SATSA Mukhapatra - Annual Technical Issue **30** : 2026 ISSN 0971-975X **Short Communication**

Threads of Change: Weaving New Narratives of Rural Women Empowerment in Bangladesh

Bharathi Parupalli

(Received : November 02, 2025; Revised : January 12, 2026; Accepted : January 17, 2026)

Introduction

In Bangladesh, a South Asian nation home to millions, women form the backbone of agriculture, contributing more than half of the labour in planting, weeding, harvesting, and post-harvest activities. Yet, their roles have long remained undervalued and informal, often confined to unpaid family labour (Food and Agriculture Organization of the United Nations, 2016; Centre for Policy Dialogue, 2025). In recent years, however, this narrative has begun to change. With increasing access to technologies, training, and enterprise opportunities, women are stepping beyond traditional roles (CSISA–MEA, 2024) to become entrepreneurs, service providers, and innovators in the agrifood system. Their growing participation in mechanization, particularly in rice-transplanter services, is not only transforming livelihoods but also challenging deep-rooted gender norms proving that empowering women in agriculture drives both economic growth and rural resilience.

Across rural Bangladesh, a quiet revolution is taking root. Women are steering machines once considered beyond their reach and turning mechanized service provision into thriving, profitable businesses.

"When women take the driver's seat in mechanization, they move entire communities forward."

The stories of Promila Rani Mondol and Shorifa Khatun from central Bangladesh prove that with training, access to finance, and the confidence to lead, women entrepreneurs can lead mechanization, strengthen local economies, and inspire others.

Rice-Transplanter Services: Profitable and Practical

Mechanized rice-transplantation has reshaped how smallholders cultivate rice. Instead of struggling with rising labour costs and unpredictable weather, farmers can now hire service providers to plant their crops quickly and precisely at lower cost. Table 1 presents an estimate of the economics of mechanization services for both service providers and farmers (Hossain and Rahman, 2023).

Even with only 50 days of operation per year in Bangladesh, a single MSP can earn approximately INR 120,000–220,000 in profit, making mechanized service provision a strong livelihood option (Hossain and Rahman, 2023) in contexts similar to Bangladesh, such as rice-growing areas of West Bengal, India. Beyond economics, mechanical rice transplanting offers distinct agronomic and climate-smart advantages that improve efficiency, yield, and sustainability (Islam *et* al., 2022).

International Maize and Wheat Improvement Center (CIMMYT), Bangladesh
Author E-mail: b.parupalli@cgiar.org

Table 1. Economics of deploying rice transplanter services (Source: CIMMYT, 2024)

Perspective	**Key Metrics**	**Amount in Indian Rupees (INR)**
Machinery Service Provider (MSP)	Machine Price	3.5 to 5.0 lakhs
	Annual gross income with around 50 days of operation covering 50 hectares	2.0 to 3.0 lakhs
	Annual expenses (maintenance and fuel)	70,000 to 80,000
	Annual profit	1.2 to 2.2 lakhs
	Net profit per hectare	2,500 to 5,000
Farmer	Manual transplanting cost per hectare	18,000 to 18,500
	Mechanized transplanting cost per hectare	12,500 to 13,000
	Savings per hectare	5,500-6,500
	Cost saving (%) Additional benefits	25 – 30% Timely planting, uniform spacing, good crop establishment, better nutrient and water efficiency, easy intercultural operations, higher yield, climate resilience

Table 2. Agronomic and climate benefits of mechanical rice transplanting compared to manual method (Source: CSISA-MEA, 2024)

Parameter	**Manual transplanting**	**Mechanical transplanting**	**Advantage**
Planting time (days per hectare(ha))	8 – 10	1 – 2	80–90 % time saved
Seed rate (kilograms per ha)	35 – 40	20 – 25	35–45 % seed saving

Labour requirement (person-days per ha)	25 – 30	6 – 8	70–75 % labour saving*
Yield (tons per ha)	4.5 – 5.0**	5.2 – 5.8	+10–15 % higher
Seedling age (days)	25 – 30	15 – 18	Younger seedlings, faster recovery
Uniformity of spacing	Variable	Uniform	Better light, nutrient, and water use efficiency
Greenhouse-gas	High	Moderate	Reduced methane due to emissions uniform spacing and timely planting, reduced fuel use, minimum tillage, improved water use efficiency, shorter cultivation time and improved aeration.

*Varietal suitability for mechanized transplanting is key to the benefits mentioned above and further reduction in labour costs.
**Yield varies with the variety

Women Entrepreneurs Redefining the Field

A) Promila Rani Mondol : From small farmer to mechanization leader

In Baliakandi Upazila of Rajbari district, Bangladesh, Promila Rani Mondol, 33, starts her mornings early checking seedling trays, coordinating with farmers, and preparing her rice transplanter for the day's work. What began as a struggle to make ends meet has turned into a story of resilience and inspiration for other women in her village and surrounding villages.

A decade ago, Promila's family owned just two acres of land. Her husband was the only earner, and their income barely reached INR 8,500 a month, hardly enough to cover basic needs. Determined to change that, Promila began helping her husband in cultivating jute, maize, wheat, mustard, and spices.

Their turning point came in 2014, when the family joined the Cereal Systems Initiative for South Asia (CSISA) project (CSISA-MEA, 2024). With support from the initiative, they attached a power tiller-operated seeder (PTOS) to their tiller and learned how to use it for line sowing. Promila quickly mastered the technique and began cultivating rabi crops like wheat, mung bean, sesame, and mustard. In

2019, Promila took part in hands-on training sessions on rice transplanter operation, seedling raising, and machinery maintenance, and went on study visits to learn about successful service models.

She also linked with the Department of Agricultural Extension (DAE), where she received 1,750 seedling trays and 750 kilograms of seeds to scale up her mat seedling business. In 2023, she purchased a rice transplanter with a 50% government subsidy and a low-interest loan from a micro-finance institute, arranged through the project.

In the same year, with the support from project, Promila provided mechanized rice transplanting services on 20 hectares of land, benefiting around 150 farmers in her village and earning INR 148,000 (CSISA–MEA, 2024). By offering line sowing services for rice, jute, wheat, sesame, and mustard, she earned another INR 94,000 bringing her annual income to INR 2,42,000 with a profit of over INR 1,00,000.

"*With just one day of cultivation service, I can cover my daughter's tutorial expenses for a month*," Promila smiles.

But her story doesn't end with her own success. Inspired by Promila, 15 other women in her village have started offering seedling and farming services, seven of whom now operate rice transplanters themselves.

Today, as the Vice President of the MSP Networking Committee in Rajbari district, Promila continues to inspire others, breaking gender barriers and transforming the perception of women in agriculture.

Her journey from a small farmer's wife to a community leader and machinery service provider shows how determination, opportunity, and the right support can plant the seeds of change-one woman, one machine, and one field at a time.

Promila Rani Mondol operating rice transplanter (Photo: CIMMYT, Bangladesh)

B) Shorifa Khatun : Cultivating success from her rooftop

In Shailkupa Upazila of Jhenaidah District, Bangladesh, 38-year-old Shorifa Khatun has turned the rooftop of her home into a small but thriving business by growing rice seedlings in trays. Where others once saw limitations, she saw an opportunity to grow.

Her journey began in 2021, when Shorifa attended a CSISA-Mechanization Extension Activity (CSISA-MEA, 2024) training on women's entrepreneurship for tray-based rice seedling production. The training equipped her with both technical skills and the confidence to start her own enterprise.

With encouragement from her husband, Mitul Hossain, a machinery solution provider (MSP) also affiliated with CSISA-MEA, she secured 3,000 seedling trays through a subsidy from DAE. Shorifa prepared 2,500 trays on her rooftop, producing seedlings for different rice seasons. Complementing her husband's rice transplanter services, she helped strengthen their family business.

In just one year, her seedlings covered 10 hectares of farmland, benefiting around 30–35 farmers and earning her INR 120,000 (CSISA–MEA, 2024).

"When I started, people doubted whether a housewife could run a business," Shorifa recalls. "Now they see that women can earn, support their families, and still manage their homes with pride."

Today, Shorifa plans to engage more women in her enterprise, creating new income opportunities and a stronger support network for women farmers.

Her story reflects the spirit of CIMMYT's mission to empower rural women through innovation and mechanization showing how change can take root anywhere, even on a rooftop.

"*My seedlings grow on the rooftop, but the benefits spread across the village***."** says empowered Shorifa Khatun.

Shorifa Khatun growing rice seedlings on her roof top (Photo: CIMMYT, Bangladesh)

For the unacquainted, imagine rows of tender rice seedlings growing in plastic trays, which are the key to mechanical transplanting, where machines take over the back-breaking task of planting by hand.

Building the Ecosystem: Supporting Enterprises for Scale

While these individual success stories are inspiring, sustainable scaling demands a broader ecosystem (Food and Agriculture Organization of the United Nations, 2021; CSISA–MEA, 2024) where supporting enterprises reinforce each other, creating rural growth hubs around mechanization. Table 3 gives an idea of how supporting enterprises can contribute.

Table 3. Key Supporting Enterprises and their contributions to the ecosystem (Source: FAO, 2021; CSISA–MEA,2024)

Enterprise Type	Function	Key Benefits
Seedling Production	Supply uniform rice seedlings grown in trays for mechanized transplanting	Improves efficiency, reduces downtime
Maintenance & Rental Hubs	Provide leasing, repair, and spare-part services	Lowers machine costs and extends lifespan
Women-Led Service Cooperatives	Coordinate machine sharing, training, and marketing	Builds solidarity, risk-sharing, and bargaining power
Input & Output Linkage Platforms	Connect MSPs, farmers, and dealers	Expands market access, ensures predictable demand
Climate-Smart Advisory Services	Support adaptive operations such as transplantation, harvesting, mobile-application based early warning systems amid erratic weather	Enhances resilience and sustainability

Such enterprises create a circular ecosystem, where women can participate in multiple roles as service providers, nursery owners, technicians, or cooperative leaders.

"When one woman succeeds, ten others find courage to start."

Why It Matters?

Mechanization in agriculture is not just about the hum of engines or the shine of steel, it's about opportunity. For women like Promila and Shorifa, every machine they operate and every seedling they nurture represents more than a livelihood; it's a statement of possibility.

When Promila drives her rice transplanter across the fields or when Shorifa tends to her trays of seedlings on a sunlit rooftop, they do more than earning an income. They inspire other women to

step into the mechanization value chain, opening doors to roles once thought out of reach.

Through these ventures, women are diversifying income beyond traditional farming, becoming entrepreneurs, service providers, and decision-makers. Mechanization is also helping them build resilience protecting their families and livelihoods against the uncertainties of climate change (Food and Agriculture Organization of the United Nations, 2021).

Above all, they are proving that women can lead high-tech, high-impact agricultural enterprises with skill, confidence, and vision. Each seedling, each machine, and each success story is a ripple in a growing wave of transformation powered not just by technology, but by determination. Table 4 and Figure 1 illustrate the growing participation of women in various mechanization activities across Bangladesh, highlighting a decade of steady progress driven by training, financing, and cooperative initiatives (CSISA–MEA, 2024; CIMMYT, 2024).

Table 4. Trends in women's participation across key mechanization activities in Bangladesh (Source: CSISA–MEA, 2024; CIMMYT, 2024)

Mechanization activity	Women's participation in 2015 (%)	Women's participation in 2024 (%)	Change (2015–2024)	Key enablers
Rice seedling nurseries	12	46	↑ +34	Training and microenterprise support through development programs
Rice transplanter operation	3	14	↑ +11	Hands-on training, loan schemes, and local repair hubs
Machine ownership (transplanters, reapers, threshers)	<1	6	↑ +5	Government subsidy and cooperative models
Maintenance and repair services	<1	2	↑ +1	Growing interest but limited technical training
Agribusiness and service cooperatives (women-led)	2	9	↑ +7	Collective marketing, networking, and peer mentoring

Growing Participaton of Wommen in Mechanization Activities, 2015-2024 in Bangladesh

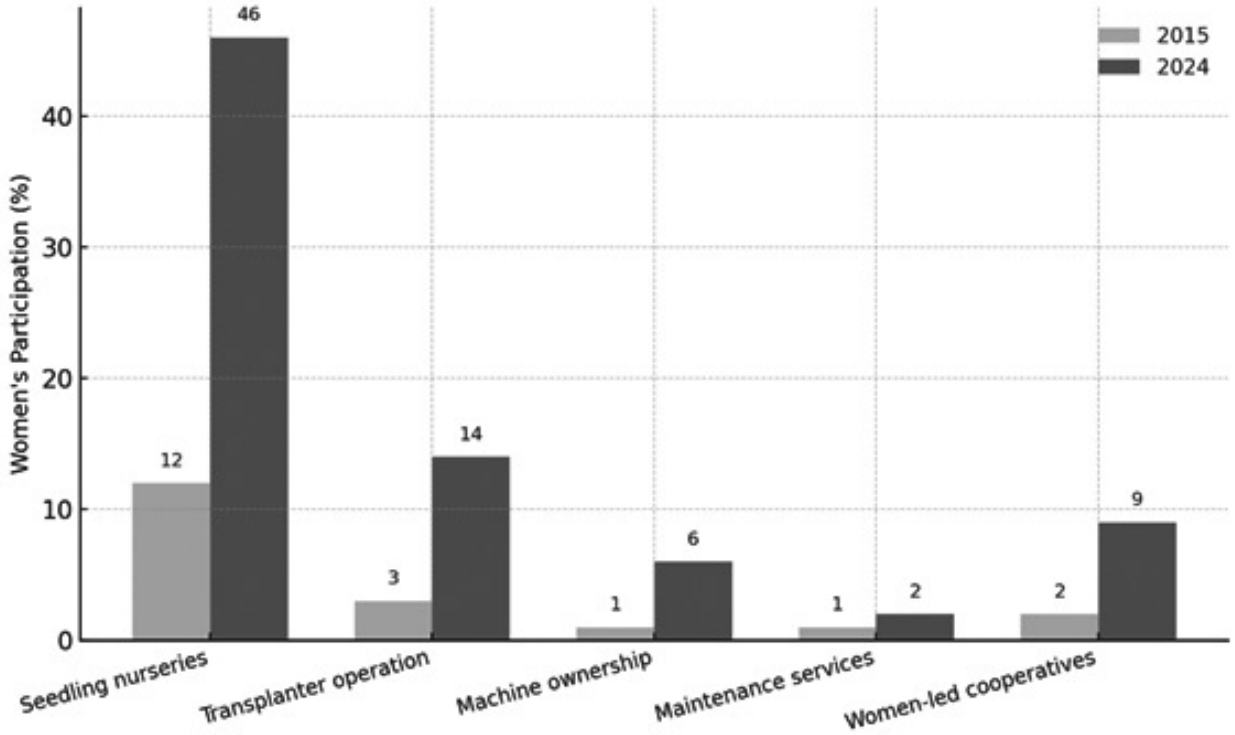

Figure 1. Trends in women participation in agricultural activities

Challenges in Scaling up Mechanical Rice Transplanting

Mechanical rice transplanting in Bangladesh is constrained by high upfront machinery costs and limited access to finance, particularly for smallholders and service providers. Small, fragmented, and irregular fields, along with uneven or poorly prepared land, reduce machine efficiency and increase operating difficulties. Adoption is further limited by inadequate availability of quality mat-type seedlings, limited technical skills for operation and maintenance, and weak after-sales service networks. These challenges are compounded by short and climate-sensitive transplanting windows, as well as low awareness and risk aversion among farmers, slowing wider uptake of the technology (CSISA-MEA, 2024).

Moreover, women operators face constraints such as restricted access to machinery, finance, and ownership, sociocultural norms limiting training, mobility, and participation, and limited technical skills and weak after-sales support (Food and Agriculture Organization of the United Nations, 2016; CSISA–MEA, 2024).

Conclusion

Inclusive mechanized rice transplanting is more than an innovation; it's a game changer. It delivers profits for service providers, saves costs for farmers, and

empowers women and youth to take leadership roles in modern agriculture.

To move from small-scale success to nationwide transformation, the momentum must be sustained through strategic policies and programs that nurture the ecosystem around mechanization. This means investing in seedling supply enterprises, machine rental and repair networks, machinery service provision businesses, women-led cooperatives, and climate-smart advisory services that make technology accessible and resilient. Creating awareness among farmers is another steppingstone for sustainable mechanized rice transplanting, which contributes to the economies and sustainability of the ecosystem.

When women are at the center of this change, mechanization becomes more than efficiency, it becomes empowerment. Supporting women like Promila and Shorifa isn't just smart economics; it's an investment in the future of sustainable, inclusive, and climate-resilient agriculture across South Asia.

Though rooted in Bangladesh, this story echoes across South Asia and offers a model other women can proudly make their own in their contexts.

References

Bangladesh Rice Research Institute (BRRI). 2023. Performance evaluation of mechanical rice transplanting under smallholder conditions in Bangladesh. BRRI, Gazipur, Bangladesh.

Centre for Policy Dialogue (CPD). 2025. Valuation of women's unpaid agricultural work in Bangladesh. CPD, Dhaka, Bangladesh.

Cereal Systems Initiative for South Asia – Mechanization and Extension Activity (CSISA–MEA). 2024. Mechanization data and impact assessment reports. International Maize and Wheat Improvement Center (CIMMYT), Dhaka, Bangladesh.

CGIAR. 2024. Seedling success on the rooftop: Shorifa Khatun's entrepreneurial journey. CGIAR Research Program, Montpellier, France.

CIMMYT. 2024. A community leader in Baliakandi inspires women empowerment in agriculture: Promila Rani Mondol. International Maize and Wheat Improvement Center, Dhaka, Bangladesh.

Food and Agriculture Organization of the United Nations. 2016. Women farmers of Bangladesh. FAO, Rome, Italy.

Food and Agriculture Organization of the United Nations. 2021. Climate-smart mechanization for sustainable rice systems in Asia. FAO, Rome, Italy.

Hossain, M. and Rahman, A. 2023. Labour productivity and profitability of mechanical rice transplanting in Bangladesh. *Bangladesh Agricultural Research Institute Bulletin* **37**(1): 12–27. Bangladesh Agricultural Research Institute, Gazipur, Bangladesh.

Islam, M. T., Rahman, M. M. and Akter, S. 2022. Comparative analysis of manual and mechanical rice transplanting in Bangladesh. Bangladesh Agricultural Research Institute.