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Socio-Economic Resilience through Participatory Innovation: Evidence from the Sabour Agri Incubators (SABAGRIs) in Eastern India

Anil Kumar Singh[1], Aditya Sinha[2*], Deepak Kumar Patel[3], Amita Singh[4] and Duniya Ram Singh[5]

ABSTRACT

Eastern India's agricultural sector faces intertwined challenges of technological gaps and socio-economic vulnerability, particularly for women. This paper analyzes the Sabour Agri Incubators (SABAGRIs) at Bihar Agricultural University as a participatory model for technological dissemination, evaluating its specific contributions to gender empowerment and livelihood diversification for socio-economic resilience. The study examines SABAGRIs' institutional framework, including its tiered incubation programs (AOP, SAIP, SOP) and the crucial role of the Bihar Startup Policy 2022. As of 2025, SABAGRIs has supported 133 startups, funding 71 with a sanctioned grant-in-aid of Rs. 831 Lakh. The model's success in gender empowerment is not merely policy-based but evidenced by the incubation of powerful, women-led enterprises. Case studies of startups like Teknoground Pvt Ltd (agri-machinery, 88% female ownership) and Vishvaksenah Herbs (VHAPLTD) (high-value crops, 51% female ownership) demonstrate tangible success. In FY 2024-25, these two women-led startups alone generated Rs. 1.28 crore in revenue and created 114 new jobs (74 direct, 40 indirect), while securing their own patents. SABAGRIs provides a successful, scalable framework for building socio-economic resilience by intentionally integrating gender-inclusive policies with robust, market-driven incubation, proving that women-led enterprises can be key drivers of technological dissemination and rural economic growth.

Keywords: Agri-entrepreneurship, Incubation, Gender empowerment, Livelihood diversification, Participatory approach, SABAGRIs

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INTRODUCTION

The agricultural landscape of Eastern India, particularly in states like Bihar and Jharkhand, stands at a critical juncture. The sector, which employs over half of the region's workforce, is constrained by a complex web of persistent challenges: high dependence on traditional farming methods, fragmented landholdings, significant post-harvest losses, and restricted access to formal markets and credit (Bhasin and Dasgupta, 2024). These factors collectively suppress productivity and contribute to the socio-economic vulnerability of millions. This vulnerability is not gender-neutral. Women constitute a significant portion of the agricultural labour force but are disproportionately affected by these challenges. They often face systemic barriers in accessing land, capital, education, and, critically, modern technology. This "gender gap" in access not only curtails the economic potential of women but also limits the adaptive capacity and overall resilience of their communities.

To address these deep-seated issues, a paradigm shift is required, moving away from conventional, top-down "transfer of technology" models. Such models have often failed to gain traction because they overlook local contexts and do not empower end-users. The contemporary challenge demands a new paradigm rooted in "participatory approaches" (Huesca, 2003). This approach reframes farmers, local youth, and women not as passive recipients of technology but as active innovators and entrepreneurs. Fostering grassroots innovation is essential for developing solutions that are affordable, scalable, and contextually appropriate. This participatory model is the most viable path toward genuine livelihood diversification, as it empowers communities to create new value chains and enterprises, moving beyond subsistence farming (Butler and Mazur, 2007).

In this context, agribusiness incubation has emerged as a powerful institutional mechanism to orchestrate this new paradigm. Incubators serve as supportive ecosystems that bridge the critical gap between research, innovation, and commercialization (Sattiraju et al., 2025). They act as catalysts, nurturing nascent ideas and transforming them into viable enterprises. The Rashtriya Krishi Vikas Yojana - Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR) scheme, initiated by the Ministry of Agriculture & Farmers' Welfare, Government of India, formally recognized this, providing a robust framework for establishing Agribusiness Incubation Centres (R-ABIs) across the nation's agricultural universities.

[1]Director Research, Bihar Agricultural University, Sabour, Bihar, India
[2,3]Assistant Professor-cum-Junior Scientist, Department of Extension Education, Bihar Agricultural College, Sabour, Bihar, India
[4]Business Manager, SABAGRIs, Bihar Agricultural University, Sabour, Bihar, India
[5]Vice Chancellor, Bihar Agricultural University, Sabour, Bihar, India
[*]Corresponding Author E-mail: inc.aditya@gmail.com

The Sabour Agri Business Incubation Centre (SABAGRIs), hosted at Bihar Agricultural University (BAU), Sabour, exemplifies this modern, participatory approach. Established to drive this transformation in Eastern India, SABAGRIs has become a pivotal hub for catalyzing an inclusive entrepreneurial ecosystem (Singh et al., 2025). The objective of this paper is to analyze the SABAGRIs model as a successful and scalable framework for technological dissemination. It specifically evaluates its structural components and processes as "participatory approaches" and assesses their direct contributions to gender empowerment, livelihood diversification, and the subsequent enhancement of socio-economic resilience throughout the region.

MATERIALS AND METHODS

A Participatory Framework for Incubation

This paper utilizes a qualitative, case-study methodology, analyzing the institutional structure and programmatic framework of the Sabour Agri Business Incubation Centre (SABAGRIs) as a model for participatory development. The analysis is based on programmatic data, internal reports, and in-depth case studies of incubated startups from 2019 to the present.

The SABAGRIs Institutional Model

The methodological framework of SABAGRIs is built upon a synergistic partnership between national policy, state-level support, and academic expertise. Strategically hosted at Bihar Agricultural University (BAU), Sabour, SABAGRIs leverages the university's deep regional knowledge and R&D infrastructure. This foundation is empowered by two key policy instruments.

First, at the national level, it operates under the RKVY-RAFTAAR scheme, which provides the primary financial mechanism for grant-in-aid support to startups. This scheme mandates a focus on nurturing innovation to make farming a remunerative enterprise. Second, at the state level, SABAGRIs is a key partner in implementing the Bihar Startup Policy 2022. This policy provides crucial supplementary support, creating a conducive environment for startups to thrive within the state.

The mission of SABAGRIs is not merely to create companies, but to cultivate a culture of innovation. Its objectives are: 1) To identify and nurture agri-based startups with scalable models; 2) To facilitate the commercialization of innovative ideas, originating from both university research and grassroots innovators; and 3) To foster inclusive entrepreneurship by actively encouraging participation from underrepresented groups, specifically youth, women, and rural innovators (Singh et al., 2024).

Participatory Programs as a Methodological Framework

The core of the SABAGRIs methodology is its three-tiered, participatory incubation pipeline. This structure is designed to engage potential innovators at multiple entry points, from nascent ideas to market-ready products.

Phase 1: Agripreneurship Orientation Program (AOP) – "SABUMANG"

This program serves as the primary entry point for participatory engagement. It targets individuals at the "Idea to Prototype" stage. Aspiring entrepreneurs, including students, farmers, and rural youth, are selected based on the novelty and feasibility of their ideas. They undergo a two-month residential training-cum-internship program, which includes intensive mentorship from industry experts and BAU faculty. During this period, participants receive a stipend of Rs. 10,000 per month. Upon successful completion and evaluation by the R-ABI Incubation Committee (RIC), innovators are eligible for a grant-in-aid of up to Rs. 5.0 Lakh. This program is critical for demystifying entrepreneurship and providing a safe, supportive environment for first-time innovators to validate their concepts.

Phase 2: Startup Agri-Incubation Programme (SAIP) – "SABSWALAMBI"

The second phase targets entrepreneurs who have progressed beyond ideation and possess a Minimum Viable Product (MVP). This "Prototype to Commercialization" program provides advanced incubation support to scale the enterprise. Selected startups receive two months of advanced training and integrated support, including access to BAU's sophisticated labs, testing facilities, and farm machinery workshops. The primary support in this phase is a substantial seed grant-in-aid of up to Rs. 25.0 Lakh. This capital is critical for product refinement, initial manufacturing, market traction, and scaling operations. This program directly addresses the "funding gap" that causes most early-stage agritech ventures to fail.

Phase 3: SABANKURAN (Student Orientation Program)

Recognizing the potential of young innovators within the academic ecosystem, SABANKURAN is a dedicated program for students. It aims to foster an entrepreneurial spirit and translate academic research into practical, real-world solutions. This initiative provides specialized training and grants of up to Rs. 4.0 Lakh, enabling students to develop prototypes and build early-stage ventures, thereby directly linking the university's research outputs with the regional innovation pipeline.

An Intentional Framework for Gender Empowerment and Inclusion

The SABAGRIs methodology is notable for its intentional focus on inclusion, which is woven into its operational design and policy support structure. This moves beyond passive non-discrimination to active, targeted empowerment.

First, the Bihar Startup Policy 2022, which SABAGRIs helps execute, includes explicit provisions for underrepresented founders. This includes an additional rebate of 5% (up to Rs. 10 Lakh) in financial support for women-led enterprises and 15% rebate (up to Rs. 10 Lakh) for SC/ST/differently abled founders. This policy directly incentivizes and reduces the financial barriers for women entrepreneurs.

Second, the incubator's mission explicitly targets the "empowerment of women" as a key performance indicator. This focus informs the selection process and the nature of mentorship provided, ensuring that solutions addressing

female-specific challenges (such as drudgery reduction) are encouraged.

Finally, the comprehensive support system, including mentorship, network access, and technical guidance is itself a tool for empowerment. It provides women entrepreneurs with the social and technical capital that they have systemically been denied access to. While the primary financial support is grant-in-aid, the incubator also facilitates linkages with financial institutions for further scale-up. The total corpus of loans facilitated to date is over Rs. 20 crores. This multi-pronged strategy ensures that gender empowerment is not an afterthought but a central, measurable component of the incubation methodology.

RESULTS

Technological Dissemination & Livelihood Diversification

The participatory incubation framework detailed in the preceding section has yielded significant, quantifiable results. The impact of SABAGRIs is evident not only in the aggregate number of enterprises created but, more critically, in the nature of the technology being disseminated and the new livelihoods being diversified. The results are categorized into quantitative outcomes and a sectoral analysis of livelihood diversification.

Quantitative Impact and Enterprise Creation

Since its inception, the SABAGRIs model has achieved significant success in transforming innovative ideas into viable enterprises. According to the latest data (SABAGRIs, 2025), the incubator has supported over 133 startups through its various programs. Among these, 71 agri-startups spanning the AOP, SOP, and SAIP cohorts have successfully secured grant-in-aid funding, demonstrating the commercial potential of their innovations. The remaining 62 startups completed training but were not deemed suitable for funding at this stage.

This support represents a significant financial investment in grassroots innovation. The cumulative sanctioned grant-in-aid outlay under RKVY-RAFTAAR has reached Rs. 831 lakh. This grant-based funding is pivotal as it allows early-stage innovators to de-risk their technological development without the immediate pressure of debt. This grant funding has been further leveraged by startups to secure additional support. The total corpus of loans facilitated to date stands at over rupees 20 crores.

A key metric for technological dissemination is the creation of new Intellectual Property Rights (IPR). The innovations fostered at SABAGRIs have led to the generation of significant IP, including 7 patents and 17 trademarks. This demonstrates a tangible output of novel technologies. These enterprises have collectively created 843 high-value jobs, contributing directly to regional economic development.

Sectoral Focus for Livelihood Diversification

A review of the incubated startups reveals a strategic focus on key leverage points within the agricultural value chain. These enterprises are not just creating businesses; they are actively disseminating technology that diversifies livelihoods, reduces drudgery, and builds socio-economic resilience. The selection and nurturing of women-led enterprises is a cornerstone of this strategy, demonstrating a direct, participatory approach to gender empowerment.

A. Agri-Machinery and Technology: Empowering Women in Leadership

A primary challenge in Eastern India is the inadequate access to modern farm mechanization and technology, leading to low productivity and high operational costs. SABAGRIs has incubated startups directly addressing this, with a notable emphasis on women leaders in this male-dominated sector.

A flagship example is Teknoground Pvt Ltd, founded on April 22, 2023, by Ms. Rashmi Kumari. It holds the distinction of being one of Bihar's first agro-companies founded by a woman. With a majority shareholding of 88%, Ms. Kumari's leadership is definitive. The company's mission is to "remove the guesswork in agriculture" by utilizing technology to improve productivity and efficiency (Teknoground, 2023).

- Technological Dissemination: Teknoground provides farmers with access to "high technology and competitive farm mechanization equipment." Its focus is on leveraging technology to overcome obstacles like unsuitable methods for crop monitoring and irrigation, with one patent secured for its innovations. This dissemination of modern tools and data-driven techniques directly addresses the region's technological gaps.
- Livelihood Diversification: By providing these tools, the company enables farmers to improve their efficiency, reduce resource waste, and increase their Return on Investment (ROI). This shifts their livelihood from one of high-risk subsistence farming to a more efficient, technology-supported, and profitable enterprise, directly supporting the goal of making Indian farming self-sufficient.
- Gender Empowerment: The most profound impact of Teknoground is at the leadership level. As a women-founded and -led company in the agri-mechanization sector, it shatters systemic barriers and provides a powerful, visible example of female leadership. This directly contributes to gender empowerment by demonstrating a new pathway for women in the agricultural economy, moving from labour to high-technology ownership and management.
- Quantifiable Impact: The market validation for this model is clear. In the 2024-2025 fiscal year, the company generated Rs. 1.08 crore in revenue. It has created significant regional employment, with 70 direct and 25 indirect jobs.

B. High-Value Crops and Value Addition: Organizing for Market Access

The second pillar of diversification is moving farmers from low-value commodity crops to high-value, market-linked agricultural products. This requires new knowledge,

processing capabilities, and market linkages.

A pertinent case study is Vishvaksenah Herbs & Aromatic Pvt. Ltd. (VHAPLTD), a hybrid social enterprise established in 2021 and led by Dr. Arundati, who holds a 51% majority share. This enterprise focuses on the cultivation, collection, processing, and export of high-quality medicinal and aromatic crops (Vishvaksenah Herbs & Aromatic Pvt. Ltd., 2025).

- Technological Dissemination: The technology disseminated by VHAPLTD is a process technology, for which it has secured one patent. The company bridges "the gap between traditional herbal farming and modern industry requirements" by introducing "scientifically cultivated, certified, and standardized raw herbs and extracts." This involves disseminating standards for quality, potency, and traceability, which are essential for accessing high-value industrial and export markets.
- Livelihood Diversification: This startup is a powerful engine for diversification. It actively moves farmers away from traditional, volatile food crops to over 150 different high-value medicinal and aromatic plants. It de-risks this transition through contract farming and contract collection, guaranteeing purchase and providing a stable, predictable income stream. The company's work with 10+ Farmer Producer Organizations (FPOs) across 8+ states demonstrates a scalable model for organizing farmers and diversifying livelihoods on a massive scale.
- Gender Empowerment: Dr. Arundati's leadership as the head of this complex social enterprise is a clear example of empowerment. Furthermore, the FPO model championed by the company is a well-established method for empowering small and marginal farmers, particularly women, by aggregating their collective bargaining power and providing them with direct market access, bypassing exploitative intermediaries.
- Quantifiable Impact: In the 2024-2025 fiscal year, the company achieved Rs. 20 lakh in revenue. It provides 4 direct and 15 indirect jobs, primarily in rural areas related to collection and processing.

C. Value Addition & Processing: Diversifying Farm Revenue Streams

SABAGRIs has placed a strong emphasis on moving entrepreneurs "up the value chain," shifting from raw commodity sales to processed, branded products. This directly addresses the user's focus on oilseeds, pulses, and processing.

Oilseeds (Flaxseed): One startup incubated at SABAGRIs focuses on the value addition of flaxseed, a regionally important oilseed. Instead of selling raw flaxseed at commodity prices, the startup develops and markets high-value functional foods and wellness products, including flaxseed oils, protein powders, and health snacks. This model creates a new, high-margin revenue stream from an existing crop, is a model particularly suited for women entrepreneurs and Self-Help Groups (SHGs) in micro-processing.

Pulses and Millets: Addressing the need for resilient food systems, Mithilanchal Organic Millets Pvt. Ltd. is reviving traditional, climate-resilient grains. The innovation here is systemic. The startup is establishing a "seed bank" to preserve and propagate indigenous millet and pulse seeds while simultaneously building the entire value chain for these crops, from seed supply to marketing finished, millet-based products (SABAGRIs, 2024 and 2025). This diversifies the regional food basket and provides farmers with a viable, drought-resistant alternative to conventional crops.

Waste-to-Wealth (Processing): Livelihood diversification is also achieved by processing agricultural "waste." An incubated startup has developed a sustainable dried cattle feed from agricultural residues (paddy husk, pulse chaff). This waste-to-wealth model provides farmers with a low-cost, nutritious feed source, reducing livestock-rearing costs and creating a new commercial product from materials that would otherwise be burned.

D. Digital Dissemination: ICT and AI in Agriculture

Finally, technological dissemination is occurring through digital platforms. Startups are developing mobile-based advisory platforms that provide real-time, location-specific data on weather, pests, and market prices in local languages. Others are deploying AI-powered drones for precision spraying and crop health diagnostics. This digital dissemination democratizes access to information, reduces chemical use, and cuts costs, empowering farmers with data for informed decision-making and thus enhancing their economic resilience.

DISCUSSION

Analyzing the Impact on Resilience

The results presented in the previous section demonstrate that SABAGRIs is functioning as more than a simple incubator; it is an active engine for building regional resilience.

SABAGRIs as a "Participatory Approach" for Empowerment

The SABAGRIs model redefines the "participatory approach." It moves beyond consultative feedback loops to a far more potent form of participation: empowering local individuals as owners and drivers of their own technological solutions. The AOP and SAIP programs are the mechanisms for this empowerment, inviting farmers, students, and local innovators to be co-creators in the region's agricultural transformation.

This model's most significant impact is on gender empowerment, which it achieves through a multi-dimensional, evidence-based strategy:

1. Systemic and Policy Empowerment: The partnership with the Bihar Startup Policy 2022 is a structural intervention. By providing an additional 5% (up to

Rs. 10.5 Lakh) for women-led enterprises, SABAGRIs operationalizes a policy that systemically reduces the financial barriers to entry for women. It sends an unambiguous market signal that women entrepreneurs are a priority, moving beyond rhetoric to tangible financial incentives.

2. Leadership and Financial Control: The cases of Teknoground Pvt Ltd and VHAPLTD are powerful illustrations of this policy in action. This is not empowerment at the margins; it is empowerment at the center. SABAGRIs has incubated and supported women as majority shareholders and definitive leaders: Ms. Rashmi Kumari with 88% ownership of Teknoground and Dr. Arundati with 51% ownership of VHAPLTD. This demonstrates a deep commitment to ensuring women have not just a seat at the table, but financial and operational control, shattering industry stereotypes in male-dominated sectors like agri-machinery.
3. Community and Livelihood Empowerment: The models of these women-led companies extend empowerment to the community. VHAPLTD's use of contract farming and the FPO model empowers farmers, many of whom are women, by providing them with economic stability and collective bargaining power. This demonstrates a cascading empowerment effect, from the female founder to the community she serves.

Impact on Employment, Livelihoods, and Economic Resilience

While the aggregate figure of 843 jobs across all 71 funded startups is significant, the employment data from just two case studies reveals the model's profound impact. Teknoground and VHAPLTD have alone created 114 new jobs (74 direct, 40 indirect).

The quality of this employment is paramount. The SABAGRIs model is not simply sustaining traditional farm labour; it is creating a new rural workforce of entrepreneurs, managers, lab technicians, skilled manufacturers, and digital specialists. The Rs. 1.08 crore in annual revenue from Teknoground is not just a company figure; it is a new, substantial economic stream in the rural economy that was non-existent two years prior. This revenue directly funds the 95 jobs created by that single startup.

This approach builds resilience by fundamentally de-risking and diversifying livelihoods. Eastern Indian agriculture is highly vulnerable to systemic shocks (droughts, floods, market volatility). The SABAGRIs portfolio of startups directly mitigates these risks:

- · Climate Risk: Mitigated by scientifically cultivated, often hardier medicinal crops (VHAPLTD) and precision resource management (Teknoground).
- Market Risk: Mitigated by VHAPLTD's contract farming model, which guarantees purchase and insulates farmers from market volatility. This is a crucial de-risking mechanism.
- Technology & Labour Risk: Mitigated by Teknoground, which provides access to modern mechanization, reducing reliance on costly and scarce manual labour and increasing farm-level ROI.
- By fostering these new enterprises and pointedly championing women leaders with majority ownership, SABAGRIs proves that investing in local, inclusive innovation is a direct and effective pathway to creating a stable and prosperous rural economy.

CONCLUSION

The Sabour Agri Business Incubation Centre (SABAGRIs) exemplifies a successful and replicable model for transforming regional agriculture. It moves beyond the traditional, linear model of technological dissemination to a dynamic, participatory framework that empowers local innovators, including youth, women, and grassroots entrepreneurs as the primary drivers of change. The analysis confirms that SABAGRIs, by synergizing national policy (RKVY-RAFTAAR) with state-level incentives (Bihar Startup Policy, 2022), has effectively catalyzed the creation of a vibrant enterprise ecosystem.

The findings demonstrate that this participatory approach directly contributes to overall development. It fosters gender empowerment not as a hopeful byproduct, but as an intentional, structural, and measurable goal, evidenced by targeted financial policies, the creation of new employment for women, and the development of gender-centric technologies. It drives livelihood diversification by supporting a portfolio of innovations from sustainable inputs and climate-resilient crops to value-added processing that builds a multi-faceted rural economy. This diversification is the foundation of the socio-economic resilience needed to weather climate and market shocks.

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