Volume 4, Issue 2, December 2025

Green Microfinance and Women's Empowerment: Mediating Role of Financial Literacy

Prashanna Sedhai[1], Surya Balami[2*], Nabin Pandey[2]

Article Type: Research Article

[1]BBA Graduate, Kathmandu Model College, Tribhuvan University, Nepal

[2]Faculty, Kathmandu Model College, Tribhuvan University, Nepal

Received: 14 October 2025; Revised: 12 November 2025; Accepted: 29 November 2025

**Corresponding email: surya.balami01155@gmail.com* *ISSN: 2976-1204 (Print), 2976 – 131X (Online)*

Abstract

This study examines the influence of green microfinance (GMF) on women's empowerment (WE) through the mediating role of financial literacy (FL), integrating human capital theory, capability approach, and experiential learning theory. Based on a survey research design, data were purposively collected from 250 women affiliated with three leading microfinance institutions (MFIs), each having at least a minimum participation period of six months. Data were analyzed using Structural Equation Modeling. The findings revealed that GMF significantly influenced FL but did not have a significant effect on WE. Moreover, the relationship between FL and WE was supported, and the mediating role of FL in this relationship was also confirmed. This indicates that GMF fosters empowerment primarily by enhancing women's financial knowledge and decision-making abilities. The study extends microfinance and feminist empowerment theories by introducing the environmental dimension of GMF and positioning FL as a key mediating factor.

Keywords: Financial literacy, green microfinance, microfinance institution, women empowerment

DOI: https://doi.org/10.32674/3gr6b357

Introduction

WE have been widely acknowledged as a multidimensional development priority (Lwanba et al., 2022) that serves as a fundamental driver for economic inclusion, enhances household well-being, and improves community resilience (Gupta et al., 2024). Contemporary studies demonstrate that empowerment serves as an enabler for both access to resources and the capability to translate those resources into meaningful outcomes (Sen, 1999). Despite the global progress in the gender equality initiative, women's participation remains disproportionately excluded from the formal financial system, ownership of productive assets, and discretion in decision-making opportunities (World Bank, 2023). In contrast, this scenario rarely aligns for women in developing countries. Financial exclusion continues to be a critical constraint: globally, 740 million women remain unbanked, and in Nepal, only 42 % of women have access to formal financial services (World Bank Global Findex, 2023), a lower level of FL demonstrating structural constraints (OECD), 2021; Thapa & Pokharel, 2020) that limit financial agency despite increasing economic engagement.

Microfinance emerged as a pivotal tool to bridge such inequalities by expanding access to credit. However, the effectiveness of traditional microfinance in promoting sustained empowerment outcomes has been increasingly debated. Empirical studies highlight several limitations: inadequate financial skills among borrowers, over-indebtedness, and limited shifts in intra-household bargaining power (Bateman & Chang, 2012). In response to these concerns and the rising urgency of climate change, GMF has gained prominence as a financial innovation that integrates microfinance with environmental sustainability. This aligns directly with the Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality), SDG 1 (No Poverty), and SDG 13 (Climate Action). GMF promotes eco-friendly products, such as solar technologies, clean energy cookstoves, and climate-resilient agricultural practices, to simultaneously improve livelihoods and environmental outcomes (Goyal & Kumar, 2021; Yadav et al., 2023). While this approach is promising, its empowerment potential remains theoretically and empirically underexamined. However, despite their potential, GMF initiatives have not always achieved transformative outcomes, partly because many women lack the FL, which is needed to effectively manage loans, plan investments, and make informed decisions about environmentally responsible ventures (OECD, 2021; Yadav & Pathak, 2023).

Studies have shown that FL emerges as a critical mechanism linking the relationship between GMF and empowerment, but it is understudied. FL fosters the ability to understand the financial aspect, plan and utilize resources, assess risks, and exercise agency in enterprise-related and household-related financial decisions. It can enhance managerial and cognitive skills that can support in transforming financial access into improved psychological and economic outcomes. However, as the 2021 Global Findex Database highlights, financial literacy rates among Nepali women remain among the lowest in the region.

While existing literature has examined either the socio-economic outcomes of microfinance (Yunus, 1998; Kabeer, 1999) or the environmental benefits of green finance (Goyal & Kumar, 2021), few studies have integrated these streams to understand how GMF and FL jointly influence

women's empowerment. Pei (2024) conceptualized GMF as an empowerment mechanism but seldom tested the mediating role of FL within developing-country contexts. Additionally, prior research (Sapkota & Bista, 2022; Thapa, 2024) has often treated microfinance and FL as independent variables affecting empowerment.

Nepal provides a compelling empirical setting for this study. Expanding the microfinance sector, policy-level emphasis on gender responsive inclusion, rising climate vulnerabilities, and growing GMF initiatives. The FL of women remains significantly low in Nepal, explicitly creating a bottleneck in the efficiency of GMF initiatives. The outcomes of GMF initiatives remain unclear regarding converting green financial initiatives into greater autonomy, discretion in decision-making, and economic independence.

Grounded on human capital theory (HCT; Becker, 1993), the capability Approach (Sen, 1999), experiential learning theory (Kolb, 1984), and microfinance and women's empowerment theory (Yunus, 1998), this study examines the influence of GMF on WE in Nepal through the mediating role of FL. The study significantly contributes to the fields of gender studies, development economics, and sustainable and behavioral finance, as well as provides actionable insights for policymakers, MFIs, and international development partners to design financially literate, gender-responsive, and environmentally sustainable development models.

Literature Review and Hypothesis Development

Green Microfinance and Financial Literacy

HCT entails that investment in knowledge and skills enhances individuals' productivity and decision-making capabilities (Elrehail et al., 2024). GMF, by integrating financial and environmental objectives, functions as a form of human capital development, providing women with access to credit while simultaneously cultivating financial and ecological awareness. Karlan et al. (2022) highlighted that participating in GMF programs empowers women to gain experimental financial knowledge through activities such as budgeting, saving, loan payment, and assessing eco-friendly investments.

Likewise, Mahmood et al. (2023) demonstrated that when MIs embed green financing within their operations, they not only increase women's financial inclusion but also encourage them to make environmentally responsible choices, thus extending their economic and social capabilities. Managing small loans for eco-friendly enterprises or renewable energy technologies stimulates learning cycles where women can reflect on financial outcomes, internalize lessons, and adapt behaviors for improving financial management (Luo & Cheng, 2023).

GMF has a significant impact on FL, a relationship that explicitly extends beyond the conventional microfinance perspectives. The influence of GMF serves as a powerful engine for experimental learning (Akhter et al., 2021). Empirically, Zhang et al. (2018) found that participation in microfinance significantly improved women's financial knowledge and credit-handling abilities in rural China. In East Africa, the defined costs and predictable

savings of clean energy loans enable individuals to develop investment appraisal skills, and in India, GMF loans educated borrowers in intertemporal analysis, sharpening their skills to calculate the opportunity cost of long-term benefits against immediate costs. Likewise, participating in the GMF program in Bangladesh translated into behavioral changes, which led to an 18% growth in savings and greater income diversification (Hossain, 2023). These findings highlight that GMF is not merely a financial service mechanism but a practical avenue for promoting sharpening financial rubrics. Therefore, the study hypothesizes:

H1: *Green Microfinance is positively related to Financial Literacy.*

Green Microfinance and Women Empowerment

GMF can enhance FL by providing women with access to financial services, practical exposure to financial tools, and enhancing their economic and decision-making potential. Studies by Uddin et al. (2020), Lee and Huruta (2022), and Mahmood et al. (2023) highlighted that the GMF program can enhance the bargaining power, access to financial resources, and participation in community as well as in household matters. GMF helps individuals in environmentally oriented financial initiatives, which promote economic inclusion but also inculcate social and psychological empowerment (Van Niekerk, 2024).

By providing women with capital for environmentally sustainable assets, such as solar home systems, biogas units, or organic farming inputs, GMF directly enhances their economic capabilities and creates new streams of income or cost savings (Hossain, 2023). This control over financial resources is a fundamental precondition for empowerment. According to Feminist Empowerment Theory (Mayoux, 2005), support of financial resources fosters women to challenge the rudimentary gender norms, increase their autonomy, and bargain for equitable relationships within households and communities. In addition, MFIs support in eliminating poverty, enhancing agency, and improving the social status quo, especially among women in marginalized societies (Egharevba et al., 2016). Thus, GMF can promote the economic and non-economic aspects of WE.

Crucially, the nature of GMF extends this empowerment beyond the purely economic. GMF empowers women to participate in environmentally conscious projects such as waste management, climate-resilient agriculture, organic farming, solar energy installation, and environmentally friendly entrepreneurship (Egharevba et al., 2016). These initiatives often position women as leaders in community-based and climate-resilience projects, thereby enhancing their social standing, decision-making power, and ultimately extending beyond financial management (UNESCO, 2020).

Empirical studies across South Asia and beyond support this mechanism. In Bangladesh, women are involved in GMF programs, demonstrating improved autonomy, confidence, and leadership capacity (Uddin et al., 2020), whereas in India, GMF initiatives enhanced women's resilience to both economic and environmental shocks. Furthermore, in Indonesia, GMF projected significantly improved collective agency, environmental decision-making, and social participation (Sabrina & Putra, 2025), whereas in Nepal, GMF initiatives reinforced self-efficacy and community leadership (Joshi, 2023).

Collectively, GMF not only empowers financial aspects but also holistically works as a mechanism for multi-dimensional empowerment, fostering psychological, social, and economic well-being among women. Therefore, the study hypothesizes:

***H2**: Green Microfinance is positively related to Women's Empowerment.*

Financial Literacy and Women's Empowerment

FL is widely recognized as a critical enabler of WE, providing the knowledge, skills, and confidence necessary to make informed financial decisions (Kumar et al., 2023). Financially literate women are better equipped to manage household resources, assess financial risks, allocate savings efficiently, and participate in investment decisions, thereby increasing their agency and empowerment (Andriamahery & Qamruzzaman, 2022).

Empowerment theory demonstrates that FL equips women with the cognitive tools to access financial risk and opportunities (Yoganandham et al., 2024). This comprehension fosters superior financial behavior and builds confidence, thereby strengthening women's bargaining power within the household and economic decision-making.

Empirical evidence robustly supports this pathway from knowledge to agency (Singh et al, 2019; Paier et al., 2016). Studies in developing economies show that financial literacy directly correlates with metrics of empowerment. For instance, Kumar et al. (2019, 2020) found that financially literate women in India and South Korea exhibited significantly greater involvement in household financial decisions and entrepreneurial pursuits, indicating a direct assertion of agency. The findings of Lee and Huruta (2022) are particularly illustrative; they demonstrated that financial literacy training within microfinance programs was the critical factor leading to women's increased autonomy and confidence in community participation, underscoring the role of FL as a catalyst.

Empirical evidence from South Korea and India highlighted that financially literate women exhibited greater involvement in entrepreneurial pursuits and household decision-making (Mishra et al., 2024; Poudel, 2024), whereas in Nepal, FL was directly associated with enhanced financial capabilities of the women, such as improved financial planning, greater control over financial matters, and participation in household and community decisions.

Similarly, the psychological benefits, such as mental well-being, have been documented by Ndung'u et al. (2019) in Kenya, which can be interpreted as an outcome of increased perceived control over one's financial life, a dimension of psychological empowerment (Kariuki et al., 2022). Thus, FL can work as both a practical and cognitive enabler of empowerment, significantly influencing social, psychological, and economic capabilities. Therefore, the following hypothesis is developed:

***H3**: Financial Literacy is positively associated with Women's Empowerment.*

Mediating Role of Financial Literacy

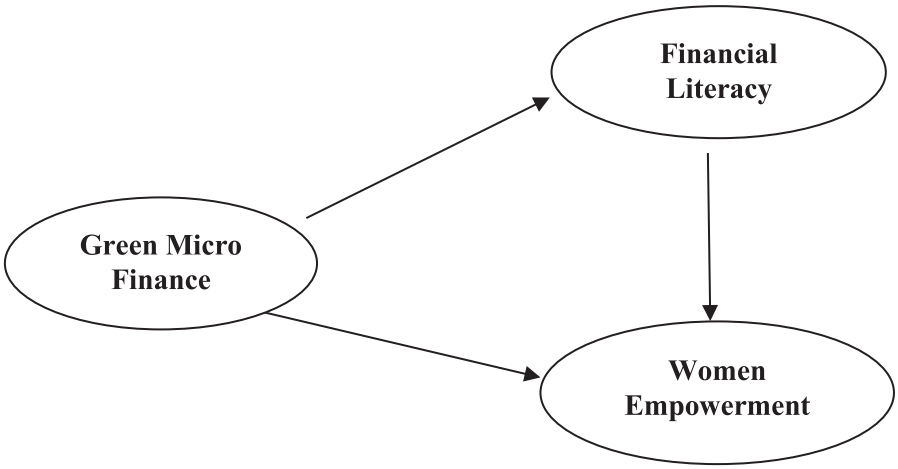
FL has been increasingly recognized as a critical mechanism through which GMF programs translate into meaningful WE's outcomes. Studies by Uddin et al. (2020), Lee and Huruta (2022), and Mahmood et al. (2023) have revealed that financial knowledge and skill constitute a form of capital, which enables individuals to maximize the opportunities from GMF resources. The GMF offers the opportunity structure, whereas FL equips women with the key skills and mindset necessary to realize empowerment (Van Niekerk, 2024). In addition, the effectiveness of GMF programs (green loans, financial capital, and sustainability-focused training) depends not only on the financial resources but also on the ability to apply these resources strategically (Egharevba et al., 2016). Thus, FL acts as a capability-enhancing mechanism that enables women to translate GMF resources into income-generation, enhanced financial behavior, and long-term economic gains, pivotal elements of empowerment.

Malik et al. (2019) revealed that financially literate women in microfinance programs achieved superior outcomes in household well-being, entrepreneurial growth, and saving and investment growth. GMF increases FL by exposing women to various financial products, training and development, and financial decision-making, and this holistically enhances FL, which in turn improves autonomy, economic agency, and household decision-making (Lee & Huruta, 2022). Lee and Huruta (2022) also highlighted that GMF impacts WE indirectly by fostering FL through exposure to green investment options, financial resources, and structured financial training. Accordingly, the following hypothesis is proposed.

H4*: Financial Literacy mediates the relationship between Green Microfinance and Women's Empowerment*

Figure 1

Conceptual Framework



Research Methods

This study is based on a cross-sectional survey design, examining the causal relationship between the study variables. The study prioritized women participating in the GMF programs in Nepal. Women affiliated with the three leading MFIs - *Swabalamban Laghubitta, Deprose Laghubitta, and Nirdhan Utthan Laghubitta, across urban and semi-urban districts of Nepal, represented the population of the study.* The purposive sampling technique was employed to select the participants who were actively engaged in GMF activities, each having at least a minimum participation period of six months.

To ensure robustness in the study findings, the sample size was estimated using Hair et al. (2019) criteria, which highlighted that a sample size above 200 is considered a large sample size and deemed significant for the comprehensive analysis of SEM. The survey questionnaire was distributed among 300 women using Google Forms. 250 valid responses were collected, yielding a response rate of 83.33%, which is consistent with significant results in a survey-based study (Kline, 2016). Data were collected over a period of three months (March, April, and May 2025). The questionnaire was divided into two parts, i.e., socio-demographic and research variables.

As an ethical precaution, all participants were assured before the questionnaire distribution that their responses would be handled confidentially, used at the aggregate level, and that no information would be shared with third parties.

The study employed covariance-based SEM to examine the causal relationship between study variables. SEM was employed because it enables a comprehensive analysis of both direct and indirect pathways among latent constructs while controlling for measurement errors. As suggested by Anderson and Gerbing (1988), a step-wise approach was used for testing the structural model. First, the measurement model's internal consistency, reliability, and validity were examined. Next, the structural model was examined (hypotheses were tested).

Measures and Instruments

All the items were anchored on a 5-point Likert scale (1 being "Strongly Disagree" and 5 being "Strongly Agree"). The study utilized a validated scale that has been widely used by multiple studies and has been recognized as a highly reliable instrument.

Table 1

Measures and Instruments

Construct	No. of Items	Adaptation from the Studies
Green Microfinance	4	(Atahau et al., 2020); (Atahau et al., 2021)
Financial Literacy	5	Lee et al. (2022)
Women Empowerment	4	(Atahau et al., 2020); (Atahau et al., 2021)

Results and Analysis

Socio-demographic profile

Among 250 respondents, most of the respondents were aged 31-40 years (45%), 65% had completed secondary and higher secondary education, and the majority (65%) were married. In terms of occupation, 50% of respondents were engaged in agriculture-related work, and 30% involved in small business or entrepreneurship. Likewise, 42% of the respondents participated for 6-12 months, and 32% participated for 13- 24 months. In terms of occupation, 50% were engaged in agriculture, and 30% in small businesses or entrepreneurship, 15% were salaried employees, and 5% were homemakers. This profile provides context for understanding how green microfinance initiatives influence financial literacy and women's empowerment.

Descriptive Statistics

The descriptive result demonstrated that all three constructs have a moderate level of agreement (see Table 3). Among the three constructs, FL demonstrated a slightly higher mean (3.48), whereas GMF revealed a moderate yet relatively lower mean (3.20). Likewise, standard deviation ranged from .72 to .80, highlighting moderate variability in respondents' perceptions. The construct reliability exceeded the threshold value of .70 (Hair et al., 2014), indicating the internal consistency of the measure.

To examine the common method bias (CMB), Harman's single-factor test was conducted. The finding revealed that the single factor accounted for 27.91% of the variance, which is less than the cut-off value of 50%, confirming the absence of CMB in the dataset.

The collinearity test was examined to see whether the independent variables exhibit problematic overlap or not. The findings revealed that the Variance Inflation Factor (VIF) score was below the threshold of 3.33(Knock, 2015), indicating the absence of multicollinearity issues in the dataset.

According to Curran et al. (1996), the recommended threshold values for kurtosis and skewness were ±7 and ±2. The kurtosis value ranges from 1.51 to 3.264, and the Skewness value ranges from 1.11 to 1.73, suggesting normal distribution within the dataset.

The correlation matrix demonstrated a strong and significant association with WE. GMF (.74) and FL (.85) strongly correlated with WE, affirming the internal consistency and validity of the measurement model.

Measurement Model

Following the criteria of .60 to .70 recommended by Hair et al. (2019), the item reliability was assessed. Table 2 revealed that all the factor loadings are above .70, demonstrating acceptable convergent validity. The measurement error variance is within the acceptable limits (generally < .60), indicating that each underlying construct accounts for a significant

portion of its variance. Thus, the indicator loading and error variances confirm that the measurement model is suitable for subsequent structural analysis. Similarly, the AVE score of all the constructs is higher than .50, ensuring convergent validity (see Table 3).

Table 2

Factor Loadings and Measurement Error Variance

Constructs	Items	Factor Loadings	Measurement Error Variance
Green Microfinance	GMF_1	.64	.59
	GMF_2	.79	.37
	GMF_3	.74	.45
	GMF_4	.66	.56
Financial Literacy	FL_1	.71	.49
	FL_2	.71	.49
	FL_3	.71	.49
	FL_4	.67	.55
	FL_5	.78	.39
Women Empowerment	WE_1	.6	.64
	WE_2	.73	.46
	WE_3	.75	.43
	WE_4	.74	.45

Table 3

Descriptive Statistics, Construct Reliability, AVE, and Correlation Matrix

Construct	Mean	St. Dev	Construct Reliability	Average Variance Extracted (AVE)	Correlation Matrix		
					1	2	3
1. GMF	3.20	.72	.82	.64	**.80**		
2. FL	3.48	.78	.71	.70	.92***	**.84**	
3. WE	3.44	.80	.76	.68	.74***	.85***	**.83**

Model Fit Evaluation

Following EFA, confirmatory factor analysis (CFA) was conducted to confirm the factor structure between observed variables. The Goodness-of-Fit Index (GFI) was .90, indicating that the model adequately reproduces the observed covariance structure. The chi-square statistic ($\chi^2 = 286.09$, df = 74) yielded a ratio of $\chi^2/df = 3.86$, which falls within the acceptable range, suggesting a reasonable fit between the hypothesized model and the observed data. The RMSEA value of .07 further supports a satisfactory fit, remaining within the recommended cutoff of ≤ .08. Additionally, the Comparative Fit Index (CFI) reached .91, surpassing the .90 threshold and demonstrating strong incremental model fit. Collectively, these indices indicate that the measurement model achieves an acceptable level of fit for further structural analysis.

Table 4

Measurement Model: Goodness-of-Fit and Badness-of-Fit Indices

Absolute Fit Indices					**Incremental Fit Index**
Goodness-of-Fit Index	**Badness-of-Fit Indices**				**Goodness-of-Fit Index**
GFI	X^2	DF	X^2/DF	RMSEA	CFI
.90	286.09	74	3.86	.07	.91

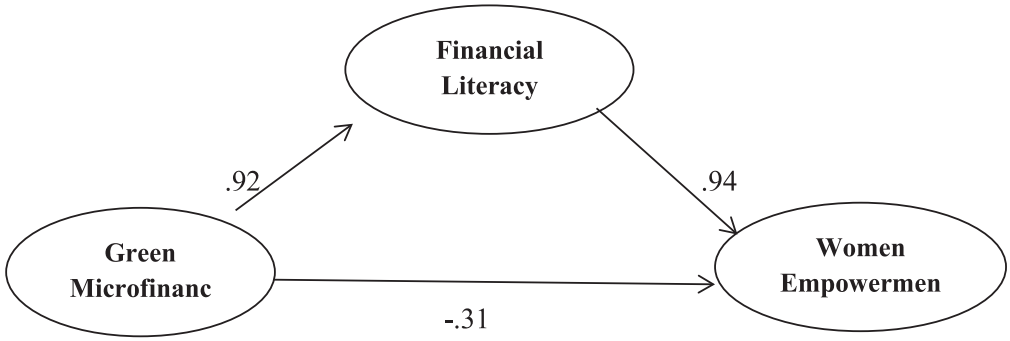
Note. GFI = Goodness-of-fit Index; X2 = Chi-square; DF = Degree of Freedom; RMSEA = Root Mean Square of Approximation.

Structural Model

The proposed hypothesis was examined using the bootstrapping technique with 5,000 iterations with a maximum likelihood estimation approach. Similarly, the estimated path coefficients are derived from the path diagram shown in Figure 2.

Figure 2

First-order Factor Structural Model



The findings demonstrated that GMF significantly affects FL ($\beta = .92$, $p < .001$), confirming H1. In contrast, the direct path of GMF to WE were negative and significant $\beta = -.31$, $p < .001$), leading to the rejection of H2. Furthermore, the relationship between FL and WE were strong and significantly positive ($\beta = .94$, $p < .001$), providing clear support for H3. offering clear support for the third hypothesis. The mediating role of FL in the relationship between GMF and WE was significant ($\beta = .86$, $p < .01$), supporting H4. Hence, the finding revealed that GMF does not directly impact WE, but its effect is realized indirectly through the enhancement of FL.

Table 4

Hypothesis Testing

Hypothesized Path	Direct Effect (β)	Indirect Effect (β)	*p-value*	Decision
H1: GMF → FL	.92***	–	<.001	Supported
H2: GMF → WE	-.31***	–	<.001	Not Supported
H3: FL → WE	.94***	–	<.001	Supported
H4: GMF → FL → WE	–	.86**	<.01	Supported

Note(s): ***$p < 0.001$, *$p < 0.01$

Discussions

The present study empirically examined the relationships among GMF, FL, and WE in Nepal, and assessed the mediating role of FL in the GMF–WE relationship. The findings provide critical insights into how GMF initiatives and financial knowledge jointly shape empowerment outcomes.

Consistent with HCT and a prior study (Lee & Huruta, 2022), the relationship between GMF on FL was significant, asserting that microfinance participation fosters beneficiaries' financial comprehension and practical decision-making skills. Similarly, the green initiatives and green-oriented financial services offered by MFIs not only provide financial resources but also embed comprehension of environmentally friendly practices through training and workshops, saving, budgeting, investment capabilities, and household financial management (Bindeeba et al., 2025; Oburu & Kinoti, 2012). This result aligns with GMF's educational and awareness-rising components, serving as a capacity-building tool, developing practical financial capabilities, strengthening women's capabilities, like attitude, knowledge, and confidence in financial matters of women (Ashrafi, 2011; Githinji, 2015).

In contrast, the relationship between GMF and WE was negative and significant, refuting several established theories and microfinance studies that documented a positive association between participating in microfinance and women's socio-economic status, community participation, voice, and agency (Chilongozi, 2022; Acheampong, 2018). Contemporary studies support the negative findings, demonstrating that credit received from microfinance may not only

empower individuals but also lead to repayment stress and dependency on family members (Engel & Pedersen, 2019). It highlights the importance of integrating empowerment-focused initiatives such as leadership, awareness campaigns, training, and community engagement into GMF programs to motivate women to translate financial access into broader social and psychological empowerment. Likewise, GMF programs may bring added responsibilities for women (managing in green technology and participating in awareness programs), financial resources may be controlled by male household members, and socio-cultural constraints in Nepal might affect the translation of financial access to empowerment outcomes (Ukanwa et al., 2018).

Similarly, the relationship between FL and WE was significant. The findings are consistent with the ample number of empirical studies (Kumar et al., 2019, 2020; Lee & Huruta, 2022) that have established FL as a crucial driver for women's economic participation, autonomy, confidence, negotiation capacity, and decision-making discretion. Studies (Lee & Huruta, 2022; Mahmood et al., 2023; Uddin et al., 2020) demonstrated that women who possess higher FL are more capable of making informed decisions, engaging in entrepreneurial activities, managing resources efficiently, and challenging traditional patriarchal roles. The findings signal that empowerment is more likely to be effective when women have access to financial resources and have the comprehension to use them effectively.

The findings showed that FL partially mediates the relationship between GMF and WE, asserting that the empowerment effect of GMF largely depends on the financial capabilities rather than just having financial access. This aligns with Capability Theory (Sen, 1999) and financial literacy mediation theory, emphasizing that financial resources alone are insufficient to empower individuals unless they possess the right capabilities (attitudes, knowledge, and skills) to transform the resources into meaningful outcomes. Financial literacy enhances women's capacity to evaluate green finance options, manage loans responsibly, and invest in sustainable practices, thereby amplifying the socio-economic and environmental impact of GMF programs. Furthermore, cognitive and psychological empowerment is often significant through literacy, training, and development programs (Lee & Huruta, 2022; Mahmood et al., 2023; Uddin et al., 2020). Thus, Programs that combine financial provision with structured financial literacy training are likely to yield stronger economic, social, and psychological benefits, while also promoting environmentally sustainable practices.

Conclusion and Implications

The study concludes that GMF fosters financial literacy, but it does not directly significantly elevate the empowerment outcomes. It demonstrates that GMF may function more as a technical and environmental financial instrument than as a gender-empowering tool. The establishment of the mediating role of FL demonstrates that empowerment is contingent on knowledge transformation rather than having financial resources alone. The negative relationship between GMF on WE indicates that GMF programs in the current framework may not holistically integrate gender empowerment components, thus it requires FL and training interventions to drive empowerment. FL acts as a key enabler that allows women to transform financial access into meaningful economic, social, and psychological empowerment.

The findings explicitly extend to capability theory, empowerment theory, and human capital theory, demonstrating that in order to generate empowerment, resources need to be linked with enabling factors. The study adds literature on GMF and FL in the context of developing countries like Nepal by integrating the environmental finance models and FL as a mediator to achieve social outcomes. Likewise, the negative relationship between GMF and WE challenge the well-established assumption that microfinance explicitly empowers women, suggesting a more context-dependent and conditional relationship. The mediating role of FL opens avenues for multi-dimensional empowerment outcomes, including economic, social, and psychological dimensions.

The findings of this study provide actionable insights for policymakers, MFIs, and development organizations seeking to enhance women's empowerment through GMF. Policymakers and MFIs should integrate structured and continuous FL programs, such as budgeting, savings management, investment decision-making for green projects, loan repayment planning, and entrepreneurial skills to ensure empowerment outcomes. To ensure effectiveness, MFIs should establish key monitoring indicators, including improvements in financial knowledge, efficiency in loan utilization, and tangible empowerment outcomes. Policymakers should focus on integrating gender-sensitive design in GMF schemes such as household negotiation sessions, decision-making training, community participation, and entrepreneurial support. Explicitly, GMF institutions and policy makers should focus in building a financial capability framework and reexamine the product design to ensure that women have significant control over the financial resources, loan utilization, and receive direct empowerment benefits.

Limitations and Further Research

Despite its contributions, this study has several limitations. All the study variables have been evaluated using a self-reported scale, which may raise concerns about the self-reported data, even though CMB and collinearity tests were conducted. The study relied on cross-sectional data, which restricts the ability to draw causal inference; hence, many scholars in behavioral science support longitudinal design to facilitate the establishment of causal relationships. Primarily, the study relied only on the three leading MFIs in Nepal, limiting the generalizability to other geographical regions and institutions with different cultural contexts and operational models.

In addition, future research could use in-depth interviews or ethnographic approaches that could provide in-depth insight about the socio-cultural dynamics, household financial management, and empowerment experiences with GMF. Likewise mixed method approach could provide more rigorous and comprehensive knowledge about the empowerment process. Lastly, future researchers could expand this study to different geographical regions, different types of MFIs, and diverse demographic groups to further strengthen the generalizability and contextual relevance.

Acknowledgment

The authors extend sincere gratitude to all individuals who contributed to the successful completion of this research. The authors also thank the anonymous reviewers for their insightful and constructive feedback on earlier versions of the manuscript.

Conflict of Interest

The authors decleare no conflict of interest.

Funding

This research was carried out independently and did not received any external funding.

Authors' Contribution and ORCID iDs:

Prashanna Sedhai: Conceptualization, Writing- Original Draft, Review and Editing, Visualization, Data Collection, and Data Analysis.

https://orid.org/0009-0000-2696-9408

Surya Balami: Review and Editing, Methodology, Data Analysis, and Supervision.

https://orcid.org/0009-0002-7796-7300

Nabin Kumar Pandey: Data Collection, Software and Resources, and Project Administration.

https://orcid.org/0009-0000-2516-1837

References

Acheampong, G. (2018). Microfinance, gender and entrepreneurial behaviour of families in Ghana. *Journal of Family Business Management*, *8*(1), 38-57.

Akhter, S., Daly, K., & Alvi, F. (2021). Microfinance and women's financial capability: Evidence from South Asia. *Journal of Economic and Social Studies, 11*(2), 45–63.

Akhter, S., Daly, K., & Alvi, F. (2021). Microfinance and women's financial capability: Evidence from South Asia. *Journal of Economic and Social Studies, 11*(2), 45–63.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411

Andriamahery, A., & Qamruzzaman, M. (2022). Do access to finance, technical know-how, and financial literacy offer women empowerment through women's entrepreneurial development?. *Frontiers in psychology*, *12*, 776844.

Ashrafi, H. (2011). Grameen bank micro-credit program's impact on women's economic empowerment: The case for Bangladesh and Turkey. *Yayımlanmamış Yüksek Lisans Tezi, İstanbul Üniversitesi, Sosyal Bilimler*.

Atahau, A. D. R., Huruta, A. D., & Lee, C. W. (2020). Rural microfinance sustainability: Does local wisdom driven governance work? *Journal of Cleaner Production, 267*, 122153. https://doi.org/10.1016/j.jclepro.2020.122153

Atahau, A. D. R., Sakti, I. M., Huruta, A. D., & Kim, M. S. (2021). Gender and renewable energy integration: The mediating role of green microfinance. *Journal of Cleaner Production, 318*, 128536. https://doi.org/10.1016/j.jclepro.2021.128536

Bateman, M., & Chang, H. J. (2012). Microfinance and the illusion of development: From hubris to nemesis in thirty years. *World Economic Review, 1*, 13–36.

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press.

Bindeeba, D. S., Tukamushaba, E. K., & Bakashaba, R. (2025). How digital capabilities and credit access influence green innovation performance in small and medium enterprises in resource constrained settings. *Discover Sustainability*, *6*(1), 955.

Chilongozi, M. N. (2022). *Microfinance as a tool for socio-economic empowerment of rural women in Northern Malawi: A practical theological reflection* (Doctoral dissertation, Stellenbosch: Stellenbosch University).

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods, 1*(1), 16–29. https://doi.org/10.1037/1082-989X.1.1.16

Egharevba, M. E., Eguavoen, A., Azuh, D., Iruonagbe, T. C., & Chiazor, I. A. (2016). Microfinance and poverty reduction strategy for promoting national development: the challenge of social/financial inclusion. *The Social Sciences*, *11*(22), 5373-5386.

Elrehail, H., Aljahmani, R., Taamneh, A. M., Alsaad, A. K., Al-Okaily, M., & Emeagwali, O. L. (2024). The role of employees' cognitive capabilities, knowledge creation and decision-making style in predicting the firm's performance. *EuroMed Journal of Business*, *19*(4), 943-972.

Engel, S., & Pedersen, D. (2019). Microfinance as poverty-shame debt. *Emotions and Society*, *1*(2), 181-196.

Githinji, J. (2015). *Knowledge, access and use of microfinance among small scale women business owners in Kiambu county, Kenya* (Doctoral dissertation, University of Nairobi).

Goyal, K., & Kumar, S. (2021). Microfinance and women's empowerment: A systematic review of literature. *International Journal of Social Economics, 48*(2), 191–206. https://doi.org/10.1108/IJSE-10-2019-0651

Gupta, S., Wei, M., Tzempelikos, N., & Shin, M. M. (2024). Women empowerment: Challenges and opportunities for sustainable development goals. *Qualitative Market Research: An International Journal, 27*(4), 608–630.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM).* SAGE.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). SAGE.

Hossain, I. (2023). Financial inclusion in bangladesh through mobile financial services: a case study on marginal agricultural peoples of Bangladesh.

Joshi, R. K. (2023). Impact of microfinance program on socio economic empowerment of women in Nepal. *Perspecfives in Nepalese Management. Kathmandu: Buddha Publications*, 315-328.

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change, 30*(3), 435–464. https://doi.org/10.1111/1467-7660.00125

Kariuki, J. K., Wandiga, E. N., & Odiyo, W. O. (2022). The mediating effect of psychological empowerment on the relationship between transformational leadership and staff retention in microfinance institutions in Kenya. *Economics and Business Quarterly Reviews*, *5*(2).

Karlan, D., Osman, A., & Zinman, J. (2022). Financial education and inclusion: Evidence from microfinance clients. *Review of Economics and Statistics, 104*(5), 1062–1077.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall.

Kumar, P., Pillai, R., Kumar, N., & Tabash, M. I. (2023). The interplay of skills, digital financial literacy, capability, and autonomy in financial decision making and well-being. *Borsa Istanbul Review*, *23*(1), 169-183.

Kumar, R., Lee, S., & Park, J. (2020). Financial literacy and women's economic decision-making: Evidence from South Korea. *Asian Journal of Business Research, 10*(2), 1–20.

Kumar, R., Singh, P., & Sharma, V. (2019). Financial literacy and women entrepreneurship: Evidence from India. *International Journal of Bank Marketing, 37*(6), 1340–1355. https://doi.org/10.1108/IJBM-04-2018-0113

Lee, C. W., & Huruta, A. D. (2022). Financial literacy as a mediator of green microfinance and women's empowerment. *Sustainability, 14*(3), 1225. https://doi.org/10.3390/su14031225

Luo, W., & Cheng, J. (2023). Transition to sustainable business models for green economic recovery: role of financial literacy, innovation and environmental sustainability. *Economic Change and Restructuring*, *56*(6), 3787-3810.

Lwamba, E., Shisler, S., Ridlehoover, W., Kupfer, M., Tshabalala, N., Nduku, P., ... & Snilstveit, B. (2022). Strengthening women's empowerment and gender equality in fragile contexts towards peaceful and inclusive societies: A systematic review and meta-analysis. *Campbell Systematic Reviews, 18(1), e1214.*

Mahmood, S., Iqbal, M., & Ali, R. (2023). Linking green microfinance and women's empowerment through capability enhancement: Evidence from Pakistan. Journal of Cleaner Production, 395, 136457.

Malik, S., Ahmed, T., & Farooq, S. (2019). Role of financial literacy in the performance of microfinance programs. *International Journal of Finance & Economics, 24*(4), 1654–1667.

Mayoux, L. (2005). Women's empowerment through sustainable microfinance: Rethinking best practice. *Development Bulletin, 66*, 71–76.

Mishra, D., Agarwal, N., Sharahiley, S., & Kandpal, V. (2024). Digital financial literacy and its impact on financial decision-making of women: Evidence from India. *Journal of Risk and Financial Management*, *17*(10), 468.

Ndung'u, N., Wanjiku, P., & Kamau, J. (2019). Financial literacy and women's well-being: Evidence from rural Kenya. *Journal of African Economies, 28*(3), 320–340.

Oburu, C. K., & Kinoti, M. W. (2012). Factors contributing towards adoption of green marketing practices in the mobile phone service providers in Kenya.

OECD. (2021). *Financial literacy and inclusion: Supporting women's empowerment.* Organisation for Economic Co-operation and Development.

Paier, M., Dünser, M., Scherngell, T., & Martin, S. (2016). Knowledge creation and research policy in science-based industries: an empirical agent-based model. In *Innovation Networks for Regional Development: Concepts, Case Studies, and Agent-Based Models* (pp. 153-183). Cham: Springer International Publishing.

Pei, J. (2024). Social responsibility of green microfinance institutions: A tool for promoting women's economic empowerment in China. *Technological and Economic Development of Economy, 30*(4), 876–898. https://doi.org/10.3846/tede.2024.20781

Poudel, A. (2024). *Access to Banking: A South Asian Perspective*. South Dakota State University.

Sabrina, O., & Putra, R. A. (2025). Navigating the Blue Economy: Indonesia's Regional Efforts in ASEAN to Support Sustainable Practices in Fisheries Sector. *Sustainability*, *17*(15), 6906.

Sapkota, A., & Bista, N. B. (2022). Role of microfinance on women empowerment: A case of Kathmandu valley. *Sustainability A Way Forward*, 134-147.

Sen, A. (1999). *Development as freedom.* Oxford University Press.

Singh, S. K., Mittal, S., Sengupta, A., & Pradhan, R. K. (2019). A dual-pathway model of knowledge exchange: linking human and psychosocial capital with prosocial knowledge effectiveness. *Journal of Knowledge Management*, *23*(5), 889-914.

Thapa, P. (2024). *Impact of microcredit programs on women empowerment in Nepal* (Doctoral dissertation, Shanker Dev Campus).

Thapa, S., & Pokharel, K. (2020). Financial inclusion and women empowerment in Nepal. *Economic Journal of Development Issues, 29*(1–2), 52–67.

Uddin, M., Kabir, M., & Rahman, M. (2020). The impact of green microfinance on women's empowerment in rural Bangladesh. *International Journal of Social Economics, 47*(7), 915–932.

Ukanwa, I., Xiong, L., & Anderson, A. (2018). Experiencing microfinance: Effects on poor women entrepreneurs' livelihood strategies. *Journal of Small Business and Enterprise Development*, *25*(3), 428-446.

UNESCO. (2020). *Education for sustainable development: A roadmap.* UNESCO.

Van Niekerk, A. J. (2024). Economic inclusion: green finance and the SDGs. *Sustainability*, *16*(3), 1128.

World Bank. (2023). *Global Findex Database 2021.* World Bank Group.

World Bank. (2023). *Women, business and the law 2023.* World Bank Group.

Yadav, R., & Pathak, G. S. (2023). Integrating green microfinance and financial literacy: Pathways to women's empowerment. *Asian Development Policy Review, 11*(2), 47–59.

Yadav, R., Pathak, G. S., & Kumar, A. (2023). Green microfinance for sustainable development in South Asia: A review and research agenda. *Sustainability, 15*(7), 6324.

Yoganandham, G., Varalakshmi, M. D., & Kalaivani, M. M. (2024). Unlocking Potential: Enhancing Women's Empowerment through Financial Inclusion in Northwestern India. *Tuijin Jishu/Journal of Propulsion Technology*, *45*(1), 2024.

Yunus, M. (1998). *Banker to the poor: Micro-lending and the battle against world poverty.* PublicAffairs.

Zhang, Q., Zhao, W., & Chen, Y. (2018). Microfinance participation and financial literacy: Evidence from rural China. *Asian Economic Journal, 32*(4), 401–421.

Bios

Prashanna Sedhai: Driven by curiosity and a commitment to excellence, I have built a strong foundation in leadership, communication, and event management during my BBA studies, from which I proudly graduated from Kathmandu Model College. I have successfully led major institutional events, including a Job Fair, exhibitions, and panel discussions, and earned distinctions such as winning Marketing Lingo and placing runner-up in Brand War. These experiences have shaped me into a confident, analytical, and purpose-oriented individual.

Email: prashnasedhai123@gmail.com

Surya Balami: An educator and researcher with over a decade of teaching bachelor's and master's students. He supervises projects and theses, has published three peer-reviewed articles and a school marketing textbook, and runs workshops on SPSS, AMOS, and case-study analysis. Skilled in SEM, mediation/moderation, and advancing R proficiency, he mentors students and professionals to apply rigorous data analysis and research methods.

Email: surya.balami01155@gmail.com

Nabin Kumar Pandey: A dedicated and enthusiastic educator with more than 15 years of teaching experience in finance and accounting. He possesses profound knowledge as a share market analyst, integrating practical market insights into his teaching, and has published a peer-reviewed article. In addition to academic instruction, he conducts training programs on accounting package software, equipping students and professionals with industry-relevant skills. His commitment to education and practical learning has earned him strong professional respect.

Email: pandeynabin43@gmail.com

Cite as: Sedhai, P., Balami, S., & Pandey, N. (2025). Green microfinance and women's empowerment: Mediating role of financial literacy. *Interdisciplinary Journal of Innovation in Nepalese Academia, 4*(2), 185-203. https://doi.org/10.32674/3gr6b357

Note: The authors acknowledge the use of OpenAI ChatGPT for language refinement, editing support, discussions, and wherever necessary for clarity and coherence in the article. The contributions made by ChatGPT helped to enhance the overall quality of this work.