International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 16s,2025
https://theaspd.com/index.php

Empowering Women Through Technology: An Economic Impact Of The Namo Drone Didi Scheme On Women's Economic And Social Development

Sri Lekha S[1] Anbarassan Ariputhiran[2], Sathaiah Manimuthu[3], Ramazeame Loganathan[4] Thulasiram R [5], Selvarani M [6]
[1,2,3,5,6] Dept. of Agricultural Economics, SRM College of Agricultural Sciences, SRM IST,
[4] Dept. of Agricultural Entomology, SRM College of Agricultural Sciences, SRM IST

Abstract
This study attempts to examine the employment opportunities, economic benefits and to analysis impact of scheme on the Namo Drone Didi Scheme in North eastern zone of Tamil Nadu for women empowerment. The Namo Drone Didi Scheme is an initiative aimed at empowering women in rural areas by integrating digital tools, specifically drones, into agricultural practices. This study adopts a mixed-methods approach, utilizing both primary data from structured interviews with 17 beneficiaries from self-help groups in the northeastern zone of Tamil Nadu, and secondary data from government sources. The findings highlight significant socio-economic changes, with beneficiaries experiencing a 140% increase in average income and a 40% reduction in farm operation costs. The scheme facilitated the transition from manual labour to skilled roles such as drone operators, assistants, and technicians, with 100% of participants engaging in drone-based agricultural services and 90% of the beneficiaries developed technical skills essential for drone operation, and 95% gained financial and business management capabilities. The scheme demonstrated a positive benefit-cost ratio of 2.5, illustrating its financial viability. Despite challenges such as technical, financial, and operational constraints, the scheme's overall impact has been overwhelmingly positive. The Namo Drone Didi Scheme is a transformative initiative that improves the economic well-being of rural women but also encourages the adoption of technological innovations in agriculture, fostering sustainable farming practices and promoting gender equality in rural communities.

Keywords: *women empowerment, technological innovations, gender equality, employment opportunities*

INTRODUCTION:

Agriculture plays a crucial role in ensuring food security and supporting economies worldwide. In many developing countries, women make up nearly 43% of the agricultural workforce, but they often face significant challenges in accessing the same opportunities and benefits as men (Raney et al.,2011). The challenges include limited access to essential resources, education, financial support, and decision-making roles within the agricultural sector. However, technology is changing the landscape. Innovations such as mobile phones, digital platforms, and precision farming tools are helping to break down these barriers, providing women with new opportunities to increase productivity, achieve financial independence, and gain greater control over their work. The gender gap in agriculture restricts women's ability to attain financial independence and sustainable development. Yet, digital tools and innovations have emerged as powerful solutions to bridge these gaps, empowering women by granting them access to knowledge, markets, and financial resources. One such digital tool that is empowering women in agriculture is the drone. Drones can provide valuable support in monitoring crops, assessing soil health, and optimizing resource use. By enabling women farmers to gain precise insights into their farming practices, drones help improve productivity, reduce costs, and enhance decision-making. With access to this advanced technology, women can overcome traditional limitations and take on more strategic roles in agriculture, contributing to greater sustainability and economic growth.Drone technology has emerged as a transformative solution in agriculture, addressing a wide range of challenges faced by farmers. These challenges include extreme weather events, inefficient fertilizer application, pests, diseases, and health risks due to the use of chemicals like fungicides, pesticides, and insecticides. Drones offer significant potential to mitigate these issues through applications such as crop monitoring, soil health analysis, irrigation management, pest and disease detection, and precision spraying (Ahirwar S et al.,2019). Equipped with advanced sensors, cameras, and imaging technologies, drones can capture high-resolution aerial data, providing farmers with real-time insights into crop health, growth patterns, and environmental factors like soil quality,

nutrient levels, and weather conditions. This data allows for targeted interventions, optimizing water and fertilizer use, reducing pesticide reliance, and improving farm management. Furthermore, drones automate tasks, reducing labour costs, enhancing precision, and increasing yields, while minimizing environmental impact. As drone technology continues to evolve, it holds the potential to revolutionize farming practices by offering more efficient, sustainable, and cost-effective solutions to modern agricultural challenges (Kalamkar, R et al.,2020).The Namo Drone Didi Scheme is a transformative central sector initiative designed to empower women in rural India by equipping them with advanced drone technology for agricultural services. This innovative program aims to bridge the gender gap in the agricultural sector by providing women-led Self-Help Groups (SHGs) with the tools and skills needed to improve agricultural practices, increase efficiency, and generate sustainable livelihoods. By offering specialized training and financial support for the purchase of drones, the scheme allows women to offer vital agricultural services, such as the application of liquid fertilizers and pesticides, to farmers in their communities. Under the scheme, 15,000 selected Women SHGs will be provided with drones between 2024-2025 and 2025-2026. These groups will be empowered to offer drone-based services, which are particularly effective in precision farming, including tasks such as spraying fertilizers and pesticides with high accuracy. The scheme is expected to significantly contribute to the economic empowerment of women, with each SHG projected to generate an additional Rs. 1 lakh per year through the rental service of these drones. In addition, the program aims to enhance the overall agricultural productivity and sustainability of farming practices across rural India. The Namo Drone Didi Scheme is a key step towards promoting gender equality in agriculture by giving women access to cutting-edge technology and enabling them to play an active role in improving their economic and social conditions. Through the application of drone technology, the scheme is not only revolutionizing agricultural practices but also fostering skill development, community growth, and environmental sustainability (Government of India, 2024).The scheme offers a subsidy to women members of Deendayal Antyodaya Yojana – National Rural Livelihood Mission (DAY NRL) SHGs for purchasing drones, covering 80% of the drone's cost, up to a maximum of 8 lakhs. For the remaining cost, a loan facility is available through AIF at a low interest rate of 3%. Additionally, the package includes drone pilot training. Women Self Help Groups (SHGs) can earn an extra income of up to 1 lakh per annum by renting out drone spray services to farmers. This initiative aims to empower women while supporting agricultural activities through the use of drones. The Namo Drone Didi Scheme offers benefits, with a focus on the empowerment of women by providing specialized training in drone technology, which equips them with valuable skills in modern agriculture. This training enables women to efficiently perform tasks such as crop monitoring, soil analysis, and precision farming. By incorporating drone technology, the scheme enhances agricultural efficiency, allowing for the precise application of pesticides and fertilizers, which reduces chemical overuse, minimizes environmental impact, and cuts costs for farmers. Women are trained to apply fertilizers, pesticides, and herbicides accurately, ensuring optimal usage and even distribution. Additionally, drones assist in detailed soil and field analysis, helping women to assess fertility, monitor irrigation, and manage water resources efficiently. The scheme also fosters community-building and networking opportunities, where participants can connect with fellow women in agriculture, share experiences, and learn from industry experts, mentors, and agricultural professionals. This collective exchange of knowledge and skills not only strengthens individual capabilities but also creates avenues for professional growth and collaboration in the agricultural sector (Government of India,2024).In Tamil Nadu, during the 2023-24 period, 44 Drone Didis benefitted from the Namo Drone Didi scheme. The study highlights significant benefits for farmers, including savings in water usage, labour costs, and pesticide and fertilizer consumption. These improvements collectively contribute to an increase in the overall productivity of the farmers (Government of India,2025). The main objectives of this study are to assess the economic benefits generated by the Namo Drone Didi Scheme for the selected beneficiaries, to evaluate the employment opportunities created for the beneficiaries through the scheme, to analyse the impact of the scheme on the beneficiaries skill development and empowerment, and provide policy recommendations to enhance the effectiveness of the scheme.

1.1 Scheme Implementation Stages

METHODOLOGY

2.1 Data Collection

This study employs a mixed-methods approach, incorporating both primary and secondary data sources to evaluate the economic impact and effectiveness of the Namo Drone Didi Scheme. Primary data was collected through a structured questionnaire method, utilizing face to face interviews with the beneficiaries of the Namo Drone Didi Scheme. The questionnaire was designed to capture detailed information on various aspects of the scheme, including the economic benefits, skill development, employment opportunities, and empowerment outcomes. The survey included both closed and open-ended questions to gather quantitative data as well as qualitative insights. A total of 17 Self Help Groups (SHGs) beneficiaries of North eastern zone of TamilNadu were selected for the study and these beneficiaries were identified through the records maintained by the scheme's implementation authorities. Secondary data collected from authentic sources such as government reports and the Government of India portal.

2.2 Area of Study

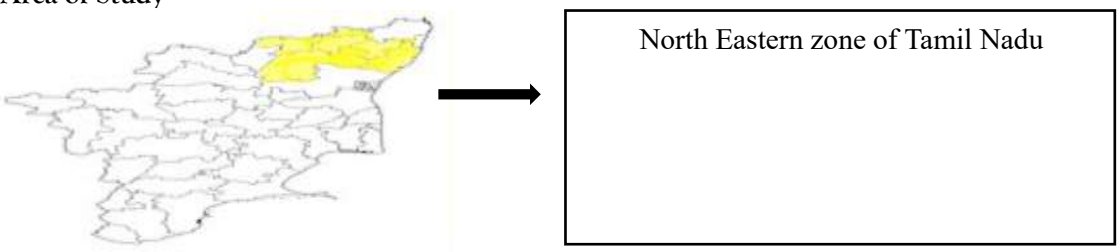

Fig 1: North Eastern zone of Tamil Nadu

Table 1: Details of the Beneficiaries collected for the study

S.No.	District	No. of. Drone Didi
1	Tiruvannamalai	5
2	Chengalpattu	5
3	Ranipet	3
4	Vellore	2
5	Kanchipuram	2
	Total	**17**

The details for the study were collected from a total of 17 Drone Didi beneficiaries across various districts. These beneficiaries are members of self-help groups, and they were selected from the following districts: Tiruvannamalai, Chengalpattu, Ranipet, Vellore and Kanchipuram. The data gathered from these individuals reflects the diverse experiences and contributions of self-help group members involved in the Drone Didi initiative.

RESULTS

The results obtained from the current study are presented below:

3.1 Socio-Economic Status of beneficiaries of Namo Drone Didi Scheme

The socio-economic characteristics of the sample farmers with respect to general particulars of beneficiaries and particulars of self-help group are presented in table 2. The socio-economic status of beneficiaries of the Namo Drone Didi Scheme reveals that a majority of beneficiaries (76.4%) are in the 30-45 age group, suggesting the scheme is particularly popular among individuals in their prime working years. Most beneficiaries (70.58%)

have completed up to higher secondary education, and a significant proportion (58.8%) have less than 5 years of farming experience, indicating that many are relatively new to farming. In addition, 47.05% of beneficiaries own farms smaller than 2 hectares, reflecting the scheme's focus on smallholder farmers. Regarding self-help groups, most consist of 15-20 members (52.94%), and the groups are generally performing well financially, with 52.94% having an annual turnover between Rs. 50,000 and Rs. 2,50,000 and 35.2% having a turnover exceeding Rs. 2,50,000. In terms of share capital, most groups (52.94%) have between Rs. 6,000 and Rs. 12,000 per person annually, indicating solid financial standing.

Table 2: Socio-Economic Status of beneficiaries of Namo Drone Didi Scheme

S.No.	Particulars	N = 17	Percentage
I	**General Particulars of Sample Beneficiaries**		
1	Age (In Years)		
	<30	2	11.7
	30-45	13	76.4
	> 45	2	11.7
2	Education		
	Upto Higher Secondary	12	70.58
	Under graduate	5	29.41
3	Farming experiences (In years)		
	< 5	10	58.8
	5-10	5	29.4
	>10	2	11.6
4	Farm size (In ha)		
	<2	8	47.05
	2-5	6	35.2
	>5	3	17.6
II	**Particulars of Self-Help Group**		
1	Size of Self-Help Group (In No. s)		
	<15	7	41.17
	15-20	9	52.94
	>20	1	5.88
2	Annual Turnover of Self-Help Group (In Rs.)		
	<50,000	2	11.7
	50,000 – 2,50,000	9	52.94
	>2,50,000	6	35.2
3	Share capital (In rupees per annum per person)		
	<6,000	2	11.7
	6,000 – 12,000	9	52.94
	>12,000	6	35.22

*N - No.of. Beneficiaries

Source: Research findings

3.2 Employment Opportunities created under Namo Drone Didi Scheme

The employment opportunities created under the Namo Drone Didi Scheme were presented in table 3. The table provides a comparison of the participants' employment and roles before and after their involvement in drone-based agricultural services. Before implementation of the initiative, all 17 participants were engaged in manual labour or handicrafts and after the implementation of Namo Drone Didi scheme 100% of them transitioned into drone-based agricultural services. The beneficiaries took on specific drone-related operations: 11 individuals became Drone Operators, 5 served as Drone Assistants, and 2 took on the role of Drone Technicians. Regarding sector-wise contribution, before the implementation of the program, 10 participants

were engaged in primary sectors such as agriculture and handicrafts, while 7 were involved in secondary sectors. After this initiative, there was a shift, with 15 participants contributing to primary sectors, and only 2 remained in secondary sectors. This shift indicates a significant transformation in the participants' employment landscape, with a stronger focus on agriculture and drone-based services.

Table 3: Employment opportunities created under the Namo Drone Didi Scheme

S. No	Particulars	Before N=17	After N=17
1	Type of Employment		
	Manual Labour, Handicrafts	17	6
	Drone Based Agricultural Services	-	11
2	Role of Work		
	Drone Operators	-	11
	Drone Assistant	-	5
	Drone Technician	-	2
3	Sector wise Contribution		
	Primary Sectors (Agriculture, Handicrafts)	10	15
	Secondary Sectors	7	2

*N – No.of. Beneficiaries

Source: Research findings

3.3 Economic Benefits generated through Namo Drone Didi Scheme for Beneficiaries

The economic benefits generated through Namo Drone Didi Scheme for Beneficiaries are presented in table 4. The Namo Drone Didi Scheme had a significant positive impact on its beneficiaries, as shown by the comparison of key financial benefits before and after its implementation. The average annual income of beneficiaries increased by a remarkable 140%, rising from Rs. 2,40,000 to Rs. 5,76,000, indicating a substantial improvement in their financial well-being. In addition to farm operation costs there is a 40% reduction in costs, decreasing from Rs. 50,000 to Rs. 30,000 per annum. This reduction can be attributed to the increased efficiency brought about by the use of drones, which likely optimized farm management, reduced labour, and improved resource utilization. The scheme has enhanced both the profitability and cost-efficiency of farming for its participants.

Table 4: Economic Benefits generated through Namo Drone Didi Scheme for Beneficiaries

S.No.	Particulars	Before	After	Percentage Change
1	Average Income Level (Rs. per annum)	2,40,000	5,76,000	140
2	Farm Operation costs (In Rs)	50,000	30,000	40

Source: Research findings

3.4 Benefit Cost Analysis of Namo Drone Didi Scheme

The Benefit-Cost Analysis of the Namo Drone Didi Scheme are presented in the table 5. The initial cost of purchasing the drone, after an 80% subsidy, is Rs. 2,00,000, with an annual amortization cost of Rs. 31,058. Training costs are covered by the government, and the total fixed cost per year is Rs. 31,058. The total annual variable costs, including maintenance (Rs. 20,000), replacement costs (Rs. 15,000), electricity (Rs. 10,000), and travel (Rs. 30,000), amount to Rs. 75,000, bringing the total cost per year to Rs. 1,06,058. The income generated from drone operations is Rs. 3,60,000 annually, along with Rs. 20,000 in labour cost savings, resulting in a gross income of Rs. 3,80,000 and the net income is Rs. 2,73,942. With a benefit-cost ratio of 2.5, for every rupee spent, Rs. 2.50 is generated in returns, indicating that the scheme provides more than double the return on investment, making it a financially beneficial and viable option for empowerment of women.

Table 5: Benefit Cost Analysis of Namo Drone Didi Scheme

S. No	Particulars	Value (In Rs.)
I	**Fixed Cost**	

	Initial cost of Drone Purchase (After 80% subsidy)	2,00,000
	Amortization cost (Per year)	31,058
	Training Cost (Government covers Rs.50,000)	-
	Total Fixed Cost (Per year)	**31,058**
II	**Variable Cost (Annual)**	
	Maintenance cost	20,000
	Replacement costs (Battery & Spare parts)	15,000
	Operational Cost (Electricity)	10,000
	Travel Cost	30,000
	Total Variable Cost (Per year)	**75,000**
III	**Total Cost**	**1,06,058**
IV	**Income**	
	Income from drone operations (Rs.300 per acre) (1200 acres per year) Reduction in farm labour costs	3,60,000 20,000
	Gross Income	**3,80,000**
	Net Income	**2,73,942**
IV	**Benefit-Cost Ratio**	**2.5**

Source: Research findings

3.5 Impact of the scheme on the Beneficiaries skill development and empowerment

The table demonstrates significant improvements in the skills of beneficiaries before and after their involvement in the Namo Drone Didi Scheme. Initially, only 10% of participants had the technical skills necessary for drone operation, maintenance, and GPS navigation, but after the program, 90% acquired these skills. The financial and business skills, including loan and subsidy utilization and record-keeping, with 5% of beneficiaries before the initiative, while 95% gained these skills of enhancing their ability to manage their drone operations. Communication skills, such as teamwork, leadership, and decision-making, were improved, with 80% of participants showing significant growth in these areas, up from 20% initially. Overall, the scheme led to a substantial enhancement in the technical, financial, and communication skills of beneficiaries.

Table 6: Impact of Scheme on Beneficiaries on skill development

S.No.	Skill	Before	After
1	Technical skills	10	90
2	Financial & Business skill	5	95
3	Communication skills	20	80

Source: Research findings

3.6 Opinion of Beneficiaries on Namo Drone Didi Scheme

The table perceived benefits of the Namo Drone Didi Scheme as reported by the beneficiaries represented in the table 7. All beneficiaries of the scheme (100%) reported an increase in income levels and employment generation, indicating that the scheme has effectively enhanced financial well-being and created job opportunities and a majority (88.2%) also experienced business growth and all beneficiaries (100%) indicated that the scheme facilitated access to credit, which could support further agricultural development. Most beneficiaries (76.47%) gained new skills through the scheme, though 23.5% did not experience skill development. Overall, the scheme has had a positive impact on income, employment, business growth, credit access, and skill development of women.

Table 7: Opinion of Beneficiaries on Namo Drone Didi Scheme

S.No.	Particulars	Yes	%	No	%
1	Increase in Income Level	17	100	-	-
2	Increase in Employment generation	17	100	-	-

3	Increase in Business Growth	15	88.2	2	11.76
4	Credit facilities	17	100	-	-
5	Skill development	13	76.47	4	23.5

Source: Research findings

3.7 Constraints faced in Namo Drone Didi Scheme

The various constraints faced in Namo Drone Didi Scheme are presented in Table 5. The table highlights the various constraints faced by participants in the Namo Drone Didi Scheme, focusing on technical, financial, social, and operational challenges. The most significant issue was technical constraints, with 64.8% of participants facing problems such as limited battery life, drone maintenance, and sensor failure, which hindered the drone's performance and increased the need for repairs. Financial constraints, affecting 17.6%, included the high cost of spare parts and repairs, which could impact the drones' longevity and operational efficiency. Social constraints, though less prevalent at 10%, involved farmers' preference for traditional methods and limited digital literacy, which slowed the adoption of drone technology. Operational constraints, affecting 35.2%, included poor internet connectivity, drone flying regulations, and occasional drone damage, complicating the use of drones in farming. Overall, the table reveals that technical constraints were the most common challenge, followed by operational, financial, and social barriers, all of which need to be addressed to ensure the sustainable implementation of drone technology in agriculture.

Table 8: Constraints faced in Namo Drone Didi Scheme

S. No	Constraints	N	Value (In %)
1	Technical Constraints	11	64.8
2	Financial Constraints	3	17.6
3	Social Constraints	2	10
4	Operational Constraints	6	35.2

*N-No.of. Beneficiaries

Source: Research findings

CONCLUSION

The Namo Drone Didi Scheme has demonstrated a significant positive impact on beneficiaries, particularly in economic benefits, employment opportunities, skill development, and empowerment. The scheme improved the average income level of beneficiaries by 140% and reduced farm operation costs by 40%, enhancing profitability and cost-efficiency. Employment shifted from manual labour to roles such as drone operators, assistants, and technicians, and 90% of beneficiaries acquired technical, financial, and communication skills necessary for drone operations. The scheme also contributed to business growth and improved access to credit for 100% of beneficiaries. However, challenges like technical issues, limited battery life, maintenance problems, and sensor failures were faced by many, while financial and operational barriers affected fewer participants. Despite these challenges, the scheme's benefit-cost ratio of 2.5 indicates strong financial viability, proving it to be a valuable initiative for empowering women, enhancing economic status of women, and promoting sustainable agriculture.

REFERENCES

1. Ahirwar, S., Swarnkar, R., Bhukya, S., and Namwade, G. (2019). Application of drone in agriculture. International Journal of Current Microbiology and Applied Sciences .8(01): 2500-2505.
2. Kalamkar, R. B., Ahire, M. C., Ghadge, P. A., Dhenge, S. A., and Anarase, M. S. (2020). Drone and its Applications in Agriculture. International Journal of Current Microbiology and Applied Sciences. 9(6):3022-3026.
3. Raney, T., Anríquez, G., Croppenstedt, A., Gerosa, S., Lowder, S. K., Matuschke, I., and Skoet, J. (2011). The role of women in agriculture.
4. Ministry of Rural Development. (2024). Centre Launches Namo Drone Didi Scheme Guidelines.
5. India.gov.in. (2024). Namo Drone Didi Scheme