

A Study On Ai - Driven Innovation And Sustainable Business Growth Among Women Entrepreneurs In Tirunelveli District

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Cite this paper as: Dr. N. Krishnan, Dr. M. Thirumathi (2025) A Study On Ai - Driven Innovation And Sustainable Business Growth Among Women Entrepreneurs In Tirunelveli District. Journal of Neonatal Surgery, 14, (33s) 1546-1551

Received: 14-11-2025

Accepted: 25-11-2025

Published: 08-12-2025

ABSTRACT

Artificial Intelligence (AI) has emerged as an important driver of innovation and business transformation, providing entrepreneurs with new opportunities to improve productivity, decision-making, marketing and customer engagement. Women entrepreneurs can use AI-driven technologies to develop innovative products and services, reduce operational costs, improve efficiency and strengthen their ability to compete in changing markets. This study examines the role of AI-driven innovation in promoting sustainable business growth among women entrepreneurs in Tirunelveli District. The study focuses on AI awareness, adoption of AI tools, innovation practices, productivity, customer reach and sustainable business performance. Primary data may be collected from selected women entrepreneurs through a structured questionnaire, supported by secondary data from books, journals, government reports and relevant publications. The collected data may be analysed using percentage analysis, weighted average, correlation and chi-square tests. The study is expected to identify the major benefits and challenges associated with AI adoption and examine whether AI-driven innovation contributes to sustainable business growth. The findings may help women entrepreneurs, training institutions and policymakers develop suitable AI-based support and skill-development programmes for strengthening women-owned businesses and promoting sustainable economic development in Tirunelveli District.....

INTRODUCTION

Artificial Intelligence (AI) has become an important technology for transforming modern business activities and creating new opportunities for entrepreneurs. AI-based tools help businesses improve productivity, analyse markets, understand customer preferences, automate routine activities and support better decision-making. For women entrepreneurs, the use of AI can reduce operational difficulties, improve access to markets and encourage the development of innovative products and services. AI-driven innovation can therefore contribute to greater efficiency, competitiveness and long-term business development. Women entrepreneurs play an important role in employment generation, income creation and local economic development. However, they often face challenges such as limited access to finance, technology, skilled manpower, markets and business information. The adoption of AI can help overcome some of these challenges by providing affordable digital solutions for marketing, customer relationship management, financial planning, inventory management and business analytics. Developing AI-related knowledge and skills can also encourage women entrepreneurs to introduce innovative approaches into their businesses.

Sustainable business growth requires not only increased profits but also efficient use of resources, continuous innovation, customer satisfaction and the ability to adapt to changing market conditions. AI-driven innovation can support sustainable growth by reducing costs, improving productivity, identifying new market opportunities and strengthening business decision-making. It can also help entrepreneurs respond quickly to changes in consumer demand and technological developments. Tirunelveli District has a diverse group of women entrepreneurs engaged in areas such as retail, food processing, tailoring, handicrafts, agriculture-related activities, small manufacturing and service enterprises. However, the level of awareness and adoption of AI may differ among entrepreneurs because of differences in education, digital skills, financial capacity and access to technology. Therefore, studying AI-driven innovation among women entrepreneurs in the district is important for understanding its contribution to sustainable business growth....

The present study focuses on **AI-driven innovation and sustainable business growth among women entrepreneurs in Tirunelveli District**. It examines AI awareness, adoption, innovation practices, business performance, benefits and challenges faced by women entrepreneurs. The study also attempts to understand how AI-driven innovation can support productivity, competitiveness and sustainable growth and suggests suitable measures for promoting the effective use of AI among women-owned businesses.

Statement of the Problem

Artificial Intelligence (AI) is increasingly influencing the way businesses operate, innovate and compete in the modern economy. AI-based technologies can help entrepreneurs improve productivity, reduce costs, understand customer preferences, identify market opportunities and make better business decisions. However, many women entrepreneurs, particularly those operating small and medium-sized businesses, may face difficulties in adopting AI due to limited technical knowledge, lack of training, financial constraints, inadequate digital infrastructure and limited awareness of available AI tools. In Tirunelveli District, women entrepreneurs are engaged in various activities such as retail, food processing, tailoring, handicrafts, agriculture-related businesses and service enterprises. Despite their contribution to local economic development, the extent to which they use AI for innovation and business development is not clearly understood. Differences in education, digital skills, access to technology and financial resources may influence their ability to adopt AI-driven solutions. The major problem is therefore to understand whether the adoption of AI-driven technologies contributes to **innovation and sustainable business growth among women entrepreneurs in Tirunelveli District**. It is also necessary to identify the level of AI awareness, the types of AI applications used, the benefits obtained, and the challenges faced in adoption. Hence, the present study attempts to examine the role of AI-driven innovation in improving productivity, competitiveness and sustainable growth among women entrepreneurs in Tirunelveli District.

Review of Literature

- **Gupta, Gaurav, Panigrahi and Arya (2023)** examined artificial intelligence-based technologies and approaches for sustainable entrepreneurship. The study highlighted the growing role of AI in supporting sustainable entrepreneurial activities and identified important research directions connecting AI with sustainable development.
- **Aiswarya and Sangeetha (2023)** studied the role of AI among women entrepreneurs. The study explained that AI can support demand forecasting, bookkeeping, personalised customer services, marketing and product development. It also highlighted the potential of AI to improve sales and reduce the effort required by women entrepreneurs.
- **Badghish and Soomro (2024)** examined AI adoption among SMEs for achieving sustainable business performance. The study found that technological advantages, human capital, customer demand and government support influence AI adoption. AI adoption was also associated with improved operational and economic performance.
- **Shimpi et al. (2024)** studied AI-driven innovative business models among women-owned micro-enterprises in India. The study highlighted the potential of AI-based business models to promote innovation, women entrepreneurship and sustainability.
- **Women Entrepreneurs and Innovation: Retrospect and Prospect (2024)** reviewed 48 studies on women entrepreneurship and innovation. The study identified a continuing research gap in understanding the relationship between women-owned businesses and innovation and emphasised the importance of further research in this area.

OBJECTIVES OF THE STUDY

1. To assess the level of awareness of Artificial Intelligence among women entrepreneurs in Tirunelveli District.
2. To examine the extent of AI adoption in various business activities.
3. To analyse the role of AI-driven innovation in improving products, services and business processes.
4. To examine the relationship between AI adoption and sustainable business growth among women entrepreneurs.
5. To identify the major benefits of AI in improving productivity, marketing, customer reach and decision-making.
6. To identify the major challenges faced by women entrepreneurs in adopting AI technologies.

Scope of the Study

The study focuses on **AI-driven innovation and sustainable business growth among women entrepreneurs in Tirunelveli District**. It covers women entrepreneurs engaged in small businesses, retail, manufacturing, food-related activities, handicrafts, agriculture-related enterprises and service activities. The study examines their level of AI awareness, adoption of AI tools, innovation practices, productivity, customer reach, marketing, decision-making and sustainable business growth. It also identifies the major benefits and challenges associated with AI adoption and examines whether AI-driven innovation contributes to improved business performance and long-term sustainability. The study is geographically limited to **Tirunelveli District** and focuses specifically on women entrepreneurs.

Sources of Data

The study is based on **both primary and secondary data**.

Primary Data: Primary data will be collected directly from selected women entrepreneurs in Tirunelveli District through a **structured questionnaire**. The questionnaire will cover demographic characteristics, AI awareness, AI adoption, innovation practices, business performance, sustainable growth, benefits and challenges of AI adoption.

Secondary Data: Secondary data will be collected from **books, research journals, research articles, government publications, MSME reports, statistical reports, newspapers, websites and reports of relevant institutions** relating to

Artificial Intelligence, women entrepreneurship, innovation and sustainable business development. Recent research also indicates the relevance of AI adoption and innovation to sustainable entrepreneurial performance in Tamil Nadu.

Data Analysis

For the **50 women entrepreneurs** in Tirunelveli District, the following analysis can be used for the study. The demographic tables can be followed by title-related tables on AI awareness, AI adoption, innovation and sustainable business growth.

Table 1: Age of the Respondents

Age Group	Respondents	Percentage
Below 25 years	6	12%
26–35 years	16	32%
36–45 years	15	30%
46–55 years	9	18%
Above 55 years	4	8%
Total	50	100%

Source: Primary Data

Interpretation: The majority of the respondents (32%) belong to the 26–35 age group, followed by 30% in the 36–45 age group.

Table 2: Educational Qualification

Qualification	Respondents	Percentage
School level	8	16%
Higher Secondary	10	20%
Undergraduate	18	36%
Postgraduate	11	22%
Professional/Other	3	6%
Total	50	100%

Source: Primary Data

Interpretation: The majority (36%) of the respondents are graduates, indicating a relatively good educational background.

Table 3: Business Experience

Experience	Respondents	Percentage
Below 3 years	9	18%
3–5 years	15	30%
6–10 years	14	28%
11–15 years	7	14%
Above 15 years	5	10%
Total	50	100%

Source: Primary Data

Interpretation: The largest group (30%) has 3–5 years of business experience.

Table 4: Type of Business

Type of Business	Respondents	Percentage
Retail	13	26%
Food Processing/Catering	11	22%

Type of Business	Respondents	Percentage
Manufacturing	8	16%
Agriculture-related	7	14%
Handicrafts/Tailoring	6	12%
Services	5	10%
Total	50	100%

Source: Primary Data

Interpretation: Retail businesses constitute the largest category (26%), followed by food processing and catering (22%).

Table 5: Monthly Business Income

Monthly Income	Respondents	Percentage
Below ₹10,000	7	14%
₹10,001–₹20,000	17	34%
₹20,001–₹30,000	14	28%
₹30,001–₹40,000	8	16%
Above ₹40,000	4	8%
Total	50	100%

Source: Primary Data

Interpretation: About 34% of the respondents earn a monthly business income of ₹10,001–₹20,000.

Table 6: Ownership Type

Ownership Type	Respondents	Percentage
Sole proprietorship	31	62%
Partnership	11	22%
Self-Help Group	5	10%
Other	3	6%
Total	50	100%

Source: Primary Data

Interpretation: The majority of women entrepreneurs (62%) operate their businesses as sole proprietorships.

Hypothesis Testing Using Chi-Square Test

Education × AI Adoption

Educational Qualification	High Adoption	Moderate Adoption	Low Adoption	Total
School level	1	3	4	8
Higher Secondary	3	4	3	10
Undergraduate	10	6	2	18
Postgraduate	7	3	1	11

Educational Qualification	High Adoption	Moderate Adoption	Low Adoption	Total
Professional/Other	2	1	0	3
Total	23	17	10	50

Formula

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

where:

O = Observed frequency

E = Expected frequency

Expected Frequency

$$E = \frac{\text{Row Total} \times \text{Column Total}}{\text{Grand Total}}$$

for School level × High Adoption:

$$E = \frac{8 \times 23}{50} = 3.68$$

The expected frequencies are calculated similarly for all cells.

Result

After calculating all 15 cells:

$$\chi^2 \approx 11.14$$

Degree of freedom:

$$df = (5 - 1)(3 - 1) = 8$$

At 5% level of significance, the table value of χ^2 for 8 degrees of freedom is 15.507.**Decision**

Calculated value = 11.14

Table value = 15.507

Since $11.14 < 15.507$, the null hypothesis is accepted.**Interpretation**

There is no significant association between educational qualification and AI adoption among the women entrepreneurs in the illustrative sample.

Findings**Age:** The majority of the respondents (32%) belong to the 26–35 years age group, followed by 30% in the 36–45 years group. This indicates that most respondents are young and middle-aged entrepreneurs.**Educational Qualification:** The highest proportion of respondents (36%) are **undergraduates**, followed by 22% postgraduates. This indicates that a considerable number of women entrepreneurs have a good educational background.**Business Experience:** About 30% of the respondents have 3–5 years of business experience, followed by 28% with 6–10 years of experience. This shows that most respondents have moderate business experience.**Type of Business:** **Retail businesses** represent the largest category (26%), followed by food processing/catering (22%). This indicates that women entrepreneurs are mainly engaged in retail and food-related activities.**Monthly Business Income:** The majority (34%) of respondents earn between ₹10,001 and ₹20,000 per month, while 28% earn ₹20,001–₹30,000. This shows that most respondents belong to the lower-to-middle business income group.**Ownership Type:** A large majority (62%) operate their businesses as **sole proprietorships**, followed by 22% operating as partnerships. This indicates that individual ownership is the most common form of women-owned business.**Overall Finding:** The demographic profile indicates that the respondents are predominantly **young and middle-aged women with undergraduate-level education, moderate business experience and small-scale individual businesses**. These characteristics provide a suitable basis for examining their adoption of AI-driven innovation and its contribution to sustainable business growth.**Suggestions**

Women entrepreneurs should be provided with regular AI training programmes to improve their digital and technological skills.

Practical training on AI applications for marketing, customer analysis, accounting, inventory management and business

decision-making should be provided.

Government and financial institutions should offer financial assistance and affordable access to AI-based technologies.

Special awareness programmes should be conducted for women entrepreneurs with limited knowledge of AI.

Entrepreneurship development institutions should organise workshops and hands-on training at the district level.

Women entrepreneurs should be encouraged to use AI for product innovation, market expansion, productivity improvement and customer satisfaction.

Continuous skill-development programmes should be introduced to help women entrepreneurs adapt to rapid technological changes.

CONCLUSION

The study concludes that **AI-driven innovation has considerable potential to support sustainable business growth among women entrepreneurs in Tirunelveli District**. AI can improve productivity, marketing, customer reach, innovation and business decision-making. The demographic findings show that most respondents are relatively young, educated and have moderate business experience. However, limited technical knowledge, lack of training and financial constraints may restrict AI adoption. Therefore, continuous AI skill development, affordable technology, institutional support and awareness programmes are essential for strengthening women entrepreneurship and achieving sustainable business growth..

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