, many ABLE SMEs either take out short-term loans from MFIs (which attract high interest rates) or use finance from business earnings. In both cases, the finance that they can raise is small, making it difficult to raise the funds they would need to purchase new machinery or expand their business premises.

To gain a better understanding of the issues affecting borrowers and lenders, and to identify ways to address constraints to access to finance affecting all agricultural machinery value chain actors in the ZOI and ZOR, the Activity commissioned a study from LightCastle Partners. The full report and a PowerPoint presentation that summarizes the findings are available on the CSISA website: <a href="https://csisa.org/5297-2/">https://csisa.org/5297-2/</a>

The study found that between 36% and 40% of workshop ABLE SMEs have been able to gain finance from banks. For foundries, which in general are larger enterprises, between 36% (in Jashore) and 78% (in Bogura) obtain finance from banks. Most ABLE SMEs (73% to 80%) want to expand their business, all of which would like to do so by utilizing a bank loan. Most of those with bank loans did not face a challenge obtaining them. However, approximately 27% to 29% did, with the most difficult challenges being lack of collateral, followed by inadequate documentation. The study recommended testing three different ways of providing finance to ABLE SMEs and MSPs:

I. loans provided by banks, with a buy-back guarantee provided by the machinery marketing company in the event the MSP was unable to repay the loan.

- 2. loans provided by an MFI to the MSPs, with the MFI offering a larger loan and better repayment terms in exchange for earning a commission when they sold a machine through the loan to an MSP.
- 3. investments in ABLE SMEs by venture capital companies on a profit-sharing basis.

# Improving financial record-keeping

To improve financial records, BRAC Bank through a JVA with CSISA–MEA provided training in financial management to 91 ABLE SMEs (22 from Jashore, 39 from Cox's Bazar and 30 from Bogura) that participated in the orientation session that conducted by BRAC Bank in September 2022. Participants learned about financial record-keeping and the financial products offered by financial institutions.

#### **Inventory management**:

One problem for many ABLE SMEs is that they cannot show FSIs how much inventory stock they hold and the amount of stock they buy and sell. This makes it difficult to determine the size and viability of the building, resulting in loan applications being rejected. To overcome this problem the Jashore CSISA—MEA team showed five ABLE enterprises how to maintain financial records and assisted three stage 2 ABLE enterprises to digitize their financial record-keeping systems, including inventory management. One ABLE SME in Jashore began category-based stock maintenance and built specialized shelving for improved storage for spare parts. In Bogura the CSISA—MEA team conducted a short survey of current inventory management systems, based on which it decided to develop a paper-based, stock book, management system. This was designed in collaboration with six ABLE enterprises who had shown an interest in improving their management systems. This stock book system is now being implemented by the ABLE enterprises.

### Support for access to finance

In Year 2, the Activity supported I3 ABLE SMEs, two dealers and six MSPs to obtain loans. In Year 3, to support financial services institutions (FSIs) to identify suitable clients by using a screening system developed in Year I of the Activity, CSISA—MEA compiled a list of ABLE SMEs considered capable of repaying loans. This list was given to FSIs that expressed interest in financing ABLE SMEs. The screening process involves first assessing the needs of ABLE SMEs and MSPs and then presenting information about their specific loan requirements and business capacity to financial service institutions. By identifying gaps, these institutions are able to provide direct support to ABLE SMEs in terms of documentation, asset management and the application process.

All this investment in manufacturing and equipment requires finance. During Year 3, the Activity facilitated links between 65 ABLE SMEs (33 in Jashore, one in Faridpur, 22 in Bogura, nine in Cox's Bazar), two dealers (one in Jashore) and 33 MSPs (including 14 women) with financial institutions (IDLC, BRAC Bank, City Bank, TMSS, RRF, Agrani Bank, Islamic Finance and Investment, VPKA Foundation and iFarmer). Through these linkage events and the support provided by the Activity, USD 363,529 was disbursed to 12 ABLE SMEs in Jashore, USD 90,588 to five ABLE SMEs in Faridpur and USD 412,941 to 12 ABLE SMEs in Bogura. In addition, three dealers in the ZOR (Cox's Bazar) received loans facilitated by the Activity from BRAC Bank, NRBC Bank, and microfinance institute ASHA, worth USD 49,412.

An interesting lesson learnt from this activity was that the interest rate offered by FSIs to SMEs varies widely and most do not receive loans at the 4% rate specified by the Bank of Bangladesh SME-support program. This problem is well-illustrated in the table below, which shows the loans provided to 13 CSISA–MEA partner ABLE enterprises and the interest rates that have been applied to their loans.

Table 2: Loans provided to Bogura-based ABLE SMEs and interest rates charged

Name of FI	Name of ABLE	Loan Amount (Equivalent in USD)	Interest Rate (%)
BRAC Bank Limited	Rony Engineering Workshop	69,307	9
	Rahmania Engineering Workshop	29,703	7
	Hannan Engineering Workshop	4,950	4
IFIL	Yousof Metal	99,010	6.5
	Safayet Engineering Workshop	19,802	6.5
IDLC	A Rahman Metal & Engineering Workshop	49,505	4
GUK	China Metal	14,852	12
	Rahad Machineries and Metal	10,891	8
	Rahmania Engineering Workshop	10,891	8
	Rosy Metal	10,891	8
	Sarker Agro industries	4,951	12
	Shoron Engineering Workshop	10,891	8
	Reza Engineers	11,881	8
Total Loan Am	nount (USD)	347,525	

The interest rates applied are determined by the size of the loan given and the level of risk of default determined by the FSI. A new activity planned for Year 4 of the activity will be to ensure more of the partnering ABLE enterprises access the 4% interest rate given through the Bank of Bangladesh SME stimulus package.

## **In-focus success story**

The ambition of youth supported by the USAID-funded agricultural mechanization initiative to build the light engineering industry in Bangladesh

Md. Abdul Hannan (age 29) developed his understanding of light engineering (LE) as a child, working in several workshops in Bogura. He had never received any formal education and nobody taught him how to run a light engineering business. Despite this he had had enough ambition and self-belief to enable him to start his own business making multicrop engine powered threshing machines. After

opening his business in 2018 called M/S. Hannan Engineering Workshop he found it challenging to train his staff, acquire new clients, get access to finance, and market the machines. In 2020, Hannan and eight of his employees were given training in light engineering skills by the USAID Cereal South Systems Initiative for Asia Mechanization and Extension Activity (CSISA-MEA). This training proved to be so useful that it enabled his business to improve the quality and quantity of machines he manufactured. He also made his workshop a safer place to work in by implementing the occupational health and safety measures recommended by CSISA-MEA during this training. He then realized that to fully utilize this improved capacity he needed better



Above: Hannnan working in his workshop in Bogura. Photo taken by Mahajabin Khan

business management and marketing skills. He was therefore delighted when CSISA-MEA offered him training on business management, communication, network building and event management skills. He also actively participated in CSISA-MEA-facilitated events that linked light engineering enterprises with banks resulting a loan from BRAC bank being negotiated.

As a result of this training and technical support he made some well-informed business decisions. that included, with technical support from CSISA-MEA engineers, the purchase of a bench grinding machine and a drilling machine further improving the capacity of the business to make higher-quality products.

To develop the market for his machines CSISA-MEA helped him set up a social media corporate site. This was a great success, raising the profile of his business and capturing new customers, even during the COVID-19 crisis, from all over Bangladesh. Finally, with technical support from CSISA-MEA engineers he has upgraded his Power Threshing Machine, from a one acre of crop per hour machine to a 1.5 acres of crop per hour machine.

This combination of new manufacturing business management and marketing skills has all resulted in production going from 70 threshers sold each year to 100 threshers sold in 2022 and income rising from USD75,000 to USD90,000.

Hannan said, "It wasn't just me who made this happen; my team and I received all of the training support from CSISA-MEA, which boosted our competence."

Hannan is an example of the more than 600 skilled workers and business owners who have received training from this mechanization initiative supported by USAID funded Feed The Future Initiative.

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

Following the work initiated in Year 2, the Activity has developed prototypes of mechanical jute fiber extractors, onion seedling transplanters and garlic clove planters. It has also been supporting two lead firms, RK Metal of Faridpur and TML, manufacture and market the Aashkol jute fiber extractor.

# Jute fiber extraction machinery.

Jute is cultivated for its fiber and is the basis for a major jute processing industry in the ZOI. This part of Bangladesh, centered around greater Faridpur and Jashore regions, produces 33% of global jute production. Jute fiber is normally extracted from jute stems by first submerging them in water for about two weeks (a rotting process called retting), after which the fibers are manually pulled away from the pith of the stem, leaving bundles of fiber and the pith, known as the jute stick. Jute sticks are widely used as fuel, fencing, supports for climbing plants, and the manufacture of particle board.



Traditional jute retting in ponds. This highly labor-intensive work takes two weeks and renders the water heavily polluted.

Photo credit: Md. Abdul Mabud, ADO, CSISA-MEA, Faridpur

In 2020, CSISA–MEA partnered with Practical Action Consulting Bangladesh (PAC) to support machinery manufacturing companies to design, test and market a jute fiber extraction machine, the Aashkol, which PAC had re-engineered from an imported machine. During Year 3, the Activity facilitated partnerships between BARI and two agricultural machinery manufacturers, RK Metal and Kamal Machine Tools, to further improve upon the original design and to manufacture and market the Aashkol machine. This led to sales of 25 Aashkol machines, some of which are the first to be sold. This positive result will be built upon in the upcoming year, as the Activity works to increase awareness of the machine among jute farmers.



The newly developed small version of the Aashkol jute fiber extraction machine manufactured by RK Metal, being used by an MSP, Faridpur district.

Photo credit: Dipongkor Ghosh, , Manager, RK Metal, Faridpur

One issue with the Aashkol machine is that it breaks the jute sticks, making them difficult to use and sell. To address this, Professor Jonathan Colton of Georgia Tech led a group of Georgia Tech students to develop a prototype jute decorticator machine that does not break the jute stick. The prototype was shipped to Bangladesh and delivered to RK Metal and Activity engineers in Faridpur for field-testing and modifications. The prototype was found to strip the fibers from the jute successfully, but the extraction rate was much slower than the Aashkol machine. The machine has been further modified in a partnership facilitated by CSISA–MEA between BARI and RK Metal and field-tested again. Manufacture of the modified machine will start in time for sale of machines before the next jute harvesting season in August 2023.

# Horticultural crops

Georgia Tech is also leading research with CSISA-MEA engineers and scientists from BARI to develop an onion seedling transplanter and a garlic clove planter.





Testing the jute machine co-designed and fabricated by BARI, RK Metal, KMT and Georgia Tech. Photo credit: BARI

Honorable Minister Dr. Muhammad Abdur Razzaque, Ministry of Agriculture, is shown the jute sticks extracted whole by the jute decorticator designed by BARI in partnership with RK Metal, with CSISA—MEA engineering support. Photo credit: BARI

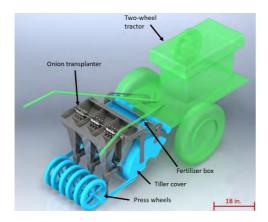
Onion seedling planters. Like rice seedlings, onion seedlings can be grown as mats, which are then manually transplanted. The Activity developed the idea of transplanting onion seedlings with a rice transplanter, but these trials were only partially successful, with good insertion of the seedlings into the ground but with damage to the succulent stalks.

In parallel, a Georgia Tech post-graduate student designed and built a prototype machine to transplant onion seedlings as an attachment to a 2WT. The machine was tested in a purpose-built test fixture at Georgia Tech. The results were promising, with approximately 50% proper seedling placement. The device has been shipped to Bangladesh for further testing and potential modification. This work is described in Stubbs, S. (2022) "The Design and Testing of a Mechanized Onion Transplanter for Bangladesh," M.S.M.S.<sup>1</sup> thesis, Georgia Institute of Technology. A copy of the thesis can be found through this link: <a href="http://hdl.handle.net/1853/67282">http://hdl.handle.net/1853/67282</a>

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<sup>&</sup>lt;sup>1</sup> Masters of Science in Mechanical Engineering.

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CAD rendering of Georgia Tech onion seedling transplanter. Photo credit: S. Stubbs, post-graduate student, Georgia Tech, USA

Field-testing of self-propelled garlic clove planter showing the modified cups. Photo credit: J. Colton, Professor, Georgia Tech, USA

**Garlic clove planter**. The Activity purchased three types of Japanese and Chinese made commercial garlic planting machines – manual, self-propelled, and 4WT attached – to test their suitability in the Bangladesh context. Field tests of the manual and self-propelled machines were partially successful but showed that there was a need to modify the cups that scoop up the garlic cloves. These were designed to pick up the large cloves in used in China and Japan. The cloves used in Bangladesh are much smaller and so, when used with Bangladesh cloves, they pick up more than one clove at a time resulting in more than one clove being planted in each planting hole. The cups that pick up the cloves were therefore made smaller. Modifications were also made to reduce the machine's vibrations that were causing cloves to jump from the cups.

# Supporting foreign investment in agricultural machinery manufacture and marketing

A number of attempts have been made during the reporting year to encourage investment by foreign companies in the Bangladesh light engineering sector. These have included discussions with John Deere Tractors, several venture capital companies including Bangladesh Angels and Truvalu Enterprises, Ltd, an Italian company selling mobile grain driers, and subcontinent agricultural machinery manufacturers. The most successful interventions so far have been:

Lincoln Electric: This Cleveland, Ohio-based company is one of the largest manufacturers of engineering tools, including welding equipment in the USA. As well as selling equipment, it has developed a large range of teaching aids which it uses to inform its customers on how to use the equipment. To make use of this resource, Georgia Tech has incorporated Lincoln Electric's training material into the Activity's ABLE workshops, which may lead to the ABLE firms purchasing Lincoln's supplies (such as welding rods) and equipment (such as welding machines). As part of the collaboration with Lincoln Electric, the Activity purchased welding training equipment, which uses virtual reality equipment to support trainees to develop their skills without actually having to use welding tools. This equipment was extensively trialed in a number of workshops and was well received.

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Young and young in mind at L Krishi Parts, Jhenaidah learning how to weld using Lincoln Electric virtual reality welding training equipment. Photo credit: Md. Hafijur Rahman, MDO, CSISA-MEA, Jashore

The Lincoln Electric agent in Bangladesh is the Chattogram-based company, AZN Corporation, which has a partnership with the Ministry of Education to support Premier University in Chattogram to initiate light engineering training programs using Lincoln Electric training aids. A delegation from Lincoln Electric visited Bangladesh in September 2022 to discuss this partnership and to meet senior staff from CSISA–MEA. At that meeting, the possibility of the Activity partnering with Premier University to give advanced training to ABLE SME staff was discussed.

LandForce: The Activity facilitated a visit to India by Janata Engineering, three ABLE SMEs and one dealer to see the agricultural machinery manufacturing factory of the Amargarth, Punjab, India-based Landforce Group. LandForce manufactures among other 4WT drawn machinery the Happy Seeder planter, designed to plant crops with minimal tillage. The aim of the visit was to observe a modern agricultural machinery manufacturing facility with a view to building similar facilities in Bangladesh, and to explore the possibility of partnerships with LandForce for both the marketing in Bangladesh of LandForce agricultural machinery and the manufacture of their machinery in Bangladesh.

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



#### Technical skill training for ABLE company staff and management

The light engineering sector in Bangladesh is largely composed of many thousands of small workshops that employ a workforce, mainly composed of young men, who have learned their skills from older workers in the same workshop. Poor practices and skills are passed from generation to generation, resulting in low quality work. This makes it difficult for the light engineering sector to compete with imported parts and machines. To address this issue, a major focus of the Activity has been on improving workforce skills for ABLE SME partners.

Since the start of the Activity in October 2019 to the end of this reporting year on 30 September 2022, the Activity has facilitated the training of 1,352 workforce staff members from 194 ABLE SMEs in machinery manufacturing skills. Of these, 60% were under 29 years old (classed as youth) and 16% were women. In addition, 151 managers and owners of 133 ABLE SMEs received managerial skills training. Details of the training provided in Year 3 of the Activity are given below.

In Year 3 the training program has increased in both size and diversity. It now includes not only skills training for workforce staff in the ZOI but also workforce skills training in the ZOR, and training of ABLE enterprise owners and managers in both the ZOI and ZOR in a wide range of technical and managerial skills.

### Key lessons learnt from the first two years of the training program

In the first two years of CSISA–MEA, the Activity provided 512 members of machinery manufacturing enterprises in Jashore and Bogura towns with training in basic machinery manufacturing skills. Implementing this training afforded CSISA–MEA staff the opportunity to learn important lessons that have been incorporated into a revised curriculum for this year's training. The main lessons learned are:

I. It was expected that members of the workforce trained by TSPs would train their co-workers, but they found it difficult to find time to do so. However, they do teach their co-workers informally, by supplying technical advice and correcting mistakes.

- 2. It was also expected that training held in the evening would allow the workforce to attend without disrupting production; however, this meant that training came at the end of a long and tiring day, and participants found it hard to focus on learning. With this in mind, training in Year 3 was instead held over two full days, every weekend for four weeks.
- 3. Initially women workers were not allowed to attend the training by their employers and anecdotal evidence suggested that some women's families objected. The Activity conducted a study to better understand employers' resistance to allowing their female members of staff to attend training. The results showed that owners did not consider the type of training being offered relevant but instead suggested they should be given training in grinding and fettling (removing sand from cast parts and polishing them) as well as the use of spray gun painting.
- 4. Knowledge of Operational Health and Security (OHS) is not new to ABLE SMEs. However, implementation is a challenge at both worker and management levels. To address this, separate sessions were arranged for the two groups to facilitate their understanding of the negative effects of ignoring OHS practices.
- 5. ABLE SMEs considered some of the lessons given during the training programs irrelevant to their specific needs, and that more practical work and less theory was needed. The Activity has responded by removing lessons from the curriculum considered not useful and reduced the amount of theory taught. These revisions reduced the length of training from 108 to 72 hours in Jashore and 78 hours in Bogura (the curriculum for foundry worker training stayed the same and its duration remains at 42 hours).

# ABLE enterprise training in the Zone of Influence and Bogura

#### Workforce training in machining skills

In Year 3 the Activity partnered with two NGO TSPs – GUK in Bogura and RRF in Jashore and Faridpur – and two agricultural machinery manufacturing companies – Janata Engineering in Chuadanga and Kushtia Engineering Works in Kushtia – to provide basic machine shop and foundry skills training to 520 workers from 110 ABLE SMEs.

Figure 2: Results of test to assess participants' knowledge of machining skills before and after training (340 respondents) in both Zol and Bogura

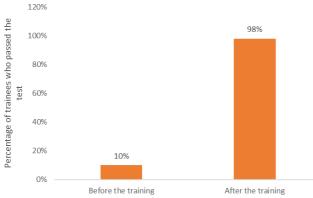


Figure 2 presents the results of the test to assess participants' knowledge of machine working before and after training. It shows that only 10% of the trainees passed the test before the training, while 98% of the trainees passed the same test given after the training.



Practical training in the use of machining tools at Reza Engineers, Bogura. Photo credit: Arifur Rahman, MDO, CSISA-MEA Bogura

# Training workers in Bogura in basic foundry skills

In Year 3, Bogura-based leading foundries Reza Industries, Uttara Metal Industry and Kamal Machine Tools provided 220 foundry workers with 42 hours of training in foundry skills. Jashore foundries partnering with CSISA–MEA received this training in Year 2.

A post-training evaluation of participants' foundry skills showed that they all answered more than 60% of the questions correctly, compared with only 7% before the training.



Practical foundry skills training, at Yusuf Metal Works, Bogura. Photo credit: Fazlul Karim, MDO, CSISA-MEA, Bogura

Gender equality and social inclusion through customized training to women and transgender workers: To support the women and transgender employees working in the extremely challenging physical and social conditions present in ABLE enterprise workshops, CSISA–MEA has continued to facilitate the training initiated in Year 2 in the techniques that the owners said their women and transgender workers need. The Activity started in Year 2 by providing women and transgender workers with a one-day training program in spray gun painting. With a view to identifying additional skills that women could be usefully encouraged to develop, the Activity had another discussion with employers and added 'Grinding and Fettling' as new skills training in Year 3.

Figure 3: Results of test to assess participants' knowledge of painting, grinding and fettling skills before and after training given in Bogura to women foundry worker



Figure 3).

Grinding and fettling is an operation which removes sand and smooths the surface of the products ready for painting after they have been 'cast' in the foundry. The most common type of grinders used in the foundries are hand grinders and bench grinders. Facilitated by CSISA–MEA, women and transgender workers were trained in using these two types of grinding techniques. They also learnt modern fettling processes such as water blast cleaning, sandblast cleaning and shot blasting, Training in spray gun painting, grinding and fettling skills was given to 139 women and one transgender workers. About 60% of the trainees who enhanced their spray gun painting, grinding and fettling skills have started to use them (see

The figure indicates that the trainees improved their knowledge and 98% of them answered more than 60% of the questions correctly.



Foundry workers using grinding and fettling skills learnt during CSISA-MEA-facilitated training in Bogura.

Photo credit: Moksedul Alam Arafat, CSISA-MEA, Field Office Coordinator, Bogura

#### Impact of basic machining and foundry skills training on the livelihoods of workforce staff

The Activity conducted a survey to determine the impact of the training on the quality of work done by trained workforce and on their livelihoods and social capital in August 2022. It interviewed 250 trainees (160 in Bogura, 90 in Jashore) of the 509 workforce staff members trained from the start of CSISA–MEA up to 30 April 2022. The full report is available in Annex 4.

The survey showed that not only had the ability of trainees to manufacture quality products increased significantly, but so had their employment prospects, social status, and quality of life outside the workplace.

- 1. **Skills once learned are not forgotten.** Almost all respondents could answer questions correctly about the key technical skills involved in machining and foundry work. They had not forgotten what they had been taught.
- 2. **Quality and quantity of output increased**. Almost all respondents considered the quality (97% of respondents) and quantity (80% of respondents) of their work had increased.
- 3. Valued employees. Increased skills made the trainees both more valuable to their employees and more employable; 32 % had been promoted, 25% were given pay rises and

- 93% job offers. In addition, 48% are sufficiently confident in their skills to consider setting up their own businesses.
- 4. **Status within the business has increased**. Not only have many been promoted and received pay rises, 63% say they are treated as decision makers and 48% say they require less supervision from their supervisor.
- 5. **Getting the job done quicker**. Improved productivity results in production targets being reached quicker. For 84% of respondents, this resulted in reduced time spent at work, which for 74% meant more time with their families. This has raised their status with their families and colleagues, with 96% stating they receive increased respect from their families and coworkers.
- 6. **Trainers and sources of information**. This improved status has made these trained workforce staff a source of knowledge for their colleagues, with 82% of respondents saying they freely provide training to other staff.

#### Management training

The owners and managers of ABLE enterprises often have limited education and have learned the technical and the business management skills of managing an ABLE enterprise from their peers and family members. CSISA–MEA staff realized at an early stage of this Activity that for the development of the ABLE requires managers to have formal, improved technical and managerial skills. A training program was therefore designed in Year 2 and implemented in Year 3, imparting a wide range of these skills to 151 managers and owners from 133 ABLE enterprises.

#### Training management staff in advanced technical concepts

Training in workshop layout, metal testing, and certification procedures and protocols was provided by the Farm Machinery and Post-Harvest Division of BARI at the headquarters in Gazipur in January and August 2022 to 101 members of management staff from 90 ABLE SMEs, of which 40% were youth. Only 8% of the trainees could answer more than 60% of the questions correctly before the training but after training they could all answer more than 60% questions correctly.

# Enhancing communication, networking, and business management skills of sales managers of ABLE SMEs and lead firms

To improve sales by ABLE SMEs, in Year 2 the Activity signed a contract in with BRAC, an international NGO, to provide training to the sales and managerial staff from ABLE SMEs and lead firms on communication and networking. In Year 3 the contract with BRAC was renewed and this resulted in the training of nine lead firm staff and 51 ABLE SME staff.

#### Advanced skills training for stage 2 ABLE SME machinery manufacture

For ABLE SMEs to expand their businesses by accessing new markets they will need new equipment and building infrastructure to increase the quality and quantity of machines and spare parts they manufacture. This will require skills to design new products, install and use new manufacturing equipment, manage stock and sales data, and market the machines and spare parts they currently make.

**Induction furnace installation and operation training for** four ABLE SMEs in Jashore was provided by Plasma Induction Pvt. Ltd, India, a supplier of induction furnaces.

**Digital inventory management system installation and operating training**: Six staff from three ABLE SMEs in Jashore received training in digitized stock and sales inventory management by SEMICOLON Pvt. Ltd.

**New mechanization technology design, drawing development training**: In Bogura, BITAC provided training for one ABLE SME in the design and drawing skills required to make spare parts for

diesel engines; the RDA provided two ABLE enterprises with training in the design and drawing skills need to manufacture a mini tiller and a new type of fodder chopper.

#### Enabling the ABLE SMEs to enter a digital business world

The CSISA–MEA team in Bogura provided training (30 August 2022) to 10 ABLE SME staff members (three women, seven men) on how to expand their sales through online marketing services and social media platforms. The training provided them with social media skills such as creating their own YouTube channel and Facebook page, and how to use these sites to advertise their products. All 10 ABLE SMEs attending the training now have YouTube sites where they advertise their products. This has resulted in the sale of 924 spare parts. These were mainly for irrigation pumps, threshers, fodder choppers, drive belt wheels and engine liners and the sales were worth USD18,827.

#### Experience-sharing workshop with TSPs and resource persons

With the completion of two years of training and the relaxation of pandemic protocols, the Activity organized a one-day experience-sharing workshop for all the TSPs and resource persons involved in CSISA–MEA training programs. Key findings from this workshop form the basis for the 'lessons learned' section at the start of this section of the report on IR2.

#### ABLE enterprise training in the Zone of Resilience

Experiences gained and lessons learned from the two years of delivering training programs in the ZOI and Bogura enabled the Activity to design a curriculum for the ZOR that provides 48 hours of training.

#### Skills enhancement of workforce in basic machining skills

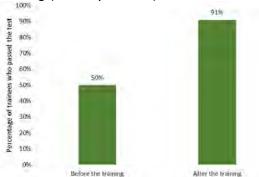
Following a series of kick-off meetings with ABLE SMEs from Cox's Bazar, Chattogram and Bandarban districts, the Activity signed agreements with 40 ABLE SMEs to facilitate training of their workforce in basic machining skills through a 48 hour-long training program designed by CSISA–MEA engineers.



Inauguration ceremony for light engineering workforce training at BITAC, Chattogram. Photo credit: Jotirmoy Mazumdar, SMD, CSISA-MEA, Cox's Bazar

The training was facilitated by the Activity through a partnership with BITAC, Chattogram to a total of 100 workers, delivered in five batches of residential training with each batch lasting eight days. The training program was opened by Mr. Anwar Hossain Chowdhury, Director General, BITAC and Dr. Md. Jalal Uddin, Director of Planning, BITAC.

Figure 4: Results of test to assess participants' knowledge of machining skills before and after training (100 respondents)



modern measuring tools and quality control.

The evaluation graph shows that before the training only half of the trainees passed the test, but after the training, about 91% of the trainees passed (see Figure 4).

# Enhancing the business management skills of managerial staff

BITAC, Chattogram trained 50 management staff in advanced technical concepts for manufacture and marketing as part of a three-day residential training program. Participants learnt for the first time the importance of concepts such as financial management, inventory management, inward and outward record keeping, digital marketing,

### **In Focus Story**

CSISA-MEA skills training leads a young light engineering worker from Jashore to find a better paid job in Cox's Bazar



Mizanur Rahman (26 year old) began working at Mohammad Ali Engineering Workshop in Jashore when he was 13 years old. Mohammad Ali, the workshop's proprietor, was his mentor, from whom he learned all of the machine skills required in a light engineering workshop. In 2021, Mizanur completed 108 hours of CSISA—MEA-sponsored training in OH&S, turning, welding, drilling, grinding, shaper operation, sheet metal cutting, and painting. The training also included basic mathematics, technical drawing and how to use measurement tools. "Previously, I didn't know how to use basic digital tools like digital calipers, micrometers, dial indicators and so on," Mizanur said, adding, "I never used technical drawings and documents to make parts with a high degree of precision".

His improved skills gave Mizanur the confidence to look for better employment elsewhere in Bangladesh. Through connections provided by CSISA-MEA he received an offer from MM Engineering Workshop in Ramu, Cox's Bazar. This new job gives him a monthly salary of BDT 20,000 (USD 235), up from the BDT 14,000 (USD 150) he had earned in Jashore. His new employer even pays for his accommodation and meals.

CSISA-MEA fosters linkages between companies and skilled employees throughout the country, which is something that clearly benefited Mizanur. "In less than two years, I received training, improved my skills, and got a better employment opportunity," Mizanur stated. "This wouldn't have happened if CSISA-MEA hadn't been there to assist us."

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

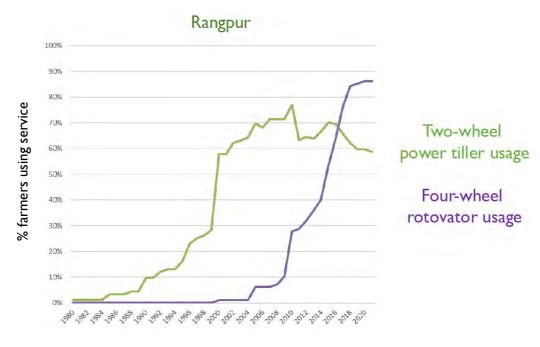


State of adoption and dis-adoption of agricultural machinery in the ZOI and ZOR

The Activity conducted a random sample survey of farmers in the ZOI and, by way of comparison, in north-west Bangladesh, to determine to what extent farmers are adopting new agricultural mechanization technology. The survey reviewed the status of 26 items of machinery introduced to Bangladesh in recent years. These include two- and four-wheel tractors, tractor-mounted planters, rice transplanters, irrigation pumps including solar pumps, harvesting equipment including reapers, and combine harvesters and post-harvest equipment such as threshers, shellers and fodder choppers.

The survey found that four-wheel tractors were starting to replace two-wheel tractors and that this was most evident in north-west Bangladesh.

Figure 5: Changes in the use of two-wheel versus four-wheel tractors with attached primary tillage equipment since 1980 in Rangpur district, north-west Bangladesh



The survey also found that adoption of newer technology such as combine harvesters was constrained not just by availability but also by farmers' limited knowledge of their functions and even of their existence. Adoption of many types of technology is therefore not only impacted by their cost, relevance to the farmer or availability of the machine but also by a lack of up-to-date information.

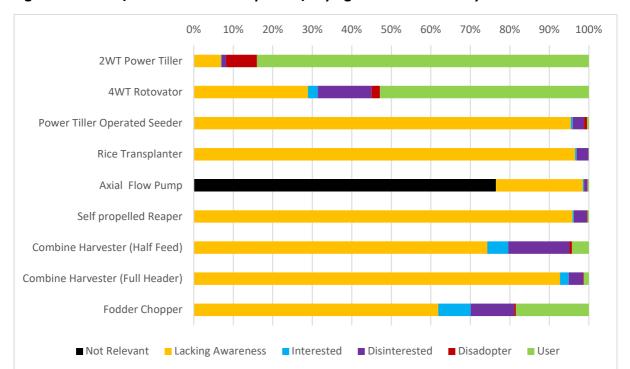


Figure 6: Level of awareness and adoption of key agricultural machinery

# Study of the mechanization needs and opportunities in Bandarban district, ZOR

In Year 3, activities in the ZOR expanded both in volume and geographic coverage, including initiating work in Bandarban district. This is quite different to Cox's Bazar district, and indeed the rest of Bangladesh – it is a hilly zone of valleys and hills, with dry land farming on the hillsides and irrigated agriculture in the valley bottoms. The Activity conducted a study to determine what types of agricultural mechanization were needed and the business opportunities that exist for companies marketing agricultural machinery in this district

Key findings from the survey were that the area of flat irrigable land for crops such as rice is small with the consequence that the market for machines such as combine harvesters and rice transplanters is limited to at most 10 to 15 each in the whole of the district (an area of 4,479 m²). The main market would be for fruit and cashew nut machinery such as mini power tillers for weeding, power sprayers, fruit and cashew harvesting equipment, and cashew shellers. There are also very few ABLE SMEs, mechanics, and MSPs; this lack provides an opportunity for improving these services through training and technical support.

This study was followed by 30 meetings in Bandarban and Cox's Bazar districts between agricultural machinery lead firms and local business, and farmers interested in buying machinery. These meetings provided farmers with information about the agricultural machinery that the lead firms market. The Activity then facilitated partnerships with Janata Engineering, RK Metal and TML, resulting in 12 demand creation events.



Rice transplanter demonstration by TML, Lama Upazila, Bandarban District. Photo credit: Shafiq Islam, Technical Operator, CSISA-MEA, Cox's Bazar.

# Supporting MSPs to maintain and use agricultural machinery

To keep machines operating, MSPs need to be confident in their operation and maintenance, be able to buy spare parts easily, and have access to mechanics trained in how to repair them. If a machine breaks down because an MSP has not been shown how to use or maintain it or does not have access to the services of a trained mechanic and a supply of spare parts, it will lie idle instead of providing farmers with the mechanization services they require in a timely manner. This intervention aims to support lead firms and MSPs to address these issues.

In the ZOI, TML and Janata Engineering provided machine operation, maintenance, and service provision training to 147 MSPs in the Jashore region. Training focused on combine harvesters, rice transplanters, the Aashkol jute fiber extractors, PTOSs, fodder choppers and reaper crop harvesting machines. To ensure access to repair and upkeep services, TML also conducted technical training in maintenance for 70 mechanics, to improve after-sales service to MSPs as required for combine harvesters (20 mechanics) and the Aashkol machine (50 mechanics).



Abedin Equipment provide their customers with training in the use of their Kubota combine harvester in the Dosomina, Patuakhali District, Barishal Division. This is a location remote from the main centers for combine harvester sales in the ZoI and complies with CSISA-MEA aims to spread new agricultural machinery technology to underserved areas.

Photo credit: Md. Rowshon Anis, OMD, CSISA-MEA, Faridpur

In addition, Abedin Equipment organized pre-season maintenance campaigns for combine harvester MSPs in Jashore for which the Activity provided technical assistance. These training sessions for MSPs ensure safe and proper use of the combine harvester machines. A total of 144 pre-season maintenance campaigns were conducted by the lead firms to raise awareness and demonstrate the effectiveness of combine harvesters (135 events), reapers (eight events), and rice transplanters (one event).



Combine harvester mechanics getting to the heart of an ACI Motors-marketed Yanmar combine harvester.

Photo credit: Md. Rowshon Anis, OMD, CSISA-MEA, Faridpur

In the ZOR, lead firms TML, Abedin Equipment, ACI Motors and Janata Engineering provided training to 30 rice transplanter, 10 reaper and fodder chopper and 30 combine harvester MSPs on correct machine operation. In addition training was provided on the operation and maintenance to 20 combine harvester mechanics, 25 fodder chopper mechanics, 10 rice transplanter mechanics.



TML-facilitated operation and maintenance training for rice transplanter MSPs, Chakaria, Cox's Bazar district.

Photo credit: Mahmudul Hasan, Assistant Manager, TML

# Facilitating lead firm and MSF partners to conduct demand creation activities for combine harvesters, rice transplanters and the Aashkol machine

As the study of agricultural machinery adoption above shows, knowledge and use of the newer agricultural machinery technology is often quite limited among Bangladesh farming communities. This is particularly true of the newest technology to enter the market: combine harvesters, rice transplanters, and Aashkol jute decortication machines. To accelerate the rate of adoption of these labor- and cost-saving climate-smart agricultural machines, the Activity supports the private sector with its demand creation activities. In this reporting period, the Activity in greater Jashore and Faridpur utilized JVAs to support lead firms to employ a range of demand creation approaches to raise awareness of new agricultural technology and sell their machines. These and the other demand creation activities described below resulted in the sales that can be attributed to these Activity facilitated demand creation events. These sales were: 145 combine harvesters (USD 2,303,267), one mini combine harvester (USD 5,293), two PTOS (USD 1,873), 26 reapers (USD 22,102) and 16 rice transplanters (USD 23,262) and 26 fodder choppers (USD 8,535) were sold. The total value of sales in the ZOI and ZOR in the year 2021–22 was USD 2,365,017.

#### Demonstrations and meetings.

TML and RK Metal held a total of 44 machine demonstrations in Jashore and Faridpur, showcasing combine harvesters, rice transplanters, and Aashkol machines to 1,320 local farmers: 150 local farmers attended TML demonstrations and 1,170 (570 women, 600 men) were at RK Metal demonstrations. In the greater Jashore region, Janata Engineering, RK Metal, and Abedin held 21 farmers awareness meetings attended by 492 farmers and 35 MSPs. The aim of these meetings was not only to identify potential customers but also commission-based agents who could find customers for the firms. As a result, 42 participants expressed their interest in purchasing machines from the lead firms, including fodder choppers, PTOSs and reapers.

#### The Feed the Future Cereal Systems Initiative for South Asia Mechanization and Extension Activity Annual Report, 2021-2022

RK Metal organized 47 farmer awareness meetings attended by 778 farmers in Rajbari and Faridpur districts to identify potential customers for Aashkol jute fiber extraction machines, as well as commission-based agents. It made 47 sales from these meetings.

In the ZOR, Activity partners TML, ACI Motors, RK Metal and Abedin Equipment conducted 67 demand creation and promotion events. These included farmers' awareness meetings for the new machinery, demonstrations of fodder choppers, rice transplanters and combine harvesters, dealer and sales agent linkages, and mechanics training. In total, more than 1526 participants attended and 74 potential customers were identified for combine harvesters, reapers, rice transplanters, and fodder choppers.

In both the ZOR and the ZOI, the Activity facilitated meetings between MSPs and representatives from TML, ACI Motors, Abedin Equipment, Janata Engineering, Alim, and RK Metal, and MSPs interested in purchasing combine harvesters, rice transplanters and reapers. The Activity also supported MSPs to gain access to government subsidies.

In the ZOR, 48 MSPs from Cox's Bazar attended four business expansion events (see In Focus story below about one of the MSPs who attended these meetings). These events allowed MSPs to collect information from potential customers for the *aman* and *boro* rice-growing seasons. A total of 1,314 participants attended the events, including 136 women. DAE representatives also participated in these events. To advertise their services, the Activity provided technical support to MSPs to create promotional materials including banners, business cards and signboards.

#### Road shows

Road shows are another way of reaching new customers, particularly in some of the remoter areas of the ZOI and ZOR. This technique was used by RK Metal in Year 2, and this year, through JVAs with CSISA–MEA, Janata Engineering and RK Metal have used the same demand creation strategy. These two lead firms put on shows in 21 locations using video demonstrations, leaflets, and promotional materials, and answering questions to promote combine harvesters, rice transplanters, and Aashkol machines.



RK Metal on the road, showing and selling their machinery and raising awareness of new agricultural mechanization technology, The Aashkol machine is displayed on the truck and the joint owner of RK Metal (far right) is explaining the technology to farmers.

Photo credit: Rowshon Anis, OMD, iDE, Faridpur

# Tea Shop TV

One-minute video shots of rice transplanters, produced by seed companies partnering with the Activity, were broadcast through local television channels to advertise the use and availability of rice transplanter services. These channels are frequently viewed by farmers while drinking tea and chatting in tea shops.

# Increasing sales by expanding dealership networks

The CSISA-MEA Jashore and Faridpur teams facilitated two meetings between RK Metal, Janata Engineering, and ACI Motors with 12 dealers interested in marketing these lead firms' machines (three for RK Metal from Khulna, Madaripur and Magura areas, two for ACI



Konica Seeds, a CSISA-MEA partner, advertises rice transplanter use in a tea shop using a local television channel.

Photo credit: Mominal Islam, CSISA-MEA, Jashore

Motors from various regions of Faridpur and Jashore, and seven for Janata from Jhenaidah, Jashore and Meherpur areas). At these meetings, information was provided on the three companies' products,

prices, warranties, promotional materials, and after-sales services as well as commission rates and other benefits for dealers. As a result, the lead firms finalized agreements with all 12 dealers. In the ZOR, similar meetings were also facilitated between Janata Engineering and RK Metal and dealers interested in marketing their machines. At the meetings, information was provided on the companies' product lines, as well as options for utilizing government subsidies to purchase agricultural machinery. As a result, four dealers signed dealership agreements.

In the greater Jashore region, as a result of the sales creation activities facilitated by CSISA–MEA, agricultural machinery marketing companies sold 62 combine harvesters, four rice transplanters, 20 PTOSs and 24 reapers. In greater Faridpur, machinery marketing companies sold 32 combine harvesters, four reapers, two rice transplanters, 25 Aashkol jute fiber extraction machines and 50 fodder choppers. In the ZOR, machinery marketing companies sold 22 combine harvesters, 13 rice transplanters, 16 reapers, one PTOS, and 14 fodder choppers.

#### Fodder chopper demand creation

Simple machines can often save farmers, particularly women, enormous amounts of time. The fodder chopper is one such machine. Dairy farmers can spend up to two hours a day cutting grass into bitesized pieces for the cows to eat, work that can be done in minutes with a small USD 400 diesel or electric enginepowered fodder choppers. These machines are also manufactured by smalland medium-sized engineering businesses in Bangladesh. Supporting these businesses manufacture and market these machines in both the ZOI and ZOR has therefore become a key focus of the Activity. Technical and marketing support has been given to 25 ABLE SMEs (13 in Jashore, eight in Bogura, four in Faridpur). JVAs supporting demand creation events for fodder choppers have been implemented by RK Metal, Janata Engineering and TML.

Many of the demand creation events for fodder choppers have been organized in collaboration with the USAID Feed the Future Bangladesh LAN Activity, in which dairy farmers supported by LAN are shown by fodder chopper owning



RK Metal demonstrate how to use an electric enginepowered fodder chopper, Faridpur. Photo credit: Mahajabin Khan, Communications Coordinator, CSISA–MEA, Dhaka

MSPs how to use the choppers to cut fodder (such as green maize). As part of these events LAN staff would show participants how to make silage.

In partnership with LAN, the CSISA-MEA Jashore team facilitated training in fodder chopper operation and maintenance to 146 livestock farmers at eight events. In addition, fodder chopper machine manufacturer 3 Star Engineering Workshop, Jashore, demonstrated its chopper machine in Khulna district, and Janata Engineering demonstrated TATA Agrico and BRRI designed fodder chopper machines in Jhenaidah, Jashore and Chuadanga districts. Nine farmers attending these events bought

fodder choppers from Janata Engineering as a result. In Faridpur, four market creation events were conducted by fodder chopper-owning MSPs to dairy farming groups which LAN supports (86 women and 49 men participated). In the ZOR, the Activity conducted II demand creation events in collaboration with LAN, with costs shared equally between the two.

These activities have resulted in the sale of 90 fodder choppers directly attributable to these events. Many more have been sold by the ABLE SMEs which make fodder choppers.

#### Rice transplanter business development activities

Every year in Bangladesh, approximately II million hectares of rice are transplanted by hand. This labor-intensive process takes time, delaying crop establishment and absorbing family and hired labor that could perhaps be used more productively on other income-generating activities. Sowing rice seed directly into the field instead of raising seedlings in a nursery is one solution to this issue but in Bangladesh the long monsoon season and the need to sow before the flooding monsoon rains start make this option challenging. An alternative solution is to use mechanical rice transplanters to transplant seedlings raised as a mat on soil-covered plastic sheets or in plastic trays. The rice transplanters have been shown to work well, saving considerable time and cost but the raising of seedlings, which requires training and coordination, remains a challenge.

To create demand for mechanical rice transplanter services, train farmers in how to raise seedlings for rice transplanters and coordinate the raising of seedlings with the availability of rice transplanter MSPs, the Activity facilitated training and links with lead firms for three seed companies from the greater Jashore region. This resulted in the following partnerships:

- Ali Seed Farm ACI Motors and Abedin Equipment Ltd.
- Kanika Seed Company ACI Motors.
- Uzirpur Organic Multipurpose Cooperative Society Ltd. (UOMCSL) TML.

These partnerships resulted in 30 Farmers Field Days, attended by 1,283 participants (145 women, 1,138 men), which demonstrated the use of rice transplanters. The partnerships also facilitated the training of 20 mechanics and 30 MSPs in the use and maintenance of rice transplanters, 110 farmers (28 women, 82 men) in how to raise seedlings for use with rice transplanters, and how to provide rice transplanter services to 198 farmers (13 women, 185 men) on 27 hectares of land. To create further demand for rice transplanter services, each of the seed companies produced a one-minute video, broadcast through local television and viewed in tea shops throughout the region.

Rice transplanter MSPs also conducted demonstrations in the greater Jashore region, with 10 of them showing farmers how to raise seedlings for use in rice transplanters and linking them with rice seedling producers.

Training on how to raise rice seedlings for the late *aman* season, 2022, Baliakandi Upazila, Rajbari District. Photo credit Md, Abdul Mabud, ADO, CSISA-MEA, Faridpur.



A farmer with seedlings raised and ready for transplanting after training by INSAF Seed company, Faridpur.
Photo credit: Zasim Uddim, ADO, CSISA-MEA, Faridpur



In Faridpur, the Activity supported INSAF, a local seed company, to extend its combine harvester rice harvesting business by adding a rice transplanter service provision business. First, CSISA–MEA facilitated training for 15 members of INSAF's staff in seedling raising, and in the use and maintenance of rice transplanters. With CSISA–MEA technical support, INSAF then established a rice transplanter service, first training 80 farmers (55 women, 25 men) in how to raise rice seedlings for planting out using a rice transplanter, and then 10 rice transplanter operators and 12 mechanics to use and maintain rice transplanters. To create demand for its services, INSAF held 15 farmers meetings attended by 432 farmers; it also conducted 11 demonstrations and three Farmers Field Days and broadcast its video about rice transplanters on local television channels. In Year 3, this resulted in the sale of rice transplanter services to approximately 300 farmers, the planting of 60 hectares of rice, and income worth USD 9,300.



Farmers displaying the seedlings they raised for rice transplanters with support from INSAF, Faridpur. Photo credit: MD Abdul Momin, photographer, Dhaka

In the ZOR, CSISA-MEA facilitated TML and ACI Motors to deliver training to 20 farmers (all women

or youth) and 30 MSPs in seedling raising, and 30 MSPs and 10 mechanics in rice transplanter use and maintenance. The Activity also facilitated eight Farmers Field Days on rice transplanter use, partnership with DAE. One outcome of this the was establishment of the first ever rice transplanter service provider in the Bandarban Hill Tracts, Bandarban district.

These activities resulted in the sale, through partnerships between CSISA-MEA and seed companies and lead firms, of three rice transplanters in the ZOI and I3 in the ZOR.



The first mechanical rice transplanter services in the Bandarban Hill Tracts began in January 2022, because of CSISA–MEA's work. Photo credit: Mahajabin Khan, Communications Coordinator, CSISA–MEA, Dhaka

In the ZOI, potential buyers are waiting to see if the technology becomes more popular before committing to buying a machine that is relatively expensive and has a limited operating time of approximately 60 days each year. Raising seedlings for rice transplanters is complex, and in the ZOR, rice transplanter owners have been given intensive support by extension staff (Government or private sector) after purchasing a machine to enable them to build up a body of seedling growers and customers who work in a coordinated way with the rice transplanter service provider. As described above, the other approach followed has been to support companies such INSAF in Faridpur to develop a seedling supply and rice transplanter provision service that they can offer farmers. This has also had some success in that a good number of farmers have gained access to these cost- and labor-saving services.

### **In Focus Story**

Returning migrant worker finds business opportunities through agricultural machinery services



Above Amanul Hoque, MSP in Cox's Bazar. Photo taken by Abdul Momin

Amanul Hoque (47), originally from Cox's Bazar, worked in Saudi Arabia for 19 years as a construction worker, returning to Bangladesh to care for his mother when she became ill. Initially he worked on the land, producing rice, vegetables, and fruit, but his earnings of just BDT 12,000 (USD 150) per month were much less than his take-home pay in Saudi. At a CSISA–MEA awareness-raising event, Amanul identified the business potential in providing combine harvester services to farmers. Next, he attended two training events given by CSISA–MEA lead firm partners, ACI Motors and Abedin Equipment, where he learned to operate combine harvesters and heard about the government subsidies for purchasing agricultural machinery. However, Amanul had savings from his time in Saudi Arabia, and he decided to invest these in his new business as an MSP and buy a combine harvester.

Amanul's first challenge was to find farmers who understood the value of hiring a combine to harvest and thresh their crops. In this he was supported by CSISA-MEA lead firms, who were running agricultural mechanization demand creation programs in partnership with the Activity. Amanul attended two of these events, and soon developed a customer base of 150 rice farmers.

"CSISA-MEA has had an influence on my career, family and income," said Amanul. "For example, I'm now able to persuade farmers to use my services – which allows me to earn more money. I'm now leading a happy family life – and will continue to do so!".

Amanul has made BDT 500,000 (USD 5,275) in just one rice harvesting season and now has over 250 clients. His ambitions however do not stop here; his aim now is to buy five combine harvesters and hire four more employees during the next five years.

#### Facilitating access to finance for MSPs

To purchase agricultural machinery MSPs often need loans even when the price of the machine is subsidized by Government subsidy programs. The access to finance study conducted by the Activity in year 3 showed that MSPs often find it more difficult to obtain loans than ABLE SMEs. This is often because do not have a credit history with FSIs, do not have financial records and usually do not have enough collateral to cover the value of the loan. The study report recommended the Activity partner with MFI to facilitate loan packages for MSPs. In the scheme they suggested MFIs provide MSPs with loans so that they could purchase machines from agricultural machinery marketing lead firms The MFI would earn a commission from the lead firm for finding and a buyer for their machine. This commission would then by passed on in part to MSPs in the form of a reduced interest rate on the loans. This concept will be tested in year 4 of the Activity.

In year 3 12 MSPs in the greater Jashore and greater Faridpur regions received loans totaling USD 6,472 and six MSPs in Cox's Bazar received loans totaling USD 12,353 giving a total of 18 loans provided worth USD18,825. Of these loans, 17 were for female MSPs who received loans totaling USD 12,942

### **Commission agents**

Another approach to facilitating market expansion for partner companies and the dissemination of information about new agricultural mechanization technology has been to facilitate recruitment of women and youth as commission-earning agents for lead firms and MSPs. Similarly, the Activity has facilitated the recruitment of MSPs as commission-earning agents for companies acting as intermediaries between input marketing, produce buying companies and FSIs and farmers.

#### Inclusion of women and youth as commissioned agents

A hurdle faced by lead firms in reaching new customers for agricultural machinery and spare parts is the lack of a trained sales force. To circumvent this and to provide a business opportunity for rural women and youth, in Year 3 the Activity facilitated meetings between RK Metal, TML and Janata Engineering, and 55 young men, 12 young women and 46 older men. All participants signed an agreement with the three lead firms to act as commission-based sales agents, selling combine harvesters, rice transplanters, and spare parts.

### Commission-based agents linked to combine harvester MSPs.

Commissioned-based sales agents work with MSPs to find farms wanting the latter's services and to ensure the farmers are ready to receive the MSP services. The agents also usually collect payments from the farmers and pass them on to the MSPs. This saves the MSPs considerable time, allowing them to reach more customers. In year 3, Jashore, the Activity facilitated linkages between commission-based sales agents and 61 combine harvester MSPs, who have been providing services for 2,687 farmers, harvesting 887 hectares of rice and wheat.

# Linking MSPs with input suppliers, produce marketing companies and financial service institutes through social enterprise intermediary companies

A growing number of start-up companies are linking farmers through a network of village-based agents with input supply lead firms and food processing companies. MSPs, being largely village-based, have a wide range of networks that can be used to expand the services provided to farmers beyond solely machinery services. Through partnerships with two of these companies – bhalo Social Enterprises and iFarmer – the Activity aims to broaden the services that MSPs can provide farmers by either engaging them as agents for these companies or by linking them with the company's agents so that the agents can offer farmers machinery services as well as input supply and crop purchasing services.

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In Jashore, the Activity supported bhalo Social Enterprises to conduct a survey of 124 MSPs, 84 retailers, and nine seed and pesticide dealers to better understand their needs for improved production and profitability. In response to the survey results, bhalo hired sales agents and provided specialized training to ensure improved after-sales services of livestock and poultry feed, medicine, pesticides, and seeds. It also conducted 38 farmer meetings with a total attendance of 653 farmers.

Using the information obtained, bhalo established four sales outlets in three upazilas to sell agricultural input items and technical and machinery services to farmers. During Year 3, sales worth USD 2,153 were made by the sales agents working on commission. However, the model used by bhalo appears only to work well for dairy livestock and not agricultural machinery; hence, and sales agents selected were not MSPs. The benefits to the Activity were thus minimal.

iFarmer focuses on increased access to finance for Bangladesh's



iFarmer facilitating information-sharing and introductory meetings with farmers groups. Photo credit: Anwar Hossain, CSISA-MEA, Cox's Bazar

agriculture sector, using an app called Sofol to record data collected from farmers and MSPs about their agricultural practices and business. After uploading the data into the app, the farmer can access services designed to help maximize profits and gain access to financial tools. In Year 3, data collected from 35 MSPs and 2,774 farmers were uploaded to the Sofol app.

To introduce farmers to financial tools, the Activity supported iFarmer to conduct meetings with farmers to enable them to better understand the requirements for acquiring loans. In the reporting period, a total of 88 meetings were held with 3253 participants (385 women, 843 men). These resulted in iFarmer facilitating loans from FSIs for 563 farmers (274 women, 275 men) worth a total of USD 36,283 for the purchase of crop production and livestock rearing inputs, as well as agricultural machinery including 2WTs, PTOSs, choppers, irrigation pumps and power tiller engines.

To support MSPs, iFarmer conducted business management and accounting training for 70 MSPs in Jashore. The three-day program provided MSPs with guidance on business plan development and maintenance of records. Going forward, these MSPs will be able to promote and record their business activity independently.

In the ZOR, the Activity collaborated with iFarmer to expand its digital services to MSPs in the Zone, starting by providing iFarmer with a list of suitable MSPs, from which a total of 157 MSPs joined the iFarmer system. iFarmer also conducted awareness meetings with five farmers groups and added 157 farmers to its database. During Year 3, the company provided information about its services to 3,600 farmers and trained 61 farmers to use the Sofol app. It also provided training to 75 MSPs on financial tools and loans, with the result that iFarmer was able to facilitate loans from FSIs for 88 MSPs.

### **In Focus Success Story**

# Use of digitally gathered data to help a dairy farmer obtain a loan to buy a fodder chopper that saves her time and helps her start down the road to becoming a business women.

Cutting fodder into small, bite sized pieces reduces feed waste by 10 to 15% and makes it is easier for cattle to digest, resulting in increased milk production. In Bangladesh looking after livestock, including cutting fodder, is traditionally the task of women in the family. Cutting fodder by hand is extremely laborious and can take at least an hour for small herds of one or two cattle. Fodder can, though, be chopped by engine-driven machines. These machines, fodder choppers, can chop fodder in minutes instead of the hours needed when chopped by hand, thereby freeing women to do other tasks that might be income generating or are just increased leisure and family time. This is the story of one women who recently bought a fodder chopper.

Sathi Mondal (22) and her husband looks after two children, four cows and two goats. She lives in Shailakupa village, Ihinaidah district close to the factory of Janata Engineering, a partner of the USAID funded CSISA-MEA Activity. It was during a marketing event given by Janata Engineer that she saw for the first time an electric motor-driven fodder chopper that could chop the fodder it takes her up to three hours a day to do by hand in just 30 minutes. Imagining all the time it would save and all the things she could do with that time she decided she must have one of these machines. The problem was finding the USD 300 needed to buy it.

In Jhenaidah, CSISA-MEA has partnered with i-Farmer, a company that acts as an intermediary between farmers and Agri Businesses helping them provide each other with goods and services. One of the services iFarmer provides is to provide loans from funds they raise from FSIs. Most FSIs would find it difficult to give many small loans to many farmers distant from their branch offices. Instead the FSI provides one loan to iFarmer who earns money on the difference they charge farmers for their loans and the interest rate they pay FSIs. Through a meeting facilitated by CSISA-MEA, iFarmer collected data from Sathi on her assets and income through their "Sofol" data collection App. This showed she had good credit worthiness and that she would be a safe bet for a loan. Sathi then applied for and was granted a BDT 30,000 loan (USD 300) to buy a fodder chopper from Janata Engineering. She pays an annual interest rate of 10% and aims to repay the loan within six months. As she now has much more time than before she bought the fodder, she has used that time to develop her own fodder chopping business. This now generates enough income to allow her to repay her loan and have some extra for her children. "I can spend quality time with my children and spend time with my family, which is a gift to me." "I intend to offer Above: Sathi Mondal with chopper service to other households in my chopper. neighborhood," Sathi Mondal said.



her fodder

# Machinery market creation events through partnerships with USAID and other donor funded projects

In addition to working with government extension services, many organizations engage with groups of farmers including in USAID-supported activities. Facilitating collaboration between these organizations and CSISA–MEA private sector partners often provides an opportunity for the latter to access a new network of potential customers who receive technical support from the organizations. This in turn provides an opportunity for the Activity to substantially expand farmer access to innovative agricultural mechanization technology and to give the Activity's partners new market opportunities. This approach has had particular success through partnerships with not only the government extension services but also donor-funded programs including USAID-funded activities.

#### The USAID Feed the Future Bangladesh LAN Activity

As described above in the section on fodder choppers, in the greater Jashore and Faridpur regions of the ZOI and in Cox's Bazar and Bandarban districts of the ZOR, the CSISA-MEA-supported LAN Activity conducted demand creation events for engine-driven fodder choppers. At these events, a CSISA-MEA supported lead firm, such as RK Metal, demonstrated the use of the fodder chopper by an MSP, and LAN showed the meeting participants, often mostly women, how to make silage out of the chopped fodder.

#### FAO, Bangladesh

In 2018, FAO under their emergency response program distributed 49 reapers in Rohingya refugee crisis-impacted host community of Ukhiya and Teknaf *upazilla*, Cox's Bazar district. However, these reapers were not accompanied with training in their use, and maintenance. As a result, most were left unused. To resolve this, in Year 3 CSISA–MEA and FAO partnered to train the machine owners and link them to farmers in need of crop harvesting services. They supported FAO partners SmartMech and Shushilon to train 20 reaper owners in the operation and maintenance of reapers.

#### IICA / DAE partnership

CSISA-MEA staff and private sector partners in Cox's Bazar supported the Japanese aid program, JICA and its partner, the Upazila Administration and DAE of Ramu *upazila*, Cox's Bazar district, to train 22 MSPs in the operation and maintenance of rice transplanters, reapers, combine harvesters, and fodder choppers.

### Communications outreach

Throughout its lifetime, CSISA-MEA has used social media, blogs, and newspapers to communicate the activities and achievements of the Activity to a wide audience. The results of Year 3 are detailed below:

- Three blog posts have been published in Agrilinks on CSISA-MEA activities and successes: RK
   <u>Metal</u>: From a Small Welding Shop to Light Engineering Ecosystem Shaper, Agricultural
   <u>Mechanization in Bangladesh The Future</u>; Sustainable Support System for Farmers in
   <u>Bangladesh's Less-Served Areas</u> and <a href="https://www.agrilinks.org/post/if-you-have-guts-begin-you-get-courage-succeed">https://www.agrilinks.org/post/if-you-have-guts-begin-you-get-courage-succeed</a>
- CSISA—MEA has signed an agreement with Bangladesh Industrial Technical Assistance Center (BITAC) to capacitate the country's light engineering sector. The signing event was covered by national print media: <u>USAID to work with BITAC to develop light engineering sector in Bangladesh</u>.
- On the occasion of International Youth Skills Day, the US Embassy in Dhaka published one of CSISA-MEA ABLE owner's story on its social media: <u>Meet Mohammad Abdul Hannan</u>.

- CSISA-MEA published a trifold brochure to distribute among government officials, donor and partners. <u>Link to the brochure</u>
- A workshop on "Agricultural Mechanization In Bangladesh –The Future" (21–22 March, 2022) was held by CSISA–MEA in collaboration with BAU. Several national media representatives took part in this event and the discussion was covered by two leading newspapers. The following are links to coverage of the activity: <a href="Dhaka Tribune">Dhaka Tribune</a>; <a href="Daily Star">Daily Sun</a>; <a href="The Financial Express">The Financial Express</a>; <a href="Agrinews24">Agrinews24</a>; <a href="Agrinews24">Agrinews24</a>; <a href="Prothom-alo">Prothom-alo</a>; <a href="Jagonews24">Jagonews24</a>; <a href="Sarabangla">Sarabangla</a>; <a href="Swadesh">Swadesh</a>; <a href="Manob-jomin">Manob-jomin</a>; <a href="BTV">BTV</a>.
- News about CSISA-MEA activities has been published several times on the official USAID
  Bangladesh Facebook page: <u>First mechanization in hill tracts</u>; <u>Online training for Light</u>
  <u>Engineering Workforces</u>; <u>Agricultural mechanization in Bangladesh The Future</u>.

### Lessons learned during the reporting period

#### Intermediate result I

- I. Providing technical, business and workforce support to all ABLE SMEs receiving skills training from the Activity was difficult and it was soon discovered that not all of them wanted it. In Year 3 of the Activity, CSISA-MEA therefore divided its support to ABLE SMEs into two stages. In the first stage ABLE SMEs entering the program received basic skills and managerial training. Those with the capacity and interest to obtain more detailed technical support entered the second stage where support was given on a cost share basis.
- 2. Linking ABLE SMEs with sale parts and machinery sales dealers was a much more effective way to support ABLE SMEs to expand their businesses than linking them to agricultural machinery importer lead firms. Support given to ABLE SMEs to produce spare parts that met the quality standards of lead firms meant that these ABLE SMEs found it easier to compete with imported parts and secure sales with dealers. Similarly, linking local manufacturers of agricultural machinery with the ABLE SMEs.
- 3. Training young women and men working in ABLE SMEs in how to advertise using social media sites such as YouTube and Facebook can very rapidly expand sales.
- 4. Partnerships between national research institutes and the private sector prove to be very effective and were essential ways of developing and marketing new agricultural mechanization technology.
- 5. ABLE SMEs and MSPs need to maintain good financial records if they are to convince FSIs that they are credit worthy. To do this, ABLE SMEs need training in how to maintain financial records including stock, sales, and customer details.

#### **Intermediate Result 2**

- 1. It was expected that members of the workforce trained by TSPs would train their co-workers. Unfortunately, they found it difficult to find time to do so. However, they do teach their co-workers informally, by supplying technical advice and correcting mistakes.
- 2. It was also expected that training held in the evening would allow the workforce to attend without disrupting production. It was found that this meant that training came at the end of a long and tiring day, and participants found it hard to focus on learning. With this in mind, training in Year 3 was instead held over two full days, every weekend for four weeks.
- 3. Initially women workers were not allowed to attend the training by their employers and anecdotal evidence also suggested that some women's families also objected. The Activity conducted a study to better understand employers' resistance to allowing their female members of staff to attend training. The results showed that owners did not consider the type of training being offered relevant but instead suggested they should be given training in grinding and fettling (removing sand from cast parts and polishing them) as well as the use of spray gun painting.

- 4. Knowledge of OHS is not new to ABLE SMEs. However, implementation is a challenge at both worker and management levels. To address this, separate sessions were arranged for the two groups to facilitate their understanding of the negative effects of not following OHS practices.
- 5. ABLE SMEs considered some of the lessons given during the training programs not relevant to their specific needs, and that more practical work and less theory was needed. The Activity has responded by removing lessons from the curriculum considered not useful and reduced the amount of theory taught. These revisions reduced the length of training from 108 to 72 hours in Jashore and 78 hours in Bogura. The curriculum for foundry worker training stayed the same and its duration remains at 42 hours.
- 6. An impact survey showed that training of workforce staff in basic machining skills can increase self-esteem as well as respect from employers and family improved, employment conditions, and employability.

#### Intermediate result 3

- I. A survey found that adoption of newer technology such as combine harvesters was constrained not just by availability but also by farmers' limited knowledge of their functions and even of their existence. Adoption of many types of technology is therefore not only impacted by their cost, relevance to the farmer or availability of the machine but also by a lack of up-to-date information.
- 2. A use of a range of different types of media including road shows and local TV advertising increases machine sales and business for MSPs.
- 3. The introduction of mechanical rice transplanters initially requires considerable support for MSPs and farmers. Without this, sales are very slow. The provision of rice transplanter services by larger companies, such as seed companies, is another approach to achieving increase adoption of rice transplanter services.
- 4. Commission-earning agents link MSPs with farmers, farmers with lead firms that sell machinery, and potential machinery buyer MSPs with FSIs. These are all ways to increase the transfer of information about new agricultural mechanization technology, to increase business for MSPs, to make it easier for farmers to obtain small loans to buy machinery, and for lead firms to find customers and to create businesses for women and youth as commission agents.

# Challenges encountered during the reporting period

While the direct impacts on project activities as a result of the COVID-19 epidemic have subsided, the war in Ukraine has put pressure on Bangladesh's economy. This has accelerated an increase in the national debt which had already started to increase as a consequence of the COVID-19 epidemic.

Escalation of costs of materials, energy and transportation have started to have an impact on productivity of the ABLE SME workshops and dealers the project is supporting. In some cases, production output has reduced and all stakeholders are making decisions to reduce risk, such as carrying less stock. Some workshops have reached their limit in terms of access loans to cover operational costs, and some have reported that they are beginning to having difficulty paying staff wages.

The national energy shortage has resulted in significant rationing of electricity resulting in many workshops being idle for 2-3 hours a day.

These same constraints are being felt globally making imports of agricultural machinery more difficult and expensive.

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All these factors raise the cost of the production of machines and spare parts, the cost of buying machinery, reduces the availability of finance and ultimately reduces the speed at which new agricultural mechanization technology can be adopted. This, with rising fuel and fertilizer prices all puts pressure on agricultural production which could ultimately end in increased food prices.

The work that the Activity is engage in which focuses on supporting agricultural machinery manufacturers increase the efficiency of their production systems by the introduction of better designed factory spaces and modern, computer controlled machinery becomes extremely important in these circumstances. This, with the other focus of the Activity which is to ensure farmers are aware of the availability of new agricultural mechanization technology and agricultural machinery operators are well trained and machines are well maintained is also vital if agricultural production systems have the resilience to withstand the current economic shocks.

### Annex I: Detailed information about Activity implementing partners



The International Maize and Wheat Improvement Center (also known as Centro Internacional de Mejoramiento de Maíz y Trigo, or CIMMYT by 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 lead firms, FIs, ABLE SMEs, machinery dealers, research institutions, MSPs 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 this CSISA–MEA, iDE plays a pivotal role in facilitating partnerships between SMEs and larger firms for process, technology and market improvements, and in leading the financial inclusion component 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 technologically focused education to undergraduate and postgraduate 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.

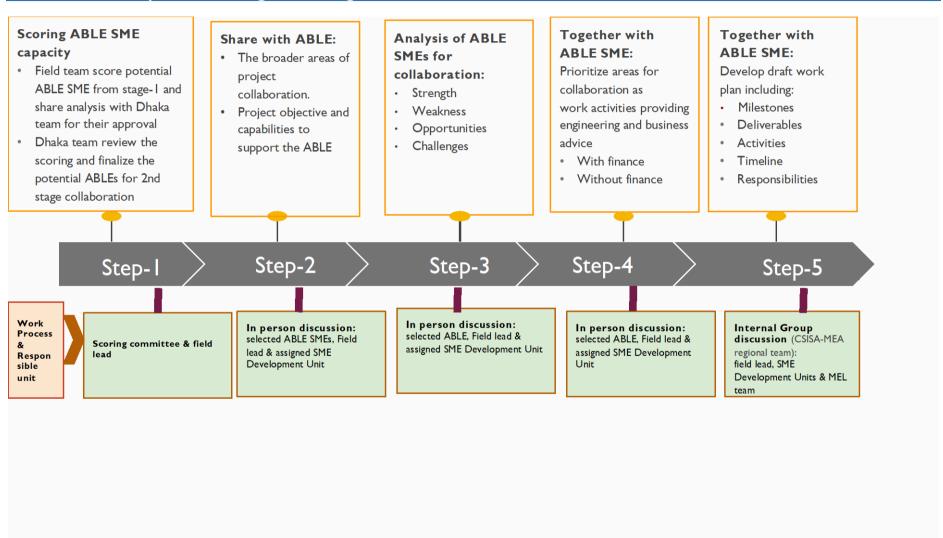
# Annex 2: CSISA-MEA staff overview

CIMMYT	No. of	iDE	No. of
CHITT	posts	IDL	posts
Dhaka Office			
Project Leader*	1	Team Leader*	I
Project Manager (currently vacant)	I	Project Manager	1
Senior Agronomist*@	1	Senior Technical Specialists (currently vacant)	2
Associate Scientist *@	1	Intervention Manager	I
Post-Doctoral Fellow, Cropping *@	1	Specialists Evidence & Analytics	I
Field Team & Private Sector Engagement lead*	I	MSA consultant	ı
Lead Training Coordinator*	1		
Training Coordinator@	2		
MEL Manager <del>l</del>	1		
Communication Coordinator	1		
MSME Market System Development Coordinator	I		
Project Administrator (currently vacant)	I		
Research Coordinator@	I		
International consultants* - 1@	4		
Locally recruited consultants – I@	4		
Total Dhaka office	14	Total Dhaka office	7
Field Offices (Jashore, Faridpur, Cox's Bazar and Bogura)			
Field Office Coordinator@	4	Field Office Coordinator	1
Agricultural Development Officer	7	Market Development Specialists	2
Machinery Development Officers (engineers)	10	Officer, Market Development	10
Senior MEL Officer	3		10
Admin & Finance@	3		
Total field offices	27	Total field offices	13
Total employed by CIMMYT	41	Total employed by iDE	20

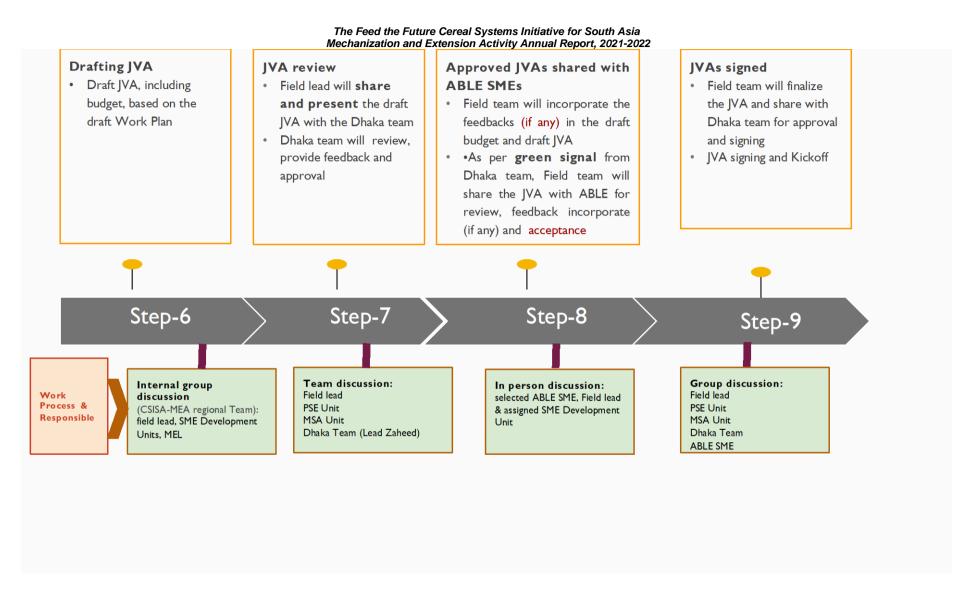
<sup>\*</sup>Internationally recruited staff

<sup>&</sup>lt;sup>®</sup>Position shared with other CIMMYT projects

# Annex 3 Selection process for stage I and stage 2 ABLE SMES



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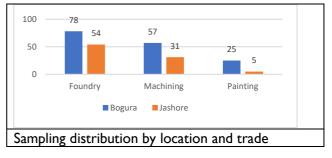
<sup>\*</sup>ABLE – agriculture-based light engineering. CSISA–MEA – Cereal Systems Initiative in South Asia – Mechanization Extension Activity. JVA – joint venture agreement. MEL – monitoring, evaluation and learning. MSA (Market System Assistance Unit) PSE – Private Sector Engagement Unit. SME – small and medium enterprise.

### Annex 4 Workforce training impact survey report

#### Sample distribution by hub and trade

Primary data were collected directly through face-to-face interviews from the selected 250 workforce

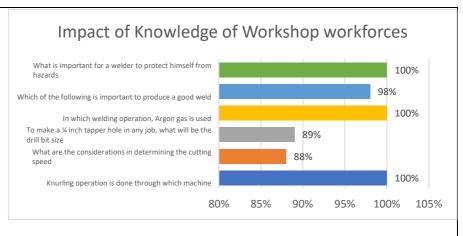
members following a structured questionnaire. This survey was conducted in Bogura and Jashore hubs with those who had received workforce skills development training from May 2011 to April 2022 from CSISA-MEA. The samples were distributed proportionately based on location and trade



# Impact of knowledge on the workshop workforce

This survey aimed to understand the short-term impact on participants in terms of knowledge and

services in the ABLE sector workforce. It found that 100% of participants properly answered knurling operation machine 88% name, mentioned what types and thickness of metal determine cutting speed (which is very significant). In response to question regarding 1/4 inch tapped hole 89% making, replied participants



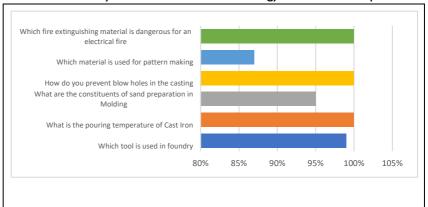
Knowledge of machining workshop workforce members trained between start of Activity and April 2022 assessed in August 2022.

correctly; 100% gave accurate answers about occupational safety equipment during welding (e.g., mask, earmuffs/ear plugs, metal gloves/other gloves, protective googles, needle guard and eye guard, safety vest/apron, and protective boots).

#### Impact of increased knowledge of foundry workforce

CSISA-MEA trained members of the foundry workforce on technology; 100% of respondents

responded accurately regarding fire extinguisher destruction and pouring temperature of cast iron. The study also revealed that 87% of participants were able to identify patternmaking materials correctly. In response to questions about foundry tools, 99% of participants overall replied correctly; 100% study participants have sound



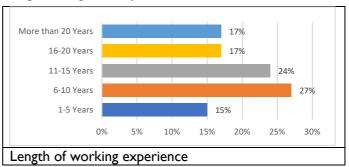
Knowledge of machining workshop workforce members trained between start of Activity and April 2022 assessed in August 2022

knowledge on the prevention of blow holes in the casting.

# Working experience of workforce

This study revealed interesting findings regarding the length of experience of the workforce, and new

workforce participation flow. Overall, 85% of the workforce surveyed were retained in the active light engineering sector for more than five years, 17% worked more than 20 years, and only 15% worked for less than five years. This indicates that 85% workforces are seasoned and new or youth workforce entrance this profession is slow<sup>2</sup>. CSISA—MEA project initiated to increase youth

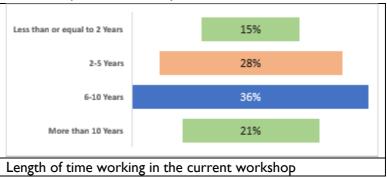


workforce flow through skill enhancement training.

#### **Mobilization of workforce**

Over the period workforces change their workplace. This survey found that over time, members of

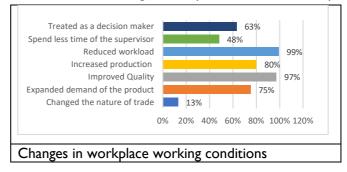
the workforce change their with workshop. only 21% workforce continuing ten years or more in the same place. At the other end of the spectrum, 15% of the workforce surveyed changed their place of work within two years and 36% continued working in the place for a maximum of 10 years. A total of 79% of the workforce changed their workshop within 10 years.



# **CSISA-MEA** training outcome of workforce and workshop

The study attempted to identify the short-term outcomes of training in their personal and workshops

level, and discovered multiple outcomes derived from the CSISA–MEA skills development training. 97% of respondents reported an improvement in product quality as a result of their training 99% identified a reduced workload due to training; 80% of participants reported an increase in their production and 75% an increase product demand due to improved quality. As a result of the training, 13% of respondents changed

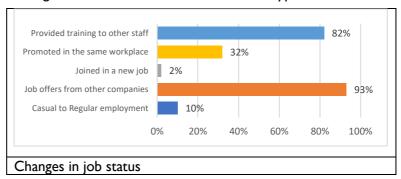


trade, 48% reported the timesaving of their supervisors after training, as they were more likely to make decisions and solve problems independently. In addition, 63% workforce said they were now treated as a decision-maker in their respective workshops.

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82% of participants passed on their training to co-workers; some received other types of benefit: 32%

of respondents said they had been promoted within the same workplace, while in response to job offers from other workshops or companies 93% had been made an offer and 2% joined a new workplace. Ten percent of participants moved from having casual working condition to those of regular employment after training.



96% of the workforce experienced increased acceptance from their family, coworkers, and employers as a result of training; 95% of respondents said their level of confidence in finding a better job had improved; 25% of respondents said that during the reporting period they received extra salary as a result of CSISA–MEA training. Participants mentioned that the training improved their skills, which resulted in 72% working more speedily and having additional time to spend with their family.

