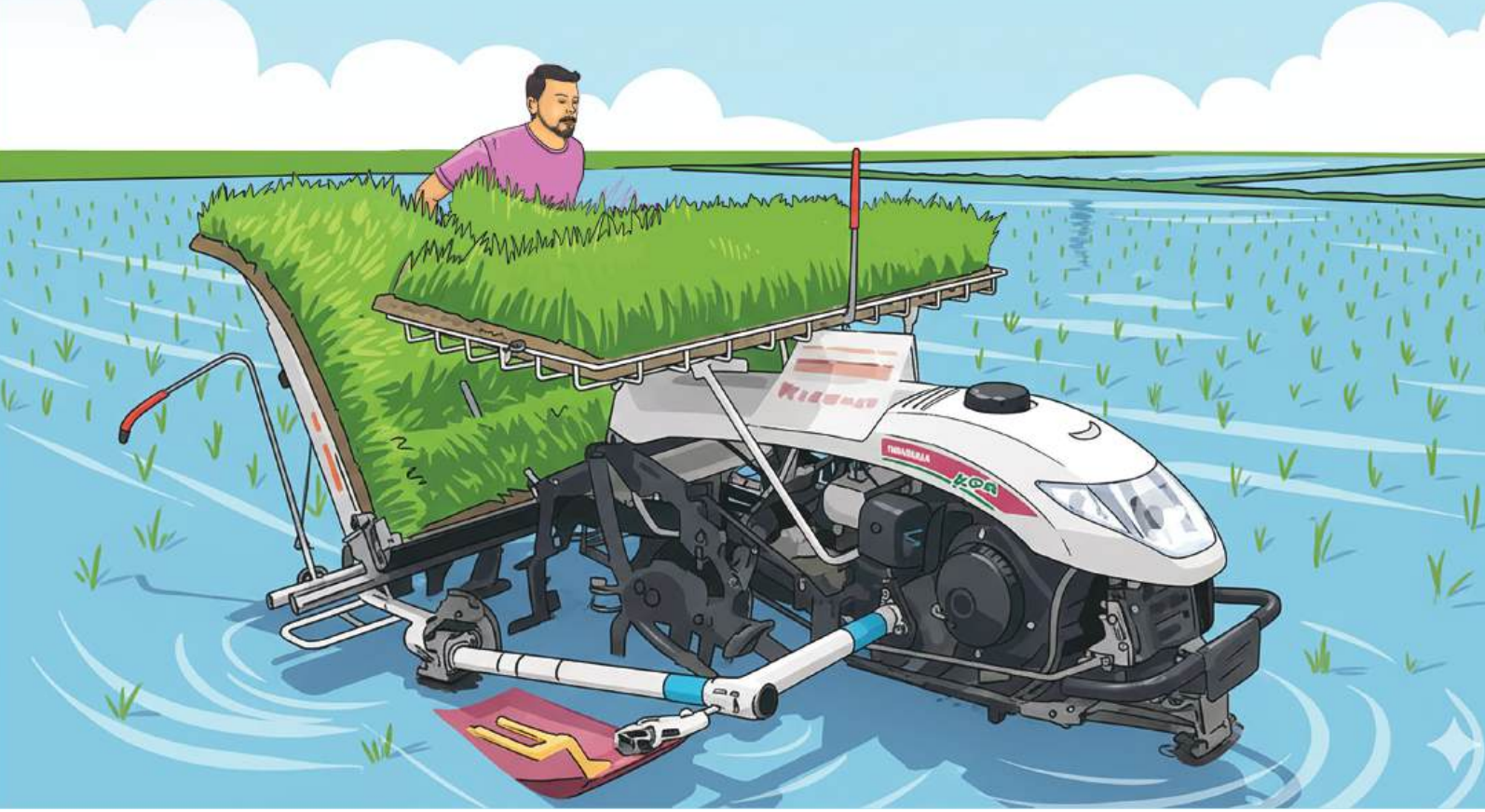
CGIAR
SCALING FOR IMPACT

Access to Finance for Agricultural Mechanization in Bangladesh

Explaining Alternative Financial Instruments

Khondaker Golam Moazzem
Faisal Quaiyyum
Abrar Ahammed Bhuiyan
Rassiq Aziz Kabir



সেন্টার ফর পলিসি ডায়লগ (সিপিডি)
Centre for Policy Dialogue (CPD)

CIMMYT

CGIAR

iDE

Access to Finance for Agricultural Mechanization in Bangladesh

Explaining Alternative Financial Instruments

Khondaker Golam Moazzem
Faisal Quaiyyum
Abrar Ahammed Bhuiyan
Rassiq Aziz Kabir

Published in October, 2025 by

Centre for Policy Dialogue (CPD)
House 40/C, Road No 11 (new)
Dhanmondi, Dhaka – 1209, Bangladesh
Phone: (+88 02) 41021780-2
E-mail: info@cpd.org.bd
Website: www.cpd.org.bd

Copyediting

H M Al Imran Khan

Printed by

Arka

Citation: Moazzem, K. G., Quaiyyum, F., Bhuiyan, A. A. & Kabir, R.A. (2025). *Access to Finance for Agricultural Mechanization in Bangladesh: Explaining Alternative Financial Instruments*. Centre for Policy Dialogue (CPD).

Executive Summary

This study provides an in-depth analysis of the agricultural mechanization sector in Bangladesh, with a focus on the access to finance for acquiring modern agricultural machinery and addressing the key financial challenges faced by stakeholders. It examines existing policies, including the National Agricultural Mechanization Policy, the SME Policy 2019, and the role of financial institutions such as Bangladesh Bank in facilitating access to financing for mechanization. The study also assesses the implications of various financial instruments and identifies the gaps in these initiatives that hinder the widespread adoption of alternative financial instruments in the agricultural machinery sector of Bangladesh.

In this study, the supply chain of the agricultural mechanization sector of Bangladesh was categorised into six segments: input suppliers, raw material wholesalers, local producers, importers, distributors, and end-users. Among these, local producers face the most significant financial challenges, reasons include double taxation on raw materials and product sales, which increases their cost burden. The study assessed traditional and alternative financial instruments, incorporating cross-country references and analysing eight alternative options: asset-based finance, machine leasing, supply chain finance, warehouse finance, venture capital or equity-based finance, crowdfunding, green finance, and women and youth specific finance. Whilst some, like asset-based finance and machine leasing, are somewhat familiar and utilised, most remain underexplored or inaccessible to the stakeholders of the sector.

Key findings indicate that financial literacy significantly influences the adoption of alternative financial instruments. However, due to limited sample sizes, the study could not establish a definitive relationship between other aspects (age, education level, location, etc.) and market actors' preference of alternative instruments. Recommendations emphasise promoting more familiar instruments such as asset-based financing and machine leasing before introducing fewer familiar options.

The study notes that existing policies, including the SME policy, National Agricultural Mechanization Policy, and Light Engineering Policy, lack specificity regarding the agricultural mechanization sector and alternative financing. Since the sector is not officially designated as an industry, it falls under SME governance. SME Foundation, with its network of public and private banks, could play a pivotal role in facilitating fund disbursement through alternative instruments. Moreover, sector-specific policies are urgently needed, with provisions tailored to the agricultural machinery sector. Dedicated funds, concessional loans, and clear disbursement mechanisms should be introduced to address the sector's challenges. This would require collaboration among agencies like Bangladesh Bank, the SME Foundation, the Ministry of Agriculture, and the Ministry of Industries.

To facilitate access to finance, interest rates and repayment periods need adjustments. A preferred interest rate of 4 per cent was identified among local producers and machine service providers, aligning with previous government initiatives. Loan repayment terms should extend beyond two years to accommodate the unique financial cycles of stakeholders. Tax-related inefficiencies were highlighted as a critical barrier, particularly for local producers. Recommendations include preventing tax duplication, streamlining processes, providing clear online guidance through the National Board of Revenue, and differentiating tax rates across the supply chain to alleviate burdens on smaller actors.

The study underscores the importance of digitalising the supply chain to enhance transparency and operational efficiency. Digital platforms for procurement, production, and sales would improve financial monitoring and support data-driven policymaking for tax exemptions, subsidies, and credit systems. The adoption of alternative financial instruments requires awareness-building and capacity-development programmes. Banks, government agencies, and private sector organisations should collaborate to improve financial literacy, promote user-friendly guidelines, and leverage existing grassroots networks to enhance accessibility. Improved financial and digital literacy is critical for fostering a more inclusive and digitally driven ecosystem for agricultural mechanization in Bangladesh.

Authors' Biography

Dr. Khondaker Golam Moazzem is the Research Director at the Centre for Policy Dialogue (CPD). With over three decades of experience, he has produced an extensive body of research work providing practical insights into areas including tariff and VAT structures, SME challenges, and import-dependent supply chains, technology and finance. He is highly experienced in national policymaking, including contributions to Bangladesh's Industrial Policy (2010 and 2016) and service on key government platforms such as the Committee on Trade Facilitation (MoC) and the ERD Eminent Group.

Email: moazzem@cpd.org.bd

ORCiD: https://orcid.org/0000-0002-9049-2031

Faisal Quaiyyum is a former Research Associate at the Centre for Policy Dialogue (CPD), where he contributed to research across interconnected economic and policy areas. His work focused on the intersection of energy policy, macroeconomics, and data-driven analysis, supporting efforts to generate evidence for national policy discussions. He is particularly interested in using quantitative methods and analytical tools to understand economic challenges and develop practical insights that can inform decision-making in developing-country contexts.

ORCiD: https://orcid.org/0009-0003-3955-3999

Abrar Ahammed Bhuiyan is an economics graduate and emerging policy analyst with academic and policy research experience in renewable energy investment, finance, decentralized energy systems, economic modeling, and data-driven policy analysis. He is skilled in both research and administration, with proven experience in policy advocacy and persuasion, successfully influencing government agencies and contributing to institutional decision-making.

Email: abrar@cpd.org.bd

ORCiD: https://orcid.org/0009-0001-9535-6178

Rassiq Aziz Kabir is a Policy Analyst and formerly served as a Programme Associate in the Research Division of the Centre for Policy Dialogue (CPD). He holds a bachelor's and a master's degree in economics from the University of Dhaka. His research interests broadly encompass applied economics and public policy.

Email: rassiq.aziz@gmail.com

ORCiD: https://orcid.org/0000-0003-1340-8104

Acknowledgement

This work was supported by the CGIAR Scaling for Impact Program (S4I; https://www.cgiar.org/cgiar-research-portfolio-2025-2030/scaling-for-impact/), implemented by CIMMYT in collaboration with the Centre for Policy Dialogue (CPD) and iDE.

The authors would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund (https://www.cgiar.org/funders/).

The authors would like to express their sincere gratitude to the experts and businesspersons from Bangladesh's agriculture sector who generously shared their valuable insights during the Key Informant Interviews (KIIs).

The authors further thank the officials from CIMMYT Bogura, Jashore, and Cox's Bazar for their cooperation and support in data collection and for their continuous resource assistance throughout the research process. The team especially appreciate the overall support and encouragement of *Mr. Owen Duncan Calvert*, Project Leader, CSISA-MEA. They also wish to extend their appreciation to S*adab Rahman Chowdhury* and *Sarara Jafrin*, former Programme Associates at CPD, for their contributions to the study.

The research team also gratefully acknowledges the valuable support received from *Mr. Avra Bhattacharjee*, Additional Director, Dialogue and Outreach, CPD; and *Mr. H. M. Al Imran Khan*, Publication Associate, CPD.

Contents

List of Tables

List of Figures

Abbreviations and Acronyms

AMMA	Agricultural Machineries Manufacturing Association, Bangladesh
BAU	Bangladesh Agricultural University
BDT	Bangladeshi Taka
BEIOA	Bangladesh Engineering Industry Owners' Association
CAGR	Compound Annual Growth Rate
CGS	Credit Guarantee Scheme
CIB	Current Credit Information Bureau
CPD	Centre For Policy Dialogue
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GTF	Green Transformation Fund
KII	Key Informant Interviews
LTO	Lease-To-Own
MFS	Mobile Financial Service
MSME	Micro, Small and Medium Enterprises
NBR	National Bureau of Revenue
NGO	Non-Governmental Organizations
SME	Small And Medium-Sized Enterprises
USD	United States Dollar
VAT	Value Added Tax
VC	Venture Capital
WTO	World Trade Organization

1

Introduction

1.1 Background of the Study

Bangladesh, as a country, underwent through phases of agricultural mechanization. Agricultural mechanization is essential for enhancing productivity and progressing towards a more commercialised farming sector. Furthermore, financing remained a critical barrier, with seasonal demand and limited access to affordable loans affecting machinery manufacturers and suppliers. According to Hossen (2019), land preparation, irrigation, threshing, and pesticide application are among the most mechanised operational activities, with over 90 per cent of them undergoing mechanization. However, in the case of planting and harvesting, the mechanization is still less than 10 per cent (Seraj, 2020). The financing schemes in agricultural mechanization remained as one of the key impediments; hence, the scope of further implementation of alternative financial instruments as well as restructuring and regulating the current instruments would have ensured further mechanization for the case of Bangladesh that had not undergone mechanization to a significant extent. Over the time, the financing landscape when it comes to agricultural mechanization in Bangladesh changed from limited government support to a more structured instrumental support (Inspira Advisory and Consulting Ltd., 2019).

By 2015, specialised agricultural loans emerged but remained inaccessible due to high collateral requirements as mandated by the Bangladesh Bank, the central bank of the country. The central bank policies such as the Light Engineering Policy, Credit Guarantee Scheme, and Bangladesh Bank Rural and Agriculture Credit Policy emphasised the progression of mechanised farming as well as ensuring collateral-free loan provisions for the stakeholders; however, effective implementation remained a key challenge. It is expected that following this trend, agricultural credit will have significantly increased, nevertheless, with a lot of barriers pertaining to access to finance.

The government classified the supply chain actors of the agricultural machinery industry, especially the manufacturers, foundries, and workshop owners, as Small and Medium Enterprises (SME). Earlier in 2024, Bangladesh Bank mandated that all banks allocate 25 per cent of their total loan disbursement to CSMEs by December, with 12 per cent specifically for industrial machinery, a classification that would include agricultural machinery, and banks were diligently adhering to this directive (Paul, 2024). The agricultural machinery workshops were highly concentrated within some industrial clusters throughout the country, with Bogura, Jashore, and Cox's Bazar being some of the districts. They often faced a restrictive financial environment due to high interest rates (up to 24 per cent) and an absence of understanding within banks about the light engineering sector, leading to high loan rejection rates (Pranto, 2023). Access to finance for agricultural mechanization, when it comes to the stakeholders of the agricultural machinery sector, witnesses a lot of other challenges, starting from the challenges when it comes to documentation in the financial institutions as well as the lack of sector-specific and alternative financial instruments that would cater specifically to the agricultural machinery industry.

Agricultural financing in Bangladesh shifted from a reliance on informal moneylenders to include microfinance institutions (MFIs) and commercial banks. However, access to finance remained constrained by high collateral requirements, limited loan sizes, and complex bureaucratic procedures. The transition from the Green Revolution to modern mechanization increased the need for substantial investments, both for farmers and

market actors, such as manufacturers and dealers. Despite policy initiatives promoting collateral-free loans and subsidies, debt financing predominates, limiting long-term investment in agricultural mechanization and leaving significant gaps in meeting the sector's financial needs. Existing financial instruments are insufficient to address the challenges of agricultural mechanization. This study examined alternative financial mechanisms, including asset-based finance, which secures loans against assets like inventory or equipment; machine leasing, which allows businesses to access machinery without large upfront costs; and supply chain finance, which enables early payments to suppliers based on approved invoices. Warehouse finance used stored goods as collateral to provide short-term liquidity, whilst venture capital or equity-based finance offers funding in exchange for ownership stakes, supporting high-growth businesses. Crowdfunding aggregates resources from multiple contributors, often through cooperatives, whilst green finance supports sustainable agricultural practices through loans or grants. Finally, women- and youth-targeted financing fosters entrepreneurship, promoting inclusive growth. These alternative financial instruments provides potential solutions to the financial challenges hindering agricultural mechanization in Bangladesh.

For FY24, Bangladesh Bank had set an agricultural credit disbursement target of BDT 35,000 crore, a 13.60 per cent increase from the previous year, with specific allocations of BDT 12,030 crore for state-owned banks and BDT 22,970 crore for private and foreign banks, whilst also directed a minimum of 15 per cent of the disbursements to the livestock sector and 13 per cent to the fisheries sector, highlighting a strategic focus on rural and agricultural development ('Bangladesh Bank fixes 35,000C agri credit target for FY24', 2023).

This study explored a significant gap in the financial accessibility required to advance agricultural mechanization in Bangladesh, especially for SMEs and the stakeholders of the supply chain of agricultural mechanization. The study was undertaken to investigate and propose effective and pertinent financing solutions that can support SMEs in overcoming these challenges. The study assessed existing loan structures, suitable financial instruments, and the role of policy in easing financing constraints for mechanization. By addressing these areas, the study aimed establishing a sustainable financial framework that could empower the SMEs as well as the stakeholders of the agricultural machinery industry, ultimately fostering productivity and economic growth through enhanced mechanization. This study aimed to address the following research questions:

1. What are the state of current financial instruments pertaining to the agricultural mechanization in Bangladesh?
2. What are the challenges faced by the supply side, i.e., the financing authorities involved, when it comes to ensuring easy access to finance for stakeholders in agricultural mechanization (e.g., regulatory challenges)?
3. What alternative financial instruments can facilitate financing with stakeholder-specific conditions, and what will address and fix the impediments mentioned in questions 1 and 2?

Organised into 9 chapters, Section 1 of the study introduces the background, motivation, and purpose of the research. Section 2 reviews existing literature on access to finance, financial instruments, and the agro-mechanization sector, with a specific focus on Bangladesh. Section 3 outlines the research methodology, detailing the use of key informant interviews (KIIs) and survey data collection from key stakeholders across the agricultural mechanization supply chain. Section 4 provides an overview of the agricultural mechanization sector in Bangladesh, examining the major actors, market characteristics, and financial landscape. Section 5 presents the context analysis, focusing on policies, laws, and practices concerning access to finance for agricultural mechanization, including cross-country experiences. Section 6 details the findings from the field survey, analysing stakeholder characteristics, loan information, and the main challenges related to financing. Section 7 discusses the perspectives of both lenders and borrowers, highlighting procedural workflows and challenges encountered in accessing finance. Section 8 concludes the study by summarising key findings and offering policy recommendations to improve access to finance, strengthen local production, and foster a more

inclusive and balanced market for agricultural mechanization in Bangladesh. Section 9 provides detailed recommendations to address existing challenges, enhance policy frameworks, and promote targeted financial solutions for sustainable growth in the sector.

1.2. Objectives of the Study

This study aimed to explore appropriate financial instruments, challenges faced by lenders and borrowers, policy issues and perspectives, and policy linkages to strengthen financing for agricultural mechanization in Bangladesh, focusing on four main objectives:

1. **Investigation of Stakeholder Characteristics and Financing Status**

   This objective examined the financial profiles and financing status of different actors using data that includes financing-related questions as well as details on stakeholder capital, inventory, education levels, and product types. By analysing how these characteristics influence their financing preferences and requirements, the study aimed to identify the unique strategies that could best support each stakeholder group within the agricultural mechanization ecosystem.

2. **Assessment of Financial Instruments and Preferences of the Supply Chain Actors**

   A comparative analysis of different financial instruments, including asset-based finance, venture capital, supply chain finance, equipment leasing, and warehouse finance, were done to clarify which options best serve different stakeholders and how financing preferences vary across the supply chain.

3. **Analysis of Lenders Perspectives on the Compliance, Procedures, and Challenges Faced by the Stakeholders**

   The study aimed to understand the specific challenges faced by various stakeholders in the agricultural mechanization sector. Investigations were also done on the compliance requirements, procedural workflows, and challenges faced by domestic banks and other lenders in providing loans for agricultural mechanization. Understanding these perspectives will clarify barriers and opportunities for enhancing access to finance.

4. **Policy Linkage and Advocacy in Establishing a Direct Link of Options for Financing for Agri-Mechanization with Policies on Light Engineering and Agri-Machinery SME Loans**

   This study tried to connect findings to existing policies of the government and Bangladesh Bank on SME loans for agricultural machinery, with the aim of understanding their impact on accessibility for stakeholders. Through a review of rules, regulations, and lending procedures, the study aimed to support advocacy efforts to enhance policy and lending practices, promoting fair access to financial resources for all actors within the agricultural mechanization ecosystem.

2
Methodology

2.1 Data Collection

A qualitative as well as quantitative approach was utilised in this study to get insights and understanding about the easy access to finance in agricultural mechanization of Bangladesh which included Key Informant Interviews (KIIs) and analysis of data from a primary survey.

Primary Survey

A primary survey was carried out by Polli Research with various stakeholders of the agricultural machinery industry in a few districts of northern, south-eastern, as well as south-western Bangladesh with a sample size of 200 respondents of the supply chain. The respondents were surveyed from 6 districts under 4 divisions. The targeted group of the survey was owners and managers of micro, small and medium enterprises (MSMEs) involved in retail and wholesale selling of agricultural machinery. The survey was conducted in a way that all these types of MSMEs are covered in terms of their business size and revenue generation.

The survey distribution and sample framing are represented in table 1 below:

Table 1: Sample size for each district and sample distribution

District	Number of Samples
Bogura	89
Jashore	25
Kushtia	25
Chattogram	25
Faridpur	25
Cox's Bazar	11
Sample Size	200

Source: Based on CPD Agro-mechanization Survey (2024).

The pre-requisite of a respondent was that he/she must be the owner or the manager of an MSME involved in the agricultural machinery supply chain.

Key Informant Interviews

A total of 13 Key Informant Interviews (KIIs) were carried out with various stakeholders of the agricultural machineries sector starting from machinery manufacturers, workshop owners, government officials, bank officials, association leaders as well as the affiliates of the supply chain. Representatives of each of the following sectors were selected for the KII:

- AMMA-B (Agricultural Machinery Manufacturers' Association-Bangladesh)
- BEIOA (Bangladesh Engineering Industry Owners' Association)
- Bangladesh Bank
- Sonali Bank
- EXIM Bank
- Bank Asia Limited
- SME Foundation
- Ministry of Agriculture
- Ministry of Industries
- Polli Karma Sahayak Foundation
- Ministry of Commerce
- ACI Motors
- Department of Development and Poverty Studies, Sher-e-Bangla Agricultural University
- Manufacturer (Bogura)
- Workshop Owner (Bogura)
- Foundry (Bogura)
- Machine Service Provider (Cox's Bazar)
- Machine Service Provider (Jashore)
- Dealer (Jashore)
- Dealer (Cox's Bazar)

Criteria of Selection

Twenty interviewees were purposely selected based on their profound knowledge as well as experience in this field. The KII participants were selected across key categories to ensure a comprehensive understanding of financing for agricultural mechanization in Bangladesh. The Bangladesh Bank shapes the policy environment for agricultural credit, setting interest rates, credit targets, and regulatory frameworks that guide the broader financial ecosystem. Sonali Bank, a state-owned commercial bank, directly implements these policies, providing agricultural loans and government-subsidised schemes to farmers and agribusinesses. Private sector banks such as EXIM Bank and Bank Asia Limited offer more flexible financing options, focusing on SMEs, agribusinesses, and export-oriented agricultural projects. The SME Foundation was included for its support of small enterprises in the agriculture sector. Government agencies like the Ministry of Agriculture, Ministry of Industries, and Ministry of Commerce play a pivotal role in policy formulation and overseeing agricultural mechanization. Industry associations such as AMMA-B and BEIOA provided insights into the manufacturing sector's challenges and opportunities. Private sector players like ACI Motors contribute to the production and distribution of machinery. Academic institutions, such as the Department of Development and Poverty Studies, Sher-e-Bangla Agricultural University, offered an academic lens on mechanization challenges. Finally, regional stakeholders, including manufacturers, workshop owners, foundries, machine service providers, and dealers from Bogura, Cox's Bazar, and Jashore, offered ground-level perspectives on machinery production, servicing, and financing barriers.

Structure of Interview

The KIIs were done in a semi-structured format, making sure of the fact that key themes are adequately addressed. This proposition was instrumental in amassing detailed information about the perspective of the stakeholders on the current financial instruments, incorporating the challenges they face when it comes to access to loans and the impact it has on their profit margin, capacity of production, and overall competitiveness. The interviews were conducted in person, and the duration of the interviews ranged from 45 minutes to 1 hour.

Content of the Interviews

The interview checklists were prepared earlier, covering topics such as perspectives on current financial instruments, the impact of high interest rates on access to loans, and policy recommendations from each

stakeholder to improve the overall effectiveness of current financial instruments, as well as the introduction of context-specific alternative financial instruments.

Confidentiality of the Interviewees

The informants were assured of the confidentiality of their responses so that the discussions could be candid, and key insights could be gathered. The interviews were recorded with the consent of the stakeholders.

2.2 Analysis Plan

This study's analysis focused on the various stakeholders within the agricultural mechanization value chain in Bangladesh, including machinery manufacturers, workshop owners, government agencies, central banks, policymakers, financial consumers (i.e., supply chain actors), financial providers, and supporting agents (NGOs, academics, etc.). Through KIIs and survey data, the study aimed to evaluate the financing landscape and identify tailored financial solutions for different supply chain actors, along with regulatory improvements that could enhance access to finance for the sector.

Step 1: Stakeholder Categories and Approach

1. ***Users of Financial Products (Supply Chain Actors such as local producers, distributors, raw materials suppliers, etc.)***
    - **Goal:** To assess the financial status, challenges, and literacy levels of local producers and other supply chain actors within agricultural mechanization.
    - **Method:** Using insights from KIIs with local producers, distributors, and other actors in the supply chain, we were able to:
        - Evaluate their current financial flows, access to various financial products, and any issues they face, such as high collateral requirements or limited access to credit.
        - Assess their awareness and access to any incentives or subsidies offered by the government.
        - Explore their level of financial literacy and discuss potential features of financial instruments that could be more favourable for their needs (e.g., lower interest rates, longer loan terms, flexible collateral requirements).
2. ***Financial Providers (Banks, MFIs, NBFIs)***
    - **Goal:** To analyse the perspectives, operational challenges, and compliance needs of financial providers offering loans or financial products to the agricultural mechanization sector.
    - **Method:** Through KIIs with representatives from commercial banks, microfinance institutions (MFIs), and non-bank financial institutions (NBFIs), we were able to:
        - Examine their interactions with loan receivers within the agro-mechanization supply chain, noting any specific operational or lending challenges, such as high default rates, risk exposure, or inadequate collateral among borrowers.
        - Identify compliance and regulatory issues from the Bangladesh Bank or any conflicting government policies that may impact both financial service providers and borrowers, such as stringent collateral requirements or limitations on certain loan products.
        - Evaluate their openness to alternative financial products (e.g., supply chain finance, warehouse finance) and any perceived risks or benefits.

3. Government Agencies and Policymakers

- **Goal:** To understand the stance, objectives, and policy direction of government bodies and central banks in supporting access to finance for the agricultural mechanization sector.
- **Method:** Through discussions with officials from relevant government ministries, the Bangladesh Bank, and policy-making institutions, we were able to:
  - Assess how current policies (e.g., SME policies, agricultural subsidies, credit guarantees) are being implemented and whether they are effectively addressing the financing needs of the agricultural mechanization sector.
  - Identify any policy gaps or areas where government support could be enhanced to facilitate better access to finance, such as introducing or scaling up targeted subsidies, reducing interest rates, or simplifying loan access requirements.
  - Gather insights on potential new policy initiatives that could further support financing for mechanization, especially for small and medium-sized enterprises (SMEs) in rural areas.

4. Supporting Agents (NGOs, Academic Institutions, and Industry Experts)

- **Goal:** To gather technical insights and recommendations from organisations that have in-depth knowledge of the agricultural mechanization sector's financing needs.
- **Method:** Interviews with representatives from NGOs, academics, and sector experts focused on:
  - Their perspectives on the overall financial situation of the agricultural mechanization industry, including structural and market challenges.
  - Recommendations for designing or improving financial products that address specific needs of the sector, informed by their technical and practical knowledge.
  - Suggestions for educational and awareness initiatives that could enhance financial literacy and improve access to suitable financial products for different supply chain actors.

Step 2: Merging KII and Survey Data

The study integrates findings from KIIs with survey data collected from supply chain actors on their financing preferences. The survey data, gathered from various stakeholders within the Agri-mechanization sector, primarily focused on two key areas:

1. Preference Rankings for Financial Instruments: Stakeholders ranked various financial instruments (e.g., asset-based finance, equipment leasing, supply chain finance) based on their relevance and attractiveness to their specific needs and business contexts.
2. Preference Rankings for Instrument Features: Stakeholders rated their preferences for specific characteristics of financial instruments, including interest rates, loan terms, risk-sharing structures, and collateral requirements.

The survey responses were segmented by characteristics such as business size, location, type of supply chain role, and owner demographics. These segments will help us identify patterns in financing preferences that can inform tailored financial solutions.

Step 3: Final Synthesis and Recommendations

1. Financial Instrument Tailoring

- Based on both the interview and survey findings, the study outlines recommendations for specific financial instruments suited to different types of supply chain actors. For example, asset-based financing may suit larger machinery suppliers, whilst equipment leasing might be more beneficial for end users like farmers or machine service providers.

2. Regulatory and Policy Recommendations

- The study identified and recommended specific policy adjustments or regulatory changes that could simplify access to finance for the agricultural mechanization sector. For example, advocating for reduced collateral requirements, lower interest rates, or credit guarantees for SMEs in rural areas.

3. Awareness and Financial Literacy Initiatives

- The study proposed programmes that financial institutions and NGOs could implement to improve financial literacy among supply chain actors, particularly regarding alternative financing options and understanding of compliance requirements.

4. Facilitating Inclusive Financing

- The study recommended strategies to make financial products more accessible and inclusive, particularly for small and underserved businesses, by promoting flexible loan terms, risk-sharing models, and targeted support for women and youth in the sector.

The study explored region and industry specific dimensions of financing, but there are limitations of this study as it does not cover the regional diversity across Bangladesh. Though it provides an accurate portrayal of the current condition to attain more precision, a higher sample size would be optimal. Since many of the indicators are self-perceptions, the perception of the participants may give rise to biases causing a divergence from objective metrics.

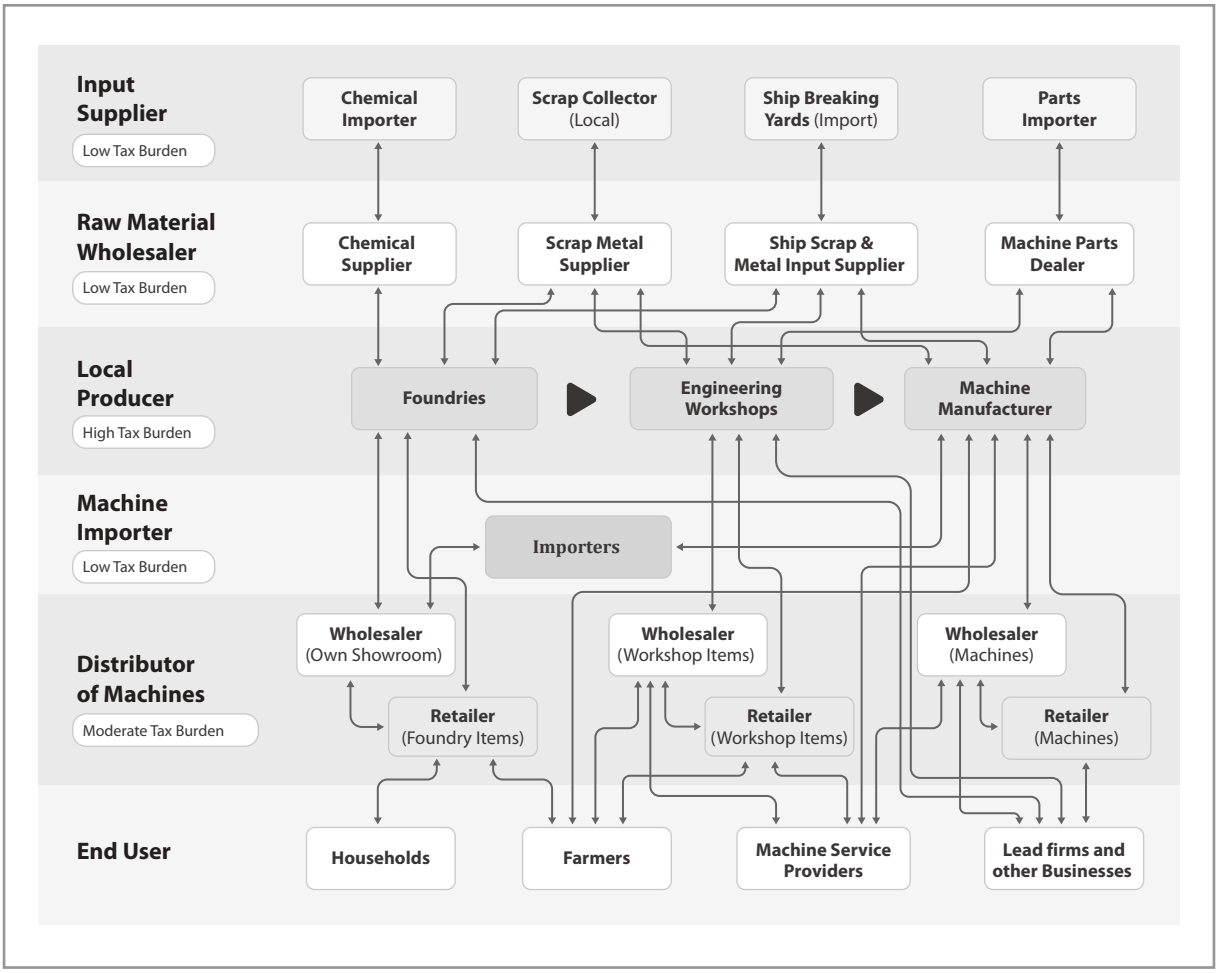
3

Overview of the Agricultural Mechanization of Bangladesh

3.1 Overview of the Major Actors of the supply chain

A few actors are involved in the machinery supply chain, and Figure 1 portrays the interaction between the major actors.

Figure 1: Supply chain of agricultural machinery and spare parts production



Source: Compiled by Authors.

3.1.1 Input Suppliers

At the initial level of the supply chain there are different types of input suppliers. The suppliers can be segmented into four broad categories:

1. Chemical importers who import Silicate, Hard Coke, etc. and sell the chemicals to the wholesalers of raw materials related to agricultural machine production.
2. Local Scrape collectors collect scraps from different areas of the country and supply the appropriate scrap down the supply chain of the Agri mechanization supply chain.
3. In the ship breaking industry, big companies import ships to extract different parts and materials that will be recycled or sold. Imported ships to the ship breaking yards are the main source of scrap material for the machine production sector. Other than scrap materials, the industry also supplies electronics and gadgets to the local market.
4. Spare parts importers who import spare parts that are used to repair existing machinery or manufacture new machines locally.

3.1.2 Raw Material Wholesalers

Raw material wholesalers play a crucial role in connecting input suppliers with the value chain, providing local manufacturers with essential raw materials for machine production. These wholesalers can be segmented into four categories:

1. **Chemical suppliers**

   Chemical suppliers purchase chemicals from importers and sell them to producers. These chemicals, such as pig iron, silicon, and hard coke, are essential inputs primarily supplied to foundries for melting metal scraps, including ships and local scraps.

2. **Scrap material suppliers**

   Scrap material suppliers collect scrap metal from local collectors, including decommissioned products either produced domestically or imported. Major inputs include scrapped metal, copper, and steel (often referred to as 'SS Material') and machine parts. These suppliers provide materials to various production-level actors, such as foundries, engineering workshops, and agro-machine manufacturers. Foundries melt these scraps, whilst other production-level actors reshape them to produce their desired items.

3. **Ship scrap and metal input suppliers**

   This category focuses on metal inputs sourced mainly from ship-breaking yards. As Bangladesh does not have internal sources of iron ore or metals, nearly 100 per cent of the metal used in the industry is imported. Ship-breaking yards import decommissioned ships, strip, and sort metal inputs such as ship scrap, sheet metal, rods, and other iron components. These materials are distributed to foundries for melting and supplied to engineering workshops and agri-machine manufacturing units.

4. **Machine parts dealers**

   Machine parts dealers receive spare parts from importers and act as distributors, providing these parts to the production segment to facilitate the manufacturing of various machinery products.

3.1.3 Local Producers

Local producers cater to a wide spectrum within the agricultural sector, producing a variety of machinery and spare parts required for farming operations, covering from basic land preparation tools like plows and harrows to advanced equipment such as tractors, combine harvesters, and irrigation systems. There are three major roles of the producer segment who deals with other actors both vertically and horizontally. They are:

1. **Foundries:** Foundries melt scrap metals and shape the melted metals into different spare parts of the machines which gets used in local and imported machineries.
2. **Engineering workshops:** Workshops cut metals and make different parts of the machine. Some of the workshops also act as repair shops to local users of machinery.
3. **Machine manufacturers:** Manufacturers assemble different parts sources from foundries and workshops and produce whole machines which are ready for use.

According to Alam (2022), there are 70 foundries, 1500 spare parts manufacturers, 40,000 spare parts retailers, 800 machinery manufacturers, 20,000 repair workshops, and 500,000 mechanics in the local producer segment of the agricultural mechanization sector.

3.1.4 Machine Importers

Machine importers import entire machines to the country and distribute them through wholesalers or retailers. In Bangladesh large companies like 'Banglamark Limited', Janata motor and machineries, and ACI Motors import agricultural machineries of different categories. Bangladesh imports machines mostly from China and Japan. Apart from these two countries Indian machines are alos imported to the country.

3.1.5 Distributor of Machines

Machinery distributors, including wholesalers and retailers, play a critical role in the agricultural machinery supply chain by distributing finished goods to end-users. This group acts as the link between manufacturers and the market, ensuring the availability of agricultural machinery and parts across the country. They ensure that a wide range of agricultural machinery and spare parts are available to farmers and local service providers. This is achieved not only through physical retail outlets but also increasingly through digital platforms, local NGO workers and mobile sales teams, expanding the reach of their distribution networks.

3.1.6 End Users

End users of the machines are households, individual farmers, Machine Service Providers (MSPs), and lead farms or businesses. Among the users MSPs offer crucial support to smallholder farmers by providing access to agricultural machinery without the need for ownership. This service is especially vital in Bangladesh, where the high cost of machinery can be prohibitive for individual farmers. These services enable farmers to utilise advanced agricultural machinery for specific tasks or seasons, thereby optimising farm operations and increasing productivity. MSPs extend their coverage by offering a wide range of machinery suited to various agricultural operations, from land preparation and planting to harvesting and post-harvest processing. This includes tractors, tillers, combine harvesters, and irrigation equipment, among others.

3.2 Overview of the Financial Instrument

3.2.1 Financial Instruments Available in Bangladesh

Different types of financial instruments are available for businesses in Bangladesh as detailed in Table 2. Below is the list of instruments with their underlying mechanisms:

1. **Bank Loan:** A financial product that provides a lump sum of money, which must be repaid over a set term with interest. Collateral may be required, typically secured against assets like real estate or inventory.
2. **Asset-based Finance:** Funding secured against specific assets, such as accounts receivable or inventory, which act as collateral. This method provides flexible financing based on asset value rather than cash flow.

3. **Credit Guarantees:** Guarantees provided by government or non-government organisations to lenders, reducing their risk and making it easier for agricultural enterprises to secure loans.

4. **Government Subsidies and Grants:** Financial support provided directly by the government to reduce the cost of machinery or offset initial capital investments in mechanization, typically not requiring repayment. To encourage agricultural mechanization, the Government of Bangladesh offers subsidies covering 50 per cent of the cost for selected machines, with the rate increasing to 70 per cent in coastal areas. This initiative applies to equipment such as power tillers, reapers, rice transplanters, and combine harvesters (Pranto, 2023).

5. **Microfinance Loans:** Small loans provided by microfinance institutions (MFIs) aimed at smallholder farmers and micro-enterprises, often unsecured and based on social collateral.

Table 2: Details of the financial instruments available in Bangladesh

Finance Instrument	Uniqueness	Duration	Return Expectation	Accessibility to Small Businesses	Overall Challenges and Risk Exposure
Bank Loan	Versatile use of funds; predictable repayment terms	Short to long-term	Interest payments; lenders	Moderate; depends on credit score and collateral	Lengthy approval process; risk of default; high collateral requirements for secured loans
Asset-based Finance	Provides flexible financing based on asset value rather than cash flow	Short to medium-term	Interest and fees; lenders	High, especially for asset-heavy small businesses	Valuation difficulties and potential depreciation of assets over time
Credit Guarantees	Encourages lending to smaller businesses by minimising lender exposure	Varies	Interest payments; lenders	Moderate; depends on lender participation	Limited awareness among businesses; may not cover all loans
Government Subsidies and Grants	Typically, does not require repayment, lowering costs for farmers	Varies	No repayment; government support	High; directly aids smallholder farmers	May have bureaucratic hurdles; limited availability based on government policies
Microfinance Loans	Tailored for those with limited access to traditional banking; often unsecured	Short to medium-term	Interest payments; MFIs	High; specifically designed for small businesses	Potentially high interest rates; reliance on social collateral

Source: Authors' compilation.

3.2.2 Cross-country Examples of Financial Instruments

Apart from the financial instruments available in Bangladesh there are other types of instruments that are utilised in businesses globally as detailed in Table 3. Below is the list of some instruments with their underlying mechanisms:

1. **Equity Finance:** Involves investors funding the business in exchange for equity. Investors seek returns through company growth and profitability rather than through traditional repayment.

2. **Supply Chain Finance:** A financing solution where a financier covers invoices for suppliers, enabling early payments that buyers approve, enhancing liquidity within the supply chain. This is more appropriate for supply chain actors who need raw materials to produce machinery or spare parts.

3. **Equipment/Machine Leasing:** This allows businesses to lease machinery or equipment over time instead of buying outright, with the lessor retaining ownership during the lease period. Both capital machinery to the producers and ready machinery to the end-users can be offered as a lease using this financing option.

4. **Warehouse Finance:** Loans based on the value of goods held in storage, where the goods serve as collateral. This is particularly useful for inventory-heavy businesses needing short-term liquidity. As most of the supply chain actors in the agricultural machinery sector have inventory, this financing option has the most potential among other instruments.
5. **Crowdfunding or Cooperative Financing:** Farmers or small enterprises pool resources collectively, often through cooperatives or community crowdfunding platforms, to purchase machinery. End users of the supply chain can utilise this financing option by creating cooperatives and funding machinery as a community.
6. **Lease-to-Own (LTO) Programmes:** Farmers lease equipment with the option to own it after a specified period, with payments contributing towards eventual ownership. In the context of agricultural machinery end users can utilise this option by taking machinery as lease and then get ownership after paying the full price.

Table 3: Details of the financial instruments available globally

Finance Instrument	Uniqueness	Duration	Return Expectation	Accessibility to Small Businesses	Overall Challenges and Risk Exposure
Equity Finance	Suitable for high-growth potential firms; no debt burden.	Long-term	Capital appreciation and/or dividends; investors	Limited for small businesses without strong growth potential	High risk if the business fails; loss of ownership and control for founders.
Supply Chain Finance	Enhances liquidity within the supply chain without burdening working capital.	Short-term	Fees on advanced payments; financiers	Moderate, as it depends on buyer/supplier relationships	Dependent on buyer and supplier creditworthiness; administrative complexity.
Equipment/ Machine Leasing	Reduces upfront costs; equipment is paid for through instalments.	Medium-term	Lease payments; lessors	High, particularly for equipment-heavy industries	Risk of depreciation and repossession if payments default.
Warehouse Finance	Enhances liquidity by using inventory as collateral.	Short-term	Interest based on inventory value; lenders	Moderate for inventory-heavy businesses	Risk if goods lose value or perish; requires strong inventory management.
Crowdfunding /Cooperative Financing	Reduces individual costs through collective investment.	Varies	Returns on investment shared among members; investors	High; allows small-scale farmers to access mechanization collectively	Requires coordination and trust among members; risk of collective failure.
Lease-to-Own (LTO) Programmes	Combines leasing flexibility with ownership benefits.	Medium to long-term	Ownership of equipment after lease; lessors	High; allows access without large upfront costs	Risk of repossession if payments default; unclear ownership transfer terms.

Source: Authors' compilation.

Though some of these instruments are already available for the agricultural mechanization sector of Bangladesh, most of the instruments are yet to be introduced to the market. Among the traditional instruments there is a need for restructuring to match the demand of the financing.

3.3 Characteristics Market for Agricultural Mechanization in Bangladesh

During the fiscal year 2011-2012 the market size for agricultural machinery in Bangladesh was approximately BDT 282,08 crore. Additionally, the market for spare parts was valued at around BDT 600 crores, with locally manufactured spare parts contributing roughly BDT 150 crores to this figure (Gulandaz et al., 2014).

Bogura and Jashore are two major hubs for agricultural machinery production. Bogura is producing about 80 per cent of local machinery and spare parts, including irrigation pumps, threshers, and diesel engine components. Despite this growth, Bogura and other regions still face infrastructure challenges for agricultural machinery production. The rise in local spare parts production suggests potential for reducing dependency on imports. The table below illustrates information on amount of agricultural machinery use in Bangladesh.

In Bogura, the agri-machinery and spare parts manufacturing sector has an estimated market size of around USD 50 million. Between 2016 and 2018, it saw a compound annual growth rate (CAGR) of about 9 per cent (Inspira Advisory and Consulting Ltd., 2019). However, according to business owners and industry leaders, growth has slowed recently, and demand for their products has decreased. Since 2005, especially after 2010, many enterprises have shut down, with about a quarter of engineering workshops closing over 14 years. Some businesses shifted to producing non-agricultural items like automotive parts and construction machine components. Although some new entrepreneurs have entered the market, there has been an overall decline in the number of enterprises. Smaller workshops that make spare parts for agri-machinery have been most affected, creating a sense of pessimism in the industry (Inspira Advisory and Consulting Ltd., 2019). In contrast, Jashore has fewer enterprises in this sector but has seen faster growth, with a market size of approximately USD 12 million and a 14 per cent growth rate over the past three years. Unlike Bogura, businesses in Jashore have not reported a major drop in demand.

Table 4 presents an overview of the current state of agricultural mechanization in Bangladesh, highlighting the extent to which various farming activities are mechanised. There is a high degree of mechanization in areas such as cultivation and irrigation, with both reaching 95 per cent. However, other critical tasks like transplanting and drying remain largely manual, with less than 1 per cent and 2 per cent mechanization, respectively.

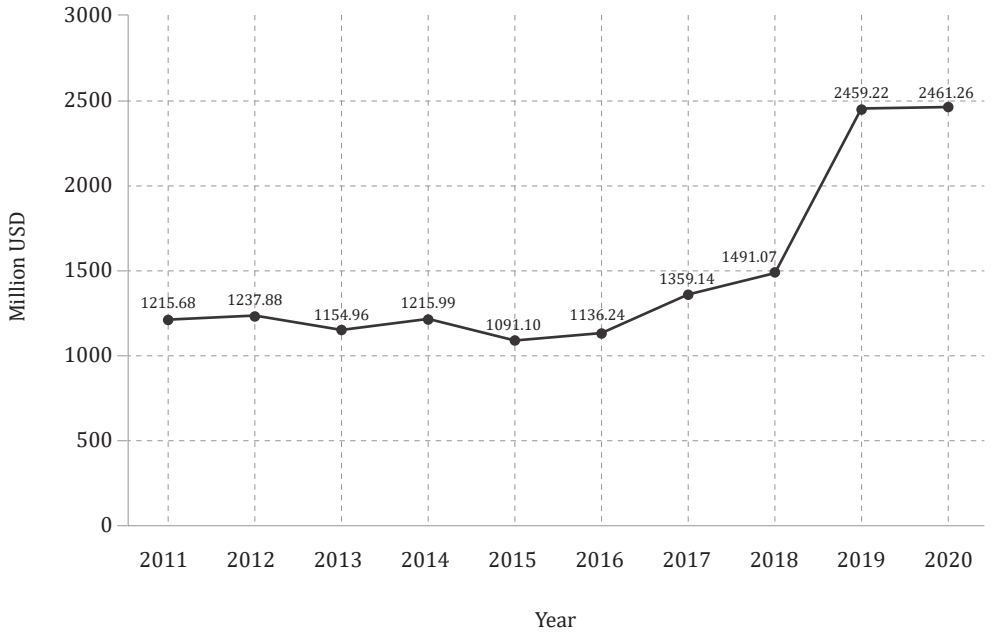
Table 4: Status of agricultural mechanization in Bangladesh

Activity	% Mechanised
Cultivation	95%
Irrigation	95%
Transplanting	<1%
Fertilizer application	1%
Weeding	65%
Insecticide application	80%
Harvesting	8%
Threshing	78%
Winnowing	6%
Drying	2%
Storing	4%

Source: (Nath, 2017).

There is a sharp increase in the size of market of agri machinery, observed between 2017 and 2019, with the market almost doubling to about 2,459 million USD in 2019. This upward trend slightly stabilised by 2020, reaching approximately 2,461 million USD. The figure 2 indicates that the demand for agricultural machinery surged during the late 2010s.

Figure 2: Trend of agricultural machinery market of Bangladesh



Source: (Alam, 2022).

The market for agricultural machinery in Bangladesh includes both locally produced and imported machinery and spare parts. Table 5 outlines the use of agricultural machinery based on type, whilst Table 6 focuses on the origin, quality, and pricing of spare parts. A significant portion of these spare parts is imported from China. Locally made spare parts generally offer better quality compared to imported alternatives, whilst prices for certain items remain similar between local and imported products.

Table 5: Amount of agricultural machinery use in Bangladesh in 2015

Agricultural Machinery	Number	Number/1000 ha
Tractor	60,000	7.00
Power Tiller	700,000	81.61
Pump (DTW)	38,000	4.43
Pump (STW)	1,575,136	183.65
Pump (LLP)	300,613	35.05
Solar irrigation pumps	5,500	0.64
High Speed Rotary Tiller	12,000	1.40
Power tiller operated seeder	7,500	0.87
Bed Planter	2,500	0.29
Rice Transplanter	754	0.09

Table 5 contd.

Table 5 contd.

Agricultural Machinery	Number	Number/1000 ha
Reaper	4,000	0.47
Mini Combine Harvester	1,200	0.14
Medium combine harvester	1,820	0.21
Closed Drum Thresher	220,000	25.65
Open Drum Thresher	150,000	17.49
Corn Sheller	44,000	5.13
Sugarcane Crusher	50,000	5.83
Winnower	3,000	0.35

Source: (Alam, 2022).

Table 6: Quality and price of spare parts

Spare Parts	Local Spare Parts		Imported Spare Parts		
	Quality	Price ($)	Quality	Price ($)	Country
Diesel engine liner (HP-25)	Very good	13.10	Not good	13.10	China
Diesel engine liner (HP-20)	Very good	11.31	Not good	13.07	China
Diesel engine liner (HP-12)	Very good	8.93	Not good	10.36	China
Diesel engine piston (HP-25)	Good	9.52	Good	11.31	China
Diesel engine piston (HP-20)	Good	8.33	Good	10.12	China
Diesel engine piston (HP-12)	Good	5.65	Good	7.50	China
Gudgeon bush(HP-25/24/20)	Very good	1.79	Good	2.38	China
Gudgeon pin(HP-25/24/20)	Very good	1.43	Good	1.79	China
Pump 3"	Very good	16.07	Good	29.76	India
Impeller 3"	Very good	2.08	Good	No import	
Impeller 4"	Very good	2.20	Good	No import	
PT Chain cover SF/DF	Very good	2.98	Good	4.52	China
PT pulley (7", 7.5", 8", 8.25")	Good	10.12	Good	No import	
Clutch / normal V-pulley	Very good	5.36	Good	No import	
Clutch Bush	Very good	0.60	Good	0.89	China
Governor bush (big)	Very good	0.71	Good	0.83	China
Governor bush (small)	Very good	0.36	Good	0.48	China
Fuel tank 8 hp engine	Very good	16.07	Good	No import	
Fuel tank 6 hp engine	Very good	10.71	Good	No import	
Fuel tank 4 hp engine	Very good	8.93	Good	No import	

Source: (Alam, 2022).

Status of Financing in the Mechanization Sector

As detailed in Table 7, Mamun et al. (2018) found that 100 per cent of the farmers of the study thinks that high price of machinery is a major problem. Around 92.85 per cent of the farmers considers inadequate loan distribution as a major problem.

Table 7: Problem faced by farmers regarding agricultural mechanization

Problem faced by farmers	Percentage
Fragmented land pattern	95.71
High price of machinery	**100**
Poor maintenance	85.71
Lack of extension service	78.58
Poor transportation	71.42
Inadequate loan distribution	**92.85**
Big size of machinery	97.14

Source: Mamun et al. 2018.

From Table 8, it is evident that from 2010 to 2023, there has been a consistent loan disbursement when it comes to irrigation equipment and machinery. However, there has been a decline in the percentage of Long-Term Loans for agricultural machinery.

Table 8: Overall loan structure for agricultural mechanization

Year	Total Agricultural Loans Disbursed	Percentage of Long-Term Loans for Agricultural Machinery	Disbursement for Irrigation Equipment & Agricultural Machinery (BDT/Taka)	Key Focus
2010 (FY11)	Not specified	37%	0.53 billion	Pivotal focus on mechanization; support for machinery and irrigation to bolster productivity.
2015 (FY16)	176.46 billion	18.3%	2.6 billion	Continued emphasis on agricultural mechanization, particularly for irrigation equipment and machinery.
2020 (FY21)	255.1 billion	13.5%	4.4 billion	Mechanization remained a key focus, with increasing disbursements aimed at improving efficiency and output.
2023 (FY23	328.3 billion	18.07%	Not specified	Increased focus on mechanization, exceeding loan targets and boosting agricultural productivity.

Source: Bangladesh Bank Annual Reports 2010, 2015, 2020 and 2023.

The significant barriers when it comes to easy access to finance for agricultural mechanization start from the fact that there exists a high interest rate when it comes to access to loans, which at present is as high as 15 per cent for commercial banks with a very constricted repayment period.

The administrative hassles as well as not having adequate knowledge about the paperwork on financial solutions are the other big impediments. The existence of SME loans is unknown to the stakeholders as well, as a lot of banks do not have a specialised SME wing. Overall lack of proper policy mechanism as well as not paying heed to the complaints of the stakeholders like ensuring zero interest loans are huge problems as well.

4

Context Analysis

4.1 Policies, Laws and Rules concerning Access to Finance for Agricultural Mechanization; Scopes, Limitations and Theory of Change

The National Agricultural Mechanization Policy of 2020 incorporates financial instruments such as minimum interest loans, which are primarily directed at farmers, but can also benefit other stakeholders in the supply chain. Additionally, the policy includes provisions for instalment payments to help facilitate the purchase of agricultural machinery. Although, challenges such as constrained purchasing power added with the difficulty in accessing loans happen to remain as key predicament for small farmers, something which needs to be addressed further. In 2020, although the government came up with up to 70 per cent subsidies (starting from 50 per cent) through the National Agricultural Mechanization Policy, access to financing instruments remained outside the reach of small farmers (Department of Agricultural Extension, 2020).

The 2019 SME Policy from the Ministry of Industries gives emphasis on access to finance as a pivotal policy when it comes to the SME sector, which includes the light engineering industries pertinent to agricultural mechanization. However, specific financial tools are not emphasised, although focus has been given to create an environment conducive to business, women's entrepreneurship, and banks. Despite all this, there needs to be targeted support for stakeholders in agricultural mechanization to level down the high interest loans in the sector as well as come up with customised financial instruments. Although the Ministry of Industries has this policy laid out for small and medium enterprises (SMEs), nothing specific is there for the agricultural machinery manufacturing firms, most of which fall under the SME classification. SME Foundation, an autonomous institution under the Ministry of Industries, has financing policies specifically laid out for the agricultural machinery sector, but the ministry does not interfere when it comes to the functionalities of the foundation (Ministry of Industries, 2019).

The Light Engineering Policy of 2022 is pertinent to the agricultural machinery sector, as the manufacturing of agricultural machinery falls within it. The policy document aims to improve access to finance through loans, tax incentives, and creating an environment favourable for new technologies and venture capital. The policy also aims to improve the financing landscape for the agricultural machinery sector by fostering foreign direct investment (FDI) and modernising existing technologies, which must be contextualised because of each sector (Ministry of Industries, 2022).

The 2023 Circular on Sustainability and Climate-related Financial Disclosures: Bangladesh Bank has its building block on the 2011 green banking initiatives. Although no specific financial instruments have been mentioned, which in a way can reinvigorate the environmentally friendly practices in agricultural mechanization, the broader sustainability goals can be readapted to cater to the needs of this sector (Ali, et al., 2023).

From the Table 9, it is evident that although there have been policies designed specifically for small farmers as well as there have been initiatives to improve the general access to finance, there have been a lack of specific financing tools as well as overall lack of importance when it comes to sector risks. Recent reports indicate that the Bangladesh government has implemented a policy for the manufacture of agricultural machinery, a policy aimed at reducing reliance on imports and stimulating local production ('Agro-based industries get 10-year tax

Table 9: Desk review of policy documents

Policy	Key Focus	Financial Tools	Challenges	Recommendations
National Agricultural Mechanization Policy (2020)	Support for small farmers	Minimum interest loans, instalment payments	Constrained purchasing power, loan accessibility	Targeted support to reduce loan interest rates and customizsd financial instruments. Specify instruments and loan provisions for supply chain actors of agricultural machinery.
SME Policy (2019)	Access to finance for SMEs, including light engineering	General access to finance	Lack of specific financial tools for agricultural mechanization and absence of industry-specific guidelines overseen by the SME Foundation	Develop targeted financial tools for agri-mechanization stakeholders
Light Engineering Policy (2022)	Improve financing landscape for agricultural machinery	Loans, tax incentives, venture capital	High interest rates	Foster foreign direct investment (FDI) and modernise technologies

Source: Mentioned Government Policy Documents.

exemption', 2021). This exemption is expected to improve access to finance for stakeholders in the agricultural machinery sector by lowering production costs, thus making machinery more affordable for farmers and agribusinesses, while also incentivising local manufacturers to invest in the industry. Additionally, Bangladesh Bank's Green Transformation Fund (GTF), a USD 200 million refinancing scheme, has expanded its focus to include financing for environmentally sustainable agricultural practices, thereby facilitating access to capital for the importation of energy-efficient machinery. This green financing initiative is poised to reduce the financial barriers to adopting modern, environmentally friendly agricultural technologies, thereby enhancing productivity and sustainability in the sector (Green Finance Platform, 2019). Between 2018 and 2024, Bangladesh Bank promoted green finance initiatives, with a significant focus on sustainable agriculture, achieving substantial growth in green finance disbursements, particularly in agriculture, which accounted for 74.7 per cent of the green finance in 2022; future targets could focus on increasing financing for climate-smart agricultural machinery to align with national climate goals and enhance resilience (Sustainable Finance Department, 2022).

4.2 Practices of Selected Banks and Other Financial Institutions concerning Access to Finance for Agricultural Mechanization: Scopes and Limitations

In Bangladesh, loans specific to agricultural machinery are handed out by a few banks, both from government and non-government level, and most of the bank's hand out these loans from their SME division as most of the manufacturing stakeholders of agricultural machinery are small and medium enterprises.

CPD has reviewed the overall loan structure of six banks and financial institutions as summarized in Table 10. Bangladesh Krishi Bank renders support when it comes to agricultural mechanization with low interest loans (reaching as low as 4 per cent) and up to 70 per cent subsidies on machinery. Uttara Bank has loan schemes of both short and mid-term for crop production, equipment purchase, and animal husbandry, where the security requirement includes land mortgages and personal guarantees. The Krishi Saronjam Rin Program of IFIC Bank instrumentalises loans for agricultural machinery with minimal collateral up to BDT 1 million and terms ranging from 12 to 36 months. Mortgage-free loans are provided by BRAC Bank through their ANONNO loans, where

Table 10: Selected financial institutions and their programmes pertaining to agri-machinery loan

Institution Name	Type of Institution	Loan Type	Interest Rate	Collateral Rate	Limitations
Bangladesh Krishi Bank	State owned Bank	Low-interest loans for machinery	As low as 4%	Not specified	Unspecified collateral requirement
Uttara Bank	Commercial Bank	Short and midterm loans	Not specified	Land mortgages and personal guarantees	Specific to crop production and equipment
IFIC Bank	Commercial Bank	Agricultural machinery loans	Not specified	Minimal collateral	The maximum loan size is BDT 15 lakh which is detrimental for many businesses
BRAC Bank	Commercial Bank	Agricultural machinery loans	Not specified	Mortgage-free	Targeted at agro-based industries but the machineries are not specified
Social Islami Bank	Islamic Bank	Collateral-free loans	Not specified	None (collateral-free)	Inconsistency in work procedures
IDLC Finance	Non-Banking Financial Institution	SME loan	Not specified	Secured & unsecured options	Based on business size and agricultural focus

Source: Documents of the mentioned banks, as of 2024.

agriculture and agro-based industries are targeted, which supports the expansion of business with loan amounts ranging from BDT 400,000 to BDT 50 million, and collateral-free loans for agriculture are provided by Social Islami Bank. IDLC Finance provides its loans under the SME division, offering both secured and unsecured options where the former is backed by collateral requirements, unlike the latter, based on the business size and needs.

The limitation in this regard often encompasses but is not confined to high collateral requirements, not specifying the agricultural machineries as well as inconsistency in work procedures when it comes to handing out loans and business size.

4.3 Policies, laws and rules concerning access to finance for agricultural mechanization: Cross-country experiences

Venture capital can be a viable financing option for the agricultural mechanization sector in Bangladesh; however, the risks associated with equity dilution and potential loss of founder control remain significant challenges (Kato & Germinah, 2022). In contrast, asset-backed leasing emerges as another relevant financial instrument. This approach has been used effectively in Ethiopia to assist farmers by reducing equipment costs. However, challenges such as long-term expenses and depreciation remain, making it a less straightforward solution for Bangladesh's agricultural sector (EASE, 2023).

Concessional loans are another financing option highlighted in the context of Nepalese agriculture, specifically within the machinery and agro-processing sectors. These loans can help overcome barriers to mechanization, but significant challenges exist in terms of collateral requirements and limited financial literacy, which hinder their effectiveness in supporting Bangladeshi farmers (Pandey, 2022).

Leasing, as a financial instrument, also has potential benefits for Bangladesh. It reduces the need for collateral, making it more accessible to farmers who may not otherwise qualify for traditional loans. This model has shown success in other regions, offering a promising avenue for enhancing access to machinery in Bangladesh

(Aram, 2021). Cash flow-based credit, including flexible, revenue-tied loans, has proven effective in supporting small farmers. By linking loan repayment to the revenue generated by farming activities, this model offers flexibility and can be instrumental in helping small-scale farmers in Bangladesh (Javed et al., 2023; Junior & Gameiro, 2020; Yi et al., 2021).

Additionally, financing models like Custom Hiring Centers (CHCs) and Farmer Producer Organizations (FPOs) in India have provided a scalable solution for facilitating the rental of agricultural machinery, thus reducing the need for farmers to make outright purchases. These models are bolstered by informal financing methods, such as family savings, and public-private partnerships, which help overcome barriers like high collateral requirements and bureaucratic hurdles. Such approaches present a potential pathway for inclusive mechanization in Bangladesh (Villalba et al., 2024).

Table 11: Cross-country financial instruments pertaining to agri-machineries

Document	Country	Financial Instruments	Applicability in Bangladesh
Empirical Examination of Venture Capital Financing in Uganda	Uganda	Venture Capital	Could be adapted in Bangladesh, especially for start-ups in agri-mechanization, though risks include equity dilution and founder control loss, which need to be carefully managed.
Ethio Lease to Mechanise the Agricultural Sector	Ethiopia	Asset-Backed Leasing	Asset-backed leasing reduces equipment costs and the need for upfront capital but could result in long-term expenses for Bangladeshi farmers. Leases should be structured to minimise depreciation challenges.
Credit and Financial Access in Nepalese Agriculture	Nepal	Concessional Loans	Concessional loans, if implemented, can reduce barriers to mechanization. However, collateral requirements and financial literacy need to be addressed for better implementation in Bangladesh.
Leasing as an Effective Tool for Agricultural Financing: The Case of Armenia	Armenia	Leasing	Lowers the need of collateral and hence can be effective in the context of Bangladesh
Banking Madagascar's Small Farmers	Madagascar	Cash Flow-Based Credit, Revenue-Tied Loans	Cash flow-based credit or revenue-tied loans can be beneficial for Bangladesh's smallholder farmers, offering flexible repayment terms aligned with harvest cycles.
Financing Climate-Smart Agriculture: A Case Study from the Indo-Gangetic Plains	India	Informal Financing	The model of Custom Hiring Centers (CHCs) and Farmer Producer Organizations (FPOs) in India could be adapted to Bangladesh to improve smallholder access to climate-smart agricultural machinery, addressing similar barriers to financing and mechanization.

Source: Authors' Compilation.

As detailed in Table 11, it can be seen that the financial instruments, such as venture capital, asset-based leasing, and concessional financing, can all be applied in the context of Bangladesh if some issues, which are administrative, financial, and supply-side in nature, can overall be eradicated. Venture capital can provide equity funding for innovative agricultural technologies, asset-based leasing enables farmers to access machinery without upfront costs, and concessional financing offers low-interest loans to reduce the financial burden on smallholders. Among these alternative financial instruments, the SME Foundation provides some venture capital financing, but it is not adequate.

5

Field Survey Findings: Results of Primary Survey

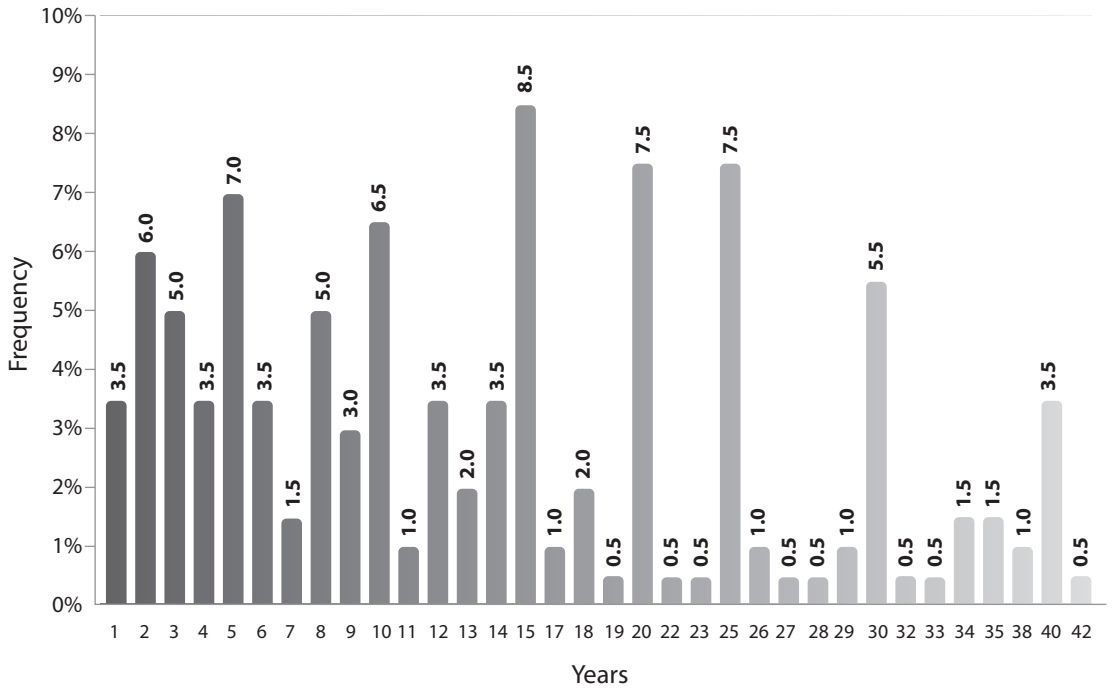
Before analysing the supply chain to find appropriate financial instruments for the actors of the supply chain and identifying challenges of the actors an overview of the characteristics of the actors and financing status of their business is imperative.

5.1 General Characteristics of the Respondents

Years In Business

As illustrated in Figure 3, the survey highlights a broad range, from newly established businesses to those with over 40 years in operation. Most businesses fall around the 16-year mark, indicating that a large part of the sector has been established for this length of time. There are also a few outliers with over 40 years of experience.

Figure 3: Respondents' total years in agri mechanization business



Source: Based on CPD Agro-mechanization Survey (2024).

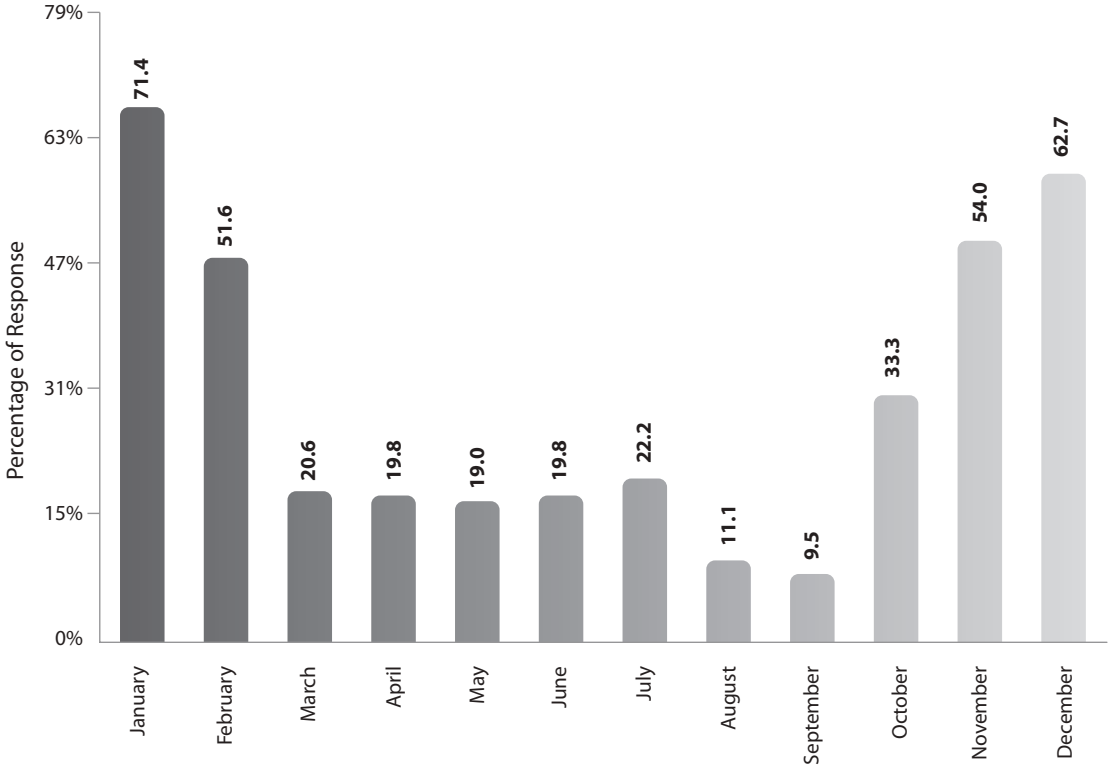
Note. Generated from total 200 respondents.

Seasonality in Business

The result shows as illustrated in Figure 4, that there is seasonality in demand for agricultural machinery. From October to February demand for agricultural machinery is higher relative to other months. December and January are the months of higher demand for most of the distributors of the sector. There might be annual

point to point fluctuations in the data, but in general the demand peaks around October to February, capturing the demand at the most relevant period of time.

Figure 4: Months with higher demand of agricultural machinery



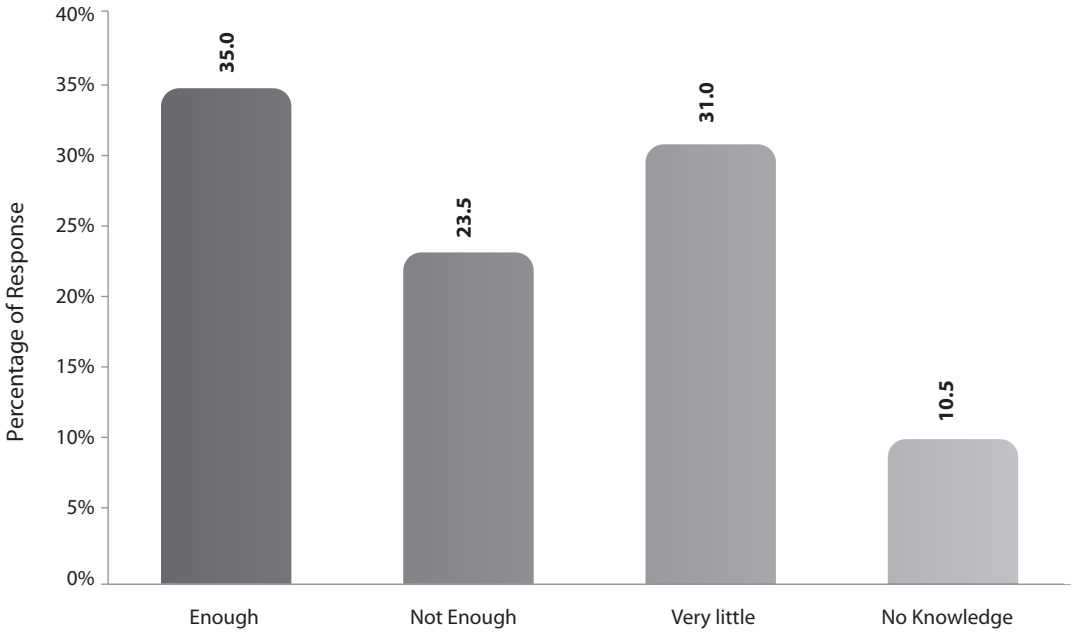
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from the 126 respondents identified as producers

Financial Literacy of the Actors

According to the survey and as illustrated in Figure 5, the majority of respondents feel they have enough financial literacy. A significant number also feel they have not enough knowledge, whilst a smaller portion feels they have very little or no knowledge.

Figure 5: Respondents' perceptions of their own financial literacy



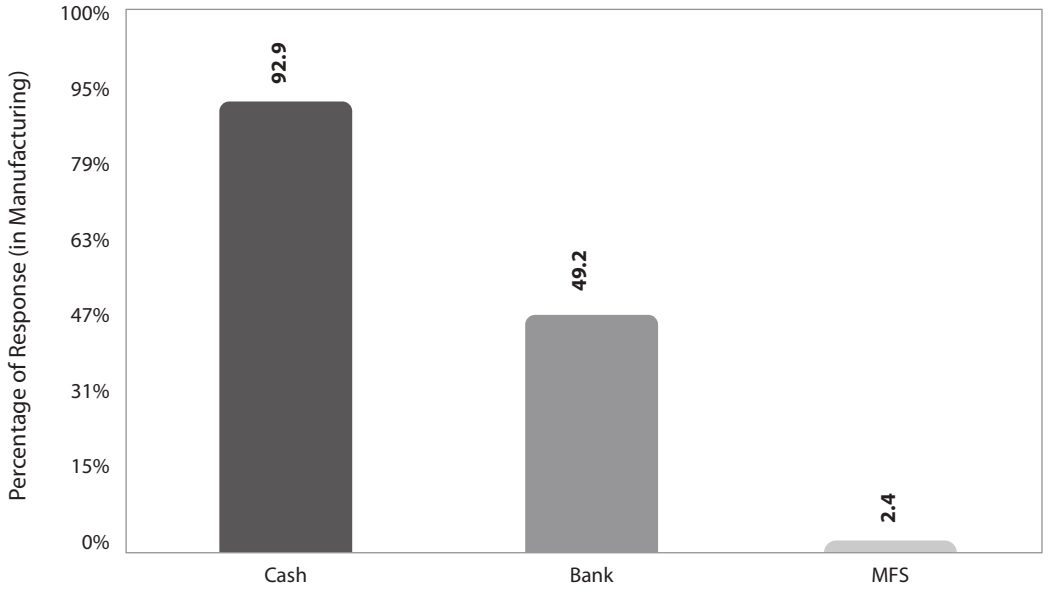
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from the response of total 200 respondents.

Medium of Transaction

Respondents were asked what their medium of transaction is, and they were given options: Cash, Bank, Mobile Financial Service (MFS), and other. Survey result shows as illustrated in Figure 6 and Figure 7 that majority of the supply chain actors use cash as mode of transaction. A significant number also use bank as medium. The MFS are not that popular in the sector.

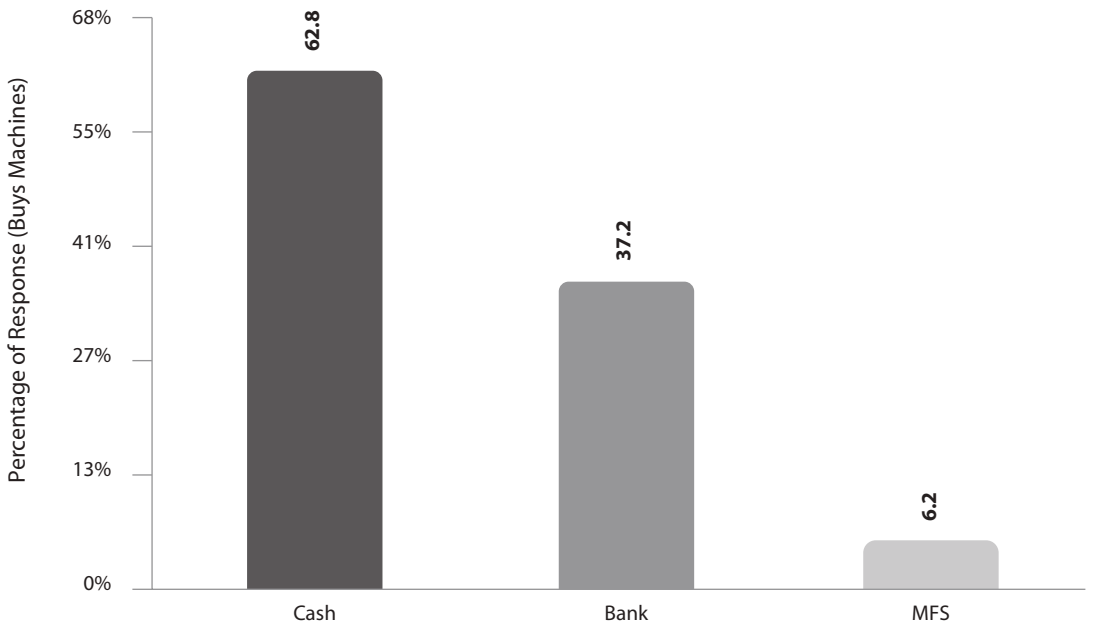
Figure 6: Medium of transactions between raw material suppliers and local producers



Source: Based on CPD Agro-mechanization (2024).

Note. Generated from the 126 respondents identified as producers.

Figure 7: Medium of transactions between local producers and end-users



Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from the 145 respondents not directly engaged in production.

Focusing on the mode of transaction in manufacturing and non-manufacturing segments, it is evident that the sector is heavily dependent on cash transaction.

5.2 Proportion of Local vs Imported Machinery in the market

The finding shows that around half of the distributors sell both local and imported machinery. And around 41 per cent of the distributors sell only local machinery (Table 12). But when it comes to the volume of products, they have the survey shows that the number of sellers who have more imported machinery is more than double the number of sellers who have more local products. Therefore, though the sector has a vast channel for distributing local products, imported machinery dominates the market.

Table 12: Proportion of local vs imported machinery in the market

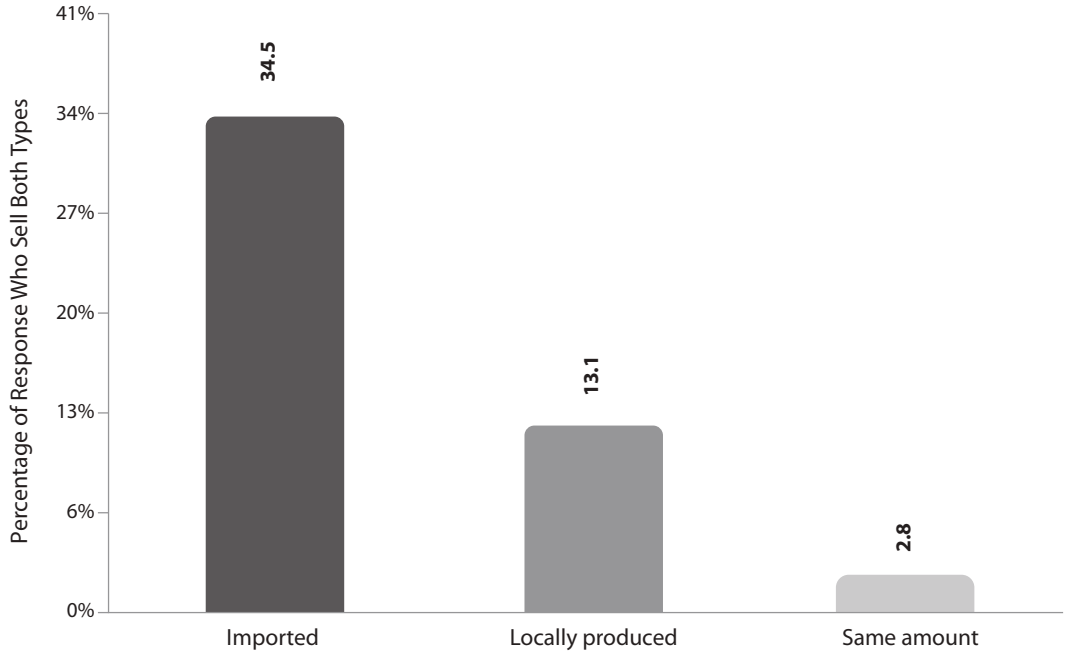
Origin	Percentage
Percentage of distributors who sell only locally produced machinery	41.38%
Percentage of distributors who sell only imported machinery	8.28%
Percentage of distributors who sell both imported and locally produced machinery	50.34%

Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from the 145 respondents engaged in selling the machinery and spare parts.

It was found that most of the shops in the market sell imported machinery and spare parts more than they sell locally produced products as illustrated in Figure 8. In the survey, the number of the shops which sell more imported machinery is more than twice of the number of shops which sell more locally produced products.

Figure 8: Proportion of imported and domestic machinery and spare parts



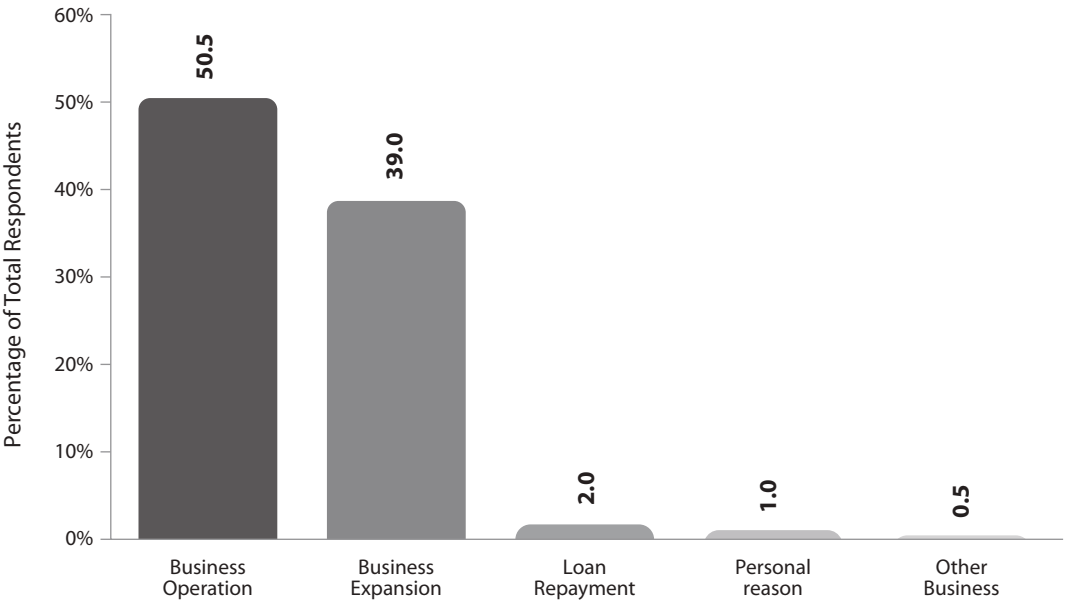
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from the 145 respondents engaged in selling the machinery and spare parts.

5.3 Information on Loans

The most common reasons for taking loans are for business operations and business expansion as showed in Figure 9. Loan repayment and personal reasons are less common.

Figure 9: Reasons for taking loans

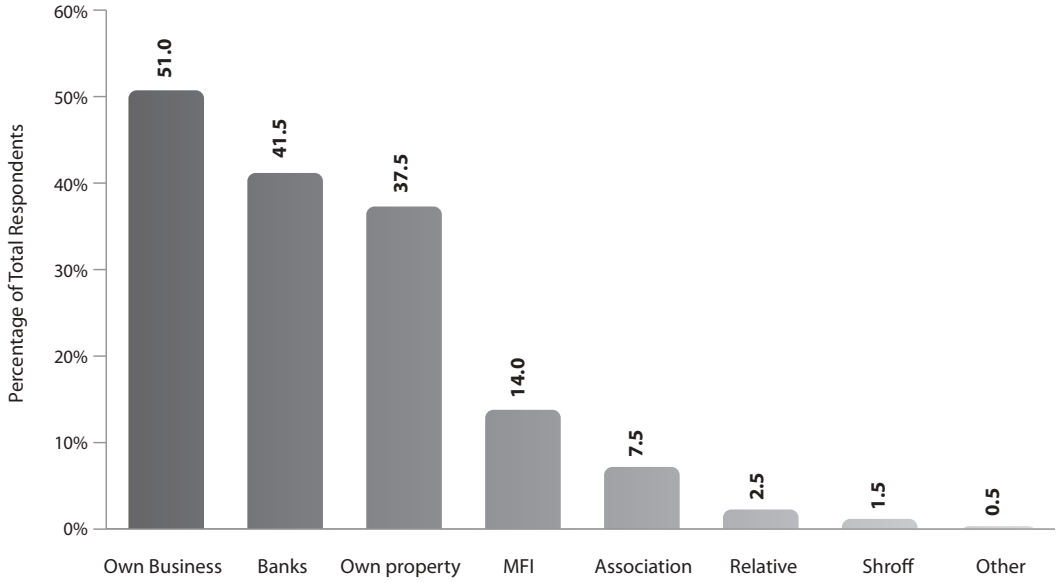


Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 200 respondents.

As showed in Figure 10, the most frequent source of loans is the respondents' own business. This indicates a strong reliance on internal resources and self-financing for business operations and expansion. Traditional banks emerged as the second most common source, signifying their significant role in the financial landscape. The use of personal property as collateral for loans is evident. Microfinance Institutions play a crucial role in providing financial services, particularly to underserved segments of the population. Their presence as a significant source of loans indicates their effectiveness in reaching out to individuals and small businesses.

Figure 10: Main source of loans

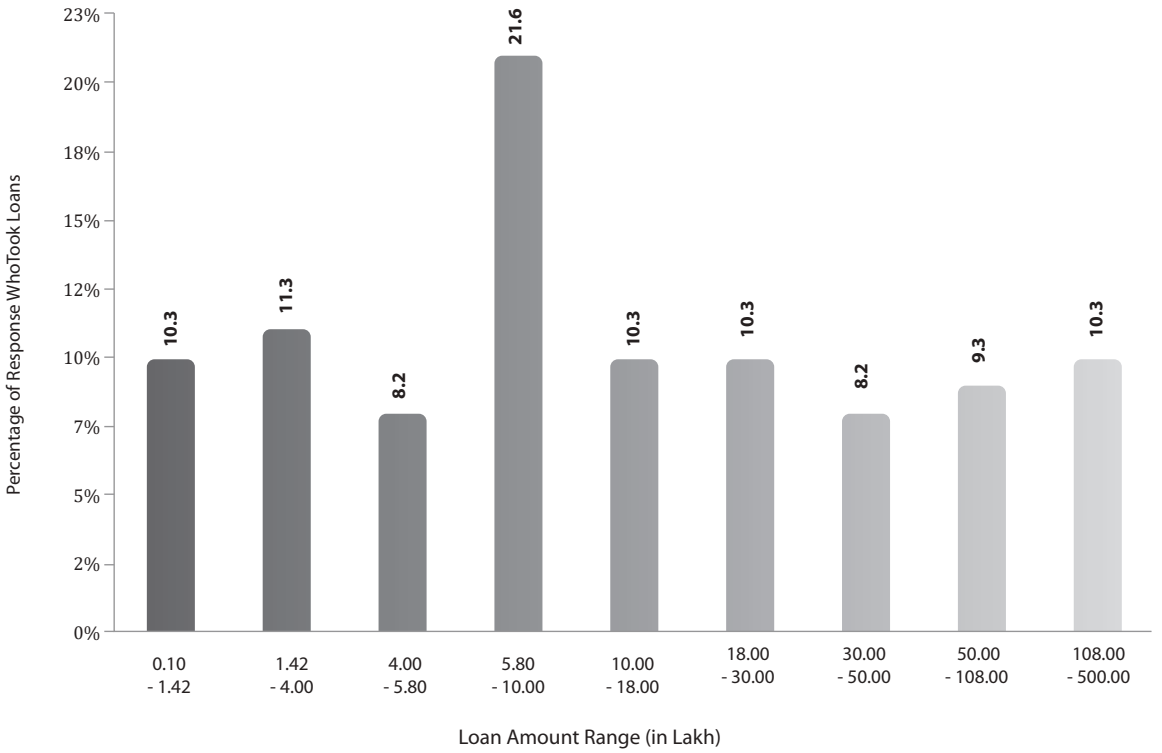


Source: Based on CPD Agro-mechanization Survey (2024).
Note. Generated from total 200 respondents.

Membership-based associations, such as cooperatives and community organizations, offer loans to their members, often at favourable terms. This highlights the importance of social networks and collective financing in certain communities. But the number of respondents is comparatively small than that of previous sources mentioned. Relatives and Shroffs are less common, these sources still contribute to the overall financing landscape. Family and friends can provide informal loans, whilst shroffs (money lenders) and other informal sources may offer alternative financing options.

The dominance of own business and banks suggests a strong reliance on both internal and external financing mechanisms. The presence of MFIs and associations highlights the importance of alternative financial institutions in meeting the needs of underserved populations.

Figure 11: Frequency distribution of loan amount



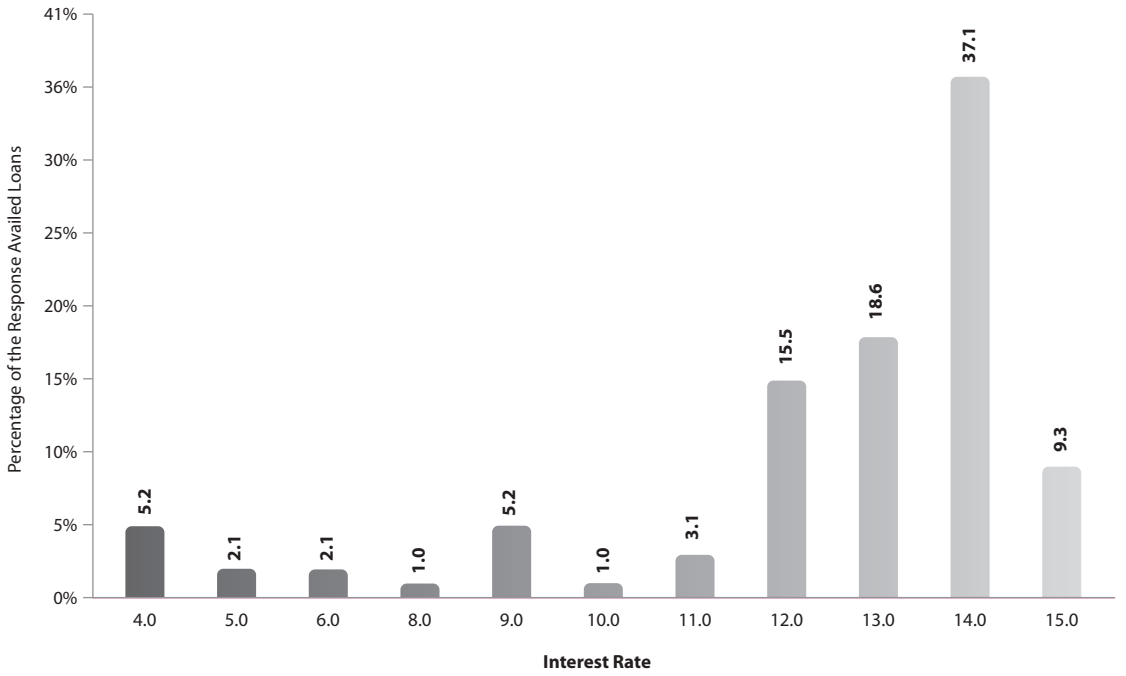
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 97 respondents who took loans in year 2022 and 2023.

The bar chart in Figure 11 shows the distribution of loan amounts taken by respondents. The majority of loans taken are between BDT 10 and 12 lakh. This indicates that a significant portion of respondents have borrowed relatively large amounts. Other common loan amounts include BDT 5-6 lakh, BDT 8-10 lakh, and BDT 2-3 lakh. Smaller loan amounts, such as those below BDT 1 lakh, are less common. Overall, the graph suggests that respondents have taken loans across a wide range of amounts, with a concentration in the mid-range.

The Figure 12 shows the distribution of interest rates for loans taken by respondents. The majority of respondents have taken loans with interest rates around 14 per cent. This reflects the recent trend of increasing interest rates offered by banks, which has risen from 9 per cent to 14 per cent. A significant proportion of respondents have also taken loans with interest rates between 13 and 14 per cent. Lower interest rates, such as those below 10 per cent, are less common. These lower rates are often associated with government-backed programs like the 'Ekti Bari Ekti Khamar' project, which offers loans at a 4 per cent interest rate. Overall, the scenario indicates that a significant portion of respondents have experienced relatively high interest rates on their loans. However, there are opportunities for accessing lower interest rates through government initiatives and specific programs.

Figure 12: Interest rate of the loans taken



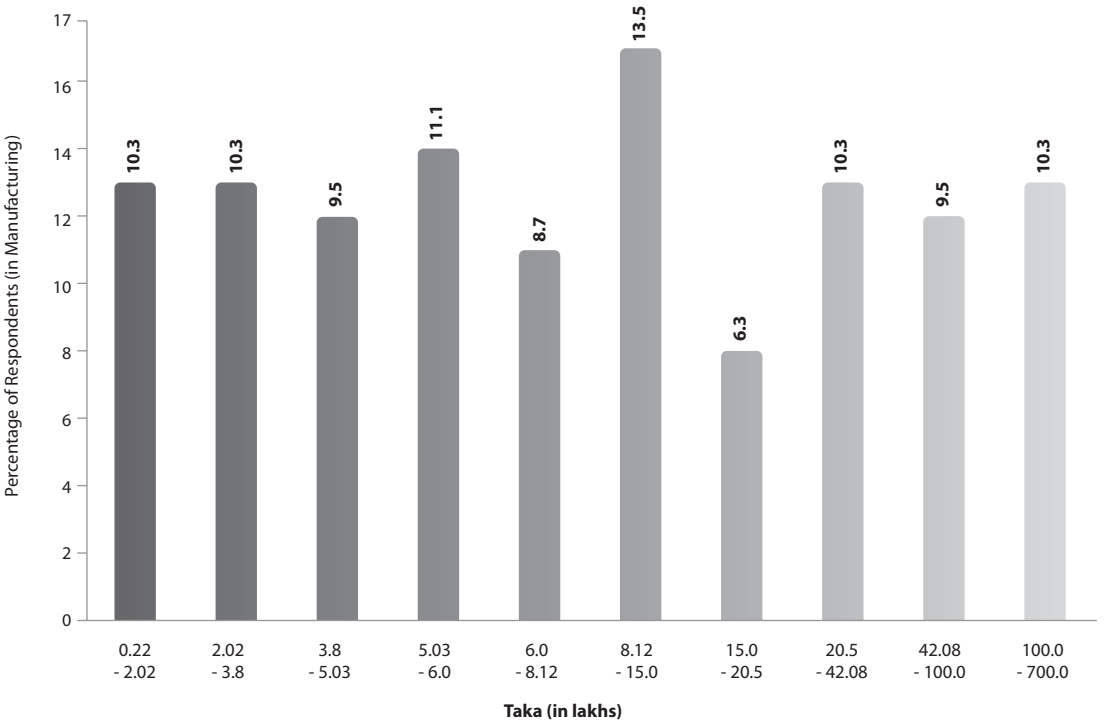
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 97 respondents who took loans in year 2022 and 2023.

5.4 Status of Capital in Business

Findings show that loan amount which are the highest in demand by the respondents fall in the ranges of 5-6 lakhs, 8.12-15 lakhs. There are other lower ranges like 0.2 to 2 lakhs, 2-3.8 lakhs and higher ranges like 20-42 lakhs, 1-7 crores that are popular. To get insights on the status of capital machinery engaged in the business the survey added questions on value of capital machinery with and without rent, security, or land value as showed in Figure 13 and Figure 14.

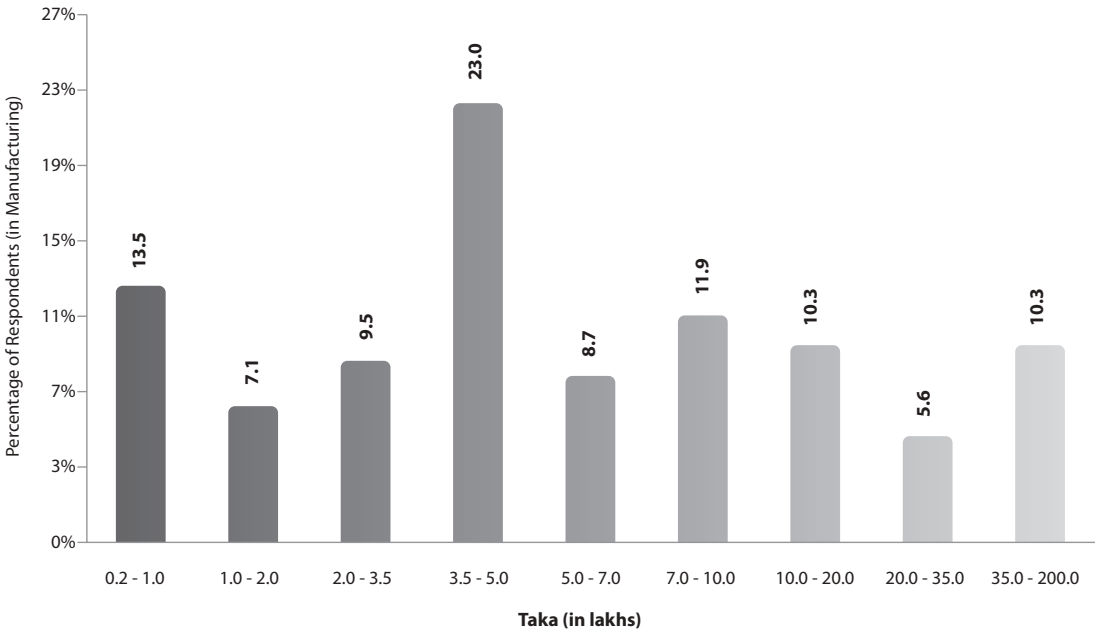
Figure 13: Value of capital machinery with rent/security/value of land



Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 126 respondents identified as producer.

Figure 14: Value of capital machinery without rent/security/value of land



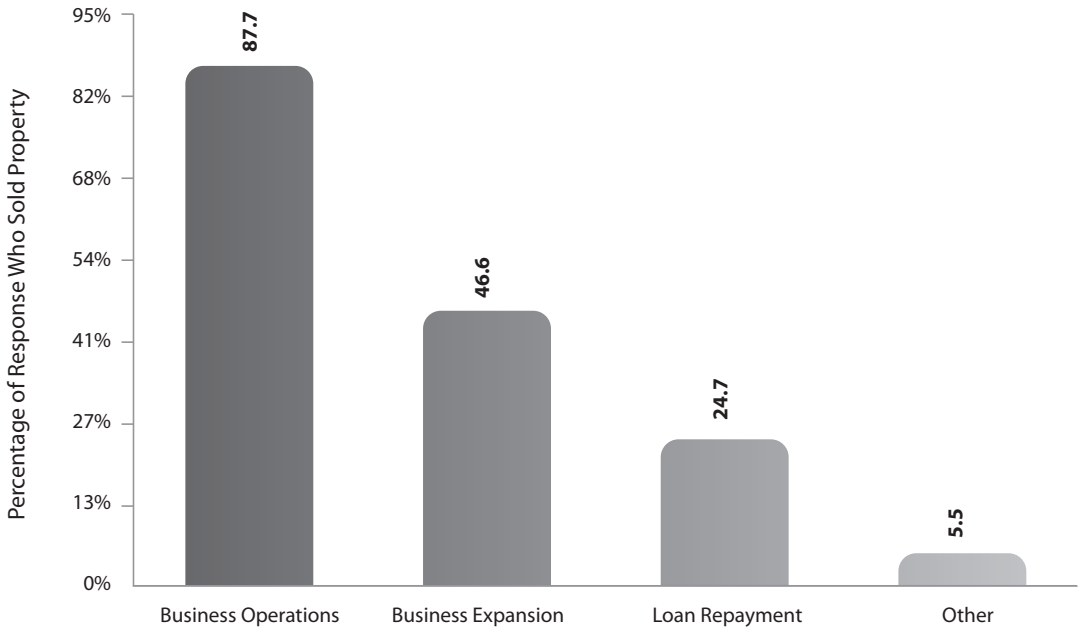
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 126 respondents identified as producer.

5.5 Problems Related to Financing

The survey questions also focused on finding out the problems faced by the actors of the supply chain in terms of financing.

Figure 15: Sold property for the mentioned reasons



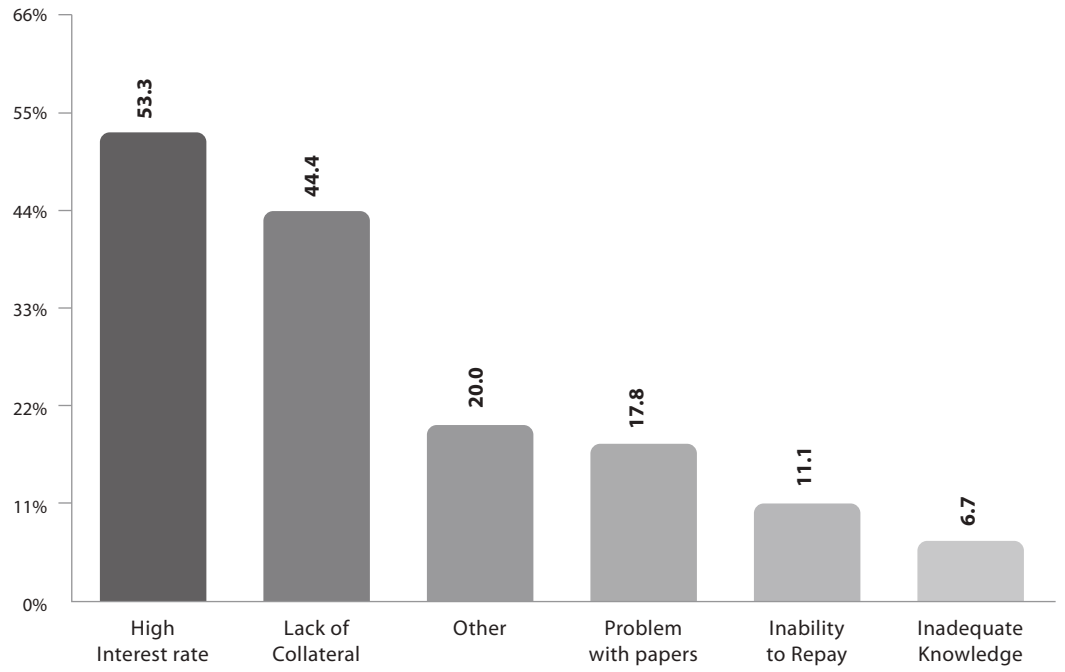
Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from 73 respondents who sold property for the mentioned reasons.

The Figure 15 shows that the most common reason for selling property is for business operations. A significant number of individuals in the sector sold their property to fund their businesses or generate capital for business activities. The second most common reason is business expansion. This indicates that individuals are selling property to finance the growth or expansion of their businesses. Loan repayment is another significant reason for selling property. This suggests that financial difficulties and the need to repay loans led to property sales in some cases.

The primary reason cited by respondents for not getting a loan is the high interest rate as showed in Figure 16. This suggests that many individuals and businesses find the cost of borrowing to be prohibitive. The second most common reason is the lack of collateral. This highlights the importance of collateral in securing loans, which can be a significant barrier for those who do not own assets or have limited resources. Other reasons, such as problems with paperwork, inability to repay, and inadequate knowledge, also contribute to loan rejection. However, these factors appear to be less significant compared to high interest rates and lack of collateral.

Figure 16: Reasons for not getting loans

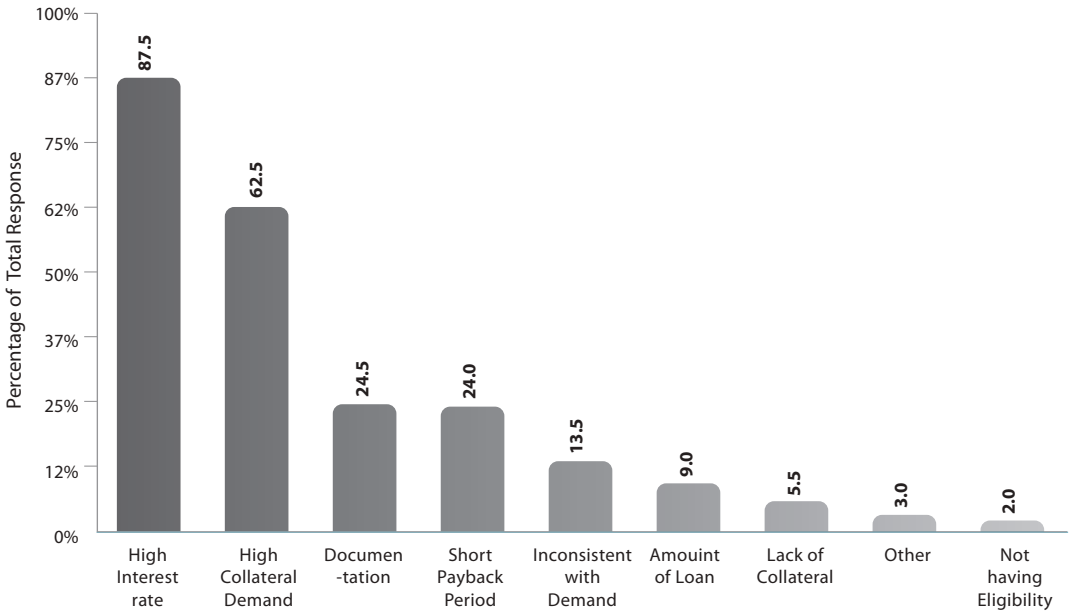


Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from 45 respondents who were denied giving loan.

The Figure 17 shows that the most common problem with existing loans is the high interest rate. Other common problems include high collateral demand, documentation requirements, short payback periods, and inconsistency with demand.

Figure 17: Problems of existing financial instruments



Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 200 respondents.

Table 13: Status of the financial assistance from the government and NGOs

Question	Yes (%)	No (%)
Have you received financial assistance from the government?	4.5	95.5
Have you received financial assistance from NGOs?	6.5	93.5
Have you ever been denied giving loans?	22.5	77.5
Do you have enough collateral for loans?	73.5	26.5
Do you have access to Industry loans?	23.0	77.0

Source: Based on CPD Agro-mechanization Survey (2024).

Note. Generated from total 200 respondents.

The majority of the actors do not get access to financial assistance from the government and NGOs. A significant number of actors were denied to giving loans though most of them have enough collateral for loans. The majority of actors do not have access to industry specific loans (table 13).

6

Assessment of the Financial Preference of the Actors

6.1 Findings from the Survey

In the survey respondents were asked about their preference of the alternative financial instruments. They had to respond whether they are interested in a specific financial instrument and were asked to rank their preferred instruments. Following Table 14 shows the summary of their response.

Table 14: Ranked preference of the survey respondents regarding different alternative financial instruments. (in percentage of total respondents)

Instrument	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Asset-based finance	0.34	0.26	0.17	0.07	0.02
Machine leasing	0.28	0.11	0.04	0.04	0.02
Supply chain finance	0.18	0.21	0.23	0.09	0.01
Warehouse finance	0.04	0.15	0.13	0.11	0.00
Venture capital / equity-based finance	0.06	0.06	0.08	0.06	0.08
Crowdfunding	0.04	0.05	0.11	0.12	0.03
Green Finance	0.03	0.07	0.13	0.14	0.07
Woman and Youth Specific Finance	0.04	0.07	0.07	0.13	0.09

Source: Based on CPD Agro-mechanization Survey (2024).

Out of 196 respondents who revealed their preference about the alternative financial instrument, it was found that, in general, most of the respondents are interested in asset-based finance. Thirty-four per cent of the respondents ranked the instrument as their first choice and 26 per cent of the respondents ranked the instrument as their second choice of alternative financial instruments. Overall, the alternative financial instruments offered to them asset-based finance is the most favoured.

Therefore, utilising a probit model, we find the determinants which determine whether a respondent will choose alternative finance moving away from traditional finance. The result shows that location of the business, level of education business owner, size of the firm (defined by total labour), whether they receive any financial support from the government or not and the financial literacy of the authority of the businesses determines whether they will go for alternative finance or not.

Probit Equation

$$\Phi^{-1}(P(\text{Asset Based Finance} = 1)) = \beta_o + \beta_1 \text{District} + \beta_2 \text{Profit} + \beta_3 \text{Vocational Training} + \beta_4 \text{Education Level} + \beta_5 \text{Total Labor} + \beta_6 \text{Years in Business} + \beta_7 \text{Support from the Government or NGO} + \beta_9 \text{Have other business} + \beta_{10} \text{Previous revenue} + \beta_{11} \text{Financial literacy} + \epsilon_i$$

Table 15: Result of probit regression

	Coefficient (Standard Deviation)		Coefficient (Standard Deviation)
District	0.111*	Support from the Government or NGO	0.707*
	(1.770)		(1.816)
Profit	0.000	Have other business	-0.327
	(0.872)		(-0.882)
Vocational training	-0.329	Previous revenue	-0.000
	(-1.168)		(-0.747)
Education level	0.166*	Financial Literacy	-0.320***
	(1.959)		(-3.203)
Total labour	0.022**	Constant	-0.179
	(2.042)		(-0.347)
Years in business	-0.001	Total Response	200
	(-0.103)		
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Source: Authors' calculations.

After finding out the determinants which influence the decision of the respondent of the Agri mechanization sector of Bangladesh (showed in Table 15), the study wanted to find out what determines the decision of the respondent to choose other alternative financial instruments that are not as familiar as the asset-based finance. To find out the dynamics the study utilised Ranked Order Probit model holding Asset based finance as the base choice of financial instrument. In the equation, *X* represents the financial instruments: Machine leasing, Supply chain finance, Warehouse finance, Venture Capital/ Equity based finance, Crowdfunding, Green finance, Woman and youth specific finance. And β and γ are the coefficients of the variables.

Ranked Order Probit Regression Equation

$$\Phi^{-1}(P(Y_i = j)) = \beta_o + B_1 X + \gamma_1 (\text{Profit}) + \gamma_2 (\text{Vocational Training}) + \gamma_3 (\text{Education Level}) + \gamma_4 (\text{Total Labor}) + \gamma_5 (\text{Years in Business}) + \gamma_6 (\text{Support from Gov't or NGO}) + \gamma_7 (\text{Other Business}) + \gamma_8 (\text{Previous Revenue}) + \gamma_9 (\text{Financial Literacy}) + \gamma_{10} (\text{Capital Machinery Value}) + \epsilon_i$$

Table 16: Result of ranked order probit

VARIABLES	(1) Machine leasing	(2) Supply chain finance	(3) Warehouse finance	(4) VC/ Equity-based finance	(5) Crowd funding	(6) Green finance	(7) Woman & youth specific finance
Profit	5.23e-08 (9.04e-08)	8.44e-08 (9.02e-08)	-1.13e-07 (8.09e-08)	2.86e-08 (1.03e-07)	-2.09e-07 (4.11e-07)	-3.18e-08 (7.69e-08)	-9.17e-07 (8.59e-07)
Vocational Training	0.270 (0.654)	0.207 (0.535)	0.147 (0.541)	-0.0976 (0.833)	0.00356 (0.883)	0.577 (0.793)	-0.624 (1.411)
Education level	0.496** (0.220)	0.380* (0.202)	0.153 (0.206)	-0.176 (0.275)	0.0586 (0.228)	0.290 (0.236)	0.358 (0.315)
Total labour	0.00940 (0.00763)	0.00365 (0.00665)	0.00595 (0.00859)	0.00418 (0.0102)	0.00579 (0.00977)	0.00608 (0.00946)	0.00148 (0.0119)
Years in business	0.0228 (0.0211)	0.00745 (0.0194)	-0.00184 (0.0194)	0.0253 (0.0305)	0.0103 (0.0256)	0.0184 (0.0263)	0.0173 (0.0430)
Support from Govt or NGO	1.720** (0.736)	0.943 (0.622)	0.215 (0.572)	1.390 (0.888)	0.285 (0.871)	1.339* (0.798)	0.769 (1.485)
Have other business	0.124 (0.853)	0.682 (0.733)	0.762 (0.820)	1.651** (0.831)	-0.406 (0.784)	1.355* (0.710)	0.877 (1.636)
Previous revenue	-1.38e-08 (1.12e-08)	-6.19e-09 (1.01e-08)	1.01e-08 (1.04e-08)	1.25e-09 (1.16e-08)	1.99e-08 (2.95e-08)	3.49e-09 (9.26e-09)	1.12e-07 (1.02e-07)
Financial Literacy	-0.435* (0.247)	0.129 (0.195)	-0.270 (0.259)	-0.0932 (0.261)	0.209 (0.284)	0.273 (0.263)	0.317 (0.402)
Value of capital Machinery	-4.90e-08 (1.46e-07)	2.77e-08 (1.41e-07)	9.38e-08 (1.48e-07)	6.87e-08 (2.63e-07)	2.05e-07 (2.40e-07)	-2.75e-08 (1.64e-07)	-6.10e-08 (2.64e-07)
Constant	-1.804*** (0.566)	-1.022* (0.538)	0.537 (0.555)	0.921 (1.007)	0.142 (0.658)	-0.398 (0.741)	0.511 (1.099)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculations.

Result of the regression showed in Table 16 entails that, education level of the owner of the business helps to move from familiar asset-based finance to machine leasing and supply chain finance. Financial support from the Government or NGOs help to move from asset-based finance to machine leasing and green finance. Having other business apart from business in Agri mechanization sector help to move from asset-based finance to venture capital/ equity financing and green financing. Financial literacy helps to choose machine leasing over asset-based finance. If all determinants are held constant generally a respondent do not prefer non-familiar alternative financial instruments over the familiar asset-based finance.

6.2 Financial Instruments' Preferences based on Locations

Respondents were asked whether they used these financial Products: Asset-based finance, Machine leasing, Supply chain finance, Warehouse finance, Venture capital/equity finance, Crowdfunding, Green Finance, Woman and Youth Specific Finance, Other Instruments.

Table 17: Percentage distribution of the preference based on the location of the market actors (Multiple responses)

District	Bogura	Chattogram	Cox's Bazar	Faridpur	Jashore	Kushtia
Asset-based finance	68.54	40.00	36.36	52.00	52.00	12.00
Machine leasing	0.07	0.00	0.00	0.00	0.00	0.00
Supply chain finance	11.24	4.00	0.00	0.00	0.00	0.00
Warehouse finance	10.11	24.00	18.18	0.00	28.00	4.00
VC/equity finance	6.74	4.00	0.00	0.00	0.00	0.00
Crowdfunding	8.99	4.00	0.00	0.00	8.00	0.00
Green Finance	4.49	0.00	18.18	0.00	8.00	0.00
Woman and Youth Specific Finance	5.62	0.00	0.00	0.00	4.00	0.00
Other Instruments	22.47	28.00	27.27	48.00	16.00	84.00

Source: Based on CPD Agro-mechanization Survey (2024).

Table 17 shows that across all analyses, asset-based finance emerges as the most popular financial instrument, indicating its broad appeal and versatility in addressing various financial needs. This preference is likely due to its reliance on tangible assets as collateral, making it a relatively low-risk option for lenders. Warehouse finance consistently ranks as the next most favoured option, particularly among certain groups. This preference can be attributed to the inventory-intensive nature of many businesses, especially in sectors like manufacturing and retail. Warehouse finance provides a reliable source of funding by leveraging the value of stored inventory as collateral.

6.3 Financial Instruments' Preferences based on Age of Business Owners

The Table 18 shows the distribution of preferred financial instruments among different age groups. Asset-based finance is the most popular choice across all age groups, with a higher preference among the 31-40 age group.

Table 18: Age and financial instrument (showed in column percentage)

Age groups (in years)	21-30	31-40	41-50	51-60	61-70
Asset-based finance	34.78	46.38	42.25	40.35	44.00
Machine leasing	0.00	2.90	2.82	5.26	0.00
Supply chain finance	4.35	4.35	5.63	3.51	4.00
Warehouse finance	13.04	11.59	11.27	7.02	8.00
VC/equity finance	4.35	1.45	4.23	3.51	0.00
Crowdfunding	8.70	7.25	2.82	3.51	0.00
Green Finance	4.35	2.90	4.23	3.51	0.00
Woman and Youth Specific Finance	8.70	1.45	0.00	1.75	8.00
Other	21.74	21.74	26.76	31.58	36.00

Source: Based on CPD Agro-mechanization Survey (2024).

Machine leasing is a relatively minor preference for all age groups. But Machine leasing, Supply chain finance is more popular among the 31-40 age group. Warehouse finance, VC/equity finance, Crowdfunding and Green finance are more popular among the 21-30 age group. Woman and Youth Specific Finance is of interest across

all age groups. Overall, the table suggests that the choice of financial instrument is influenced by the age of the individual. Younger individuals (21-30) tend to prefer more specialised and innovative financial instruments, whilst older individuals (51-70) often opt for more traditional options like asset-based finance and others.

6.4 Financial Instruments' Preferences based on Firm Size

Table 19 shows the preference of different alternative financial instruments based on firm size, which is determined by the total number of labours in a firm.

Table 19: Preference based on size of the firm (Multiple responses)

No. of labor in the firm	1-5	6-10	11-15	16-20	More than 20
Asset-based finance	40.80	58.97	50.00	100.00	91.67
Machine leasing	2.40	5.13	12.50	0.00	4.17
Supply chain finance	4.00	5.13	12.50	50.00	4.17
Warehouse finance	12.80	12.82	12.50	25.00	8.33
VC/equity finance	4.00	2.56	0.00	0.00	4.17
Crowdfunding	4.80	7.69	12.50	25.00	0.00
Green Finance	3.20	5.13	0.00	25.00	4.17
Woman and Youth Specific Finance	1.60	5.13	0.00	25.00	4.17
Other	42.40	23.08	50.00	0.00	4.17

Source: Based on CPD Agro-mechanization Survey (2024).

Asset-based finance is the most popular choice across all business sizes, with a higher preference among larger businesses. Overall, the table suggests that the choice of financial instrument is influenced by the size of the business. Larger businesses tend to prefer more sophisticated and specialised financial instruments, whilst smaller businesses often opt for more general-purpose options like asset-based finance.

6.5 Financial Instruments' Preferences based on the Role of the Actors

Table 20 below shows the preference of different alternative financial instruments based on specific role of the firms in the Agri mechanization supply chain.

The table provides a breakdown of the financial instruments preferred by different actors within the supply chain, categorised by their role in the industry. Key observations are asset-based finance is the most popular choice across all roles, with the highest preference among scrap metal refiners and foundries. Machine leasing is a relatively minor preference for most roles, with slightly higher interest among retailers and wholesalers. Supply chain finance is more popular among manufacturers and retailers. Warehouse finance is favoured by manufacturers, wholesalers, and repairers. VC/equity finance is primarily of interest to manufacturers and retailers. Crowdfunding and Green finance are more popular among manufacturers and wholesalers. Woman and Youth Specific Finance is of interest across all roles, but with higher preference among scrap metal refiners.

Table 20: Preference based on the role of the actors

	Scrap metal Refine	Foundry	Spare Parts manufacture	Spare parts sell with Dealer	Spare parts sell with other products	Local Machine Manufacturing	Retailer of Machine	Wholesaler of Machine	Repairing
Asset-based finance	61.90	67.50	41.86	42.68	37.18	37.50	37.07	33.33	29.23
Machine leasing	2.38	2.50	2.33	2.44	5.13	2.50	2.59	5.26	4.62
Supply chain finance	7.14	2.50	5.81	4.88	8.97	7.50	4.31	5.26	3.08
Warehouse finance	9.52	7.50	12.79	12.20	10.26	11.25	16.38	15.79	9.23
VC/equity finance	2.38	2.50	1.16	2.44	7.69	2.50	5.17	3.51	0.00
Crowdfunding	2.38	0.00	5.81	4.88	6.41	5.00	5.17	7.02	4.62
Green Finance	4.76	2.50	4.65	6.10	3.85	2.50	2.59	7.02	1.54
Woman and Youth Specific Finance	4.76	2.50	4.65	4.88	2.56	5.00	2.59	3.51	0.00
Other	4.76	12.50	20.93	19.51	17.95	26.25	24.14	19.30	47.69

Source: Based on CPD Agro-mechanization Survey (2024).

6.6 Financial Instruments' Preferences based on the Education Level of the Owner

Table 21 shows the preference of different alternative financial instruments based on the education level of the business owners.

Table 21: Education level and financial instrument (showed in column percentage)

	No Institutional Education	Till Primary level	Till Secondary level	Till Higher Secondary level	Under-graduate and above
Asset-based finance	41.67	38.71	51.28	55.17	67.24
Machine leasing	0.00	4.84	0.00	0.00	6.90
Supply chain finance	8.33	6.45	2.56	0.00	8.62
Warehouse finance	16.67	14.52	2.56	20.69	12.07
VC/equity finance	0.00	4.84	0.00	3.45	5.17
Crowdfunding	16.67	3.23	5.13	0.00	8.62
Green Finance	8.33	1.61	0.00	10.34	5.17
Woman and Youth Specific Finance	8.33	1.61	2.56	3.45	3.45
Other	41.67	46.77	38.46	27.59	17.24
Count	**100**	**100**	**100**	**100**	**100**

Source: Based on CPD Agro-mechanization Survey (2024).

The findings show a clear correlation between education level and the preferred financial instruments among supply chain actors. Asset-based finance is the most popular choice across all education levels as it is a well-known financial instrument. Unlike asset-based finance, nontraditional financing instruments like Machine leasing and VC/equity finance are primarily of interest to those with higher education. Supply chain finance, warehouse finance, crowdfunding, and green finance are more popular among those with primary and undergraduate/higher education. Woman and Youth Specific Finance is of interest across all education levels, but with higher preference among those with primary education.

7

Analysis of Lender's and Borrower's Perspective on the Procedures and Challenges Regarding Access to Finance

This section explores the perspectives of various stakeholders in the agricultural mechanization sector, focusing on the compliance requirements, procedural workflows, and challenges encountered by domestic banks and other lenders in providing loans. Understanding these perspectives is crucial to identifying barriers and opportunities for enhancing access to finance for agricultural mechanization in Bangladesh. Table 22 details the perspective on the financial issues, challenges, and suggested recommendations.

Table 22: Perspective on the financial issues, challenges, and suggested recommendations

Issue	Perspective on the issue	Challenges	Suggested Recommendations
Inclusivity in financing	Sonali Bank's 'Agriculture and Rural Policy' aligns with Bangladesh Bank's goals to expand financial inclusion for farmers and streamline access to finance for rural sectors.	Intermediaries complicate loan application processes, leading to potential misuse and challenges in verifying borrowers' financial credibility.	Strengthen verification processes on the ground, reduce intermediaries by leveraging technology (making banking apps and websites more user friendly), and educate farmers to minimise reliance on middlemen.
Loan Accessibility and Amount	SME Foundation offers collateral-free loans through partner banks for agricultural machinery and agro-processing, targeting underserved SMEs and rural areas.	Current loan limits for agricultural machinery (BDT 25-50 lakh) remain insufficient compared to market needs, limiting SME growth and mechanization.	Increase the loan amount available for agricultural machinery to better meet market demand, with flexibility to support equipment costs.
Alternative Financing Options	SME Foundation promotes innovative financing through programmes like Credit Wholesaling. The foundation carried out project focusing on venture capital, organised meeting in different districts, and worked with UNDP to popularise blended finance, aimed at building resilience in agriculture and SME sectors.	Limited awareness and accessibility to alternative financing tools among SMEs, particularly in rural regions.	Expand awareness initiatives for alternative financing (e.g., blended financing) at district levels, particularly for climate-resilient and innovative projects.
COVID-19 Response Support	During the pandemic, SME Foundation allocated BDT 300 crore in collaboration with 22 listed banks (including Sonali Bank) to support agro-processing and machinery sectors.	High post-pandemic demand for affordable financing, yet loan size caps restrict larger investments necessary for sectoral recovery.	Promote blended finance options and increase funding caps to support post-pandemic recovery, particularly for essential sectors like agricultural mechanization.

Table 22 Cond.

Table 22 Cond.

Issue	Perspective on the issue	Challenges	Suggested Recommendations
Regional Cluster Development	SME Foundation actively supports regional clusters, notably in Bogura and Jashore, through capacity-building, subsidised loans, and district-level engagement programs.	Inconsistent access to adequate financing and cluster-specific support limits the scale and efficiency of some regional SMEs.	Expand financial backing and targeted programmes for SME clusters in Agri mechanization, focusing on light engineering and machinery production to meet growing demand.

Source: Authors' Compilation.

8

Assessing Public Policies Related to Financing of Agricultural Mechanization in Bangladesh

Bangladesh Bank has undertaken policies such as Light Engineering Policy (2022) and a credit guarantee scheme which was first formed in 2020 and later updated in 2021 for the overall proliferation of the SME and the Light Engineering Sectors, of which the agricultural machinery industry is a part of.

8.1 Light Engineering Policy (2022)

The Light Engineering Policy of Bangladesh Bank sets 11 strategic objectives. Access to finance for the light engineering sectors is the 10th strategic objective, and it outlines some suggestions from the policy, such as to lessen the loan requirements for the light engineering industries and create a special fund for the light engineering industries from the Financial Institutions Division, Ministry of Finance. Also, some other prescriptions include the provision of low-interest loans for the stakeholders in the light engineering sector from Startup Fund. It is also anticipated that the Finance Division and Bangladesh Bank will take the initiative to establish a venture capital fund to ease the production process of Light Engineering products by 2025. Most of the manufacturers of the agricultural machinery industry fall under the classification of light engineering, and henceforth the access to finance outlined in the policy is pertinent to the study. Overall, the policy aims to increase the contribution of this sector by 40 per cent by 2027, where access to finance would be one of the most pivotal components. The Ministry of Commerce in Bangladesh has a special project named *Export Competitiveness for Jobs (EC4J)*, which is funded by the World Bank and aims to boost export diversification in the country; Light engineering sector is one of the focused sectors in this project.The project focuses on both the production and maintenance of agricultural machineries. The TRIPS Article 66.2, under the World Trade Organization's (WTO) Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, illustrates that developed countries should encourage technology transfer to least developed countries (LDCs) by incentivising their domestic enterprises and institutions. The Ministry of Commerce of Bangladesh works for the effective implementation of TRIPS, which has the light engineering sector as one of its priority sectors. However, nothing specific is mentioned about the agricultural machinery industry. Provisional licences for businesses to use proprietary technologies related to agricultural mechanization should be effectively implemented under this article.

8.2 Credit Guarantee Scheme (CGS)

The Bangladesh Bank, in 2020, approved the formation of a BDT 2,000 crore credit guarantee scheme to support cottage, micro, and small enterprises that lack adequate assets to apply for bank loans, and the stakeholders in the supply chain of the agricultural machinery industry fall under small and medium enterprises. The CGS operates on a risk-sharing model, which means that Bangladesh Bank will cover a portion of losses if loans default despite standard recovery efforts, reimbursing up to 80 per cent of defaulted individual loans. The scheme targets guaranteeing loans amounting to BDT 8,320 crore but has seen limited disbursement due to reluctance from financial institutions and procedural delays. This structure lowers the risk for banks whilst mitigating the concerns of the SME sector, a lot of which found it very difficult to stay afloat during the COVID pandemic, a time when the credit guarantee scheme was implemented. In 2021, it was iterated by Bangladesh Bank that the women-owned MSMEs will get priority to obtain CGS facilities, i.e., collateral-free loan requirements.

8.3 Bangladesh Bank Agricultural and Rural Credit Policy

From 2022 to 2025, Bangladesh Bank's agricultural credit schemes have progressively been prioritising mechanization, with access to finance as one of the core focuses. In 2022-2023, policies promoted mechanised farming through equipment subsidies and training, alongside increased budgets for R&D for facilitating technology adaptation. By 2023-2024, the scope expanded to include mechanization for high-value crops, irrigation systems, and subsidised post-harvest machinery, backed by provisions of training and low-interest loans to boost adoption. In 2024-2025, the emphasis strengthened on aiding small and marginal farmers through affordable loans and potential grants, with continued support for training, technical assistance, and R&D to align modern tools with local needs, ensuring productivity, sustainability, and easier access to advanced agricultural technology. Table 23 details the Bangladesh Bank policies in alignment with agricultural machinery sector needs.

Table 23: Bangladesh Bank policies and the evaluation of alignment with agricultural machinery sector needs

Policy	Alignment	Challenges	Potential Impact
Light Engineering Policy (2022)	The policy supports access to finance for light engineering industries, which includes agricultural machinery manufacturers, through special funds, reduced loan requirements, and low-interest loans from the Startup Fund. A venture capital fund is also proposed to further support production by 2025. Export Competitiveness for Jobs (EC4J The TRIPS Article 66.2, which focuses on the light engineering sector is emphasised by the Ministry of Commerce.	The policy is still not properly implemented as the collateral requirements are still there. Implementation of special funds and venture capital is not yet completed. Incorporating and specifying policies for the agricultural machinery sector should be a priority in the next edition of the Light Engineering policy.	SIf fully implemented, this policy could greatly increase sector investment, enabling agricultural machinery production to contribute to the 40% GDP growth target by 2027.
Credit Guarantee Scheme (CGS)	The CGS aligns well with sector needs by enabling collateral-free loans through a risk-sharing model, which is particularly beneficial for small-scale stakeholders in agricultural machinery. The priority given to women-owned SMEs under the CGS is also a positive step toward inclusive access to finance.	Access remains limited due to low awareness among eligible businesses, and some banks may hesitate due to risk aversion despite the guarantee. Limited uptake by women-owned enterprises in this sector could also limit the CGS impact on inclusivity.	The CGS has strong potential to lower financing barriers, allowing smaller agricultural machinery stakeholders to remain competitive and resilient, especially critical for post-pandemic recovery.
Bangladesh Bank Rural and Agriculture Credit Policy	Progressive focus on mechanised farming, equipment subsidies, training, increased R&D budgets, and expansion to high-value crops and irrigation. Aiding small farmers with affordable loans, potential grants, and continuous support for training and technical assistance.	Limited awareness and training participation, equitable access to funding, technical limitations, financial risk management for small farmers, dependency on consistent funding.	Improved uptake of mechanised farming, enhanced productivity, inclusion of small farmers, sustainable technology adaptation, and better access to modern tools.

Source: Authors' Compilation.

9

Policy Recommendations for Improving Access to Finance in Agricultural Mechanization

9.1 Revision of Major Policies

There needs to be proper advocacy for policy amendments, which for light engineering policy is streamlining the implementation of special funds and venture capital. For the Credit Guarantee Scheme, it is increasing awareness among eligible businesses as well as creating more opportunities for women entrepreneurs in this sector.

The Ministry of Commerce, Ministry of Industries, as well as the Bangladesh Bank, despite having policies focused on the light engineering sector, do not have anything specifically for the agricultural machinery industry, which needs to be addressed properly by the policymakers of these ministries by implementing specific policies. Table 24 compiles the recommendation on policy, laws, and relevant institutions.

Table 24: Recommendation table on policy, laws, and relevant institutions

Policy	Laws / Projects /Agreements	Institutions	Operational
National Agricultural Mechanization Policy (2020)	No pertinent laws found.	Department of Agricultural Extension, Ministry of Agriculture	Streamlining the process of accessing subsidies by removing bureaucratic neighbourhoods.
SME Policy (2019)	No pertinent laws found.	SME Foundation	The Ministry of Industries needs to prioritise and implement separate policies for the agricultural machinery industry in the SME sector.
Light Engineering Policy (2022)	Export Competitiveness for Jobs (EC4J) WTO TRIPS Agreement	Ministry of Industries	Designing low-interest loans specifically for the agricultural machinery sector and implementation of alternative financial instruments, such as venture capital, at first by creating awareness

Source: Authors' Compilation from the Mentioned Policy Documents.

9.2. Ensuring Availability of Preferred Financial Instruments

The survey data provides valuable insights into the financial instrument preferences of supply chain actors. An analysis based on the age of business owners reveals that, beyond asset-based finance, instruments like warehouse finance, crowdfunding, and supply chain finance are particularly popular across age groups. This indicates a potential role for microfinance institutions and NGOs such as BRAC and ASA to not only offer these tools but also to enhance awareness about them.

Additionally, the data shows that preferences for lesser-known financial alternatives, such as machine leasing, increase with the educational level of stakeholders. This suggests that institutions like the SME Foundation could play a key role in promoting awareness and understanding of these alternative instruments. From the perspective of firm size, the findings indicate that as businesses grow, they tend to adopt more specialised and sophisticated financial instruments, whilst smaller firms often rely on general-purpose options, such as asset-based finance. Therefore, streamlining loan processes and providing tailored loan products for agricultural machinery would support business expansion, thereby encouraging the adoption of diverse financial instruments. Table 25 summarizes recommendations based on insights collected from the survey.

Table 25: Financial instrument preferences by demographic and firm characteristics

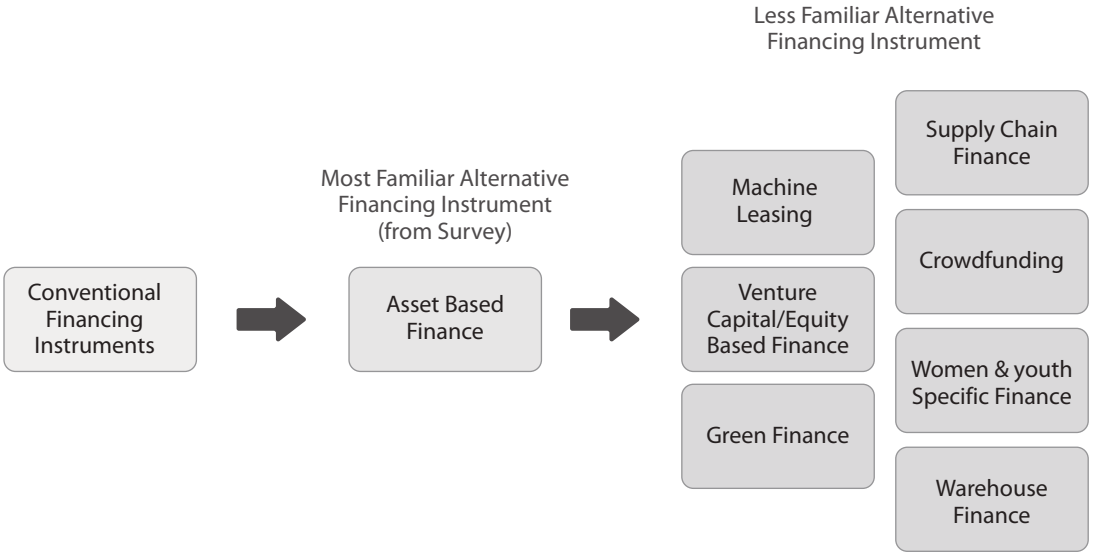
Factors	Insights	Recommendations
Location of the Actor	Actors in Bogura are more aware of the nontraditional financial instruments compared to other regions. Across the regions asset-based finance and warehouse finance are more popular.	There is a need for awareness building programme and workshop related to financial literacy across the regions. Financial institutions or firms like WeGrow and iFarmer can offer these facilities to the actors.
Age of Business Owners	Popular choices across all age groups include warehouse finance, crowdfunding, and supply chain finance, besides asset-based finance.	NGOs and microfinance institutions (e.g., BRAC, ASA) should expand offerings and awareness of these tools.
Level of education	Higher education correlates with interest in alternative tools, such as machine leasing.	SME Foundation and similar institutions can enhance outreach and education on alternative financing.
Firm Size	Larger firms favour specialised instruments, whilst smaller firms use general-purpose options.	Streamline loan processes and offer tailored financing for agricultural machinery to support growth.

Source: Authors' Compilation from the Survey and KIIs (2024).

When introducing alternative financial instruments in Bangladesh's agricultural mechanization sector, 'Law of Gradual Adoption' or the '*Familiarity Principle*' should be followed. This principle, widely used in marketing and product development, suggests that people are more likely to adopt new concepts when they feel familiar or build upon their existing knowledge and experience. Applying this approach, financial instruments should be introduced in stages, starting with the most familiar ones before gradually introducing others.

The survey findings under the study revealed that among the listed alternative instruments, asset-based finance was the most familiar to respondents, followed by machine leasing. Additionally, respondents showed strong interest in supply chain finance. Therefore, to successfully integrate alternative financial instruments, the focus should first be on rolling out asset-based finance, machine leasing, and supply chain finance before expanding to other options. The process of integrating the alternative financial instruments to the market is showed in Figure 18.

Figure 18: The process of introducing alternative financial instrument to the market



Source: Authors' Illustration.

9.3. Addressing the Socio-Economic Background in Financing:

The regression analysis indicates that among the non-traditional financial instruments, asset-based finance, machine leasing, and supply chain finance are the most recognised by stakeholders. Therefore, it is recommended that these financial instruments be implemented at the public level, particularly through institutions like the SME Foundation. The SME Foundation currently offers some provisions for alternative financing, such as venture capital. It should integrate the aforementioned three financial instruments, as these are more widely known among stakeholders.

The district of the respondents has emerged as a significant variable in the regression analysis, suggesting the need to implement financial instruments tailored to the specific needs of each district. This can be achieved by assessing the requirements of stakeholders at the district level, particularly in areas that are hubs for agricultural machinery. The government, particularly through the SME Foundation, can play a pivotal role in this regard, as they have identified industry-specific clusters, including those related to agricultural machinery.

Educational background and financial literacy have been found to be significantly correlated with stakeholders' willingness to adopt alternative financial instruments. Consequently, there is a pressing need to increase awareness-building programmes. Agri-tech companies, such as iFarmer, along with the Ministry of Agricultural Extension, should take the lead in these efforts. Private commercial banks can also contribute by creating information windows to promote awareness. Furthermore, the size of the labour force has been shown to significantly influence the likelihood of adopting alternative financial instruments. Therefore, priority should be given to small farms in these awareness programs.

The analysis reveals that stakeholders who receive adequate financing from the government and non-government organisations (NGOs) are more open to adopting alternative financial instruments. As such, it is recommended that both government financing options, particularly through the SME Foundation, and the expansion of the Credit Guarantee Scheme (CGS) of Bangladesh Bank, be increased. NGOs, such as BRAC Microfinance and Midas Financing, which have a strong presence at the grassroots level, should also be engaged in the promotion of these instruments. Additionally, it was found that stakeholders are more willing

to adopt alternative financial instruments if they already operate another business, which reflects a classic risk-taking behaviour. To support these stakeholders, the CGS should be redesigned to cater to more micro and sector-specific needs, ensuring that stakeholders have a fallback option. Table 26 details the recommendations based on the regression analysis on promoting alternative financial instruments in agro-mechanization sector.

Table 26: Recommendations based on the regression analysis on promoting alternative financial instruments in agro-mechanization sector

Recommendation	Rationale	Implementation Entities
Implement asset-based finance, machine leasing, and supply chain finance at the public level	These instruments are widely recognised by stakeholders.	SME Foundation, Government
Tailor financial instruments to specific district needs, especially in agricultural machinery hubs	District-specific needs, including agricultural machinery, should be addressed.	Government, SME Foundation
Increase awareness-building programs on alternative financial instruments	Educational background and financial literacy significantly affect the adoption of these instruments.	iFarmer, Ministry of Agricultural Extension, Private Banks
Prioritise small farms in awareness programmes on financial instruments	The size of the labour force impacts the adoption rate of alternative financial instruments.	Agri-tech Companies, Ministry of Agricultural Extension
Expand financing options and promote the Credit Guarantee Scheme (CGS)	Stakeholders receiving adequate financing are more receptive to alternative financial instruments.	SME Foundation, Bangladesh Bank, NGOs
Redesign CGS to support micro and sector-specific needs	Risk-taking behaviour among stakeholders who have other businesses requires a more targeted financial safety net.	Bangladesh Bank, NGOs

Source: Authors' Compilation.

9.4. Providing Appropriate Financial Instruments across the Supply Chain Actors

For different supply chain actors of the agricultural machinery industry, different financial instruments are appropriate; a comprehensive list is being provided in the matrix below in this regard. Table 27 shows which financial instruments are appropriate for which actors of the supply chain.

Table 27: Overview of financial instruments and applicable actors in the supply chain

Instruments	Actors	Description
Equity Finance	Most supply chain actors (except end users)	Investors provide funding in exchange for equity, expecting returns through company growth and profitability.
Supply Chain Finance	Actors needing raw materials for machinery production	Financier covers supplier invoices for early payment with buyer approval, enhancing liquidity in the supply chain.
Equipment/Machine Leasing	Producers and end users (for leasing capital and ready machinery)	Allows leasing of machinery over time, with lessor retaining ownership; can be for capital or ready machinery.
Warehouse Finance	Inventory-heavy businesses across the supply chain	Loans based on goods held in storage as collateral; ideal for businesses needing short-term liquidity for inventory.

Table 27 contd.

Table 27 contd.

Instruments	Actors	Description
Crowdfunding or Cooperative Financing	End users (farmers or small enterprises in cooperatives)	Farmers or small enterprises pool resources through cooperatives or crowdfunding to collectively fund machinery.
Lease-to-Own (LTO) Programs	End users (agricultural machinery users)	Leasing option where payments contribute toward eventual ownership, suited for agricultural machinery end users.

Source: Authors' Compilation.

9.5 Key Recommendations for facilitating easy financing focusing on alternative financial instruments

Based on the comprehensive analysis conducted in this study, the following key recommendations aim to address the barriers and opportunities regarding easy access to finance in the agricultural machinery sector.

Interest Rates and Repayment Periods

To facilitate financing in the agricultural machinery sector, both existing and alternative financing instruments need to be revisited. Specifically:

- **Interest Rate:** From the field survey and KIIs the study found that a 4 per cent interest rate is widely preferred among supply chain actors, particularly local producers and machine service providers, aligning with government initiatives such as Ekti Bari Ekti Khamar. Overall, a reduced rate of interest compared to the existing market rate is needed for facilitating financing in the sector.
- **Repayment Periods:** Loan repayment periods should extend beyond two years, with durations tailored to the business type and the borrower's role within the agricultural machinery sector. Additionally, payback period should start after a grace period (6 months to 1 year) since borrowers need time to integrate the loan into their operations. This adjustment will allow sufficient time for borrowers to reinvest funds, generate profit, and repay financial institutions sustainably.

Overarching Issues in Financing

Several institutional and regulatory barriers hinder borrowers from obtaining and effectively utilising credit. Addressing these challenges requires structural reforms, transparency, and borrower-centric policies.

- **Borrower Training and Support:** Banks primarily see themselves as financial providers, but they also need to play a role in educating borrowers on credit utilisation. Many borrowers lack financial literacy, which limits their ability to use loans effectively. Training programmes led by banks or in collaboration with financial literacy initiatives can bridge this gap, ensuring that funds are used productively.
- **Discriminatory Lending Practices:** Borrowers report facing discrimination in accessing credit based on factors such as gender, business size, and political influence. This unequal treatment discourages small businesses and underrepresented groups from seeking loans. Financial institutions should implement fair lending practices and introduce regulatory oversight to eliminate bias in loan approvals.
- **Transparency in Credit Ratings:** Current Credit Information Bureau (CIB) rating systems are often opaque and do not align with the financial literacy levels of many borrowers. A more transparent, borrower-friendly credit rating framework is necessary. Additionally, a guarantor-free loan scheme should be introduced to support businesses that lack traditional collateral but demonstrate strong repayment potential.

- **Hurdles in Loan Disbursement:** Banks such as Bank Asia require extensive documentation, including machine registration, trade licences, and certifications, to approve loans. These requirements pose significant challenges for service providers, particularly small businesses that struggle with regulatory compliance. Simplifying loan application processes can improve access to finance.
- **Flexible Loan Repayment Structures:** Current loan structures often penalise borrowers for economic downturns beyond their control. A more flexible installment scheme is needed, ensuring that loan durations are fixed but borrowers are not unduly penalised for unavoidable business fluctuations. This approach would make credit more accessible and sustainable for businesses.

Streamlining the Tax and Subsidy System

Tax-related inefficiencies pose a significant burden, particularly for local producers, who face taxation on both raw material purchases and product sales. The following measures are recommended:

- **Tax Duplication:** VAT and taxes should be collected from one actor at once in the supply chain to prevent redundancy and to reduce hassle. This will also increase the tax collecting capacity of the National Bureau of Revenue (NBR).
- **Simplification of Processes:** A dedicated window on the NBR website should provide clear guidance on required documents and procedures. Uniform requirements across regional tax offices are essential to avoid confusion and hesitation among the taxpayers.
- **Differentiated Tax Rates:** Tax rates should vary across the supply chain to reflect the distinct tax burdens borne by different actors. Local producers, who face disproportionate tax liabilities, should receive targeted relief to promote growth in the sector.
- **Determining Subsidy:** Current subsidies are given as a percentage of the product price, leading to potential over-invoicing issues. The recommended alternative is to set specific product prices for subsidies or provide direct fixed amounts for particular products.

Supply Chain Digitalization

End-to-end digitalization of the supply chain is critical to improving transparency, operational efficiency, and policymaking.

- Digital platforms are needed for raw material procurement, production, and product sales to enable seamless monitoring of financial transactions.
- Digitalised systems will enhance data collection to evaluate the impacts of tax exemptions, subsidies, and credit systems, which will facilitate data-driven policymaking. Also, there is a need for a targeted financing framework that addresses the challenges faced by different actors in the supply chain. The frameworks can be developed based on data from relevant financial institutions and surveys to design the terms and conditions of financial instruments.
- Collaboration among the Department of Agricultural Extension, Ministry of Industries, and SME Foundation is required to implement digital systems for seamless monitoring of financial transactions and business activities.
- For businesses, maintaining vouchers and registers is essential to assist financial institutions and tax authorities to monitor business health.

Sector-Specific Policies and Provisions

The agricultural machinery sector requires dedicated focus in policies from Bangladesh Bank, the SME Foundation, Ministry of Agriculture, and Ministry of Industries.

- Generic schemes in the policies (Light Engineering Policy, SME Policy, National Agricultural Mechanization Policy 2020) should be replaced or complemented with sector-specific provisions (mentioning size of the funds, target of disbursement, specific terms and conditions for the sector) that address the unique challenges of agricultural mechanization.
- Expanding financing options for agricultural mechanization through initiatives like the Credit Guarantee Scheme (CGS) of Bangladesh Bank is important. Bangladesh Bank has to prioritise agricultural mechanization within the CGS and increase the amount of allocated funds to better serve this sector.
- Familiar financing instruments like asset-based finance, machine leasing, and supply chain finance should be promote by collaborating with the SME Foundation. Since the SME Foundation has been mapping agricultural machinery clusters since 2013, leverage their Credit Wholesaling Program to expedite financing by utilising their funds through banks and NBFIs.
- The government should specify its vision and targets for the sector. And to incentivise growth in the sector dedicated funds and concessional loans should be introduced. The mentioned government agencies should also mention how these funds will be disbursed so that the benefit of the initiative tickles down to the actors of the Agri Mechanization sector. For example, Bangladesh Bank should develop targeted funds with clear disbursement provisions and sector-specific targeting.

Promoting Alternative Financial Instruments

To expand financing options for stakeholders, alternative financial instruments need to be popularised through a multi-stakeholder approach:

- There is a lack of clarity in terms and conditions of the financial instruments offered by banks or other organisations. Banks should develop and disseminate user-friendly tutorials and guidelines on alternative instruments, such as equity financing and machine leasing.
- Government agencies can use existing grassroots networks (Grassroot committees formed by Department of Agricultural Extension) to promote awareness and accessibility of crowdfunding and leasing options.
- Leverage organisations like WeGrow and iFarmer can encourage adoption of alternative instruments through their existing training and outreach programmes (Monthly gatherings and activities of local offices).

Awareness and Capacity-Building Programmes

Improving financial literacy and awareness is critical to encouraging the use of banking channels, navigating the tax system, and adopting digital solutions. As found in the calculation of this study, financial literacy plays a significant role in leading actors to use alternative financial instruments. Recommendations include:

- As found through the KII of this study, zilla-level Agri-Entrepreneur Festivals are being organised to incentivise businesses in the sector by Department of Agriculture Extension. These events should be utilised to educate farmers and people associated with the agriculture sector on financing options, tax regulations, and business registration procedures. Banks should have tutorials and blogs written in

Bangla to improve the financial literacy of the users. Private sectors should include financial literacy programs in their initiatives.

- Improving digital literacy of the stakeholders is also essential for creating a digitally driven ecosystem. The mentioned entities should prioritise digital literacy along with financial literacy when designing their grassroot programmes.

10

Conclusion

This report has critically examined the financial landscape surrounding agricultural mechanization in Bangladesh, focusing on the accessibility of finance for stakeholders across the agricultural machinery supply chain. The findings highlight the significant barriers faced by small and medium enterprises (SMEs), including high interest rates, stringent collateral requirements, and inadequate awareness of alternative financing options. Despite various policy interventions, such as the National Agricultural Mechanization Policy (2020) and the Light Engineering Policy (2022), challenges remain in the practical implementation of these policies, particularly in ensuring that financial instruments are tailored to the unique needs of the agricultural sector.

The analysis of the stakeholders' preferences reveals a clear inclination towards asset-based finance, with a growing interest in alternative financial instruments like machine leasing, supply chain finance, and warehouse finance. These findings underline the need for a more inclusive and flexible financial system that caters to the diverse needs of the agricultural mechanization sector. Additionally, the role of government and NGO support is crucial in enhancing financial literacy and promoting sector-specific financial products. It is evident from the regression analysis and field survey that educational background, financial literacy, and the support received from government or non-governmental organisations are key determinants in the adoption of alternative financial instruments. The results emphasise the importance of targeted policy measures that reduce the financial barriers to entry, particularly for smallholder farmers and SMEs involved in agricultural mechanization.

In conclusion, whilst progress has been made in addressing the financing needs of the sector, much work remains to be done. Policymakers must prioritise the development of tailored financial instruments, improve the implementation of existing policies, and foster greater collaboration between government institutions, financial providers, and the private sector. By addressing these gaps, Bangladesh can unlock the full potential of agricultural mechanization, ultimately driving productivity growth and enhancing food security in the country.

References

Agro-based industries get 10-year tax exemption. (2021, June 04). *Financial Express*. Retrieved from: https://thefinancialexpress.com.bd/economy/bangladesh/agro-based-industries-get-10-year-tax-exemption-1622741148

Alam, M. M. (2022). *Trend of Agricultural Machinery and Spare Parts Manufacturing and*. Retrieved from CSISA: https://csisa.org/wp-content/uploads/sites/2/2022/04/Day-2-Session-3_Trend-of-Agricultural-Machinery-and-Spare-Parts-Manufacturing-by-BAU.pdf

Ali, C. L., Khandaker, R., Mahbub, A. Z., Hossan, S., Rayhan, M. A., Hasan, M. K., & Asha, A. S. (2023). *Guidelines on Sustainability and Climate Related Financial Disclosures*. Dhaka: Bangladesh Bank. Retrieved from https://www.bb.org.bd/aboutus/draftguinotification/guideline/sustainabilityreport.pdf

Aram, M. (2021). Leasing as an Effective Tool for Agricultural Financing: The Case of Armenia. *Agrarian Bulletin of the Urals*, 206(3), 81-91. doi:10.32417/1997-4868-2021-206-03-81-91

Bangladesh Bank fixes 35,000C agri credit target for FY24. (2023, August 06). *Dhaka Tribune*. Retrieved from: https://www.dhakatribune.com/business/banks/321767/bb-agri-credit-target-fy24

Department of Agricultural Extension. (2020). *National Agricultural Menchanization Policy*. Dhaka: Ministry of Agriculture. Retrieved from https://dae.portal.gov.bd/sites/default/files/files/dae.portal.gov.bd/policies/c940594d_3ca5_4665_b390_ace578255853/2021-08-25-06-05-7b2382934f7fa3773586d4084061cd04.pdf

EASE. (2023, July 25). *Ethio Lease to Mechanise the Agriculture Sector*. Retrieved from EASE: https://www.easeglobal.com/latest-news/ethio-lease-to-mechanise-the-agriculture-sector.

Green Finance Platform. (2019). *Bangladesh's Green Transformation Fund (GTF)*. Green Finance Platform. Retrieved from https://www.greenfinanceplatform.org/policies-and-regulations/bangladeshs-green-transformation-fund-gtf

Gulandaz, M. A., Jahan, N., Rahman, M. M., & Miah, M. S. (2014). Status of Agricultural Machinery Manufacturing in Bangladesh. *Journal of Agricultural Engineering*. Retrieved from https://www.researchgate.net/publication/337415342_Status_of_Agricultural_Machinery_Manufacturing_in_Bangladesh

Hossen, M. A. (2019). Mechanization in Bangladesh: Way of Modernization in Agriculture. *International Journal of Engineering Trends and Technology*, 69-77. Retrieved from https://ijettjournal.org/Volume-67/Issue-9/IJETT-V67I9P212.pdf

Inspira Advisory and Consulting Ltd. (2019, December). *Market Analysis of the Agricultural Machinery and Spare Parts Manufacturing and Light Engineering Sector in Bangladesh*. Retrieved from CSISA: https://csisa.org/wp-content/uploads/sites/2/2020/04/Market-System-Analysis-Inspira-2019.pdf

Javed, I., Yasen, G., Rashid, S., Subhan, A., Akhtar, S., Ahmed, S., . . . Majeed, S. (2023). Impact of agricultural credit on farmer's income: evidence from central Punjab, Pakistan. *International Journal of Agricultural Extension, 11*(3), 219-229. doi:10.33687/ijae.011.03.4896

Junior, R. C., & Gameiro, A. H. (2020). Cash Flow in an Agribusiness Restructuring Process. *Journal of Agricultural Studies, 8*(4). doi:https://doi.org/10.5296/jas.v8i4.17850

Kato, A. I., & Germinah, C.-P. E. (2022). Empirical Examination of the Relationship Between Venture Capital Financing and the Profitability of the Portfolio Companies in Uganda. *Research Square (Research Square),, 11*, 30. https://doi.org/10.1186/s13731-022-00216-5

Mamun, M. R., Shahed, A., & Tamanna, T. A. (2018). Identification of Hindrances to Adapt Agricultural Machinery. *Pearl Research Journals, 4*(7), 134-144. Retrieved from https://www.pearlresearchjournals.org/journals/jasft/archive/2018/Sep/Abstract/Al%20Mamun%20et%20al.html

Ministry of Industries. (2019). *SME Policy*. Dhaka: Ministry of Industries. Retrieved from https://moind.portal.gov.bd/sites/default/files/files/moind.portal.gov.bd/page/66b4934c_1ad2_4ab3_a9f8_329331d9b054/10.%20SME%20Policy%202019.pdf

Ministry of Industries. (2022). *Light Engineering Industry Development Policy*. Dhaka: Ministry of Industries. Retrieved from https://moind.portal.gov.bd/sites/default/files/files/moind.portal.gov.bd/policies/c3d480d2_1369_464a_82d0_3b797f5ddf1b/Light%20Engineering%20Industry%20Development%20Policy%202022.pdf

Nath, B. C. (2017). Status and Constrain for Mechanization of Rice Harvesting System in Bangladesh. *Agricultural Sciences*.

Pandey, A. (2022). Credit and Financial Access in Nepalese Agriculture: Prospects and Challenges. *Journal of Agriculture and Environment, 23*, 56-70. https://doi.org/10.3126/aej.v23i1.46868

Paul, P. (2024, June 27). *Leveraging the power of SMEs*. Retrieved from *The Daily Star*: https://www.thedailystar.net/supplements/msmes-day-2024/news/leveraging-the-power-smes-3642786

Pranto, P. (2023). *Agricultural Mechanization Landscape of Bangladesh: Access to Finance a Significant Barrier*. LightCastle Partners.

Seraj, S. (2020, July 10). *Agricultural machinery: Where is Bangladesh heading?* Retrieved from *The Daily Star*: https://www.thedailystar.net/country/news/agricultural-machinery-where-bangladesh-heading-1927969

Sustainable Finance Department. (2022). *Quarterly Review Report on Sustainable Finance*. Dhaka: Bangladesh Bank. Retrieved from https://www.bb.org.bd/en/index.php/publication/publictn/2/39

Villalba, R., Joshi, G., Daum, T., & Venus, T. E. (2024). Financing Climate Smart Agriculture: a case study. *Mitigation and Adaptation Strategies for Global Change, 29*(33). doi:https://doi.org/10.1007/s11027-024-10127-3

Yi, Z., Wang, Y., & Chen, Y.-J. (2021). Financing an Agricultural Supply Chain with a Capital-Constrained Smallholder Farmer in Developing Economies. *Production and Operations Management, 30*(7). https://doi.org/10.1111/poms.13357

Access to finance in Bangladesh's agricultural mechanization sector is shaped by stakeholders' preferences for alternative financial instruments. Local producers face the greatest financial constraints, primarily due to double taxation on raw materials and product sales. Survey results from 196 respondents show strong preference for asset-based finance and machine leasing, while other instruments remain largely underutilized. Econometric analysis reveals that education, financial literacy, government support, and firm characteristics significantly influence adoption. Recommendations include promoting familiar instruments, gradually introducing alternatives, strengthening policy support, building capacity, and digitalizing the supply chain to enhance financial inclusion, operational efficiency, and mechanization uptake.

Centre for Policy Dialogue (CPD)
House 40/C, Road No 11 (new)
Dhanmondi, Dhaka – 1209, Bangladesh
Phone: (+88 02) 41021780-2
E-mail: info@cpd.org.bd
Website: www.cpd.org.bd