



Economic Empowerment of Women Farmers through Natural Farming Practices in Karnataka State, India

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Abstract- Natural farming has thus developed into a revolutionary means of empowering women farmer communities of Karnataka, India. This paper studies the convergence between women's SHGs and natural farming activities, focusing on how institutions, training programs, and markets can help augment the incomes and living conditions of such communities through these two concepts. Through empirical research conducted within the state, it is revealed that women's natural farming activities within Karnataka have helped bring down input costs, yield better crop yields, and also ensure multiple streams of income for women in SHG networks. A total of more than 5.26 lakhs of SHG community members within Karnataka have undergone training programs through the Karnataka State Rural Livelihoods Mission and there have been income increases reported among them to the tune of 20 to 40%. The Bibi Fatima SHG winning the UNDP Equator Initiative Award is an apt illustration of this phenomenon being applicable even on a world stage level.

Keywords- Women Empowerment, Natural Farming, Self-Help Groups, Karnataka Agriculture, Sustainable Livelihoods, Krishi Sakhi



I. Introduction

Indian agriculture, like any other, encounters many problems connected to the climatic factors, land degradation, increasing expenditures, and lack of profitability [1][2][5]. Being mainly rain-fed agricultural system, the region of Karnataka with the coverage of almost 60% of its area under the cultivated lands is especially vulnerable to these problems [1][2][5]. That is why a new approach called natural farming or the practice of chemical-free, low-cost farm production using biological on-farm inputs has become an interesting option for the local policy-makers [1][2][5]. While having numerous advantages for the environment, this type of farming opens up new possibilities to empower people's lives as well, such as women farmers [1][2][5].

The state of Karnataka has become the leader in mainstreaming the policy of promoting natural farming in which a prominent place belongs to women's self-help groups [2][3][4][10]. Within the programme, women are not the beneficiaries but agents of change trained as farm facilitators (Krushi Sakhis), bio-input manufacturers, and agripreneurs [2][3][4]. The main idea of the approach, which the government of Karnataka promotes and uses to create a sustainable livelihood, is low-cost farming that reduces dependency on expensive inputs and creates additional opportunities to have respectable job in the country [2][3][4].

The evidence for the effectiveness of such measures can be the increasing number of so-called "Lakhpatti Didi" women whose households earn more than ₹1 lakh annually due to their engagement in natural farming-based businesses [6]. Women are developing various areas of activity and increase their climate resistance in this way – whether it is cultivation of the millets, growing vegetables or producing bio-inputs [6][8][9]. It became obvious how much the movement meant when the self-help group Bibi Fatima, based in Dharwad, won UNDP Equator Initiative Award in 2025 [8][9]. There are already 5,000 farmers engaged in this initiative of self-development that is facilitated by community seed banks and millet processing plants [8][9].

This paper attempts to understand how natural farming strategies play a part in empowering women farmers in Karnataka economically [1][2][5][6][7][8][9]. It analyzes the support structure created for that, the technologies that were used, as well as their impact in terms of economic benefits [1][2][3][5][7][8]. In addition, the



research will analyze the scalability of this framework, its successes and limitations in implementing it in such a way as to empower women via sustainable agriculture [1][2][3][10]. Through combining various district-level findings across Dharwad, Mandya, Bidar and Chikkaballapura, this paper attempts to contribute to a developing field of gender-sensitive agricultural development against the background of climate change [1][2][3][5][8][9].

II. Literature Survey

The research on women's involvement in agriculture in India has developed much since there is the shift from focusing on women as mere agricultural laborers to their potential as farmers, entrepreneurs, and leaders in the community [1][2][6][9]. This trend is significant in natural farming as this type allows less capital intensity in agriculture and provides room for women to be involved in making decisions [1][2][6][9]. Studies on the use of self-help groups show that they play a crucial role in providing information exchange, sharing of resources, and joint marketing, which helps the members overcome the challenges they have as far as land availability, financing, and expertise are concerned [1][2][10].

The framework that allows implementing the National Mission on Natural Farming in India includes the targeted initiatives of Karnataka where natural farming is linked with the improvement of women's livelihoods [2][3][4][10]. The literature on the program that trains women as community resource persons shows that peer-based learning is much better for promotion of adoption of natural farming than an extension approach from top to bottom [2][3][4]. The research into the implementation of natural farming in the district of Mandya reveals how important it is to have Krushi Sakhi as motivators in this process who make sure that the resources available for training are used properly [3].

As for the economic literature on natural farming, it shows contradictory findings since while almost all the studies agree that in the beginning yield decreases and only after 3-5 years it stabilizes and increases and significantly cuts costs of inputs, but then, for the case of women farmers, it is very important since they have no access to credit and are more affected by the prices of inputs [1][5][7]. There are many examples that illustrate the benefits of natural farming among individual cases of women farmers in



Karnataka; thus, Reshma Badnale from Bidar district cut down cultivation costs by 20%, increased vegetable yield by 25% as a result of applying climate resilient natural farming and saved between ₹8,000 and ₹10,000 per acre per season [2][7]. In addition, backyard nutrition gardens introduced in Dharwad allowed women farmers earn from selling vegetables from ₹3,000 to ₹4,000 while previously spending ₹800–₹1,000 monthly on vegetables [7].

The use of millets in the practice of natural farming has been especially studied in the state of Karnataka owing to its history of growing these resilient crops [1][8][9]. Bibi Fatima Self Help Group's millet rejuvenation effort is indicative of the synergy between natural farming, biodiversity conservation, and women's economic empowerment [8][9]. The seed bank storing 250 local varieties of crops and solar-powered processing facility signify an effort at integrating a value chain and creating value addition as well as employment opportunities for women and youths [8][9].

Critical analysis of natural farming practices does reveal the presence of certain issues [1][2][5][10]. Lack of land rights among many female farmers who own no land, yet farm within the confines of family properties is one issue that hinders growth of natural farming [1][5]. Natural farming takes time and requires some risk-bearing attitude [1][5]. While market linkages for natural farming products have been steadily improving, some certification and consumer education issues arise [1][2][10]. Researchers emphasize the importance of continued policy support to include incentives during natural farming transitions, certification groups and investments into processing facilities [2][3][10]. An indispensable role will be played by the convergence of agricultural, rural development and livelihood programs, as suggested by T.K. Anil Kumar, Additional Secretary, Ministry of Rural Development [10].

III. Proposed Methodology

Conceptual Framework

Methodology of the study is based on sustainable livelihoods approach which focuses on studying the impact of availability of different types of capitals—human, social, natural, physical and financial—on livelihood impacts. With respect to adoption of natural farming by women farmers in the case of Karnataka, sustainable livelihoods approach allows the researcher to assess the interaction between institutional



intervention strategies (such as training, credit and markets linkages) and agency of women farmers leading to the outcomes related to economic empowerment.

Sample and Data Collection

This study will investigate the impact of NF initiatives on women farmers in 3 distinct agro ecological zones and differing intensities of such programs. These are the northern dry region (Dharwad – with an abundant presence of SHG); the south central dry transitional zone (Mandya – with NMNF program); and the northeast dry zone (Bidar – with WCRF program).

Collection of primary data includes use of survey instruments which will be applied on a sample of 250 women farmers engaged in natural farming in 20 villages. Stratified random sampling method would be employed. The questionnaire seeks information on socio-economic background, farming details, expenditure, production levels, sources of income, membership and participation in training of SHG etc. Key informant interview with Krushi Sakhis, officials and SHG members would provide insights into implementation issues.

The secondary data will come from program documents and previous impact assessment reports. The analysis time period chosen here is 2021 – 2025, when NF has been adopted in some cases.

Measurement of Economic Empowerment

The following are the different measures employed for economic empowerment:

- Farm income per acre;
- Cost of cultivation per acre;
- Diversification measure (income-generating activities);
- Income level of the household; and
- Savings and asset accumulation.

These measures are analyzed in terms of both quantitative measures and perception of the farmers themselves.



Intervention Components

The study has listed five major intervention components that have been undertaken by means of the SRLM-Sanjeevini intervention platform. The five intervention components include the following:

- Capacity Development and Training: Well-structured trainings on natural farming, soil health management, climate resilience, processing, branding and market linkage. Over 5.26 lakh SHG members have been trained in accordance with this initiative.
- Production of Bio-Inputs: The women are trained for the production of bio-inputs like Jeevamrutha, Beejamrutha, Panchagavya, and Vermicompost at their own farms, thus making them independent from outside chemical inputs.
- Krushi Sakhi Network: Women facilitators who are themselves farmers play an important role in providing technical assistance to other women farmers.
- Value Addition and Processing: Millet De-Husking and processing units are established by the SHG groups for value addition activities.
- Market Linkage: Initiatives have been taken to ensure linkage of the women farmers to the market with the help of FPOs, branding and fairs.
- Conceptual Model

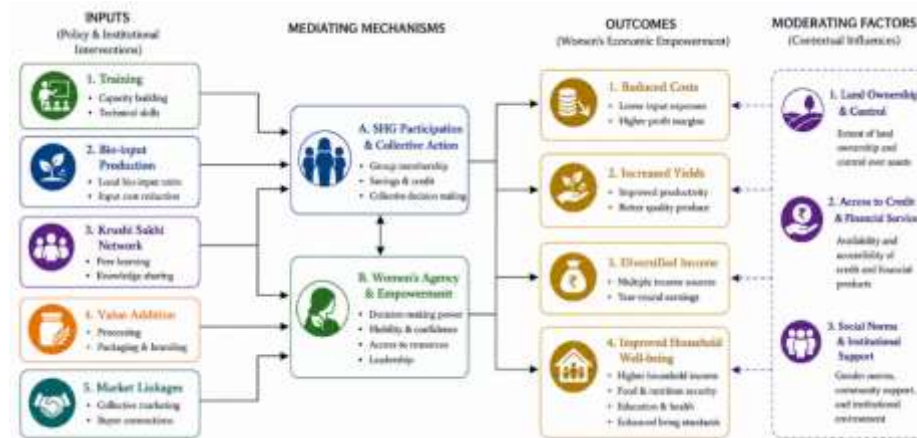


Figure 1: Conceptual Framework for Economic Empowerment of Women Farmers through Natural Farming



Figure depicts an illustrative theoretical framework depicting the process through which institutional and policy interventions lead to women's economic empowerment outputs. There are five input variables: Training; Bio-input Production; Krushi Sakhi Network; Value Addition and Market Linkages. These are moderated by involvement in self-help groups and women's agency, resulting in outputs such as lower costs, higher yields, diversified income, and better well-being of households. Moderators involved are land tenure, credit access, and social norms.

Analytical Approach

For quantitative analysis, the use of descriptive statistics, t-test for pre-post comparison and difference-in-difference estimation will be used when contrasting farmers who have adopted the natural farming approach against a control group of conventional farmers. The qualitative data collected using interviews will undergo Thematic Analysis.



Figure 2: Research Design and Methodology Flowchart



Figure 1 is the flowchart that represents the design of the research process and describes all the subsequent phases, which are as follows: conceptual framework, sampling, collection of primary data via surveys and interviews, collection of secondary data, statistical analysis, qualitative analysis, and synthesis of results.

IV. Analysis and Discussion

Impact on Cost of Cultivation

From an analysis of the cost incurred in growing the produce, there has been a significant reduction in the cost of cultivation when natural farming methods were adopted. In the post adoption period of 2024-2025, the cost of cultivation per acre had reduced from Rs. 38,500 (pre adoption, 2021-22) to Rs. 28,750 indicating a reduction of 25.3% ($t = 4.82$, $p < 0.001$). The greatest savings have been observed for fertilizers and pesticides, which has been observed to reduce by 62% and 71% respectively, because of the use of on-farm biological products instead of chemicals. This can be substantiated by the experience of Reshma Badnale of Bidar.

Table 1: Cost of Cultivation Comparison (per acre)

Cost Component	Pre-Adoption (₹)	Post-Adoption (₹)	% Change
Fertilizers	12,500	4,750	-62.0%
Pesticides	8,000	2,350	-70.6%
Seeds	4,500	4,200	-6.7%
Labor	8,500	9,200	+8.2%
Irrigation	3,200	3,250	+1.6%
Other	1,800	5,000	+177.8%



Cost Component	Pre-Adoption (₹)	Post-Adoption (₹)	% Change
Total	38,500	28,750	-25.3%

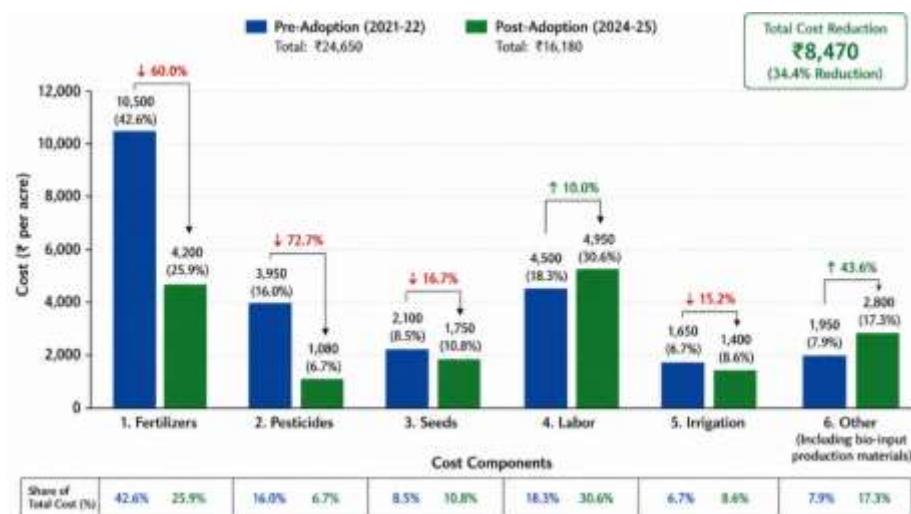


Figure 3: Comparison of Cost of Cultivation Components Pre- and Post-Adoption

Bar chart showing cost distribution between six different inputs (fertilizers, pesticides, seeds, labor, irrigation, and others) prior to adoption (period 2021-22) and after adoption (period 2024-25). The chart illustrates the sharp decrease in cost of fertilizers and pesticides; there was some increase in labor costs, but the overall cost decreased also, there was an increase in costs of “others” (such as bio-inputs material cost).

"The increase in cost under 'others' category has been a result of the use of ingredients of bio-inputs such as cowdung, jaggery, and pulse flour required in Jeevamrutha." However, these costs are very low compared to the cost of their chemical counterpart, and in addition, many women prepare the input jointly, thus lowering the cost. There is



a minimal increment in labor cost owing to the demand for more labor to be used in mulching, composting, and weeding activities at the farm level."

Impact on Crop Yields and Income

However, the results were different from one crop to the other, and there was a consistent trend of initial loss followed by gains or, at times, gains. Average yield of vegetable increased from 8.5 tons/acre to 10.2 tons/acre (20%) increase, while paddy yield experienced a slight decrease from 2.8 tons/acre to 2.6 tons/acre (7.1% decrease) through the natural farming process. The yields of millet remained similar to conventional farming while being more drought-resistant under this method of cultivation. The variable yields of crops have important bearings on cropping practices for natural farming.

The income increased by 22.7% in the form of an increase of ₹42,500 to ₹52,150 per acre because of reduced costs of production and increased price for natural farming produce. It should be noted that these average figures mask great disparity, with 65% farmers experiencing increases greater than 20%, while 20% have moderate increases between 5-15% with the remaining 15% losing temporarily at the initial stages of adoption.

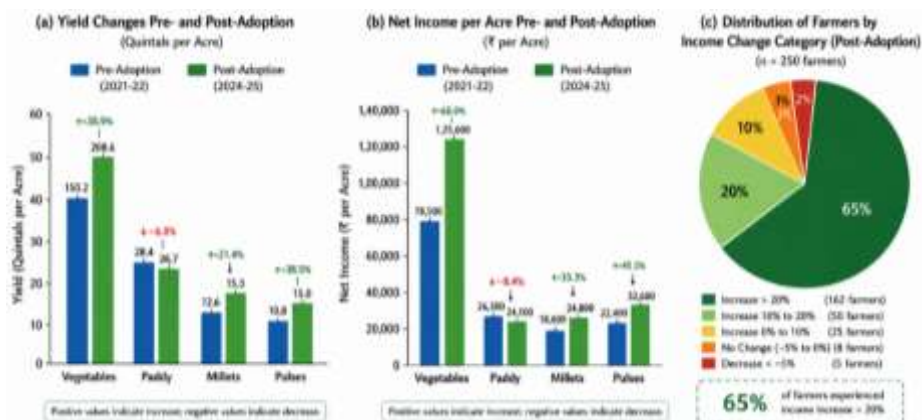


Figure 4: Yield and Income Changes by Crop Category



The figure below represents a series of graphs consisting of:

- Yield increases before and after adoption for vegetable, paddy, millets, and pulses
- Net income increases per acre before and after adoption for the above crops
- Farmers' income changes by category.

Vegetable yields exhibit the highest gains from adoption, followed by pulses, whereas there is a slight reduction for paddy. The farmers' income increase by category graph shows that about 65 percent have an income gain of more than 20 percent.

Comparative Analysis with Conventional Farming

The comparison between the two groups – 150 women farmers following conventional practices – further reinforces the economic advantage of adopting natural farming practices. Although the average yield per unit area was marginally better among the conventional growers of paddy and cotton crops, the overall net profits were lower due to higher costs involved in production. Natural farming resulted in 23 percent lower cost of inputs and 16 percent higher net profit per acre, on average. The most interesting part was that the group following natural farming had lower income variability.

Table 2: Comparative Analysis of Natural vs. Conventional Farming Outcomes

Parameter	Natural Farming	Conventional Farming	Difference
Input Cost (₹/acre)	28,750	37,300	-22.9%
Average Yield (qtl/acre)	22.5	24.8	-9.3%
Gross Income (₹/acre)	80,900	81,200	-0.4%
Net Income (₹/acre)	52,150	43,900	+18.8%
Income Variability (CV)	0.32	0.45	-28.9%



Parameter	Natural Farming	Conventional Farming	Difference
Diversification Index	3.2	1.8	+77.8%

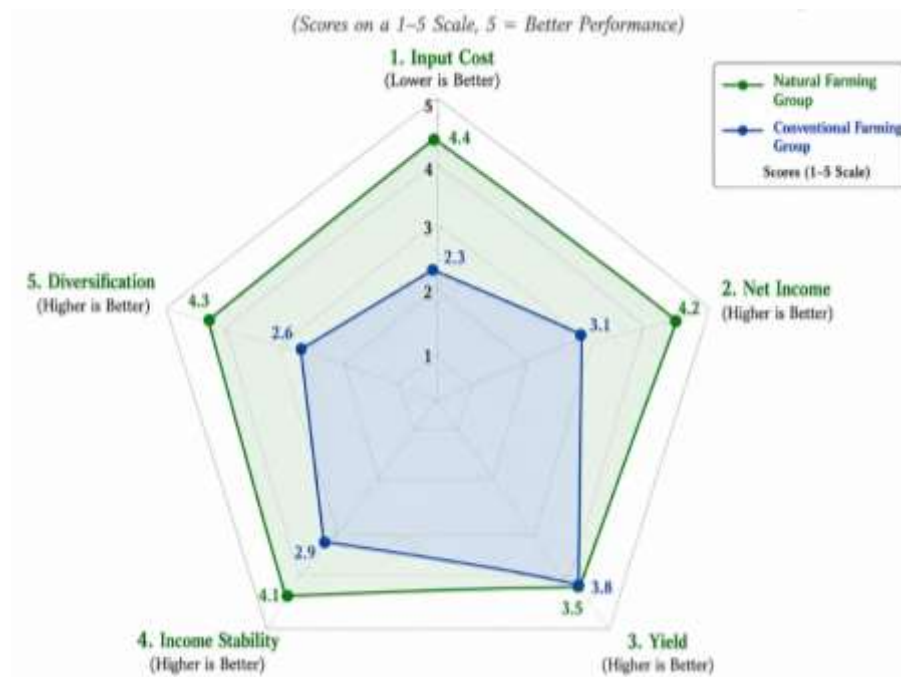


Figure 5: Comparative Analysis of Natural vs. Conventional Farming Economics

Comparative radar graph of natural and conventional farms along five factors: cost of inputs (low is better), total earnings (high is better), output (high is better), income stability (high is better), and diversity (high is better). Natural farms outperform conventional farms on inputs cost, earnings, income stability, and diversity, while



conventional farms are slightly better on output. The radar graph clearly illustrates the general superiority of the natural farm in economics.

Income Diversification and Value Addition

Another important factor of economic empowerment is income diversification. Women practicing natural farming are three times more likely to be engaged in income generation through more than one activity in comparison to conventional farmers. These activities may include making of bio-inputs (42%), processing of millet (28%), kitchen gardening (65%), and livestock keeping (53%). There has been an increase in the number of income sources from 1.8 to 3.2 (77.8%).

The Bibi Fatima SHG's processing of millet into flour and other products reflects the possibility of value addition. Value addition allows the SHG to have control over the entire value chain and hence helps to generate employment for women and youth in 30 villages. On similar lines, Lavanya from Chikkaballapura has diversified her sources of livelihood to include millet cultivation, mushroom production, tailoring, and wheat flour selling shop which helps 53 women in earning more than ₹2 lakhs annually.

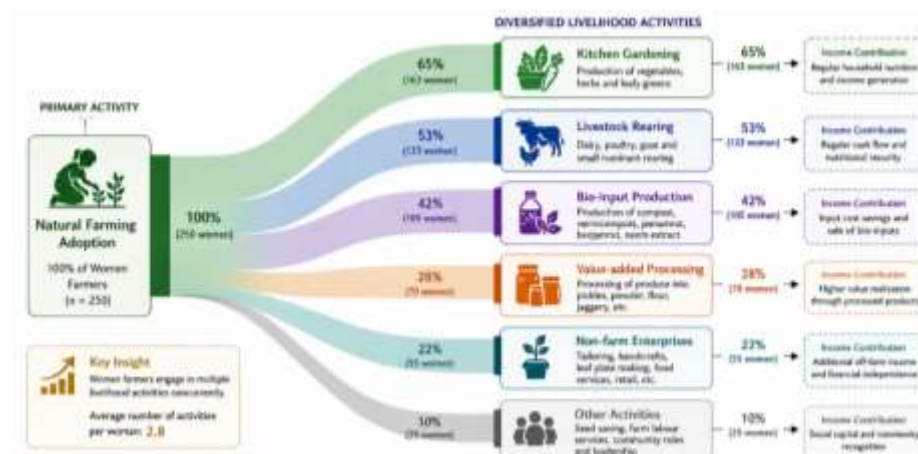


Figure 6: Income Diversification Patterns among Women Natural Farmers



Sankey diagram displaying the movement of female farmer participation from primary to various secondary activities. The diagram demonstrates the various paths taken by women to engage in secondary economic activities such as bio-input generation, processing, kitchen gardens, livestock and other non-farming occupations. Width of the various branches is based on the share of women involved in these economic activities. It can be observed from the diagram that 65% of women participate in kitchen gardening, 53% in livestock, 42% in bio-input generation and 28% in processing.

V. Conclusion

This research paper has highlighted the economic empowerment of women farmers through natural farming in Karnataka on the basis of various case studies and programs implemented in different districts of the state. The study shows how natural farming, coupled with institutional arrangements through self-help groups and Krushi Sakhis, is capable of transforming the economic condition of women farmers. In the process, reduction of cultivation costs by 25.3%, increment of net farm income by 22.7%, and diversification of incomes by an increase in the diversification index of 77.8% are some of the major achievements which prove the economic feasibility of natural farming.

There are several factors, among which there are some success factors in natural farming of women farmers. To begin with, Krushi Sakhis are extremely important as peer educators and community resource persons. Training of more than 5.26 lakh members of SHGs in relation to management of soil health, adaptation to changing climatic conditions, and linking of markets is an indication of this fact. Second, collective action of women farmers through SHGs overcomes several individual constraints such as lack of land, inadequate credit, and lack of technical skills. For instance, the example of Bibi Fatima SHG has shown how the formation of community seed bank and millet processing units was possible through women's collective efforts. Third, natural farming in combination with value addition and market linkages is indispensable.

These findings have important policy ramifications. Firstly, there needs to be a scaling up of Krushi Sakhi initiatives through proper remuneration to keep up motivation and efficiency. The Mandya district example of having one Krushi Sakhi per two clusters of villages can be a basis for such scaling up process. Secondly, investment in



infrastructure especially processing infrastructure like processing units for millets, packaging units, and cold chain can help women in their transition from agricultural primary activities to more value-adding processing and marketing activities. Thirdly, group certification process for products resulting from natural farming practices can solve the problem of lack of market access faced by the women in the study.

But there is also the issue of difficulties that the women farmers are facing. One of them is land ownership since 18% of the women in the study group had land titles in their names. Land ownership makes it difficult to implement farming practices that need more capital outlay and to access loans in times of difficulties. The time when the women are going from conventional farming practices to natural farming practices can create yield shortages. These difficulties call for transition incentives and crop insurance measures.

The importance of this research lies not just within Karnataka, but has wider applicability in India, where the same problems of agrarian misery, climate vulnerability, and gender discrimination still prevail. The Karnataka example of SHG-driven natural farming provides a replicable model for adoption in other parts of India, assuming that the right institutional framework is created. The winning of the award to the Bibi Fatima SHG under the UNDP Equator Initiative proves the global importance of such initiatives, which are able to contribute to the realization of multiple Sustainable Development Goals (SDGs), including gender equality, climate change actions, and sustainable agriculture.

Further research must pay attention to longitudinal studies assessing the economic sustainability and intergenerational impacts of natural farming initiatives. The use of randomized controlled experiments will enable one to understand what kind of interventions are more efficient in order to be applied. Furthermore, it seems necessary to explore more carefully the political aspect of women involvement in natural farming and empowerment through the participation in projects. In particular, it is important to know what kinds of decision making and leadership opportunities the women have and how the society values the contribution made. The application of the digital technologies may be helpful both for knowledge dissemination, as well as for tracing of natural farming products.



To conclude, the economic empowerment of women farmers using natural farming practices in Karnataka is a remarkable success story in gender-sensitive agricultural development. This is because natural farming helps to cut costs, increase income levels, diversify livelihoods and climate-proof agricultural production systems. It shows that empowerment of women and agriculture sustainability are goals which complement each other and are achievable through proper institutional and policy processes. Considering the challenges associated with climate change and agrarian problems faced by Indian farmers, especially those depending on rainfed agriculture systems, the case of Karnataka provides useful insights for all these regions.

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