Shaping Atmanirbhar Bharat (Self-Reliant India) through Atmanirbhar Nari (Self-Reliant Women): A Roadmap for Empowering Women-Led MSMEs through ICT, Financial Access, and Skill Development

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Abstract: Women entrepreneurs have emerged as a strong conduit of sustainable economic development, encompassing the power to help achieve United Nations Sustainable Development Goals (UN SDG) 5, which advocates for women's equality and empowerment. In recent years, this community has surged exponentially in the developing world, uplifting the economic and social status of women in society. India, the fastest-growing economy in the world and the abode of young talents has witnessed an increase in the number of women entrepreneurs, challenging the skewed female participation in the labor force, which abysmally stands at 23.6%. The honorable Indian Prime Minister, Shri Narendra Modi, has placed women entrepreneurs at the center stage to help achieve the aspirational dream of transforming India into an Atmanirbhar and Vikshit Bharat. Women MSMEs, if developed with equity and inclusion, have the potential to enhance India's gross domestic product (GDP) by USD 770 billion. Thus, the Indian government, policymakers, researchers, etc., in recent years have shifted the focus toward women entrepreneurs and have initiated different policies to build a conducive environment for women micro, small, and medium enterprises (MSMEs) to unfurl their latent power in the entrepreneurial turf. In this progressive journey amidst the dynamic, emerging technological, and innovative ecosystem, the three pillars of MSME, i.e., Information Communication and Technology (ICT), Skill Development, and Access to Finance, have been recognized as significant tools that can help women entrepreneurs unleash their full potential. Thus, the study attempts to explore how these three cornerstones of women MSMEs have evolved and shaped the entrepreneurial landscape of women in India.

Keywords: access to finance; information communication and technology; micro small and medium enterprises; skill development; women entrepreneurs

1. Introduction

The economic development of a nation proliferates with the effective involvement of its human capital irrespective of gender[1)]. This is further substantiated by the development of UN Sustainable Development Goal 5, which calls for gender parity and women's empowerment[2)], leading to an equitable, inclusive, and sustainable growth of society. Women, though representing a considerable size of the population, i.e., 49.58%, their low participation in economic activity leads to stunted growth of the nation[3)]. In the last couple of decades, developing countries have hardly seen an increase in women's participation in the labor force. This lower

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engagement of women in the working cohort has widened the workforce gender gap, which, if neutralized, could add up to $28 trillion to the global GDP[4]. Women have not been able to make a mark equal to men in the formal workforce due to the glass ceiling and the deeply embedded societal norms[5]. This has resulted in women resorting to the informal economy and being inclined more towards self-employment to maintain a harmonious balance between personal and professional life and attain economic independence[6,7]. Thus, in recent years, women's entrepreneurship has been gauged as the most powerful weapon to combat poverty and gender inequality[8,9] leading to an improved and balanced labor force participation number, which could boost the GDP growth rate of the country, if provided a level playing field[10].

Entrepreneurship has emerged as a strong platform for women to unfurl their untapped potential for the development of an egalitarian society, ensuring women's empowerment through economic independence[11]. Participation of women in entrepreneurial endeavors brings multifaceted dividends to a country in the form of better health, good education, building of productive assets, greater wealth, higher GDP, and quality human capital, as the breadth of women's growth unlike men's percolates down to her family, children, other women in the society at large, and even to cross nations[2,12]. This fact is well acknowledged by developed and high-income countries where women entrepreneurs are driven by opportunity owing to a high level of education coupled with a gender- neutral favorable, rich entrepreneurial ecosystem[5] as demonstrated by the US, New Zealand, and Canada, which command the top three positions in women entrepreneurship as per the Master Card Index Report 2022[13]. In recent years, women entrepreneurship has been receiving impetus in developing nations too for sustainable and equitable growth[2,14] to overcome poverty. They have surfaced as a reform agent having the potential to change the dynamics of an economy through their capability of generating socio-economic development[15]. Hence, this power-packed fraternity of women entrepreneurs is garnering attention across the globe from researchers, governments, NGOs, corporates, policymakers, etc, who are working in solidarity towards their upliftment and economic empowerment targeted to grow global GDP by 13 trillion in 2030[13] through boosting their participation in the MSME (Micro, Small, and Medium Enterprises) sector, which is the major GDP contributor and employment generator of an economy.

MSMEs as the nervous system of the business world, in recent times have seen a strong influx of women entrants in developing nations operating one-third of the world's SMEs[16], yet the infrastructural and fundamental problems[13] like lack of finance, low education, familial responsibilities, and cultural barriers persisting in the system constrain women MSMEs from flourishing at their fullest possible extent. In developing countries, unlike developed nations, women are rather pushed to pursue entrepreneurship because of gender disparity, poverty, lack of skill, technical know-how, education, and confidence, etc which labels them as entrepreneurs born out of "necessity" struggling for survival[17,18]. Middle and low-income countries are working on different pro-women measures to provide all possible help to this latent powerhouse to make obvious their phenomenal presence in the country's growth and make the balance lean more towards opportunity-driven entrepreneurship[19,20], yet the current measures seem to be falling short, and a more concerted effort is to be pivoted at bringing them up the development curve on a global platform.

With a relatively youthful population[21] and a thriving micro, small, and medium enterprise (MSME) sector, India is quickly becoming one of the world's most dynamic economies, yet it ranks 57 out of 65 countries in women entrepreneurship as per the MasterCard Index Report 2022[13]. MSMEs play a vital role in driving India's economic development[22], however, the growth of women-led MSMEs has remained limited[23]. Despite women's growing recognition as entrepreneurs and continuous improvement in the entrepreneurial ecosystem, their growth remains stunted and skewed across different sectors, majorly cluttered in low-skilled and labour-intensive industries, primarily due to low education and social-cultural norms of patriarchal society[24,25]. In the past, numerous studies have focused on the push and pull factors that motivate women to pursue entrepreneurship, contributing to their empowerment. However, with the rapid advancement of digitization and the rise of the Fourth Industrial Revolution, ICT, coupled with diverse skill sets, has emerged as the indispensable tool driving the growth of women entrepreneurs, supported by cost-effective, accessible, and adequate capital.

With the diffusion of technology in different spheres of life, women are leveraging various tools of ICT to overcome the age-old traditional barriers and stereotyped social norms for making their way into an unexplored territory that was beyond their reach[26]. They are acquiring and polishing their skills to gel with the rapidly growing technological landscape[27]. To combat the deep-seated norms, in today's tech-driven, vibrant environment, women entrepreneurs in India are expected to enhance their competence with ICT and varied skills powered by adequate financing. As India is riding high on the ambitious agenda of becoming Atmanirbhar Bharat (self-reliant), Vikshit Bharat, and a developed country by 2047[28], the nation must propel women entrepreneurs' hidden power through a conducive entrepreneurial ecosystem armed with digital, financial, and skill inclusion conjoined by parity. Against this backdrop, the study focuses on addressing the critical gaps in the women-led MSME ecosystem in India by identifying unique

challenges such as patriarchal norms, limited digital literacy, lack of access to finance, and insufficient skill development opportunities. It further explores the role of ICT, skill training, and financial sources in strengthening this ecosystem and evaluates their collaborative impact on enhancing women's entrepreneurial capabilities, bridging gender gaps, and fostering socio-economic empowerment within the MSME sector. By aligning these interventions with India's unique socio-economic context and the vision of Atmanirbhar Bharat, the research seeks to provide practical, scalable solutions that empower women entrepreneurs and drive systemic transformation toward a more inclusive and equitable entrepreneurial landscape.

This research stands out for its integrative approach, focusing on ICT, skill development, and access to finance as interconnected tools to empower women entrepreneurs in the MSME sector. Moving beyond the conventional practice of analyzing these factors in isolation, this study offers a cohesive framework to examine their combined impact within the Indian context. Furthermore, the study aligns with global development goals, directly contributing to the advancement of UN Sustainable Development Goal 5, which emphasizes achieving gender equality and empowering all women and girls. By supporting India's vision of self-reliance, the research underscores the critical role of women-led MSMEs in fostering an equitable and sustainable entrepreneurial ecosystem.

2. Literature Review

2.1. Entrepreneurship and Women

Over the years, entrepreneurship has emerged as a powerful tool to combat the vicious circle of poverty[29)] and foster economic prosperity. It is the act of bearing risk to explore and exploit new opportunities and transform them into business ideas to generate income[30,31)]. Entrepreneurship is the value creation activity aimed at the satisfaction of consumer demand through the synergy of material, manpower, finance, etc., against the risk premium called profit. It is a connotation of societal progress[11)]. Traditionally, entrepreneurship has evolved as a male-dominated field[32,33)], as it involves financial decision-making and risk-taking which are primarily thought to be a man's personality trait[34)], owing to the gender-ascribed role as a breadwinner[35)]. In contrast, the representation of women's role in society as nurturers has made them accept the boundaries of the house as their limitations dictated by social and cultural conventions of family care, domestic tasks, and child raising, resulting in their low penetration in income-generating activities[36)]. Their involvement in economic activity was a less thought concept and priority; however, with the spread of education, liberalization, and globalization, the spirit of entrepreneurship was ignited among women across the globe[37,38)]. Another noticeable reason that caused a surge in women pursuing entrepreneurship as a career is the existence of an impermeable glass ceiling in the corporate world, which prevents them from scaling the ladder of senior positions owing to career breaks at different times for familial growth and care, making them fall prey to the management's preconceived notion of perceiving them as incompetent for long-term commitment in the organization[39-42)]. Moreover, the pay inequality compels them to look for other income sources in the form of entrepreneurship[19)], which has emerged as a game changer by blessing them with the flexibility to strike a cordial balance between work and family life[43)], exploring their inner call for innovation[44)] and taking control of themselves[45)]. Women who were not an active part of the labor market also got motivated to take up entrepreneurship as the best earning opportunity seeking it as the ultimate solution for low-income, image creators in society[8)] and for reconciling the work-life cycle[46,47)]. Unlike male entrepreneurs who pursue entrepreneurship to satisfy their craving to earn more money, power, and independence[48,49)], the female entrepreneurial spirit is been driven by different motivations which are the rendition of push (compelling force to start) and pull (attracting force for start) factors mentioned in different earlier studies[32,50,51)]. Thus, women entrepreneurs have manifested as a blend of push and pull factors who are willing to bear the risk to bring their best and help build the nation with innovative ideas contributing to high GDP and employment creation [44,52,53)].

Despite both genders being bestowed with equal capability, women have been seen struggling in starting and scaling businesses majorly due to the gender-bound responsibility of domestic care which has been the breeding ground of a patriarchal mindset in society more pronounced in the developing countries contributing substantially towards the low development of women in terms of financial independence[54,55)]. Their condition is further exacerbated by the lack of finance and collateral to borrow loans[37,56)]. Due to the small ticket size of the loan, women are charged high interest rates[57)] and processing fees[58)]. The existence of gender disparity in the availability of capital makes women inclined towards the informal economy for their entrepreneurial journey concentrated majorly in micro and small enterprises[58,59)] operating primarily in the service industry due to limited technical skills, and capital investment[41)]. Owing to this glass ceiling of financial barriers[60)], women rely on their capital for starting a business[61)] which too at times is limited due to fewer earning avenues at their disposal. They don't even enjoy the privilege of having loans from formal financial institutions owing to the lack of transaction history and the dearth of collateral[57)] resulting from skewed ownership of land, the most valuable economic resource, in the name of male counterparts[62)] as only 10-20% of women in developing nations enjoy land ownership[49)]. Due to weak

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responses from banks and other financial institutions for formal credit, women often resort to informal sources like family, friends, and money lenders to meet the capital needs of their businesses[61,63]. While males continue to enjoy a lion's share of the financial market, microfinance programs have provided credit access to many women who have been turned down by traditional lenders[64]. These institutions came as a savior for women especially at the base of the pyramid and in rural areas which helped them with small loans to commence their economic activity in the form of small businesses and micro enterprises[65,66]. However, the paucity of funds at large scale from formal institutions makes women compromise with business expansion plans and settle with limited resources restricting their business size[58]. Investors too shy off from investing in women-run businesses due to unconscious bias[67], thinking of them as risk-averse possessing a low propensity to take risks[68]. Financial inaccessibility has been the major impediment in the growth of women entrepreneurs aggravated by other factors like a limited reach to the market, weak networks, unavailability of raw materials, scarcity of role models, lack of education & training, cutthroat competition, the burden of social responsibilities, etc. which together make this journey somewhat a roller coaster ride for them[32, 69-72]. Table 1 reflects the similar barriers experienced by female entrepreneurs in other developing countries.

Moreover, women are highly vulnerable to economic shock resulting in fewer women entrepreneurs[35]. This bears testament to the fact that around 90% of women entrepreneurs operating in low and middle-income countries were afflicted due to the coronavirus catastrophe[73]. Around 64% of the women entrepreneurs were more impacted as compared to 52% of men-led businesses. This underscores the reality that women often have to exert even more effort than men to prove their value in the business world.

Table 1: Barriers faced by women entrepreneurs

Developing Nation	Challenges Faced by Women Entrepreneur
Pakistan[74,81]	Cultural and religious hurdles Male-dominated society resulting in gender discrimination depriving women of equal rights. Male witness required to register a business.
Bangladesh[75]	Patriarchal society prioritizes women's role as household handlers thus resulting in their low-earning activities. Spouse approval required to start a business Major challenges poised are lack of finance, training, availability of market, etc.
Malaysia[76]	Male-dominated society resulting in women having limited mobility and lack of decision-making power.
Nigeria[77]	Access to finance is restricted due to a lack of property rights (especially Land) and gender discrimination. Low level of education, difficulty in maintaining work-life balance due to social norms
Vietnam[78]	Difficulty in obtaining finance
Ethiopia[79]	Difficulty in obtaining finance from formal institutions due to gender discrimination, Socio-cultural barriers
Nepal[80]	A patriarchal society where women are denied equal access to education compared to men; lack of assets and guarantees from male family members required for availing loans.
Afghanistan[81]	Women require the consent of a male guardian to travel outside the home, significantly restricting their mobility.

2.2. Women MSME and Diffusion of Technology

MSMEs have unfolded as the most dynamic and lively sector, accounting for up to 45 percent of total worldwide employment and up to 33 percent of GDP in emerging nations[82]. This sector has the potential to drive national GDP growth by fostering entrepreneurial development with minimal capital investment, leading to wealth creation and job opportunities[83,84]. By stimulating innovation, MSMEs produce products and services, contributing to broader economic prosperity[85,86]. In recent years women MSMEs have seen unprecedented growth, accounting for 35% of MSMEs in developing nations. Despite their significant contributions, women-led MSMEs continue to face financial, social, cultural, legal, spatial, and infrastructural challenges that hinder their growth[87]. The lack of entrepreneurial skills and business acumen, compounded by limited access to education, training, support systems, and social networks, makes scaling women-led MSMEs particularly challenging. As a result, they continue to fall behind male-owned MSMEs, who dominate the sector and account for two-thirds of global business. Among all regions, South Asia records the lowest growth in women-led MSMEs, accounting for just 18%.[88].

Women-led MSMEs have historically faced geographical and societal challenges that restricted their productivity and profitability. However, the rise of digitalization and ICT has been transformative, providing women entrepreneurs access to broader markets and new

opportunities, such as business expansion and social networking. ICT tools, including mobile phones, smartphones, mobile apps, and e-wallets, offer user-friendly platforms that enhance communication, facilitate seamless transactions, and simplify access to global supply chains. They have lowered entry barriers, enabling women to create innovative, low-cost business models. As a result, the impact of ICT is far-reaching, benefiting both urban centers and rural communities and facilitating international connections. E-commerce platforms like Taobao in China empower rural women to convert domestic spaces into productive hubs, enhancing household incomes and challenging traditional gender norms[89]. Similarly, social media platforms like WhatsApp and Facebook have facilitated cross-border trade and global business connections. In Khartoum, Sudan, these tools have enabled women entrepreneurs to engage with the Sudanese diaspora, fostering both local and international growth[90].
ICT's influence spans across developed and developing countries and industries such as agriculture, tourism, manufacturing, and healthcare etc. In Thailand, for example, Facebook has empowered women micro-entrepreneurs in tourism and hospitality, encouraging self-expression, fostering connectivity, and enhancing access to knowledge[91]. In Nairobi (Kenya), mobile money has enabled women to access financial services that support business growth[92]. While ICT is essential for inclusive and sustainable growth, obstacles such as low internet penetration, digital illiteracy, and limited access to ICT tools create significant barriers to its adoption and application by women.

3. Theoretical Framework

The research framework integrates Liberal Feminist Theory and Resource-Based Theory to examine the sustainable development of women-led MSMEs in India. Liberal Feminist Theory underscores gender equality, providing a lens to identify systemic inequalities and women's barriers to accessing resources. It posits that both genders should be granted equal entitlements and opportunities in every facet of life. The notion of women being inferior is a socially constructed stigma, deeply rooted in discriminatory cultural and social practices[93]**.** This theory emphasizes dismantling these structural barriers to promote women's empowerment and economic independence through equitable education and legal rights[94]. Advocates of Liberal Feminist Theory actively strive to achieve equal status for women in all societal domains, including education, employment, marriage, and personal freedom[95]. Thus, entrepreneurship, influenced by gender, family dynamics, necessity-driven motives, and broader goals beyond profit, reflects the critical importance of feminist theories in improving women's lives[96].

Resource-Based Theory posits that resources, particularly those that are unique, rare, and difficult to replicate, serve as key assets that provide organizations with a significant edge[97]. The theory underscores the strategic importance of effectively utilizing and integrating these resources to drive innovation and create value. For sustainable growth in a dynamic entrepreneurial environment, firms must continuously optimize their existing resources while seeking new and distinctive ones[98]. According to this theory, combining tangible resources such as ICT, machinery, and finance with intangible assets like management skills results in distinctive capabilities, fostering competitive strength and industry leadership[99].
These theories collectively provide a robust foundation for women-led MSMEs, which often face social biases and challenges in competitive markets. Critical resources such as ICT, skill development, and access to finance play a pivotal role in their growth and success. ICT facilitates access to digital platforms, improves market visibility, and drives innovation by bridging the digital divide. It empowers women entrepreneurs by enabling cost-effective marketing, knowledge sharing, and customer engagement through tools like social media and e-commerce. Skill development equips women with the technical, financial, and entrepreneurial expertise required to manage and grow their businesses effectively, adapt to new technologies, and compete in dynamic markets. Meanwhile, access to finance provides the infrastructure and capital required for expansion and long-term sustainability. Together, these three interconnected pillars address structural barriers, fostering empowerment and enabling women-led MSMEs to thrive in evolving economic landscapes

4. Research Methodology

This research adopts a descriptive approach to examine the role of ICT, skill development, and access to finance in fostering the sustainable development of women-led MSMEs in India. Anchored in secondary data and a comprehensive literature review, the study aims to develop a conceptual model aligned with the national vision of *Atmanirbhar Bharat* (Self-Reliant India). Relevant literature for the purpose was identified through a systematic and thorough search using key terms such as "Women Entrepreneurship," "ICT," "Access to Finance," "Financial Inclusion," "Skill and Training," "Developing Nations," and "Women MSME" from varied sources including conference proceeding, peer-reviewed journal articles, government publications, industry reports, and credible online resources. The review focused on identifying the interrelationships among these key factors and their contribution to women's empowerment. Synthesizing these findings, the study proposes a theoretical framework highlighting the significance of

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ICT, skill development, and access to finance in promoting socio-economic development. This methodology ensures a structured analysis of prior research to offer practical and policy-level recommendations for enhancing the sustainability of women-led MSMEs in India.

5. India and Women Entrepreneurs

On a global front, India is positioned as the fastest emerging economy contributing about 15% of the global growth[21] and further possesses the potential to lead the world by closing the gender gap through channelling its women workforce energy in productive pockets like entrepreneurship which could help the country's GDP growth to leap by USD 770 billion (i.e.,18%) by 2025[100] and increase workforce by creating employment for an additional 150-170 million people by 2030[101]. The skewed gender gap has made India stand at 127th place out of 146 countries globally and occupies 6th place out of 9th in the South Asia region[102] posing a serious threat to India's growth, if the gender disparity is not addressed appropriately and timely. Moreover, as depicted in Figure 1, India occupies the lowest position among the BRICS countries across multiple indicators. Men make up 77% of the world's working-age workforce, while women comprise just 50%[103]. India's female labor force participation remains among the lowest globally, due to not receiving equal opportunities on different fronts plugged by the patriarchal culture of the economy[104], burdened with the traditional gender role of domestic care thus all weighing heavily on the professional aspirations of the Indian female[105], unconsciously labeling it a male-dominated country. In 2021, female participation in the labor force was recorded at 19% which is considerably lower than the world's average of 25.1%[106]. This plunging female LFPR (Labor Force Participation Rate) can be arrested by providing a more conducive entrepreneurial ecosystem to women to motivate them to take up entrepreneurship as their career choice which tends to add to the economic growth and GDP as women entrepreneurs create a domino effect by creating job opportunities for other women and making them an active part of the labor force. India by ignoring its half-productive labor will struggle to realize its ambitious dream of

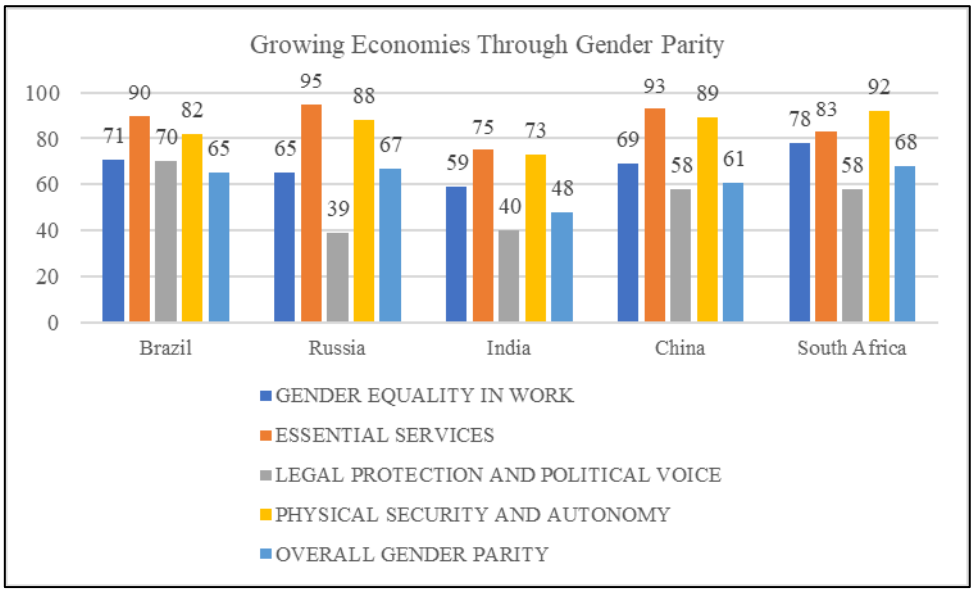

Fig. 1: Reflects the gender parity achieved by BRICS Nations on different parameters

Source: Council on Foreign Relations. Scores are measured on a scale of 0 to 100, where 100 represents full parity

of being a USD 5 trillion economy by 2025[107], a New India, and Atmanirbhar Bharat[28]. Without women being equal growth partners, India's objective of achieving the UN sustainable development goals by 2030 will too succumb.

India is a land of a deeply ingrained cultural ecosystem where women have been growing with the social norm of building families and creating bonds within and around the periphery of their homes[108,109]. They have been sculptured with the mindset of being a domestic figurine entrusted with the responsibility of taking care of the family[110] in the best possible manner within the financial means[111] and other resources made accessible to them by the male head of the family[112]. This historically defined position of Indian women has resulted in time poverty, economic dependence, restricted or no mobility, and a relatively low level of education[33]. The patriarchal form of the society slowly overshadowed the aspirations of Indian women[112] who were thus left neglected and unnoticed in the economic progress of the nation causing a substantial loss in the GDP[113]. With the advent of social reforms and education[111], Indian women gradually started to move out

of their closed nests in quest of their identity and independence which led to the emergence of women entrepreneurship[33]. Though male entrepreneurs were in vogue and flourishing in India in the pre-independence era[114] female entrepreneurship gained momentum post-1991 with the introduction of industrial policy[111,115] which removed restrictions for private enterprises to conduct business, fostered the privatization of public sectors, and attracted an inflow of foreign investment in India. In the initial years, women were confined to home enterprises with little or no motive of earning[116,117] however, with the progress of India, women entrepreneurs too grew to foray into different fields of entrepreneurship leapfrogging from traditional industries like Pappad, Pickles & Powder making to modern industries of Electronics, Engineering, and Energy[14] through government support extended by way of different schemes like E-Haat, Rashtriya Mahila Kosh and Swayam Siddha Kosh, MUDRA scheme, Women Entrepreneurship Platform, Support for Training and Empowerment of Women (STEP), SIDBI schemes, Mahila Udyam Nidhi and Mahila Vikas Nidhi, Mudra Yojana Scheme for Women Udyogini, etc. which aimed to promote women entrepreneurship[104]. Over the years, women entrepreneurs have made a signification stride in the MSME sector which is the lifeblood of the economy and is expected to further fuel the growth of the country. Thus, women entrepreneurs are indispensable assets for India which needs special treatment to unleash their full potential.

6. Women Entrepreneurs and MSME in India

MSMEs in India serve as the second-largest employment generator, providing 110 million jobs and contributing 30% to the GDP annually. Recognizing this, the Government of India has prioritized MSME growth. However, women's representation in this sector paints a dismal picture, comprising just 20.37% of the total 63.38 million MSMEs in the country. Among these, 82% operate as micro units in the informal economy, predominantly run by sole proprietors, focusing on traditional industries like handloom and service sectors such as beauty and health[118]. Women in this sector often remain confined to small-scale businesses, primarily due to limited access to finance, leading to a staggering credit deficit of USD 158 million[119]. Despite generating 3.09% of the industrial output and supporting the livelihoods of around 27 million people, women entrepreneurs in India face persistent challenges[120]. These include market inaccessibility, weak networks, gender digital divides, societal obligations, lack of skills, safety concerns, work-life balance issues, and inadequate government support. Such gender-insensitive entrepreneurial ecosystems contribute to India's poor performance in early-stage women entrepreneurship. Only 33% of start-ups in the country are headed by female, even though India ranks third globally in producing early-stage entrepreneurs. Women tech entrepreneurs face even greater challenges, representing just 14% of tech unicorns having at least one female founder[120]. Nevertheless, despite these adversities, women entrepreneurs have demonstrated remarkable resilience and determination, driving meaningful changes in the entrepreneurial ecosystem. To unlock the untapped potential of women entrepreneurs and boost India's GDP and employment, empowering women and strengthening the existing support framework is imperative. To address these issues, a conceptual model has been developed for the study, as shown in Figure 2.

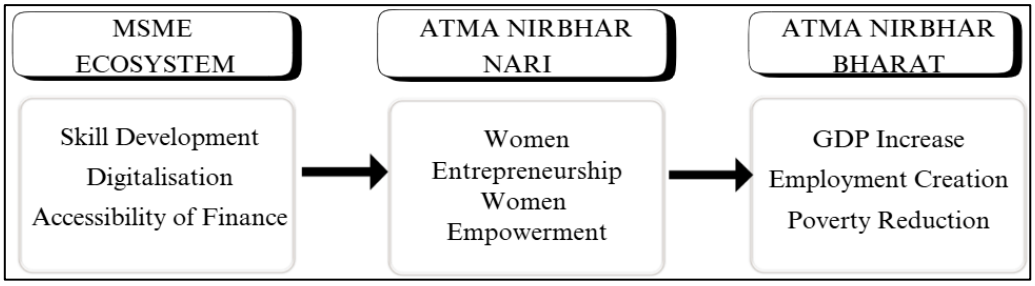

Fig. 2: A conceptual model illustrating the sustainable development of women entrepreneurship leading to Atmanirbhar Bharat

7. Skill Development

In today's technological an innovative world, a skilled workforce is imperative to keep abreast with the competitive globalized ecosystem[121]. Skill development helps break the cycle of poverty and leads to sustainable employability[122]. A skilled manpower is an asset for the nation and the entire humanity. This calls for an urgent need to equip women, the underappreciated and underutilized workforce, with various skill training to help them build an empowered and sustainable future[73]. Women entrepreneurs, while being recognized as the rising stars of the global economy, frequently experience stunted business growth due to a lack of financial and human resources. Their condition is exacerbated by illiteracy and a narrow mindset of being risk averse and poor decision-making, engendered by cultural upbringing, which, when treated with adequate education and soft skill

training, produces favorable outcomes[123,124]. Enabling customized training programs through different government agencies, NGOs, and other support systems enables women to acquire a skill set that helps in improving their performance as substantiated in the study by Batada, 2022[125] on women entrepreneurs in Pakistan. The research by Rudhumbu, Plessis, & Maphosa[126] on the challenges of Botswana women entrepreneurs came with the finding that exposing women to entrepreneurial training helps them reach the target market effectively and connect with customers better. Women need to be served with both traditional and non-traditional training for the growth of their businesses. Entrepreneurs need to continuously enhance their learning and evolve new skills to adapt to changing circumstances to survive. This is evident through the work of Afshan, Shahid, & Tunio[127] which showcases the resilience of women entrepreneurs of Pakistan who acquired technical skills, learnt the use of online transactions, etc. to adapt to the new normal due to the COVID-19 crisis for their business existence. Thus, skill development and entrepreneurship go hand in hand and no economy can afford to abandon women out of this ecosystem.

8. Women Entrepreneurs and Skill Development in India

India ranks one of the lowest in the world in terms of female employment plunging to 19.9 percent in 2020 from 26.4 percent in 2005[3] and has a dismal ranking in women entrepreneurship. Despite the growing recognition of women entrepreneurs as a barometer of economic development, the gender-backed social norm inadvertently deprives them of the opportunity to tap the resources far more easily available to men, thus making their entrepreneurial journey challenging[128]. Women in India are majorly concentrated in the low-skilled, informal sector, operating from homes owing to their skewed time division leaning heavily towards family and domestic responsibilities with a low infusion of capital investment[118] thus impeding their productivity[129]. This business informality has added to their woes making them skill-deficient and creating a barrier to sustainable development. Over the years, Women entrepreneurs in India have flourished in the service sector (27-40 percent) while remaining underrepresented in the manufacturing sector (3-12 percent) concentrating primarily in the traditional manufacturing pockets like textiles, and food industry which are dominated by the feminine skills of stitching, cooking, etc.[130]. However, their presence in core manufacturing sectors like electricity, automobiles, construction, etc demanding technical skills remains bleak as these sectors have grown up to be male-dominated territories and thus subject to gender bias creating a gender gap[131]. The manufacturing segment contributes significantly to India's GDP, yet women represent only 20% of the 8 million workforces engaged in this vital industry[132]. To bring diversity in culture and perspective to the manufacturing industry, GOI initiated the ITI program for the skill development of the female population. Women enrolment in these ITI programs over time managed to climb from 6% to 21% in 2018[133], the penetration of women in sectors like IT, Electronics, and automobiles seemed negligible due to functional problems like deep-rooted old thinking, lack of education and training, dearth of basic amenities, lack of gender-neutral labor laws, mobility and safety issues, childcare responsibilities, etc[134]. Further with the dawn of Industrial Revolution 4.0, which is driven by machine learning, artificial intelligence, automation, and innovative technologies, the possibility of low and mid-skill work getting redundant is highly endangering the women participating in the workforce and thus necessitates the priority to make them future-ready with digital and other critical skills like cognitive flexibility, negotiation, creativity, people management, etc.[135].

To capitalize on the benefits of this demographic dividend and expand its horizon to help India gallop from USD 3 trillion to become a USD 9 trillion economy by 2030[136], GOI discovered the need to make her women workforce industry ready with requisite skills through its first-ever skill training program called STEP (Support to Training and Employment Programme for Women) initiated in 1986. It aimed at training women to become entrepreneurs, however over time, it lost its effectiveness with its budget remaining unutilized and the trainees dropping out[137]. The next initiative on the row is PMKVY (Pradhan Mantri Kaushal Vikas Yojana), a flagship scheme under the Ministry of Skill Development and Entrepreneurship (MSDE) designed to impart short-term training courses, in line with the current market need making women the primary beneficiary of the program while taking care of their commuting cost, childcare facility, etc. to boost maximum participation. It mostly caters to the skilling needs of feminine sectors like beauty, clothing, etc[138]. The Skills Acquisition and Knowledge Awareness for Livelihood Promotion (SANKALP), a joint program of MSDE and the World Bank works towards skilling women in the vocational field in support of the PMKVY scheme[138]. To add to the list is the National Apprenticeship Promotion Scheme (NAPS), which was established in 2016 and provides apprenticeship training to help women increase their employability[139]. Other schemes like the Jan Shikshan Sansthan (JSS) scheme prioritize skill training for illiterate and school dropout females while the Craftsmanship Training Scheme (CTS) intends to impart vocational training to women through enrolment in ITI (Industrial Training Institute), however, received marginal participation from female in engineering and other technical field citing socio-cultural norms and

inadequate facilities as the major roadblocks[139]. In a pursuit to help women catch up with the unprecedented opportunities beamed by fast automation in manufacturing, GOI has introduced several policies like The World Scientists Programme, The Science and Technology for Women Scheme, The Vigyan Jyoti Scheme, etc to boost their participation in the field of STEM (Science, Technology, Engineering & Mathematics)[3] and last but not least, a hefty budget of Rs 2.23 lakh crore in 23-24 have been mobilized by the government for the development of gender-sensitive policies and projects[140].

9. Information, Communication, and Technology (ICT)

Amidst the rapid digitization in the world, ICT has emerged as an indispensable tool for sustainable growth charting a new landscape of work[119]. ICT has evolved as a key enabler in bridging the communication gap by facilitating easy and clear long-distance communication using mobile, computers, the internet, and other social media applications. The adoption of ICT has become an inevitable need for MSMEs, the growth machinery of an economy, to adapt to the changing dynamics to thrive in the cutting-edge ecosystem to boost socio-economic development[142,143]. Aftermath of the COVID-19 crisis, digitization has become the new normal and the use of ICT is no longer a luxury for a developing nation[144]. The growth of ICT has opened new avenues of doing work for women entrepreneurs in developing countries who are rapidly embracing the different tools of ICT to the best of their advantage, knowledge, and skill to move the extra mile in their business[145]. Access to the internet and its usage has led to an increase in the economic empowerment of women entrepreneurs by providing them the opportunity to work online and get connected with their customers, suppliers, and markets easily[146]. The study conducted on the women micro-entrepreneurs in South Africa found that ICT provides a simple and easy mode of communication that helps women to build social relations more easily and faster widening their network without displacing them from their location[147]. The research by Komunte[148] on women entrepreneurs in Uganda amplified the benefits that mobile technology brings for them in the form of better markets, attractive prices through negotiation, timely information, profit increase through network scalability, and easy transfer of funds. The findings of Chatterjee, Gupta and Upadhyaya established that ICT adoption helps in generating entrepreneurial orientation in rural women and thus brings economic, social, and political empowerment[149]. However, as women entrepreneurs are unfamiliar with the positive outcomes that technology brings to business, the rate of adoption remains diluted and thus emphasizes the designing of gender-inclusive training both for rural and urban women to increase awareness about technology[150,151].

10. Women Entrepreneurs and Information, Communication, and Technology in India

With the growth of the digital economy and penetration of the internet, the landscape of women MSME in India has undergone an upheaval through the adoption of e-commerce as the new business model[152] which is expected to grow by USD 300 billion by 2030[153]. The availability of smartphones and mobile internet allowed them to engage in social commerce – a fusion of e-commerce, social media, and digital payments[154] overcoming the traditional barriers of limited mobility, time paucity, limited social network and low capital[155]. E-commerce, Social Commerce, and financial services were further fuelled by the COVID-19 catastrophe[156], which exposed everyone to the new digital normal and necessitated the paramount need to have mobile and internet. The advent of Fintech and the availability of mobile has brought financial services into the hands of women entrepreneurs spurring their financial inclusion and empowerment[157].As per Gogoi & Manzar[158] facilitating easy internet connectivity to more than 600 million females in developing countries are expected to raise the global GDP between USD 13-18 billion. The above benefits can be made more meaningful when the digital gender divide is addressed which is a product of gender-biased beliefs and value systems. The Digital Divide is the lack of physical access to digital tools like mobile, internet, laptop, etc, impairing digital skills, opportunity, and autonomy to make meaningful use of ICT. The gender digital divide refers to the gap existing between men and women in accessing different tools of ICT[159]. The digital divide is a manifestation of global inequalities. In India, women have significant barriers to using digital technologies due to sociocultural issues[154]. Prevalent gender roles, attitudes, and conventional practices contribute to women's limited adoption of digital technologies[160]. The gender digital divide is worsened due to low levels of female education, time paucity, restriction to free mobility, and oversight by male members on female internet usage [161,162]. According to the GSMA Mobile Gender Gap Report 2023, males accounted for 52% of internet users in 2022, while women accounted for 31%. There exists a gap in smartphone ownership – 48% of men have a smartphone as against 29% of women[163]. The digital gap is far larger for rural women as only 34% of women in rural India have net accessibility, as evident from the NFHS (National Family Health Survey) 2020[164]. Moreover, women in rural India are deeply bound by the patriarchal thought process which restricts them from visiting community internet centres, and co-ed training facilities[165] making them poorer in terms of digital accessibility and rendering it difficult for them to explore

the myriad benefits of using technology, limiting their growth and making them confined to a culturally defined boundary. So, to increase women's participation in technology, more women be encouraged to STEM education and digital literacy to be improved to close the digital divide, particularly in rural areas.

The government of India has introduced several policies on different levels across states to address the gender digital divide and make women entrepreneurs more tech-savvy. Under the Initiative of digital India, Mahila – E – haat was launched in 2016 to provide an indigenous e-commerce platform to women entrepreneurs to help them sell their products to a wider customer base without a platform fee. It eliminated the middlemen thus maximising the profit[137]. The most notable measure taken to embolden the digital infrastructure for women is the "Women Entrepreneurship Platform" developed by NITI AAYOG in 2018. It serves as a knowledge repository designed to streamline the information asymmetry bringing all women entrepreneurs, channel partners, industry experts, and mentors on a single platform fostering development through the sharing of aspirations, constructive feedback, and experiences. It helps to create awareness among women entrepreneurs about different schemes and initiatives and guides them to maximize the benefits from them[23]. To make ICT a pervasive reality, its accessibility should percolate to the last mile, necessitating the spread of digital literacy to fortify the access network of women to better health, education, finance, and other social benefits. Digital Sarthak is one such digital literacy drive that has benefitted around 17,000 women entrepreneurs by skilling them in the usage of digital tools for conducting trade, making payments, and sharing information[166].

11. Access to Finance

According to Cicchiello, Kazemikhasragh, Monferrá, & Girón[167], entrepreneurship is crucial for personal, societal, and national development, and it can only flourish in a financially inclusive and cohesive environment. Finance is the life wire of business and imperative for the growth of an economy. Current and future entrepreneurs are encouraged to take risks and grow their enterprises by a steady supply of low-interest finance which in turn increases the gross domestic product (GDP) and the country's economic health via increased tax revenues[168]. Entrepreneurship and financial inclusion thus move hand in hand for a prosperous nation and the equitable growth of women by providing them with financial autonomy ensuring quality life[169,170]. Though the increased number of women entrepreneurs resonates with the progress of an economy, they remain underrepresented in this financially inclusive entrepreneurial culture owing to a lack of access to financial products and services making it difficult for their enterprises to thrive and grow at the same rate as those led by male entrepreneurs[171,172]. Women for long have been reeling under financial exclusion particularly in developing and under-developing countries with no bank account ownership due to the stereotyped gender role of domestic care, no asset ownership to pledge as collateral for loans, low education, limited mobility, and biased attitude of officials[173,174]. Besides this, lenders' feeble trust in women-led initiatives, the lack of financial knowledge, and the susceptibility to loan applications getting rejected have made women entrepreneurs shy away from approaching formal institutions for credit[175]. All these factors have made them credit constraints and thus inhibited their growth as entrepreneurs widening the inequality gap, poverty, and low levels of economic development. The credit demand of women entrepreneurs across the world has been progressively addressed through microcredit, microfinance, self-help groups, financial inclusion policies like opening bank accounts, and fintech, yet the journey to contract credit gap of USD 1.7 trillion is still a long way to go and calls for a more conscious and rigorous effort[176].

12. Women Entrepreneurs and Access to Finance in India

Indian society is governed by a patriarchal culture, where the majority of families are headed and controlled by males making gender discrimination a pronounced reality[112] manifested in the form of female early marriage, their lower control over household resources, and the absence of property rights[177] stamping them as a child bearer and family nurturers whose majority of the time is consumed in unpaid work, estimated to be around 4.4 hours more than men on average, making them deficient in terms of time[178] thus leading to limited mobility, poor networking, and low financial inclusion. Indian women across different nations stand at the top echelon in performing domestic chores whose growth is compromised due to their productive time invested in unpaid activities and their hard work being discounted[138]. The persisting gender inequality has created barriers for females in India to join the formal economy which they dared to circumvent through pursuing entrepreneurship operating majorly in informal setup at the micro level to overcome the guilt of not compromising the family life. However, with time, Indian women have made major inroads into entrepreneurship, yet they remain infected with a credit deficiency of $11.4 billion (INR 836 billion) as per the IFC 2022[179]. Around 90% of the women failed to avail the formal loans owing to ignorance, lack of awareness, and prejudiced treatment with a meagre 5.2% of the loans being received from public sector banks. Women Entrepreneurs' accessibility to less than 3% of the venture capital further narrates the gloomy story of gender discrimination[180]. The stark gender gap in the investing space reflects the weak pipeline of women investors in

India calling for a more conscious address to boost the gloomy numbers of women angel investors (1%) and venture capitalists (7%) to help women entrepreneurs with ease of financing[181].

To facilitate easy availability of finance at the disposal of women, the need to promote "financial inclusion" emerged as the top priority agenda of the developing nations[182]. India has made a slew of changes to drive financial inclusion to empower women and women-led enterprises. The most notable and distinguished initiative of GOI made a stride in 2014 with the introduction of the PMJDY (Pradhan Mantri Jan Dhan Yojna Account) Scheme which aimed at providing women with a bank account by connecting it with their Aadhar card[183]. The scheme led to a surge in women's bank account ownership recording a penetration of 78% in 2021[156] which further got an impetus when the government made female account holders, the primary beneficiaries, of the social benefits which were directly credited to their accounts. To help women entrepreneurs with credit assistance, GOI introduced the MUDRA Loan in April 2015 which offered to provide collateral-free loans of up to Rs 10 lakhs to micro and small enterprises[184]. TREAD (Trade Related Entrepreneurship Development Assistance Scheme) Program came into existence to support women entrepreneurs through funding, training, counseling, etc. Under this program, the government contributes 30% of the loan amount[185]. Stree Shakti Scheme was started by the State Bank of India to provide loans to enterprises where women hold a majority stake of 51% for a maximum amount of 20 lakhs with no mandatory requirement of security for loans under 5 lakhs. Mahila Udyog Nidhi Scheme is driven by SIDBI[186] wherein a loan of Rs 10 lakhs is provided for starting a business in service, manufacturing, or production units. The development of Niti Aayogs's WEP (Women Entrepreneurship Platform) aids in connecting aspirational women entrepreneurs with potential investors to fuel their ideas through necessary funding[23]. Other schemes include – the Dena Shakti Scheme, Udyogini Scheme, Annapurna Scheme, Orient Mahila Vikas Yojana Scheme, etc which tend to provide financial assistance to women entrepreneurs in different capacities and sectors in aid with the government[184].

13. Result and Discussion

The study has endeavoured to enrich the literature with new insight by building a conceptual model for women-led MSMEs' growth and their immeasurable contribution to the development of self-reliant India. The model examines how the key attributes - ICT, Skill, and Access to Finance create a conducive ecosystem for sustainable entrepreneurial success yielding employment generation, an increase in GDP, and poverty reduction. These pillars address the socio-economic challenges women face in India and resonate with the national goals of Atmanirbhar Nari (self-reliant women) and Atmanirbhar Bharat (self-reliant India).

The digital revolution has created countless opportunities for women in MSMEs, with ICT acting as an equalizer by providing access to global markets, knowledge resources, and real-time communication, regardless of geographic boundaries. Access to tools like mobile phones and the internet has enabled women to adopt innovative business practices and gain a competitive edge, as shown in Evi Susanti's study on Indonesian women MSMEs[98]. These technologies augment professional competencies and economic standing, as exemplified by Iranian women leveraging the Internet for business in Tehran[187].

Women entrepreneurs in underdeveloped countries are increasingly using digital resources, like e-commerce apps, social media tools, and digital payment systems, to build firms locally with little investment, challenging traditional norms. In Turkey, the "Technology Power for Entrepreneur Women" program has trained and supported 8,000 women entrepreneurs to embark on their entrepreneurial journey[188]. Social media interface like WhatsApp, Facebook, and Instagram are being extensively deployed by women entrepreneurs to market products, build brands, and connect with diverse audiences at low costs[189]. Entrepreneurs like Lenjou of Swahili Bites in East Africa[190] and Falguni Nayyar of India's Nykaa demonstrate the global reach and success achieved through these tools[191]. ICT has been a crucial lifeline during crises like the pandemic, enabling women to sustain their economic activities, as highlighted by N. S. Rahayu[192]. The adoption of ICT tools by rural women has significantly simplified their livelihoods, aligning with findings of the study undertaken by Md Mizanur Islam[193]. Initiatives such as Bangladesh's iFarmer provides crowdfunding support for women cattle farmers[194]. However, challenges like digital illiteracy, inadequate infrastructure, and gendered bias in ICT adoption continue to persist, with only 26% of women in India having regular ICT access[15]. Programs like Internet Saathi by Google and Tata Trusts showcase ICT's potential, having empowered over 30,000 women in 1.1 lakh villages to improve health awareness, productivity, and earnings[165]. Expanding ICT access and training through robust policies can bridge the digital divide and ensure greater inclusion of women in the digital economy.

Skill development is pivotal in empowering women, furnishing them with the knowledge and competencies needed to grab better economic opportunities and enhance their livelihoods, as highlighted by Peter Raven[196]. Providing women with diverse business skills enables them to excel in competitive markets, a sentiment echoed by different authors in earlier studies[197,198]. The integration of hard skills (technical and financial expertise) with soft skills (communication and problem-solving) through

training programs creates a synergistic impact for women entrepreneurs. This combination not only helps them overcome gender-specific challenges but also enhances their adaptability to dynamic business environments and global scenarios, resulting in significant productivity and income growth, as emphasized by Siba[123]. In India, organizations like the Mann Deshi Foundation and Wadhwani Foundation have trained rural women entrepreneurs in hard and soft skills, supporting around 150,000 microenterprises[199]. The Samarth Initiative, launched by the Ministry of MSME in March 2022, allocates 20% of delegation slots in domestic and international exhibitions to women-led MSMEs and provides financial support under its International Cooperation scheme. It also reserves 20% seats for women in skill development programs and offers concessions on NSIC's schemes target to benefit 7500 women entrepreneurs[200]. In today's digitally driven world, developing digital skills across all domains is imperative for women to meet evolving industry demands and ensure sustainable growth[201]. The "Women Weavers in Morocco" project empowers rural women weavers by providing an online platform to sell their handmade rugs directly, helping them maximize their profits[202]. To foster inclusive empowerment, policymakers must design skill development frameworks that integrate digital literacy, vocational training, and financial service accessibility. In Australia, the government has pledged AUD 25 million over ten years to boost Indigenous girls' participation in STEM, supporting 100 girls annually to pursue STEM careers and transition into the workforce[194].

Access to finance is crucial for the growth and sustainability of women-led MSMEs, empowering them to innovate, expand, and thrive in competitive markets. Studies have shown that financial inclusion enhances women's autonomy and decision-making capabilities within their businesses and households, highlighting the importance of inclusive financial initiatives[203]. However, women entrepreneurs often face systemic barriers such as gender biases, insufficient collateral, and limited financial literacy, which significantly restrict their access to formal funding, forcing many to rely on informal financial sources aligning with the earlier studies[204].

In response to these challenges, innovative financing solutions have emerged. Ghana's initiative to accept movable assets as collateral facilitated $35 billion in loans over seven years, with women entrepreneurs comprising 40% of beneficiaries. Similarly, the Indian government's Credit Guarantee Schemes (CGSs) disbursed $12.8 billion in loans over three years, with 19% allocated to women entrepreneurs who otherwise lacked guarantors[205]. Informal mechanisms like Africa's ROSCAs also provide essential financial access, pooling funds for emergencies, community needs, and entrepreneurial activities, thereby significantly empowering women excluded from formal financial systems[206].

Digital financial inclusion further addresses the gender gap by reducing transaction costs and improving accessibility, enabling underserved women to engage in entrepreneurial ventures[207]. Despite these advancements, barriers such as limited awareness, insufficient digital skills, and entrenched gender stereotypes persist, hindering the full utilization of financial resources[208]. To tackle these issues, integrated interventions combining financial access, education, and capacity-building programs are vital. For instance, an Egyptian fintech firm collaborated with Nasser Social Bank and a telecom operator created a mobile wallet, securely transferring funds to over 700,000 elderly and widowed women while reducing harassment and saving time. Similarly, India's Indifi partnered with e-commerce platforms to address barriers for women entrepreneurs, introducing small, short-term loans to help build credit histories. Colombian digital lender Juancho Te Presta also innovated with women-only credit products, offering loans at 15% lower instalment costs than those for men[209]. Together, these initiatives highlight the transformative potential of targeted financial inclusion strategies.

14. Implications of the Study

14.1. Theoretical Implication

This study builds upon previous research by uniquely integrating Resource-Based Theory (RBT) and Liberal Feminist Theory (LFT), offering a more comprehensive and dynamic perspective on women-led MSMEs. Unlike earlier studies that examined these theories separately, this research synthesizes them to demonstrate how women entrepreneurs can achieve sustainable growth through strategic resource utilization and structural inclusivity. While previous research on RBT primarily concentrated on resource management, this study broadens the scope by emphasizing the continuous exploration of new resources and their integration with existing ones to bring uniqueness. This approach is critical for adapting to a dynamic environment and fostering long-term competitive advantage. In this context, ICT acts as a digital resource that enables market expansion, skill development enhances human capital, and access to finance strengthens financial resilience—together forming a unique resource base that empowers women entrepreneurs. This collaborative framework not only promotes increased economic participation but also reduces gender disparities, leading to the greater empowerment of women within the entrepreneurial landscape. Despite societal progress in raising awareness about gender issues, gender inequality continues to persist, particularly in areas such as ICT adoption, skill acquisition, and access to finance. Liberal feminist theory reinforces this framework by advocating for equal access to economic resources, education, and

opportunities while calling for the dismantling of structural barriers that prevent women from achieving full economic participation. The study also contributes by emphasizing that as ICT becomes increasingly ubiquitous, acquiring digital skills is essential, thus urging for closing the gender gap in this domain. By aligning with Atmanirbhar Bharat, this research provides a strategic framework for gender-inclusive economic reforms, ensuring that women-led enterprises not only survive but also gain a sustainable competitive edge in the digital era, contributing to employment generation, economic diversification, and long-term socio-economic empowerment.

14.2. Practical Implication

This study provides practical insights for advancing women-led MSMEs by integrating Resource-Based Theory (RBT) and Liberal Feminist Theory (LFT). It emphasizes the need for equitable and inclusive access to resources, along with the continuous exploration of new ones, to help women entrepreneurs develop a sustainable competitive advantage. By focusing on ICT adoption and the development of digital and financial skills, the study advocates for policies that close the gender gap in technology and finance. It also calls for structural reforms to ensure equal access to education, capital, and business opportunities. Supporting initiatives like Atmanirbhar Bharat and Atmanirbhar Nari can help policymakers create a more inclusive entrepreneurial ecosystem. Additionally, the study stresses the importance of strengthening financial resilience through targeted access to finance. This comprehensive approach not only boosts economic participation but also helps reduce gender disparities, enabling women entrepreneurs to succeed in the digital economy. Ultimately, such reforms will drive long-term socio-economic growth, create employment, and foster economic diversification.

14.3. Policy Recommendation

The growth of women-led MSMEs requires a collaborative effort from various stakeholders and the effective implementation of policies and programs. Financial institutions should introduce customized, innovative, and user-friendly solutions to meet the specific financial needs of women entrepreneurs, ensuring transparency and simplifying access to these services. Fintech companies must focus on making their platforms accessible and easy to navigate, particularly for rural women or those with lower literacy levels. New financing platforms like peer-to-peer lending, crowdfunding, incubators etc. to be encouraged by government.

To help women fully leverage existing policies, the government should conduct regular awareness programs across diverse platforms, alongside financial and digital literacy workshops to enhance their knowledge. Moreover, the government must expedite property-related cases involving women to address collateral-related challenges swiftly and effectively. Special attention should also be given to businesswomen in tier 2 and tier 3 cities to help expand the number of women entrepreneurs across the country.

The delayed integration of women into the digital space could exacerbate the gender gap in technology, leaving them at a disadvantage in an increasingly digital world. To address this, STEM education must be prioritized in the early school years, both in rural and urban areas, with special provisions for female students with disabilities or those from economically disadvantaged backgrounds. Ensuring affordable access to internet connections, mobile devices, and computers is essential for enabling success in STEM fields.

Educational institutions can also play a key role by organizing training and workshops for parents to help broaden their perspectives, encouraging them to support their daughters in pursuing skills in non-traditional fields. Highlighting role models like Parbati Baruah, India's first female mahout, can inspire other women to challenge norms and pursue their dreams[210]. Additionally, corporate houses should use CSR initiatives to drive skill development programs and provide financial support to women entrepreneurs, helping them establish and grow their businesses.

Finally, increasing female representation in policymaking, leadership roles, and financial institutions is crucial to building a sustainable, inclusive ecosystem for women entrepreneurs. The combined power of ICT, skill development, and access to finance will strengthen women-led MSMEs and propel India toward becoming "Atmanirbhar."

15. Conclusion

This study explores the evolving landscape of women's entrepreneurship in India and its pivotal role in realizing the national vision of *Atmanirbhar Bharat*, fostering a sustainable and inclusive future. Anchored in liberal feminist theory and resource-based theory, it underscores how entrepreneurship serves as a catalyst for women's social and economic empowerment. However, despite its transformative potential, women entrepreneurs in India remain significantly underrepresented due to systemic barriers, resource inequities, and persistent gender biases that limit their ability to seize opportunities. The findings suggest that when women gain equitable access to resources, they can harness them effectively driving innovation, developing sustainable business models, and achieving growth on par with their male counterparts.

To address these challenges, the study proposes a conceptual model integrating ICT, skill development, and access to finance as fundamental pillars for the sustainable growth of women-led MSMEs. Empirical evidence

underscores that these factors collectively drive entrepreneurial success, financial independence, and socio-economic empowerment. By promoting inclusive growth, gender equity, and economic resilience, this framework aligns seamlessly with the Atmanirbhar Bharat (Self-Reliant India) initiative.

In an evolving technological and financial landscape, strengthening digital infrastructure, enhancing financial literacy, and fostering skill development is imperative to equip women entrepreneurs with the necessary tools to overcome systemic barriers and thrive in competitive markets. To maximize the impact of this integrated model, uniform and inclusive development is warranted across these three fronts, ensuring a robust network of resources for women to unlock their potential. However, challenges such as financial and digital illiteracy, inadequate infrastructure, persistent gender biases, and affordability constraints continue to pose significant barriers.

Bridging the digital divide, addressing socio-cultural constraints, and fostering collaboration between government and private stakeholders will accelerate the impact. Ultimately, the study underscores the critical role of women-led MSMEs in India's economic growth and urges policymakers to design customized, women-centric policies that cater to diverse groups, including widows, elderly women, differently abled women, and rural women, ensuring truly inclusive entrepreneurship development.

16. Limitations and Future Research Agenda

While this study provides valuable insights, it has some limitations. First, the research is based on data from a specific region, so the findings may not fully apply to other areas. Second, it mainly focuses on ICT, skill development, and access to finance, while other important factors like market connections, government policies, and social barriers were not explored in depth. Third, since the data is cross-sectional, it captures only a snapshot in time, making it difficult to study long-term impacts and trends, however, future researchers can conduct primary research to understand how this new conceptual model affect the outcomes of women entrepreneurs in diverse geographical and cultural context. Extending the study to include different regions and industries would enhance the generalizability of the findings.

Contribution of Authors

P.R. has prepared the draft, collected, and analyzed the data. A.R. did the analysis, proofreading and editing of the study. A.R., S.S., R.K.T. and A.H. supervised the study.

Conflict of Interest

The authors declare no conflict of interest.

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