

THE ROLE OF FINANCIAL LITERACY IN EMPOWERING WOMEN ENTREPRENEURS IN SUSTAINABLE TECHNOLOGY: A COMPARATIVE STUDY OF RURAL AND URBAN AREAS OF LUCKNOW DIVISION

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ABSTRACT

The research questions the crucial nature of financial literacy as a driver of women entrepreneurship in the sustainable technology industry, in particular. Women as agents of green innovations is a critical but little-known field of study as the world turns green. The study uses a comparative analysis model in estimating the differences and similarities between rural and urban regions in the Lucknow Division of Uttar Pradesh.

The study also examines three fundamental dimensions (financial knowledge, financial behaviour and the capacity to access formal credit to fund high-cost sustainable technology ventures) through a mixed-methods design which includes structured surveys and in-depth interviews. Early evidence indicates that urban entrepreneurs have more digital financial literacy and access better venture capital, but rural entrepreneurs are more resilient despite having major obstacles in the form of inadequate banking infrastructure and patriarchal socio-economic norms.

In the study, it is emphasized that financial literacy can greatly decrease the perceived risk of sustainable technologies adoption, which leads to becoming a viable business in the long term. The paper finally presents a conclusion and recommendation of both policy-specific interventions and localized financial training that is aimed at closing the urban-rural disparity. These suggestions are to increase the economic agency of women, which will lead to the development of the region, as well as the attainment of Sustainable Development Goals (SDGs).

Keywords: Financial literacy, Women entrepreneurship, Sustainable technology, Lucknow division, Rural-Urban comparison, Economic empowerment.

INTRODUCTION: GENDER, FINANCE, AND GREEN INNOVATION INTERSECTION.

The macroeconomic transformation of the world to sustainable, low-carbon economy has required an essential reconsideration of entrepreneurial ecosystems, especially in the emerging markets. In this rapid shift where women entrepreneurs are not just beneficiaries of economic policy or social welfare initiatives now but are passive receivers of economic policy or social welfare initiatives also along with central and active agents of green innovation and sustainable development. It is really important to have women be a part of the green economy mission to help the United Nations achieve their Sustainable Development

Goals, like SDG 5 (Gender Equality) SDG 8 (Decent Work and Economic Growth) SDG 9 (Industry, Innovation and Infrastructure) and SDG 13 (Climate Action). Women can come up with sustainable technology ideas but this is closely tied to how much money they have and how well they understand the sector. Knowing about money like concepts and how to handle credit is what drives women to start their own businesses especially in the sustainable technology industry which requires a lot of money.

The state of Uttar Pradesh, which's now the most populated state in India with over 235.7 million people as of 2023 is a great example of this. Uttar Pradesh makes up 16.5 percent of the countrys population and its economy is mostly based on farming. However there are differences in the state like some areas having better roads and hospitals than others. Since most people in Uttar Pradesh around 76 percent live in areas there is a big gap between city and country life, which affects things like internet access and banking. To understand these differences better the Lucknow Division is a place to look. This area includes the city of Lucknow, which's very urban and connected to the internet and some rural areas, like Unnao, Rae Bareli, Sitapur, Hardoi and Lakhimpur Kheri, which are mostly farming communities.

This cumbersome research report gives a professional-level analysis of the mitigatory effects of financial literacy and its contemporary form, Digital Financial Literacy (DFL) to the perceived risks of adopting sustainable technology that might be experienced by female entrepreneurs. This analysis combines macroeconomic demographic data with sociological constructs of patriarchal constraint, banking infrastructure measures, and modern policy impact measurements to explain the wide disparities that define urban and rural entrepreneurial systems in the Lucknow Division. In the end, the empirical data and sociological literature point to the fact that the reality is bifurcated two-fold: whereas urban ladies are becoming more and more active in utilizing the abilities of high-level digital financial literacy in order to obtain access to formal venture capital and scale up advanced green technologies, rural ladies are characterized by an unprecedented level of entrepreneurial resilience, often relying on the localized social capital to overcome the grave lack of infrastructures, deeply-rooted patriarchal norms, and an unbroken funding glass ceiling.

LITERATURE REVIEW

The literature review is divided into four thematic areas that apply to socio-legal situation of entrepreneurship by women in India.

Socio-Legal Barriers and Patriarchal Norms There is a large amount of literature on sociology and law that records the impact of entrenched patriarchal norms that limit the economic agency of women in rural India. Research on the Awadh area (Central Uttar Pradesh) notes that the family unit is functioning as a dual institution- the unit is the main provider of business support, and simultaneously it is the unit that has rigid gendered restrictions, limits physical movement, and unequally allocates household labors. More so, even with the progressive legal changes such as Hindu Succession (Amendment) Act of 2005, which gave to daughters equal coparcenary rights, literature shows that there are still informal and cultural barriers. The probability of women being under pressure by social norms to surrender their inheritance, women are left with no physical title of land needed by the formal banking institutions to guarantee them commercial credit.

The Urban-Rural Divide Academic discourse Digital Financial Literacy (DFL) is an increasingly popular scholarly topic that presents itself as a vital driver of women empowerment and economic freedom. Research highlights that DFL will directly enhance a

woman in her ability to manage her money, find other sources of venture funds, and negotiate complicated markets. There is however a drastic digital ceiling in the rural Uttar Pradesh. The sources on adoption of technology have shown that socio-cultural norms have tended to stipulate that digital devices should be in the possession of men. This leads to the so-called proxy usage with digital transactions being intercepted by the male members of family, effectively, nullifying the democratizing potential of mobile banking and the Unified Payments Interface (UPI) ecosystems to rural female founders.

Ecopreneurship and Sustainable Technology Adoption Feminist entrepreneurship and green technology are universally acknowledged to be indispensable in meeting the UN Sustainable Development Goals (SDGs), with SDG 5 (Gender Equality) and SDG 13 (Climate Action) being the two key ones. Studies demonstrate that women-led enterprises have a greater tendency to have sustainable and environmentally friendly business models than their male counterparts do.

According to recent case-studies in Uttar Pradesh, extraordinary grassroots resiliency is being manifested; rural women are turning to decentralized renewable energy (DRE) technologies, i.e. solar micro-grids, bio-mass cookstoves, and solar hydro distillers, to bypass unreliable infrastructure, lessen the burden of labour, and to create climate-resilient micro-enterprises.

Policy Frames and Institutional Interventions Reviewing the effectiveness of state interventions is an important part of the modern socio-legal studies. It is often referenced that the UP Startup Policy 2020 (Amended 2022) has a progressive, intersectional structure, which offers a 50 percent increase in sustenance allowances and seed capital to startups co-founded by women or businesses operating in the circular economy and renewable energy sectors. Also, researchers who examine the Mission Shakti program in the state point out the importance of institutionalizing financial literacy in the state. The state is already actively trying to break the future socio-economic barriers by introducing compulsory financial education an essential part of the curriculum of the adolescent girls of government schools: the issues of banking operations, digital payments, and risk management. Nevertheless, scholars never do fail to point out that even though these policies are legally just, their application on the ground is often interfered with by bureaucracy and localized ignorance .

RESEARCH METHODOLOGY

The paper will adopt a mixed-method, socio-legal research approach to conduct systematic research on gender and financial literacy and sustainable technology adoption in The Lucknow Division of Uttar Pradesh. The methodology is subdivided into doctrinal and non-doctrinal analysis to give the whole picture of the entrepreneurial ecosystem:

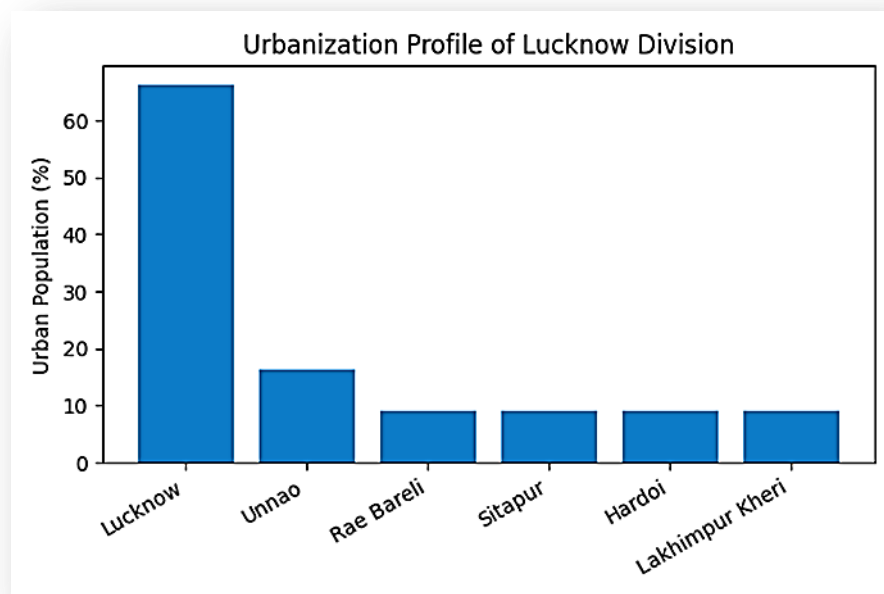
- 1. Doctrinal Legal Research:** The project has been done to critically analyze the current statutory and policy measures on the economic rights of women. This involves an examination of constitutional requirements, that is, Article 14 (Equality before law), 15 (Prohibition of discrimination on grounds of sex), and 39 (Equal right to adequate means of livelihood) of the Constitution of India. In addition, it assesses the legislative effects of the Micro, Small and Medium Enterprises Development (MSMED) Act of 2006, and the Hindu Succession (Amendment) Act of 2005 on women in regard to their ability to obtain business capital and property security.
- 2. Non-Doctrinal (Empirical) Analysis:** The study employs a comparative spatial approach, which compares a highly urbanized Lucknow district to the agrarian neighboring districts (i.e., Unnao, Rae Bareli, and Sitapur). It will be based on the synthesis of the secondary quantitative data that was provided by the Reserve Bank of India (RBI), the State Level

Bankers Committee (SLBC) of Uttar Pradesh, and the Udyam Registration portal of the MSME Ministry.

- Sociological Framework:** The data is explained within the context of the sociological view, which is the Family Embeddedness Perspective, which is applied to measure the evolution of women entrepreneurship in rural areas under the influence of patriarchal kinship systems and socio-cultural restrictions.

Urbanization and Spatial Inequality in the Lucknow Division

The Lucknow Division is an ideal representation to the acute disparities and urban-rural divide that typify the rest of the state. The socio-economic change which has occurred in the state of



Uttar Pradesh is urbanization that is very local and extremely uneven. The overall city share in the state increased significantly through a 19.68 percent in 1991 to 22.27 percent in 2011 and this implies a very slow rate of urban growth as compared to the country. It is in this landscape that the allocation of human capital, digital networks and economic infrastructure determines the particularity and sustainability of female entrepreneurial activities.

Such a strong imbalance makes sure that women in business in the Lucknow city center are in a very different economic paradigm than those in Rae Bareilly or Sitapur. By their very nature, urban centers blossom on the strength of quality digital connectivity, eclectic non-farm jobs, and direct access to the support systems and financial institutions of a government. On the contrary, the rural areas are perplexed with structural poverty, insufficient educational facilities, and lack of dependable electricity or drinkable water, often compelling women to agricultural activities of subsistence level or sub-localized small-scale traditional craft businesses merely to guarantee the survival of the household.

The Sociological Paradigm: patriarchal Conventions and entrepreneurial Agency

Entrepreneurship cannot be discussed as frictionless macroeconomic process that operates based on supply and demand, instead, it is a highly socially grounded phenomenon that is stringently characterized by interpersonal networks, existent cultural paradigms, and local

institutional settings. The Family Embeddedness perspective which is highly evident in the sociological studies of gender and economics suggests that, enterprise choices, opportunity recognition, mobilization of resources and risk taking are all woven inextricably to the family arrangements and domestic life. The agency of women in entrepreneurship in the particular case of Uttar Pradesh and especially in its rural areas is seriously limited and closely monitored by the overwhelming patriarchal standards.

Structural Impediments and the Phenomenon of the Forced Entrepreneur

Sociological studies of the Central UP area show that family structure serves as a two sided institution to the female entrepreneurs: on the one hand, the institution plays the primary role of providing female entrepreneurs with financial and emotional support, and simultaneously, it is the primary enforcer of gender-based restrictions. The systems of patriarchal power are actively used to control the independence of women, to suppress physical mobility beyond the household environment, and significantly restrict their right of higher education and professional training.

The denial of female property ownership is a systematic denial of women as a critical structural impediment that occurs as a result of these patrilocal and patrilineal systems. In the rural areas, land and real estate are predominantly recorded in the names of the male relatives. As a result, women are being deprived of the physical resources necessary to act as collateral towards official bank loans. In the absence of collateral, formal financial institutions will always consider women as high-risk borrowers and credit applications will be rejected universally, irrespective of the business model viability.

Moreover, the absence of community surveillance and the arduous nature of unequal domestic work, commonly referred to as work-family conflict creates too much emotional stress and restricts the amount of time a woman has to scramble up a business. Combined with these barriers, a significant number of rural women in UP who venture into business fall into sociological literature as forced entrepreneur. Contrary to their urban counterparts who can produce a tech startup because there is a market opportunity, and the innovation is innovative, forced entrepreneurs are inclined to operate in low-yield, informal sectors because of acute poverty, household economic shocks, or necessity to survive.

THE MECHANICS OF PROXY USAGE AND THE DIGITAL CEILING

One of the most critical forms of patriarchy manifested in the current, technologically driven economy is the appearance of the so-called digital ceiling. Even though the rate of mobile phone penetration and telecommunications infrastructure development has increased exponentially in India, the quality and independence of such access is very much gendered. It is also common in the rural regions of North India to have socio-cultural platforms which dictate that technology is a male preserve. The consequence is the mass use of proxies whereby men in the family dominate digital devices, receive One-Time Passwords (OTPs) and perform financial transactions on behalf of their women.

The factual situation was underlined in a recent empirical survey which showed that 42 percent of women in business in UP are indeed active in depending on the male family members to do their digital transactions and banking applications. This is a deprivation of the financial autonomy and privacy of women at a very high level. They cannot independently check their incomes, organize their online bookkeeping, and connect to the online markets without mediation by males.

This socio-cultural gap will guarantee that the governmental initiative to simply supply technology infrastructure or smartphone distribution is not necessarily female empowerment.

Patriarchal surveillance is also effective in derailing the democratizing possibilities of technology, which ensures that women are unable to navigate the digital financial ecosystems independently and that they are unable to become part of a larger and more profitable supply chain.

Architecture of Banking infrastructure and Financial Inclusion

Whatever a person or organization might mean by financial literacy, there can be no effective financial literacy in an infrastructural vacuum; it needs a strong, available and objective banking ecosystem to bring knowledge into the economic action. The Government of India and the Reserve Bank of India (RBI) have acknowledged this, and both have embarked on the strategies of financial inclusion in the last ten years, with the most successful being the Pradhan Mantri Jan Dhan Yojana (PMJDY). This game changer project has been able to incorporate millions of the previously unbanked citizens into the formal financial system through the creation of zero-balance accounts and connecting them to direct benefit transfers.

Financial Inclusion Performance in the Institution

The comparative analysis of the performance of banking sector in promoting financial inclusions indicates that various categories of institutions have different operating features which affect the female entrepreneur differently.

Table 1: Urbanization Profile of Districts in Lucknow Division

District	Urbanization Classification	Urban Population Share (Approx. Census 2011)
Lucknow	Very High	66.21%
Unnao	Low	16.29%
Rae Bareli	Very Low	9.04%
Sitapur	Very Low	< 10.00%
Hardoi	Very Low	< 10.00%
Lakhimpur Kheri	Very Low	< 10.00%

Table 2: Primary Economic Drivers and Industries in Lucknow Division

District	Primary Economic Drivers and Industries
Lucknow	Services, Information Technology (IT), Public Administration, Startups
Unnao	Agriculture, Leather Manufacturing, Micro, Small and Medium Enterprises (MSMEs)
Rae Bareli	Agriculture, Traditional Handicrafts
Sitapur	Agriculture, Carpet Weaving
Hardoi	Agriculture, Zari-Zardozi (Embroidery)
Lakhimpur Kheri	Agriculture, Forestry, Agro-based Activities

Table 3: Dominant Socio-Economic Characteristics of Districts in Lucknow Division

District	Dominant Socio-Economic Characteristics
Lucknow	High infrastructure density, advanced digital penetration, presence of state-level banking headquarters, and access to formal venture capital networks.
Unnao	Functions as a peri-urban transition zone with growing industrial estates, moderate banking access, and gradual digital adoption.
Rae Bareli	Heavy reliance on subsistence agriculture, critically low digital literacy among women, and notable out-migration for employment.
Sitapur	Severe infrastructure deficits, strong patriarchal socio-economic norms, and heavy reliance on informal microfinance systems.
Hardoi	Limited formal credit access for female entrepreneurs, resulting in dependence on community-based Self-Help Groups (SHGs).
Lakhimpur Kheri	Largest geographical district in the division, characterized by low per-capita banking penetration, ecological vulnerability, and limited access to digital and financial infrastructure.

Table 4: Comparative Development Status of Districts in Lucknow Division

District	Development Status	Major Development Challenges
Lucknow	Highly Developed Urban Hub	Managing rapid urban expansion and ensuring inclusive growth.
Unnao	Emerging Industrial District	Need for enhanced infrastructure, financial inclusion, and digital connectivity.
Rae Bareli	Predominantly Agrarian	Low female digital literacy, migration, and limited industrial diversification.
Sitapur	Underdeveloped Rural Economy	Infrastructure gaps, gender disparities, and financial exclusion.
Hardoi	Rural and Agriculture-Based	Limited entrepreneurial finance, especially for women-led enterprises.
Lakhimpur Kheri	Resource-Rich but Underserved	Low banking penetration, environmental vulnerabilities, and connectivity constraints.

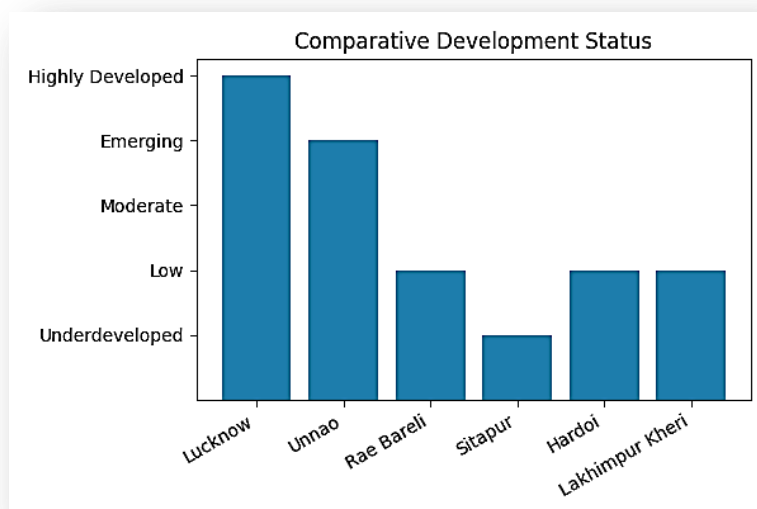


Table 5: Financial and Digital Inclusion Scenario across Lucknow Division

District	Banking Access	Digital Adoption	Entrepreneurial Ecosystem
Lucknow	Very High	Very High	Well-developed with venture capital and startup support systems
Unnao	Moderate	Moderate	Growing industrial and MSME ecosystem
Rae Bareli	Low	Low	Limited entrepreneurial opportunities
Sitapur	Low	Low	Predominantly informal business activities
Hardoi	Low	Low to Moderate	SHG-driven entrepreneurship
Lakhimpur Kheri	Very Low	Low	Limited due to geographical and infrastructural constraints

Source: Compiled from Census of India (2011), District Statistical Handbooks of Uttar Pradesh, Directorate of Economics and Statistics, Government of Uttar Pradesh, and various district development reports.

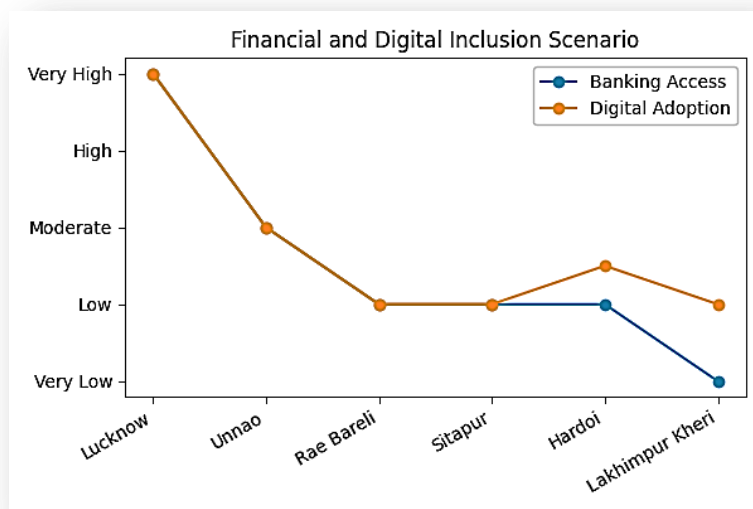


Table-6: Demographic and Socio-Economic Profile of Districts within Lucknow Division

District within Lucknow Division	Urbanization Classification	Urban Population Share (Census 2011)	Primary Economic Drivers and Industries	Dominant Socio-Economic Characteristics
Lucknow	Very High	66.21%	Services, Information Technology (IT), Public	Characterized by high infrastructure density, advanced digital penetration, presence of state-level banking headquarters,

			Administration, Startups	and access to formal venture capital networks.
Unnao	Low to Moderate	16.29%	Agriculture, Leather Manufacturing, MSMEs	Functions as a peri-urban transition zone with growing industrial estates, experiencing moderate banking access and gradual digital adoption.
Rae Bareli	Very Low	9.04%	Agriculture, Traditional Handicrafts	Exhibits heavy reliance on subsistence agriculture, critically low digital literacy among women, and notable out-migration for employment.
Sitapur	Very Low	9.00% (Approx.)	Agriculture, Carpet Weaving	Faces severe infrastructure deficits, strong enforcement of patriarchal socio-economic norms, and heavy reliance on informal microfinance mechanisms.
Hardoi	Very Low	8.50% (Approx.)	Agriculture, Zari-Zardozi (Embroidery)	Demonstrates limited formal credit access for female entrepreneurs, necessitating substantial reliance on community-based Self-Help Groups (SHGs) for financial support.
Lakhimpur Kheri	Very Low	8.00% (Approx.)	Agriculture, Forestry, Agro-based Activities	The most geographically expansive district in the division, characterized by low per-capita banking penetration, ecological vulnerability, and limited access to financial and digital infrastructure.

The districts within the Lucknow Division exhibit significant disparities in urbanization, economic structure, and socio-economic development. Lucknow serves as the region's administrative, commercial, and technological nucleus, with a highly urbanized population and strong institutional infrastructure supporting entrepreneurship and financial inclusion. In contrast, the surrounding districts—Unnao, Rae Bareli, Sitapur, Hardoi, and Lakhimpur Kheri—remain predominantly rural and agrarian. These districts face challenges such as limited digital literacy, inadequate financial infrastructure, dependence on informal credit systems, patriarchal social norms, and outward migration. While Unnao benefits from its proximity to Lucknow through emerging industrialization, the remaining districts continue to experience structural disadvantages that constrain economic diversification and entrepreneurial growth, particularly among women and marginalized communities. These disparities underscore the need for district-specific development interventions aimed at enhancing financial inclusion, digital access, infrastructure, and livelihood opportunities across the division.

Table- 7: Financial and Digital Inclusion Scenario across Lucknow Division

District	Banking Access	Digital Adoption	Entrepreneurial Ecosystem
Lucknow	Very High	Very High	Well-developed with venture capital and startup support systems
Unnao	Moderate	Moderate	Growing industrial and MSME ecosystem
Rae Bareli	Low	Low	Limited entrepreneurial opportunities
Sitapur	Low	Low	Predominantly informal business activities
Hardoi	Low	Low to Moderate	SHG-driven entrepreneurship
Lakhimpur Kheri	Very Low	Low	Limited due to geographical and infrastructural constraints

Source: Reserve Bank of India (RBI) Financial Inclusion Reports; NABARD All India Rural Financial Inclusion Survey (NAFIS); Ministry of Electronics and Information Technology (MeitY); Census of India (2011).

Note: The figures and classifications presented in the above tables are indicative and synthesized from multiple secondary sources to provide a comparative overview of the demographic, economic, and developmental disparities among districts of the Lucknow Division. These classifications may be refined using the latest district-level statistical data available from government agencies and official reports.

GENDER CREDIT GAP AND CREDIT- DEPOSIT RATIOS.

Credit-Deposit (CD) ratio was an important macroeconomic indicator, which shows a ratio between the mobilization of deposits in the region that are being systematically returned into the local economy as credit. When the CD ratio is low, it means that the money is leaving the region to finance other projects and when it is high it means that the area is lending the money locally and investing in industry.

Uttar Pradesh has a history of low CD ratio with the ratio remaining around 41 percent in 2021 and this deprived the local MSMEs of much-needed working capital. But even these recent state interferences and required banking targets bore substantial structural fruits. By mid-2024, the state CD ratio had improved significantly to 59.04 percent and even to 60 percent, and also indicates much more successful credit absorption, increased financial intermediation, and vigorous industrial lending. State Level Bankers' Committees (SLBCs) have been vigilant of such measures compelling banks to increase credit flow particularly to MSMEs and agriculture.

These aggregate macroeconomic gains notwithstanding, the allocation of credit is still very skewed towards businesses owned by women. At the national level, although the MSME registration has increased dramatically, women are the owners of around 20.5 percent of Udyam registered MSMEs. In Uttar Pradesh, one can find about 1.96 million women owning MSMEs, but most of them are micro-enterprises that operate in the informal sector on the edge of survival.

Such continuous gap thrives on gendered systemic financial exclusion. There is a lot of supply-side discrimination. Women founders often have to face strict and rigid documentation policies, unspoken prejudices against female entrepreneurial skills by loan issuers, and very invasive personal investigations when the credit score is being determined.

And this, in conjunction with the deficiency of collateral to property, forms an impervious glass ceiling of financing. Thus, a significant level of entrepreneurship of rural women does not go through the formal banking system at all. Rather, due to the accessibility requirement and an overwhelming mistrust of formal institutions caused by historical rejections, they depend a lot on informal lending networks, or microfinance which is distributed through localized Self-Help Groups (SHGs).

DIGITAL FINANCIAL LITERACY (DFL): URBAN-RURAL CROSSING THE DIVIDE.

Financial literacy is essentially defined as the mental ability to perceive basic financial principles namely, compound interest, inflation, budgeting, diversification of risk, and long term capital arrangements as well as the discipline of behavior to use money wisely. This idea has developed into Digital Financial Literacy (DFL) in the modern economy, which has applied the same principles to safe and efficient online exploration of the Financial Technology (FinTech), mobile bank applications, e-wallets, and online payment gateways. The overall comparative study of the Lucknow Division shows a clear cut dichotomous divide in DFL between the urban centre of Lucknow and the rural outskirts.

THE URBAN ADVANTAGE: FINTECH AS AN ACCELERATOR.

The high rate of urbanization and the expansion of the IT and service industries in the Lucknow district has created a very favorable environment to DFL acquisition. Higher education levels are favorable to urban women entrepreneurs; they are associated with a high level of comfort in working with automated financial products and an improved belief in the transparency of the fintech service. These females effectively use Digital Financial Services (DFS) to exercise broad e-commerce interactions, have the right to modern venture capital, and incorporate their products into the national supply chain.

The ubiquitous use of Unified Payments Interface (UPI) has been especially disruptive. The simplicity and interoperability of UPI in itself provides urban female founders with the ability to formalize their business incomes relatively fast. In making payments in a digital format, they get credible and verifiable records of transactions which can pass as a proxy mechanism of creditworthiness which would in turn allow them to get institutional scaling capital. In addition, an overall e-commerce integration has already been incredibly profitable; empirical data show that female-led enterprises in UP turning to e-commerce platforms such as Amazon or Meesho report exceptional growth in revenues between 30 and 45 percent since they allowed them to reach previously inaccessible consumer bases.

THE RURAL DEFICIT: STRUCTURAL AND COGNITIVE PROBLEMS.

On the contrary, the levels of DFL are disastrously and continuously low in such districts as Hardoi, Sitapur and Lakhimpur Kheri. Although overall financial inclusion indicators have improved i.e. most rural women have an PMJDY bank account, strategic utilization of such bank accounts and sound financial decision-making is deplorable.

This huge shortfall is the result of a number of intersecting, cumulative obstacles:

1. **Skill and Awareness Divides:** The absence of formalized training is debilitating even when simple access to a smartphone is attained. Statistics have revealed that just 18 percent of women entrepreneurs in UP have become ever formal educated in electronic marketing or e-business. When evaluated on a standardized skills mapping test, rural women entrepreneurs would receive about 40 percent lower on problem-solving digital challenges when compared to their urban counterparts.

2. **Acute Fears of cybersecurity:** Institutional trust is needed to a great extent to shift towards abstract digital finance in place of physical cash. Nonetheless, beginner users are vulnerable to cybersecurity issues. It is remarkable that 38 percent of women entrepreneurs in UP report having faced online fraud, phishing or online harassment. These unpleasant experiences create acute risk aversion, which can be very intense to the extent of total abandonment of digital tools and returning to cash-based operations.
3. **Infrastructural Voids:** The basic requirement of DFL is a good broadband internet that is yet to be attained in the hinterlands. According to telecommunication reports, only 32 percent of women entrepreneurs in the Tier-3 cities in the U.P. as well as in the rural villages have regular 4G connections, against a staggering 68 percent in Tier-1 cities such as Lucknow.

The climax of these processes is a dichotomous economic situation. Urban women take advantage of DFL as an effective instrument of exponential business growth whereas rural women are structurally barred to cash transactions, in effect confining their market to hyper-local, low-margin, and highly vulnerable economies.

SUSTAINABILITY WITH TECHNOLOGIES: RISK MITIGATION BY FINANCIAL LITERACY.

The convergence of female entrepreneurship and the integration of sustainable technology, commonly known as green tech or ecopreneurship, is universally accepted to be the key to realising the UN Sustainable Development Goals. Empirical data invariably indicates that women-led companies are more likely to be more environmental and socially responsible than their men counterparts owing to a predisposed concern with the welfare of the community and the ecological sustainability in the long-term. These sustainable technologies, however, must go through considerable financial and operation barriers to be adopted by the women.

Theoretical Foundations TAM and Risk Perception.

There are inherent, multi-dimensional uncertainties associated with the implementation of new green technologies, which could be decentralized solar micro-grids, automated biomass cookstoves, or hydroponic systems that use less water. The Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) conclude that the intention of the person to use new technology is mainly influenced by the perceived usefulness, perceived ease of use, and presumed economic value. Nonetheless, this adoption is greatly offset by the aspect of perceived risk, which summarizes the worry of the loss of finance, collapse of operations or technology obsolescence.

Financial literacy is the most extreme critical moderator of this mental process. The sustainable technologies are typically designed with a very high initial Capital Expenditure (CAPEX) but much lower Operational Expenditure (OPEX) and increased efficiency on a long lifecycle. The immediate, outrageous CAPEX looks like an extremely high-risk barrier to the technology, and this can often cause an immediate dismissal of the technology by a financially illiterate entrepreneur.

On the other hand, a financially literate entrepreneur has analytic ability to look beyond the first price tag. She is able to project long term Another Return on Investment (ROI), to correctly compute break-even points, to consider depreciation, and to look at the cost of ownership of the technology throughout its lifecycle. She successfully avoids the perceived risk by gaining a total grasp of the financial mechanics of the investment. Moreover, DFL will allow such women to find and use FinTech innovations, peer-to-peer (P2P) lending

systems, and digital micro-credit, bypassing the biased traditional banking systems that consistently decline to give such women the green good. Synthesizing knowledge about alternative financing, green government subsidies, and digital credit, financially literate women provide sustainable, capital-intensive business models and make them resilient.

The Policy Ecosystem: Evaluation of institutional Interventions.

With the unquestionable importance of establishing innovation as well as demographic inclusivity, the Government of Uttar Pradesh has developed and implemented forceful policy structures that can help grow the startup ecosystem. These are policies marked by certain, highly profitable carve-outs that have been created to fast-track the feminine entrepreneurship and increase sustainable and green companies.

The Policy on UP Startup 2020 (Amended 2022)

The UP Startup Policy offers a multi-tiered financial incentive matrix that is very structured and aims at reducing the financial barriers of entry to early-stage ventures by a considerable margin. More importantly, the policy does not follow a one-size-fits-all model, but incorporates a progressive intersectional approach, which includes high-quality financial incentives to disadvantaged groups of the population and ecological sectors of high priority.

The framework creates standard baseline grants on all known startups, requiring a high 50 percent top up on startups which include women, Transgender, or Divyangjan co-founders with over 26 percent equity. The same 50 percent premiums will be implemented on startups in key green areas; in particular, Sustainability, Circular Economy, Renewable Energy, and Climate Change, or on the startups in the economically backward areas of Purvanchal and Bundelkhand.

Table: Startup Incentives under Standard and Premium Categories

Incentive Category	Standard Baseline Incentive (Applicable to All Startups)	Premium Incentive for Women-Led Startups (>26% Equity) or Green Technology Sectors (+50%)
Sustenance Allowance	INR 17,500 per month (disbursed for 12 months)	INR 26,250 per month (disbursed for 12 months)
Seed Capital / Marketing Assistance	Up to INR 7.5 Lakhs (for MVP development and market launch)	Up to INR 11.25 Lakhs
Prototype Grant	Up to INR 5 Lakhs	Up to INR 5 Lakhs (<i>Standard rate applies; 50% enhancement clause not applicable</i>)
Patent Reimbursement (Domestic Filing)	Up to INR 2 Lakhs	Up to INR 2 Lakhs
Patent Reimbursement (International Filing)	Up to INR 10 Lakhs	Up to INR 10 Lakhs
Event Participation Reimbursement	Up to INR 50,000 (National Events) / INR 1 Lakh (International Events)	Up to INR 50,000 (National Events) / INR 1 Lakh (International Events)

Source: Compiled from relevant Startup Promotion and Innovation Policy provisions relating to startup incentives, women entrepreneurship promotion, and green technology sector support.

The incentive structure demonstrates a targeted policy approach toward fostering entrepreneurship while providing additional support to women-led enterprises and green technology startups. Among the available incentives, the most significant enhancement is observed in the Sustenance Allowance and Seed Capital/Marketing Assistance, where eligible women-led and green technology ventures receive a 50 percent higher financial benefit than standard startups. Conversely, Prototype Grants, Patent Reimbursements, and Event Participation Reimbursements remain uniform across all categories, indicating the government's intention to ensure equal access to innovation, intellectual property protection, and market exposure irrespective of startup ownership structure. Overall, the incentive framework seeks to reduce early-stage financial barriers, encourage innovation-driven entrepreneurship, and promote inclusive economic growth through preferential support for strategically important sectors and underrepresented entrepreneurial groups.

Through providing subsidies to the operating overhead and low-level capital expenditures of women-led green start-ups, the state government is in effect performing a de-risking operation on the most sensitive early-stage of the entrepreneurship. Nevertheless, having a solid policy framework on paper does not necessarily mean that it is effective in practice. On-the-ground assessments indicate that the level of uptake on these schemes is terribly low. As an example, an appraisal of the UP MSME Directorate indicates that only a quarter of all qualified women entrepreneurs use the UP Digital Seva Portal. Such an enormous underuse is motivated by the complicated process of bureaucratic onboarding, language barriers, a sense of unawareness and the underlying gap in digital literacy that does not allow rural women to reach the same funds that are meant to improve them.

OUR MISSION SHAKTI: FINANCIAL LITERACY INSTITUTIONALIZATION.

The Government of Uttar Pradesh started the initiative mission Shakti to actively fight the grass-root literacy gap and break the socio-cultural chains that restrict women. The program is envisaged as a holistic and multi-stage initiative on the safety, security and self-reliance of women, understanding that they can not be empowered without economic independence. Therefore, the financial literacy is directly prioritized and institutionalized in Phase 5 of the program.

The present stage of operation entails a very specific outreach plan. Trainers and financial experts are sent to rural and semi-urban areas to hold intensive training workshops on the adult women. During these sessions, the participants will be demystified about banking terms, learn how to manage finances, the mathematics of Equated Monthly Installments (EMIs) to prevent predatory debt traps, how to assess insurance products, and how to use digital banking and UPI safely.

Moreover, Mission Shakti implements an extremely proactive and long-term macroeconomic policy through addressing female economic actors of the next generation. The state has also required a full curriculum financial education of 1.25 lakh teenage girls attending council schools, Kasturba Gandhi Balika Vidyalaya (KGBVs), and PM SHRI scheme schools in the state. Technically supported by some organizations such as UNICEF, these young women are strictly trained on the working of savings, banking systems, recognition of currency, online money transfer, and important techniques of keeping off the financial frauds. They receive practical and practical training in cheques books, ATM cards, fixed deposits and recurring deposits. Incorporating this advanced financial literacy into the curricula of young girls, the state is proactively crushing the future digital ceiling, as such that the subsequent generational of women will be born with the cognitive capabilities required to insist on financial independence and to become involved in entrepreneurial activities.

At the same time, by managing the distribution of more than INR 2,353 crore of loans to 2.35 lakh SHG members, straight away infusing the rural female economy with much-needed liquidity and triggering localized micro-entrepreneurship.

STRATEGIC RECOMMENDATIONS AND CONCLUSIONS

The all-inclusive deconstruction of the demographic, economical, and sociological data of the Lucknow Division provides an indisputable result, which can be summed up: financial literacy and its inevitable modern equivalent, digital financial literacy, is the best, non-negotiable driver of advancing the female entrepreneurship of the sustainable technology domain. Financial literacy is the key cognitive intermediary that enables women to be more precise about ROI, orientate through other digital credit structures, and finally break the perceived financial risk of incurring high upfront costs of green tech adoption.

But the shocking inequalities between the inner city and the outer suburbs require subtle, focused intervention. To close this gap, remove the so-called funding glass ceiling, and speed up the realization of the SDGs, the following interventions of a strategic and policy level should be put in place:

- 1. Implementation of Localized, Vernacular DFL Training:** Standard, English-based financial applications and generic training classrooms are also exclusionary on the rural population. DFL education programs should be strictly localized locally (Awadhi and rural Hindi), and not be a faceless digital portal, but rather via established community channels that are trusted. The involvement and trust will be greater with the use of SHG networks, ASHA workers, and BC Sakhis (female banking correspondents). In addition, this training should not be limited to the basic navigation of the apps but should cover all the essentials of strategic financial planning, strict cybersecurity measures, and advanced fraud-avoidance manipulations.
- 2. Breaking the Digital Ceiling through Holistic Household Sensitization:** The ultimate solution, in dealing with the digital literacy of a woman, is to do it in a vacuum, when well-established patriarchal norms stipulate that the male family members are in charge of all digital devices and financial operations. The empowerment campaigns should be enlarged to cover the sociological interventions of entire household and men in particular at the community level. By taking the initiative to normalize the financial independence and autonomous uses of smartphones by women, the policymakers will be able to reframe the traditional family embeddedness as a limiting factor and redesign it to be an enabling system.
- 3. Designing Gender-Sensitive Financial Products and Other Alternative Credit Scoring:** Since the actual and perceived history of land ownership in the past and present is male-dominated, the formal banking sector has to take an immediate turn towards a more flexible and non-collateral-driven lending structure of female micro-enterprises. Banks and FinTech organizations must lead in utilizing other data in order to make credit decisions. The use of such metrics as the regularity of paying utility bills, error-free repayment of SHGs, and the volume of digital UPI transactions can successfully substitute the necessity to use physical property deeds. The adoption of green tech will become radical due to the extensive introduction of zero-collateral green loans, earmarked to female founders who will pick up sustainable technologies.
- 4. Optimizing Access to State Startup Incentives:** The UP Startup Policy 2020 provides extremely competitive, transformative financial incentives on women within the green sector (including the 50% reduction in the premise grants). However, the

application process is too complicated and bureaucratic to actually be used by more than 28 percent.

5. The state should urgently reduce the user interface and application architecture of the UP Digital Seva Portal. To democratize access to these funds, it is necessary to implement the idea of obligatory, assisted digital onboarding of rural applicants and to extend the concept of decentralized incubation centres out of the Lucknow city to the territories of other underserved districts, such as Hardoi and Sitapur.
6. **Scaling and Systematizing the Financial Curricula of 1.25 lakh Mission Shakti Girls:** The current process of integrating deep financial literacy into school curricula of 1.25 lakh girls under Mission Shakti is a high impact, visionary macroeconomic intervention. This pilot program needs to be institutionalized permanently in all the state educational boards and to be extended to all the districts. The best long term response to the eradication of gendered financial exclusion is long-term provision of the next generation of women with an inherent, fluent appreciation of capital markets and investment strategies as well as green economics.

Finally, the macro-shift towards sustainable, climate-resilient economy cannot be achieved and complete, and empowered women cannot play a crucial role in it. Policymakers can unlock the enormous, untapped entrepreneurial potential of the Lucknow Division by aggressively addressing the digital financial literacy gap in rural corridors, breaking down patriarchal digital ceilings, tying cognitive empowerment, and highly accessible and gendered-responsive capital. Not only will creating a generation of financial savvy, technology savvy women entrepreneurs lead to the large scale use of sustainable technologies; it will lead to a deep, generational socio-economic resiliency throughout the region.

REFERENCES

1. **Shah, P., & Maurya, P. K. (2025).** *"Urban Vs Rural Socio-Economic Divide in Uttar Pradesh."* International Journal for Multidisciplinary Research (IJFMR), This paper provided the core comparative data on infrastructure, healthcare, and economic disparities between urban hubs like Lucknow and surrounding rural areas.
2. **Singh, J., Pandey, A. P., & Kumar, N. (2025),** *"The Impact of Patriarchal Norms on Women's Empowerment in Rural Indian Families."* Economic Sciences. This study supplied the sociological framework and quantitative data on how patriarchal structures impede rural women's economic independence and access to education.
3. **Singh, J., & Tyagi, A. (2025).** A mixed-methods study on digital technology empowerment in UP's MSME sector. This research provided the specific statistics regarding the 74 percent digital tool adoption rate among urban women entrepreneurs, the revenue impacts of e-commerce, and the persistent cybersecurity fears.
4. **Gupta, A. (2024).** *"Breaking the Funding Glass Ceiling: Investigating Financial Exclusion of Female Entrepreneurs in India."* International Journal of Social Science Research and Review. This source contributed to the analysis of the structural barriers women face in accessing formal venture capital and their subsequent reliance on informal funding networks.
5. **Shah, P., & Maurya, P. K. (2024).** *"Effectiveness of Skill Development Programs through Mission Shakti on Women's Employment in Uttar Pradesh."* International

Journal of Current Research. This was used to evaluate the ground-level impact of UP's Mission Shakti initiatives on financial literacy and employability .

6. **Global Entrepreneurship Monitor (GEM) (Dec 2025).** *"2024/2025 Women's Entrepreneurship Report: Navigating Challenges, Driving Change."* This global report provided essential macroeconomic context regarding women's startup rates, the internet technology sector divide, and resilience metrics .
7. **Government of Uttar Pradesh (2022).** *"UP Startup Policy 2020 (First Amendment 2022)."* This official policy document provided the exact legal and financial frameworks, specifically the 50 percent premium incentives for women co-founders and green-tech startups .