

Current practices and perceived constraints to agricultural machinery manufacturers in the light engineering hubs of Bogura and Jashore

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Our Goals

Increase amount and quality of:

- Domestic production of spare parts
- Domestic production of agricultural machinery



Agenda

- Market Size for Spare Parts
- Spare Parts Fabrication
- Raw Materials Procurement
- Supporting Services / Testing and Quality Assurance
- Challenges
- Key Issues and Potential Solutions



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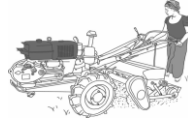


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The Market Size Potential for Spare Parts (SP)

Combine Harvester	4 Wheel Tractor	Rice Transplanter	2 Wheel Tractor	PTOS	Thresher	Fodder Chopper
						
At present 1500 machines in operation 60,000 service provider market \$2.3 m sales of SP	At present 60,000 machines in operation 5,700,000 SP market \$141 m sales of SP	At present 400 machines in operation 7,600 SP market \$0.10 m sales of SP	At present 700,000 machines in operation 23.8 m SP market \$232 m sales of SP	At present 7,500 machines in operation 180,000 SP market \$0.86 m sales of SP	At present 400,000 machines in operation 4.4 m SP market \$26 m sales of SP	At present 40,000 machines in operation 280,000 SP market \$2.92 m sales of SP
In 5 years approx 15,000 machines will be in operation 600,000 SP market \$23 m sales of SP	In 5 years approx 85,000 machines will be in operation 8,075,000 SP market \$200 m sales of SP	In 5 years approx 850 machines will be in operation 16,150 SP market \$0.22 m sales of SP	In 5 years approx 600,000 machines will be in operation 20.4 m SP market \$199 m sales of SP	In 5 years approx 7,500 machines will be in operation 180,000 SP market \$0.86 m sales of SP	In 5 years approx 400,000 machines will be in operation 4.4 m SP market \$26 m sales of SP	In 5 years approx 150,000 machines will be in operation 10.5 m SP market \$10.96 m sales of SP
100% imported 0% locally manufactured	46% imported 54% locally manufactured	100% imported 0% locally manufactured	92% imported 8% locally manufactured	46% imported 54% locally manufactured	21% imported 79% locally manufactured	49% imported 51% locally manufactured





- Manufacturers copy parts
 - Unknown nominal dimensions and tolerances
- Use outdated and inaccurate tools
- Result is poor quality parts



Improved Shop Practice

- Use drawings, rather than parts
- Use accurate measurement instruments
- Use computer-controlled machines (e.g., milling machines)
- Advanced technical training of staff
- Hire degreed engineers



CNC Milling Machines



Vernier vs Digital Calipers



Hardness Testing Instrument



Hardness Testing Files

Raw Materials Market Assessment for Agro Machines and Spare Parts

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Geographic Scope of Inspira Study

Bogura Regions

Railway Market
Gohail Road
Char-Matha
Khandar
Silimpur
Namaj Ghar
Fulbari
Sherpur Road
Chelopara

Dhaka Regions

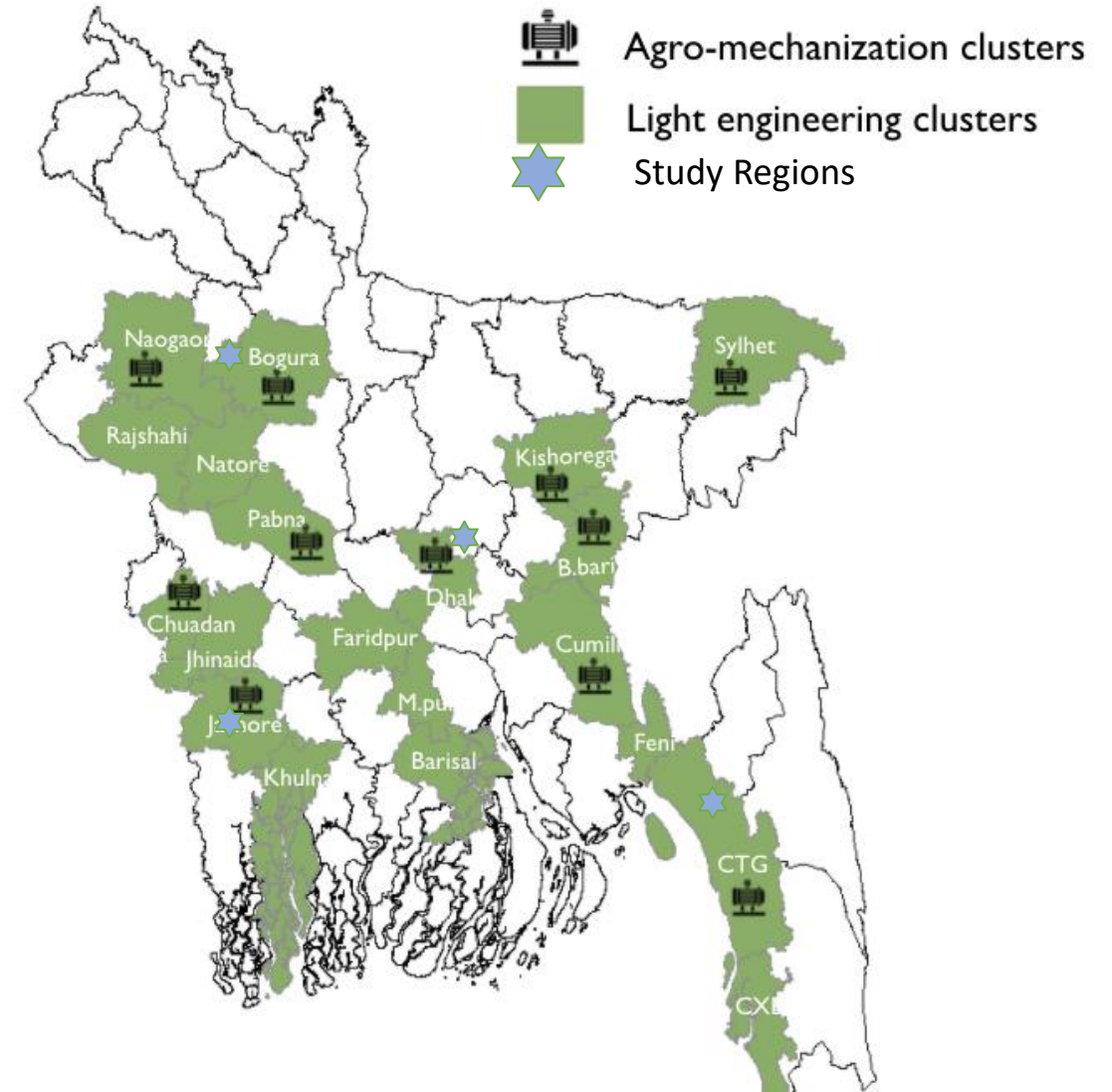
Postogola
Nawabpur

Jashore Regions

RN Road
Chanchra
Bokchar
JUST campus

Chattogram Regions

City Area
Salimpur
Sitakund (Kumira and Bhatiyari)





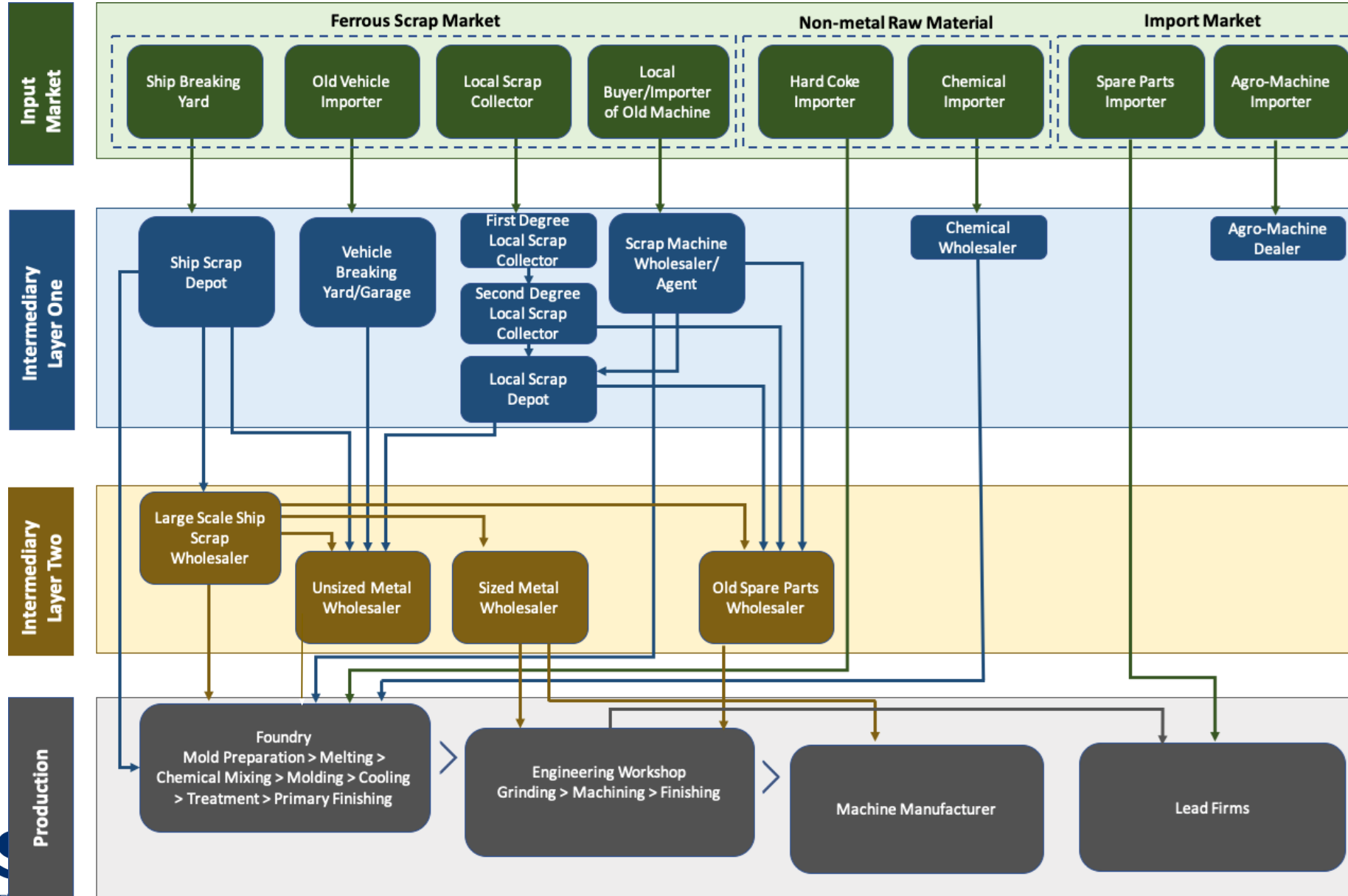
Primary Research: Key Informant Interviews (KII)

Cohorts for Key Informant Interviews (KIIs)	Locations (District Level)	No. of KIIs
Importers (<i>Chemicals and Spare Parts</i>)	Dhaka, Bogura, Jashore, Chattogram	4
Domestic Raw Material Backward- Chain Actors (<i>Ship Scrap Market Wholesalers and Local Scrap Collectors</i>)	Dhaka, Bogura, Jashore, Chattogram	9
Foundries	Bogura, Jashore, Dhaka	10
Engineering Workshops	Bogura, Jashore, Dhaka	7
Steel Re-Rolling Mills (<i>BSRM and HSRM</i>)	Chattogram, Dhaka	2
Large Enterprises/ Lead firms (<i>Small Importers, ACI, TML, Walton</i>)	Dhaka, Bogura	7
Industry Associations (<i>FOAB, BEIOA, BSRMA</i>)	Dhaka, Bogura	3
Testing Institutions (<i>BCSIR, Ripon Metal Industries, Haque Engineering</i>)	Dhaka, Jashore	3
Academic Units with Testing Capabilities (<i>BUET and JUST</i>)	Dhaka	2
GoB (<i>BITAC and Polytechnic Institute of Jashore</i>)	Dhaka, Jashore	2
NGO (<i>YPSA</i>)	Dhaka	1
Others (<i>EC4J</i>)	Dhaka	2
Total		52





Value Chain Map



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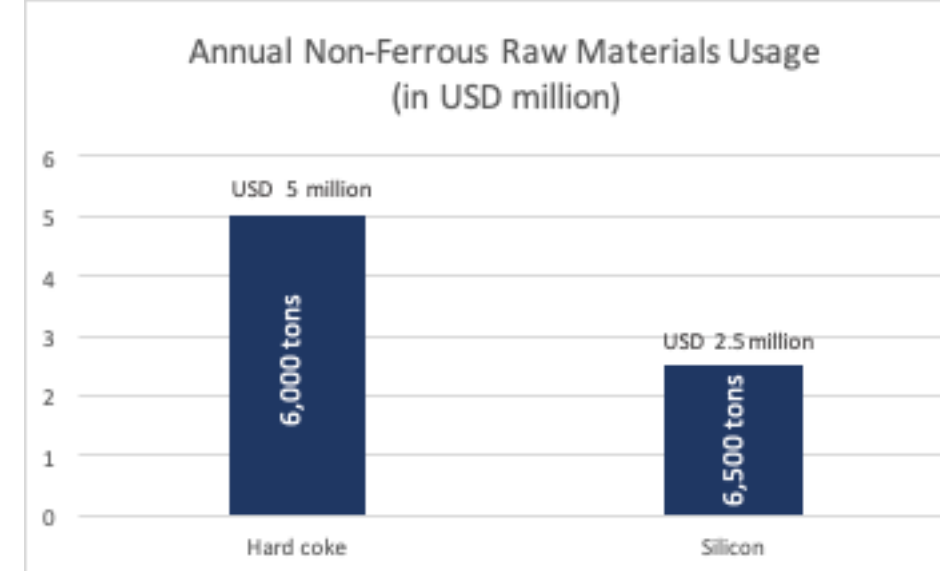
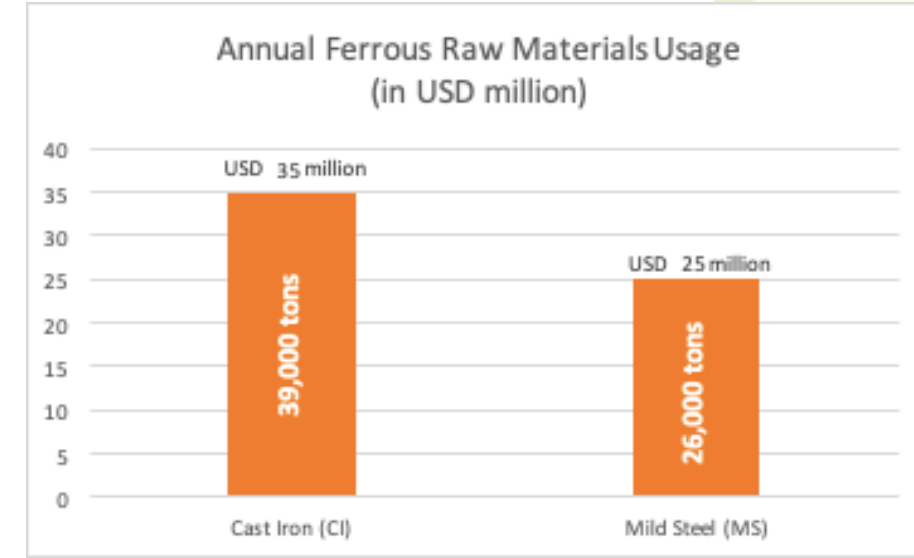
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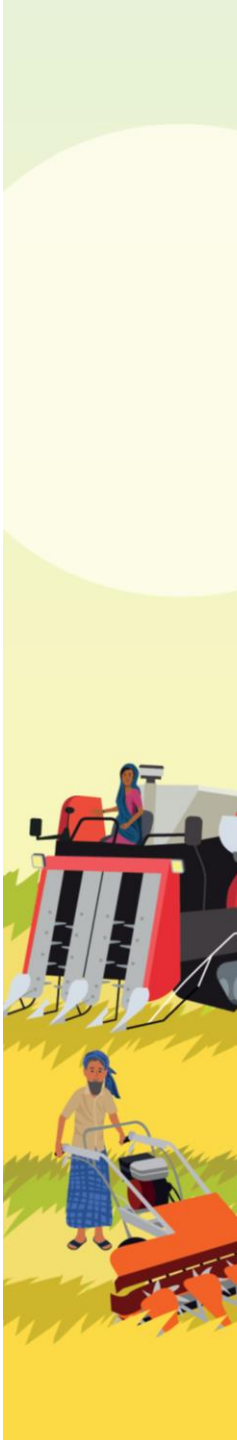
Market Size: Raw Materials in Bogura and Jashore

- Foundries use both **ferrous (scrap iron chunks)** and **non-ferrous (hard coke and silicon)** raw materials.
- *Engineering Workshops* only use **ferrous (CI and MS)** based raw materials.
- Two types of ferrous based material, **MS Metal** and **Cast Iron** are used as raw materials in *Engineering Workshops* while *foundries* only consume **Scrap iron**.
- Bogura and Jashore generate a market demand for **39 thousand tons of Cast Iron**, which is worth around **USD 35 million**.
- Bogura and Jashore together generate around **26 thousand tons of MS Metal** material demand, which is worth around **USD 25 million**.
- Non-ferrous based raw materials mainly include **Hard Coke** and **Silicon**.
- Currently there is a market demand of **6 thousands tons of hard coke** per annum in Bogura and Jashore, which is worth around **USD 5 million**.
- At present, there is a market demand of **6,500 tons of Silicon** per annum, which is worth around **USD 2.5 million**.



Inputs Prices Hinder Production

- Shipyard scrap
 - Rising prices from 28-30 to 52053 BDT/kg
 - Rising taxes 15% to 20%
- Imported old machines
 - Rising prices from 45-48 to 80-90 BDT/kg
- Hard coke for casting furnace
 - Rising prices from 90 to 120 BDT/kg
- Chemicals
 - High level of taxes
 - 37% on silicon
 - 43% on ferro-manganese (>2% carbon in weight)
 - 31% on ferro-manganese (<2% carbon in weight)
 - 43% on ferro-silico-manganese





Foundries

- **Locations**
 - **Rangpur–Dinajpur hubs** - spare parts for autos, trains, mills, factories, and maintenance work
 - **Sylhet hubs** - mill and factory spare components
 - **Dhaka-Gazipur-Narayangonj hubs** - capital machinery, bicycles, construction equipment, and spare parts
 - **Khulna-Barisal hubs** - mill, factory, and industry spare parts,
 - **Chattogram hubs** - ship breaking, car spare parts, and maintenance services
 - **Bogura-Natore and Jashore hubs** - foundry, agro-machinery, manufacturing spares, LPC, cylinders, and maintenance work
- **55 foundries** are active currently in Bogura
 - **7-8 foundries** inside the **BSCIC** area,
 - **Others** are scattered in different areas of **Bogura city**
 - **In terms of their production capacity:**
 - **12** are large
 - **26** are medium
 - **17** are small
- **18 foundries** in Jashore with major focus on producing AM-SP



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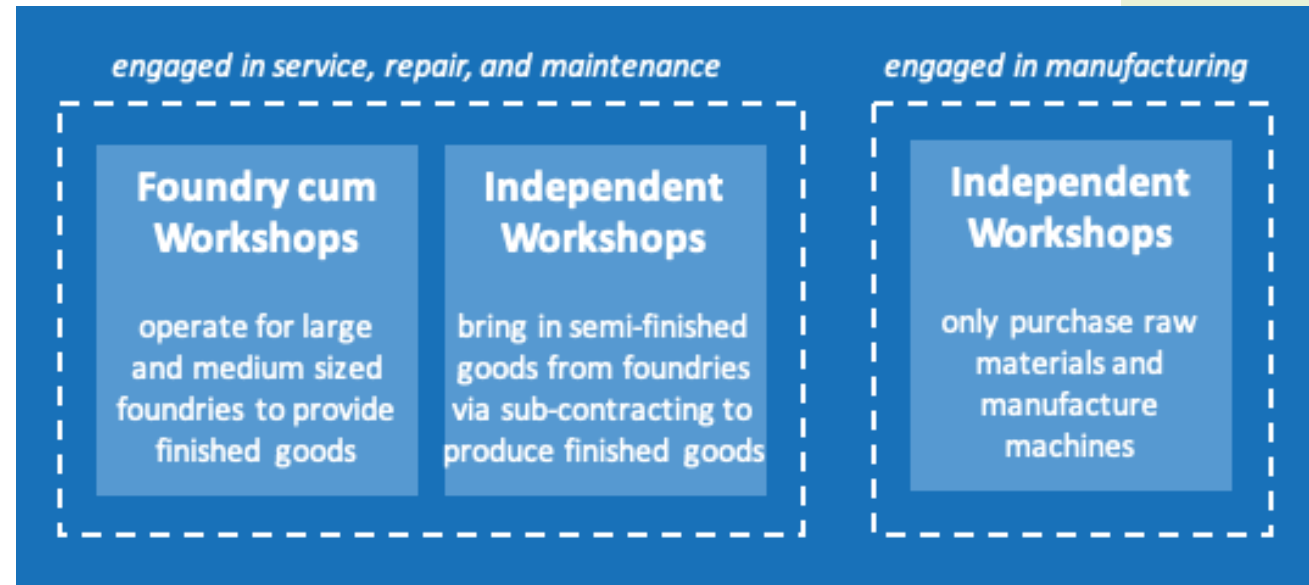
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Engineering Workshops

Bogura hub -

- There are **1,500 engineering workshops in Bogura.**
- About **50% of the workshops are in manufacturing** while the rest are in repair, service, and maintenance.
- The **largest cluster of sole engineering workshops** in Bogura is situated in the **Railway Market.**
- The **BSCIC region** in Fulbari union of Sariakandi Upazila has 7-8 active foundry cum engineering workshops.
- **Gohail Road and Khandar** neighbourhoods of Bogura also have clusters of foundry cum engineering workshops.
- **Chelopara** neighbourhood has many sole engineering workshops.

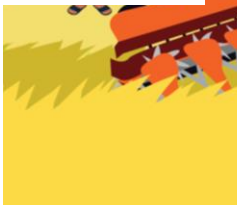


Jashore hub -

- The estimated number of engineering workshops in Jashore Zone (the Jashore zone includes Chuadanga) is **550**
- **180-200** are involved in agro-machine and spare parts manufacturing sub-sectors.

Dhaka hub -

- The cluster of engineering workshops in Dhaka are based in **Jahajpotti of Dholaikhal, Postogola, and Zinzira** neighbourhoods of old Dhaka city.





Raw Material Testing

- **No formal system in place** for assessing the quality of raw materials like ship plates and shafts
- Quality of cast iron (CI) material procured from foundries is assessed by their color.
- Workshops do not opt for testing their raw materials due to the **increase in production cost**. Hence, the most experienced workers are employed in the production process to produce the best quality machines and parts.

End Product Quality Compliance

- The quality of end products is examined by their **color, sound, finish, and dimensions**
- **Colour** - End products with a metallic appearance of aluminium are perceived as good quality products by consumers
- **Sound** - Experienced workers understand the quality of spare parts by the sound they make after striking them lightly against a hard surface.
- **Finish and dimensions** - Quality depends on the extent of finish and accuracy of dimensions of the machines.
- **Locally manufactured machines and spare parts being sold with the name of foreign brands** so as to ensure quality compliance to consumers, who have a perception that Indian or Chinese spare parts would be of superior quality compared to Bangladeshi ones.



- Bangladesh Industrial Technical Assistance Centre (BITAC) Tools and Technology Institute (TTI) in Dhaka (Materials testing laboratory and machinery)
- Pilot Plants & Process Development Centre (PP & PDC) at Bangladesh Council of Scientific and Industrial Research (BCSIR) in Dhaka (Testing)
- Department of Materials and Metallurgical Engineering (MME) at Bangladesh University of Engineering and Technology (BUET) Dhaka (Materials testing laboratory)
- Centre for Sophisticated Instrumentation and Research Laboratory (CSIRL) of Jashore Institute of Science and Technology (JUST) (Chemical composition testing of materials)
- Jashore Polytechnic Institute (Mid-level engineering and technology education programs)
- Export Competitiveness for Jobs (EC4J) Project is intended to promote the growth and competitiveness of specific industries including the light engineering sector (including foundry)
- Young Power in Social Action (YPSA) offers ship breaking yard employees training in accordance with the Hong Kong convention on a variety of topics, such as safe decomposition of ship scrap and removal of waste from ships



Quality and Production Cost Issues

- Locally manufactured spare parts and machines are produced from unknown composition scrap, leading to uncertain quality.
- ABLE enterprises purchase most of their metal from ship breakers but this represents a tiny percent of the scrap metal marketed by the ship breaking industry, so they cannot negotiate low prices.
- Costs of imported raw materials as a result of 10% to 15% import duty, 15% VAT, and 5% advanced tax.
- In addition, recent ferrous scrap prices surged up to 60 percent.
- So, lead firms are reluctant to procure parts locally due to their high costs.



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Quality and Production Cost Issues

- Mismatch exists between production volume required by lead firms and by local manufacturers.
- Local manufacturers want to produce spare parts that have a high market value based on large orders.
- Lead firms require a volume of spare parts at a time that is too low for economic production.
- An example:
 - Cost of mold for a single product is much higher than the earnings generated from the sale of parts produced for lead firms.
 - A gap exists between lead firms and local foundries that prevents a steady and efficient use of moulds to produce machine parts for the firms for a long term.



Challenges

- **Inability of local manufacturers to ensure accurate measurement of the machine parts** - SMEs cannot ensure uniform measurements of products due to lack of technical skills and poor technologies.
- **Difference in the material composition of locally manufactured spare parts and imported spare parts** – Domestic spare parts are produced from scrap whose composition is unknown and thus creates quality issues in end products.
- **Quality issue of local manufacturers** – Local manufacturers want to manufacture spare parts based on large orders but due to their inability to meet quality requirements with lead firms, they are unable to do so.



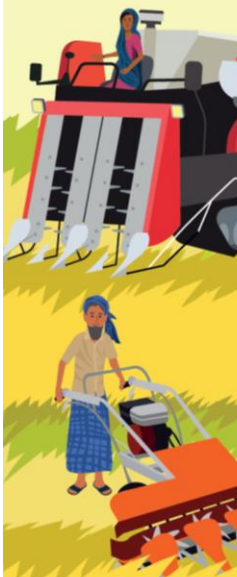
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Challenges

- **Lack of knowledge and capacity for machines with future demands** - Lead firms are interested in machines with potential future demands like rice planter and combined harvester. However, local manufacturers neither have the capacity nor the technical know-how to manufacture these machines.
- **Heat treatment facilities** – Require a large volume of parts to be efficient and economic.
- **Taxes and Tariffs** – These disadvantage local production versus importation.



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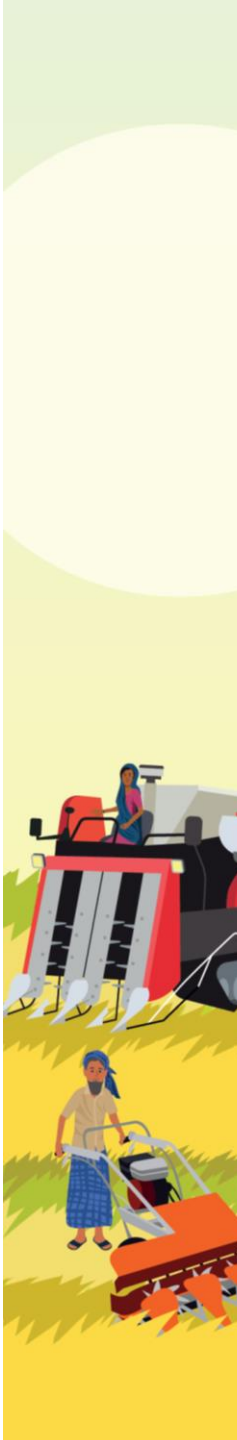
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Key Issues and Solutions: Domestic production of spare parts and agricultural machinery

- Enhance Raw Material Quality and Lower its Cost
 - Need: Higher quality metals with known composition and certification at lower prices
 - Reduce import tariffs and taxes for raw material and metals. Hence, remove disadvantage to local production versus imported machines and spare parts
 - Identify dealers/ intermediaries who will buy in quantity and sell small lots to ABLEs
 - Organize manufacturers to buy in quantity – possibly around Business Associations



Key Issues and Solutions: Domestic production of spare parts and agricultural machinery

- Increase access to modern manufacturing machines, tools and training to improve quality
- Provide access to measurement, certification, and testing facilities
 - Located in regional/city clusters
 - Quick results
 - Reasonable prices
- Provide access to Heat treatment
 - Organize groups of manufacturers to submit larger lot sizes to reduce prices
 - Business Associations may fulfill this need



Key Issues and Solutions: Create Regional Pay-per-use Facilities to Support SME Manufacturers

- Machining facilities
 - CNC and other high value-added machinery
- Testing facilities
 - Mechanical
 - Chemical Composition
- Heat treatment facilities
- Use existing pathways to create regional centers
 - E.g., BITAC, BCSIR, EC4J



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