Intelligent Technology, Empowered Women: AI and the evolution of Female Entrepreneurship in Mumbai Metropolitan Region

Ravneet Syan
Assistant Professor, Department of Business Economics,
Smt. MMK College of Commerce and Economics, Mumbai

Ambili Madhu Thampi
Associate Professor, Department of Economics
K.P.B. Hinduja College of Commerce, Mumbai

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Abstract
This study looks at how artificial intelligence (AI) has changed the lives of female business owners in the Mumbai metropolitan area. This study examines awareness levels, adoption trends, perceived business impacts, and barriers to AI integration using a mixed-method approach. The study ends with tenable recommendations to improve the digital ecosystem and transform AI-driven growth in women-led businesses in India's rapidly growing innovation ecosystem.

Keywords: Empowerment, Profitability, Innovation, Demographics, Strategy

Introduction

Recent interest in Artificial Intelligence (AI) has made it a vital pillar driving innovation and efficiency across all entrepreneurial ecosystems around the world. In the midst of this change, women-owned businesses are just starting to use AI tools to help bust through time-honoured limitations and make operations more efficient while also making better decisions. Especially in urban areas such as Mumbai, AI provides scope to re-imagine business models spearheaded by women, in sectors like fashion, beauty, design and cloud kitchens. The research aims to explore the effect of AI on women entrepreneurs' business, as well as suggest recommendations for supporting their technological empowerment.

Female led AI startups are on the rise, and they represent a more ethical future of tech. Through ongoing challenges of gender bias, underrepresentation and limited funding access, women entrepreneurs are overcoming long-standing barriers. Their leadership and fresh perspectives are resulting in AI-centric solutions that not only address real-world problems, but build a more inclusive tech world. These efforts are encouraging the next generation of women leaders in AI and sparking a fundamental cultural change on how we build and govern technology.

Review of Literature

Digital infrastructure and the affordability of access shape whether women entrepreneurs can move beyond basic digital use toward AI-enabled

operations. In Maharashtra, the newly announced Maharashtra Startup, Entrepreneurship & Innovation Policy 2025 recognises digital infrastructure as a strategic priority and emphasises inclusive support for women-led enterprises (Drishti IAS, 2025; Entrepreneur, 2025).

Several global studies document that although mobile connectivity has broadened, recurring data costs, unstable networks, and device limitations remain bottlenecks, especially for women in lower-income or marginalized settings (Koning, Otis, & Delecourt, 2025; Alshibani, 2025). In many contexts, women also face greater digital safety risks (harassment, privacy threats), which discourage visible business use of digital platforms (Cherie Blair Foundation, as reported in Reuters, 2025).

Empirical and case studies show that many micro and small firms, especially women-owned ones, adopt AI via embedded features in platforms—chatbots, analytics dashboards, automated marketing. These tools help improve operational efficiency, reach more customers, and reduce transaction costs (Nagalamshi, 2024).

Research Problem

This research is meant to investigate:

- The current rate of AI adoption in businesses led by women;
- The perceived impact of AI on key business functions such as customer engagement, marketing, operations, and profitability; and
- The suggestions entrepreneurs have to encourage wider AI adoption.

By addressing these questions, the research seeks to fill a gap in understanding how AI is being integrated into women-led enterprises and to provide insights for developing targeted support and resources to promote their success in a technology-driven economy.

The accelerating presence of women in AI based entrepreneurship marks a positive trend. Female entrepreneurs are heading innovative startups that not only increase the boundaries of AI but also address pertinent issues of the society. This not only leads to gender diversity in AI, but also enriches innovation among entrepreneurs.

Objectives of the Research

1. To estimate the level of AI awareness in women entrepreneurs
2. To ascertain AI adoption rates among the respondents in particular industries
3. To estimate the perceived impact of AI on Profitability and Revenue.
4. To investigate if female entrepreneurs are among early adopters and planners of AI driven technologies.
5. To collate suggestions on how AI technologies can be made better for women-led startups

Research Design

This study makes use of a mixed-method research design, and combines both qualitative and quantitative approaches to ascertain how AI influences female-led entrepreneurial activities.

A questionnaire was shared digitally among the respondents using Google Forms in various female entrepreneur groups as well as startup networks in Mumbai Metropolitan Region. All respondents were kept anonymous and confidential.

Responses of 42 women entrepreneurs have been recorded in this study by using the method of Purposive sampling, thereby targeting women business owners operating in apparel/fashion, interior design, cloud kitchens, beauty, retail/manufacturing sectors.

AI and the New Era of Women Entrepreneurship

Historically, women have been significantly underrepresented in both the technology and startup ecosystems, and artificial intelligence has reflected this imbalance sharply. Persistent challenges—such as limited access to venture capital, restricted entry into influential networks, and the absence of strong female mentorship—have constrained women entrepreneurs for decades.

Despite these hurdles, a growing number of women are now leading AI-driven enterprises across sectors like healthcare, fintech, and climate innovation. These founders are confronting complex issues such as equitable access to healthcare, the ethics of AI governance, and sustainable growth. Their leadership not only challenges traditional norms but also brings new perspectives that are transforming industries and redefining innovation itself.

The Importance of Inclusive Leadership

Inclusive leadership is fundamental to building ethical and effective AI systems. Teams that represent diverse genders, backgrounds, and experiences contribute broader insights and more balanced approaches to problem-solving. In fields like healthcare and financial services—where AI technologies influence crucial decisions—gender-diverse leadership helps identify potential biases and ensures fairer outcomes.

A culture that values inclusion fosters creativity, engagement, and accountability within organizations. Encouraging women and other underrepresented groups to lead in AI does more than strengthen decision-making; it also cultivates role models who inspire future generations to view technology as a space where they belong.

Creating New Markets

Women entrepreneurs are increasingly using AI to address unmet societal and market needs, giving rise to entirely new business opportunities. Their ventures span predictive healthcare systems, customized learning platforms, and digital finance tools that enhance accessibility for underserved communities. These enterprises combine economic success with social responsibility, appealing to investors who prioritize long-term, impact-oriented growth. As these businesses expand, they generate employment, stimulate local economies, and attract diverse talent, further strengthening the ecosystem of inclusive innovation. The result is a marketplace that values both profitability and purpose.

Support Systems for Women-Led AI Startups

Access to Capital

Gender inequality in funding remains one of the largest barriers to scaling women-led AI startups. Many women founders encounter implicit bias during fundraising, often facing skepticism about their technical expertise or business vision. Global research indicates that women continue to receive a disproportionately small share of venture capital investment.

However, this landscape is gradually improving. Dedicated investment groups such as Female Founders Fund, Women Who Tech, and All Raise are actively connecting women entrepreneurs with investors, mentors, and growth networks. Simultaneously, major corporations and government programs are adopting gender-diversity investment strategies to ensure more equitable access to resources.

Better funding access enables women-led startups to innovate freely, invest in talent, and compete internationally—reducing the structural disadvantages that once limited their growth.

Incubators and Accelerators

Specialized incubation programs have emerged to support women founders in AI. Initiatives such as Google for Startups Women Founders Accelerator, WEgate, and AI for Women Entrepreneurs provide financial assistance, technical mentorship, and training opportunities for early-stage businesses. These platforms help bridge knowledge gaps, instill confidence, and equip women to thrive in technology-driven industries.

Notable Indian Women in AI Entrepreneurship

India's AI ecosystem is witnessing an impressive rise in women-led ventures making a global impact:

- **Morph.ai (Gurugram):** Co-founded by Niyati Agarwal, Morph.ai provides AI and NLP-powered live chat tools that integrate seamlessly with communication platforms like Twitter, Messenger, and Slack.

- **Vue.ai (by Mad Street Den, Chennai):** Founded by Ashwini Asokan, Vue.ai offers fashion e-commerce companies solutions for personalization, catalog tagging, and visual search.
- **Niramai (Bengaluru):** Established by Dr. Geetha Manjunath and Nidhi Mathur, Niramai uses AI and machine learning for early breast cancer detection through a non-invasive and privacy-conscious approach—one of India's most acclaimed health-tech innovations.
- **Algonomy (formerly Manthan, Bengaluru):** Led by a diverse founding team, Algonomy provides real-time analytics that enable retailers to make data-driven decisions and adopt intelligent, algorithm-based strategies.

These examples demonstrate how Indian women entrepreneurs are not just adopting AI but using it to design transformative, socially conscious business models.

The Future of Women-Led AI Startups

As AI adoption accelerates across industries, women-led startups are expected to play an even greater role in shaping the ethical and inclusive dimensions of technology. Their contributions extend beyond product innovation—they influence how societies approach fairness, privacy, and accountability in the digital age.

Many of these ventures are oriented toward solving urgent global challenges such as healthcare inequality, environmental degradation, and social exclusion. Their approach signals a shift in entrepreneurship where moral responsibility and economic achievement reinforce each other, laying the foundation for a sustainable and equitable future.

Emerging AI Tools Empowering Women Entrepreneurs

The growing ecosystem of AI tools is helping women entrepreneurs manage operations efficiently, enhance decision-making, and strengthen their competitive edge.

- **Smart Meeting Tools:** Platforms like Fathom Notetaker automatically transcribe and summarize meetings, enabling founders to focus on strategic planning instead of administrative tasks.
- **AI Research Assistants:** Tools such as Perplexity AI and Claude assist with research, writing, and knowledge management, improving productivity while ensuring confidentiality.
- **No-Code Platforms:** Services like Poe allow non-technical entrepreneurs to design custom AI bots that can handle client queries, recruitment tasks, or training simulations. These tools simplify innovation and make AI more accessible to all.

AI: A Catalyst for Growth, Not a Replacement for Humanity

Artificial Intelligence (AI) has become one of the defining forces of modern transformation. Yet, its greatest promise lies not in replacing human work, but in amplifying it. When used wisely, AI can complement human intelligence—enabling smarter decisions, expanding innovation, and driving sustainable growth. The key is to approach AI as a collaborative partner, guided by ethics and empathy, rather than as a substitute for human ability.

At its essence, AI enhances decision-making rather than displacing it. Its real power lies in processing massive amounts of data, uncovering patterns, and generating predictive insights that would otherwise take humans immense time to achieve. By automating data-heavy tasks, AI frees people to focus on creativity, strategic reasoning, and emotional understanding—skills that remain uniquely human. This partnership between human expertise and machine intelligence leads to more accurate, efficient, and informed outcomes, positioning AI as a co-pilot in progress, not the pilot itself.

To harness this partnership effectively, continuous learning becomes indispensable. Since the AI landscape evolves rapidly, professionals must remain proactive in acquiring new knowledge. Fortunately, accessible online resources and training programs allow individuals across sectors to understand AI's capabilities, ethical boundaries, and applications. Such lifelong learning not only keeps professionals relevant but also ensures that technological adoption happens responsibly and inclusively.

Equally important is the need to scale AI thoughtfully. Starting with accessible, high-impact tools—such as predictive analytics and chatbots—can help organizations integrate AI sustainably. Predictive analytics allows businesses to anticipate trends and make data-backed decisions, while chatbots improve customer service efficiency by handling routine inquiries. As organizations become more comfortable with these tools, they can progressively implement advanced AI systems, ensuring that digital transformation remains steady, cost-effective, and people-centered.

Collaboration is another essential driver of success in the AI era. The challenges and opportunities associated with AI are far too complex for isolated efforts. Building partnerships through peer networks, cross-sector alliances, and mentorship platforms enables the sharing of ideas, experiences, and best practices. Such cooperation creates an ecosystem of collective learning—accelerating responsible innovation and ensuring that AI's advantages reach diverse communities and industries.

However, the expansion of AI must always rest on a solid ethical foundation. Ethical AI is not optional; it is central to sustainable technological progress. Developers, policymakers, and organizations must work together to ensure that AI systems are transparent, fair, and accountable. This includes mitigating biases in data, maintaining user privacy, and ensuring that algorithmic decisions align with human values. Embedding ethics into every stage—from design to deployment—builds trust and prevents unintended harm.

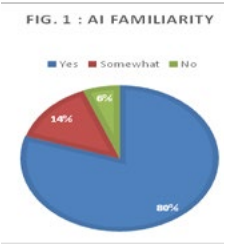
Finally, while AI surpasses humans in logic and computation, it lacks the depth of human emotion, empathy, and moral reasoning. These distinctly human traits remain critical in leadership, communication, and social connection. Empathy allows us to interpret data within the human context—to understand not only what is happening, but why it matters. AI may illuminate the path, but human compassion gives it purpose and direction.

Findings, Conclusion and Recommendations

Data was collected from **42 respondents** and seven responses had to be deleted by the researcher due to incomplete answers. The following trends and statistical inference could be pointed out from the same.

Assessing the level of AI awareness/Familiarity among women entrepreneurs

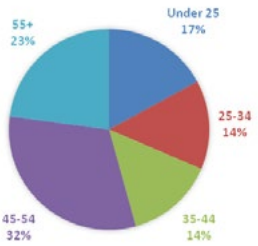
This pie chart shows the respondents' familiarity with the term "Artificial Intelligence (AI)." The majority of respondents, **65.7%**, are familiar with the term.



Age Distribution

This chart illustrates the distribution of respondents across different age groups, providing insights into the demographics of the participants. The most represented age groups are **35–44** and **45–54**, each accounting for **25.7%** of the respondents.

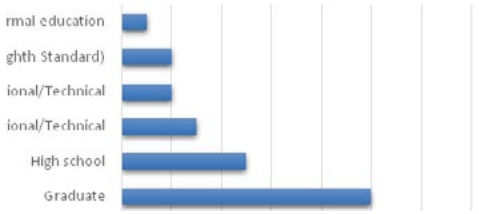
FIG. 2 DISTRIBUTION OF RESPONDENTS BY AGE



Educational Background of the Respondents

This chart visualizes the educational background of the respondents. It shows that **Postgraduate** degree holders are the most represented group, followed by **Graduate** degree holders.

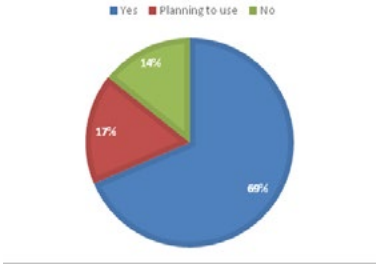
. 3 : EDUCATIONAL BACKGROUND OF THE RESPONDENTS



Identifying Adoption Rate of AI Tools among the Respondents

This chart shows the adoption rate of AI tools among the respondents. It indicates that the highest percentage of respondents, **54.3%**, are currently **planning to use** AI tools, while **34.3%** are already using them.

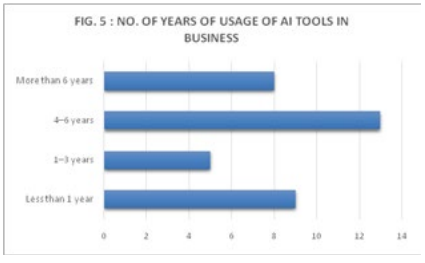
FIG. 4 : CURRENT USE OF AI TOOLS IN BUSINESS



Women as Early Adopters or Planners of AI in Businesses

This chart provides insight into the adopting of AI tools by respondents as business owners. It shows that a large number of respondents, **37.1%**, have been using various AI tools for **more than 6 years**.

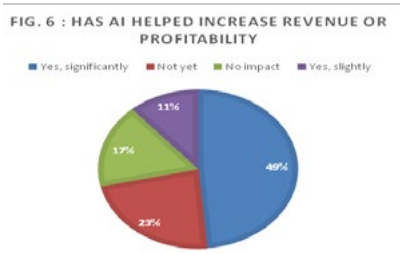
FIG. 5 : NO. OF YEARS OF USAGE OF AI TOOLS IN BUSINESS



Impact on Revenue and Profitability

When asked directly, the responses were mixed. The results show:

- **45.7%** of respondents stated that AI has helped increase their revenue or profitability.
- **37.1%** said that it has not yet had an impact.
- **17.1%** reported no impact at all.



Overall Impact

The charts indicate a generally positive, though often moderate, impact of AI on various aspects of the businesses. The average impact ratings for all areas, on a scale of 1 to 5, range from approximately **2.3 to 2.8**. This suggests that while AI is influencing these businesses, the majority of respondents do not yet see it as having a "major impact" (a rating of 5). The areas with the highest perceived impact are **Customer Engagement** and **Overall Business Growth**.

Based on the Charts and Analysis, following is a Summary of the Key Findings from the Survey

- **Demographics:** The survey was primarily completed by female entrepreneurs, with the majority falling into the **35–44** and **45–54** age groups. Most respondents are highly educated, with a **postgraduate** degree being the most common qualification.
- **Women Entrepreneurs as users of AI:** The majority of the entrepreneurs surveyed have a significant amount of experience in using AI tools, with most of them having used the AI tools **more than 6 years**.
- **AI Adoption:** Most of the respondents are already **familiar** with the term "Artificial Intelligence." While a large portion is still in the planning phase, a notable percentage of entrepreneurs are **already using** AI tools and solutions in their businesses.

Based on the Charts and Analysis, the Main Conclusions are as follows

Overall AI Impact

- **Growing, but not yet major, impact.** While many businesses are using AI and see a positive effect, the average impact rating is still moderate. This suggests that AI is seen as a helpful tool rather than a transformational force for most respondents at this stage.
- **Positive outlook on revenue.** A significant number of respondents reported that AI has helped increase their revenue or profitability, indicating a direct positive return on investment for many. However, a large percentage is still not seeing this financial benefit, either because the impact is "not yet" felt or because there has been "no impact" so far.

Demographics and Business Profile

The survey reveals that the typical respondent is an experienced and well-educated woman entrepreneur. Most participants hold postgraduate qualifications and have operated their businesses for more than six years. This demographic context is crucial, as it frames the findings within a specific group—women who are both knowledgeable and established in their entrepreneurial journeys.

The data also indicates two key segments within this cohort: early adopters who have already integrated AI tools into their operations, and planners who are actively exploring or preparing to do so. This mix highlights a high level of awareness and curiosity about AI among women entrepreneurs in the Mumbai Metropolitan Region (MMR).

In summary, for this demographic, AI is seen as a positive but still evolving enabler. While its measurable effects on revenue and business performance are not yet uniform, there is strong evidence that women entrepreneurs view AI as a valuable asset that can enhance efficiency, competitiveness, and customer engagement. This research provides a meaningful foundation for future strategic planning aimed at supporting women entrepreneurs. The combination of survey insights and broader industry data reveals a pattern: AI adoption among women-led enterprises is steadily increasing, with tangible benefits already visible in areas such as customer interaction and overall growth. The findings confirm that AI is not just a passing trend but a relevant and empowering technology for this segment of entrepreneurs.

Recommendations for Future Planning

Based on the data collected, several actionable strategies can guide future interventions and policy efforts.

a) Develop Targeted Training Programs

While awareness of AI is high, many respondents are still in the planning phase of adoption. Therefore, training programs should move beyond basic introductions to provide hands-on, application-oriented learning. Emphasis should be placed on practical tools such as AI-based marketing systems, predictive analytics for decision-making, and customer service automation. This approach will help women entrepreneurs integrate AI effectively into their operations.

b) Highlight Tangible Benefits

The survey identifies customer engagement and business growth as the areas most positively impacted by AI. Future communication and capacity-building initiatives should focus on these benefits, showcasing real examples of how AI can help entrepreneurs achieve measurable results—improved customer loyalty, market expansion, and productivity gains.

c) Address the 'Not Yet' Segment

A considerable number of respondents have not yet experienced an increase in revenue directly linked to AI adoption. This finding highlights the importance of demonstrating clear return on investment (ROI). Workshops and case studies could help bridge this gap by illustrating financial gains from successful AI integration in similar businesses.

d) Anticipate and Overcome Challenges

Although this study did not explicitly identify the challenges faced by women entrepreneurs, broader research shows recurring barriers such as limited digital skills, lack of mentorship, and concerns about bias in AI systems. To ensure equitable adoption, future initiatives should create supportive environments that encourage continuous learning, address ethical concerns, and foster confidence in technology use.

Strategic Recommendations for Non-Tech Founders

For women entrepreneurs without a strong technical background, adopting AI can still be both achievable and impactful if approached strategically:

Start Small with Clear Objectives

Begin by identifying one core business challenge and using AI to solve it. For example, automating

frequent customer queries or routine administrative tasks can generate immediate efficiency gains before scaling to more complex AI applications.

Evaluate Data Readiness

Reliable and well-organized data is essential for effective AI performance. Businesses should focus on data hygiene—ensuring that information is accurate, secure, and compliant with privacy regulations—to build a solid foundation for AI implementation.

Invest in AI Literacy

Building AI literacy across teams helps ensure long-term success. Leaders can organize workshops, internal "prompt-a-thons," or small pilot projects to familiarize staff with AI tools and encourage experimentation. This not only builds confidence but also helps demystify the technology.

Limitations of the Study

- **Small Sample Size:** The survey included only 42 respondents, limiting its statistical generalizability. The findings represent indicative trends rather than broad population-level conclusions.
- **Geographic and Business Focus:** The study concentrates on women entrepreneurs in the Mumbai Metropolitan Region (MMR), which may not reflect the diversity of women-led ventures across other regions or industries.
- **Self-Reported Data:** As the responses are self-reported, they may be influenced by individual perceptions, biases, or the desire to present socially acceptable answers.
- **Lack of Control Group:** The absence of a comparison group (e.g., male entrepreneurs or women not using AI) restricts the ability to determine whether observed impacts are specific to AI usage or reflect broader entrepreneurial patterns.

Conclusion

Women entrepreneurs in Mumbai are emerging as active participants in the digital transformation era, integrating AI into their businesses to reimagine processes, enhance customer engagement, and expand market reach. While challenges related to funding, digital literacy, and systemic bias remain, the overall outlook is promising.

AI's potential to drive inclusive and sustainable growth is becoming increasingly clear. To fully realize this potential, support systems must evolve—through funding access, mentorship, digital training, and gender-responsive policy frameworks.

Ultimately, this research moves the discussion beyond "Is AI relevant for women entrepreneurs?" to a more forward-looking question: "How can we make AI more effective, ethical, and accessible for women-led enterprises?" By focusing on these answers, policymakers, educators, and ecosystem partners can help build a future where technology serves as a genuine catalyst for women's empowerment, leadership, and innovation.

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