



FINANCIAL LITERACY AND DIGITAL INCLUSION AMONG WOMEN ENTREPRENEURS: A COMPREHENSIVE STRUCTURED REVIEW

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ABSTRACT

This systematic literature review (SLR) explores the financial literacy as well as digital inclusion intersection within women entrepreneurs, emphasizing the crucial role these factors play in fostering entrepreneurial success. The study begins by addressing the global rise of women entrepreneurs and the distinct obstacles they encounter in obtaining financial resources and digital tools, which are essential for business growth. The problem statement highlights the ongoing gender gap in financial literacy and digital inclusion, which limits women's entrepreneurial potential. To address this issue, we conducted a comprehensive search of scholarly articles from reputable databases such as Scopus and Econbiz, emphasizing research published between 2019 and 2024. The study was organized according to the PRISMA framework, resulting in 26 final primary data sources that were analyzed. The findings are categorized into three themes: (1) digital financial literacy (DFL) as well as financial inclusion, (2) gender and financial inclusion, and (3) the influence of financial literacy with regard to business and economic development. The review also identifies key factors influencing this gap, including socio-cultural barriers, educational disparities, and limited approach to financial services as well as digital technologies. The conclusion emphasizes the need for targeted interventions and policy measures to strengthen financial literacy as well as digital inclusion within women entrepreneurs, thereby empowering them to fully leverage their entrepreneurial capabilities and contribute to economic growth. This study adds to the ongoing conversation about gender equity in entrepreneurship by providing insights for policymakers, educators, and practitioners who seek to support women within the entrepreneurial ecosystem.

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1. INTRODUCTION

Financial literacy and digital inclusion have emerged as critical factors for economic empowerment, particularly among women entrepreneurs in the rapidly evolving global economy (Tony & Desai, 2020; Widyastuti et al., 2024; Yates & Carmi, 2020). These two dimensions are not only instrumental for women to navigate the complexity of today's business, but they also have the potential to unleash higher economic growth and social equity across countries globally. Women entrepreneurship represents an increasing portion of the world business, but women entrepreneurs are challenged by gender-specific barriers that influence their financial and digital systems. This underscores the need to interrogate what financial literacy looks like with digital inclusion when developing strategies and interventions that will lead women-led enterprises to be successful and sustainable. Besides, financial literacy is known as the capability to have knowledge as well as understanding in managing personal finances (Akpene Akakpo et al., 2022; Gunawan et al., 2023; Mireku et al., 2023). This contrasts with research that shows women to be less financially literate than their male counterparts, particularly in developing countries. Such form of inequality serves to limit the scope for credit, investment and, therefore, prevent them from being overextended. Moreover, women entrepreneurs find it even harder as they are generally excluded from formal financial institutions. There is also gender bias in lending practices and fewer than required tailored products. For these women entrepreneurs, this highlights the need for interventions aimed at improving their financial literacy, providing them with proper knowledge in order for them to fully engage and benefit from such economic opportunities.

Digital inclusion, or the capability of groups as well as individuals to access and use technology, can be another key driver for women entrepreneur empowerment. There are literally innumerable opportunities for businesses within the digital economy when it comes to extending market reach, increasing operational efficiencies, or benefitting from any other mosaic of new-age tools out there. However, the largest digital allocate concerning connection to digital skills, internet connectivity, and digital technologies remains a challenge for many women entrepreneurs in our region. The exclusion of digital does not only refine these women for their opportunities in business but also layers over existing gender inequalities. Digital inclusion for women entrepreneurs is not just access to technology but also the development of digital skills and literacy needed to make the most of these technologies. Financial literacy and digital inclusion form a potent combination in empowering women entrepreneurs. Enabling women entrepreneurs to have the acumen of financial and digital literacy will ensure they are more knowledgeable when understanding how modern business environments are navigated, have access to financial resources and technology platforms at their disposal scale industries (Eichelberger et al., 2017; Zarrouk et al., 2020). In addition, the increase of such skills among societies can translate into the greater economic potential of women entrepreneurs, leading to wider socio-economic development.

According to study by The Asia Foundation (2024) stated that gender digital inclusion for female still low compared to male. In 2022, internet penetration rate was 96.8% and the rate of female in social media users was 48.6%. Malaysia has high rating in the digital readiness, but this not reflect to the business sector particularly among women entrepreneurs. Many small medium entrepreneurs (SMEs) still unfit to shift their business from conventional platform to digital technology. The initiative

from Bank Negara Malaysia (BNM) to run a campaign on the target group specifically on women entrepreneur to equip them with the correct financial education. Therefore, female entrepreneurs particularly single mother can transform the knowledge to their family and community (Alliance Financial Inclusion, 2023).

To conclude, this article has emerged with the intersection of financial literacy and digital inclusion by women entrepreneurs amidst challenges they face to encourage opening up for opportunities further that may enrich more literacies in those crucial domains (Casinal & Ancho, 2021; Pradini & Faozan, 2023). Solving these problems will enable us to move towards a more vibrant, diverse, and inclusive economic environment fostering the adequate preparation of women entrepreneurs in this new digital era.

2. LITERATURE REVIEW

Digital financial inclusion is increasingly recognized as a critical component for economic development, particularly in the context of the digital revolution. Research highlights the significant role of both financial and digital literacy in achieving digital financial inclusion. For instance, a study emphasizes that the lack of financial and digital literacy can act as a substantial barrier to digital financial inclusion, especially among diverse demographic groups such as those from rural areas or with lower income levels (Srivastava, 2022). The study collected primary data from individuals aged 18-60 with varying educational backgrounds and found that financial and digital illiteracy was prevalent due to limited access, usage, and application of digital financial tools. This underscores the need for targeted financial training and education to bridge these gaps and promote digital financial inclusion¹. Similarly, another study focusing on India revealed that the country's low financial literacy ranking significantly hampers the adoption of digital financial services, suggesting that enhancing digital financial literacy could lead to better financial inclusion outcomes (Tony & Desai, 2020).

Further research supports the notion that financial literacy is a crucial factor in improving financial inclusion across different countries. A cross-country analysis demonstrated that financial literacy positively impacts the use of financial services, complementing the financial infrastructure (Grohmann et al., 2017). This effect is consistent across various income levels and demographic subgroups, indicating the universal importance of financial literacy in fostering financial inclusion (Grohmann et al., 2017). Additionally, studies have shown that digital financial literacy is essential for building financial resilience, particularly in regions like South Asia and Sub-Saharan Africa, where a significant portion of the population remains unbanked (Kass-Hanna et al., 2022). The integration of digital literacy into financial education programs is recommended to enhance financial well-being and resilience, especially in the face of the growing influence of fintech (Golden & Cordie, 2022). These findings collectively highlight the intertwined roles of financial and digital literacy in achieving comprehensive digital financial inclusion and underscore the need for inclusive educational strategies to address these challenges.

Financial literacy is an important element in ensuring that women entrepreneurs are economically empowered, which in turn makes it vital to bring financial literacy as well as digital inclusion together. Prabadevi et al., (2024) highlighted that digital financial literacy (DFL) has been said to be a key prerequisite for rural woman entrepreneurs in South India in order for her level of inclusion and participation could

increase their overall demand. Through the research, it is noted that people who were able to use digital financial services steered a larger share of their yearly cash towards savings than did those without access. Still, the researchers said wealth was similarly equal among both groups. This highlights the vitality of financial literacy as it enables women with practical knowledge to make decisions that benefit their finances, specifically in rural areas where access to traditional financial services is reserved.

Similarly, Widyastuti et al., (2024) explore the DFL effect with regard to the gender gap in digital financial inclusion. The main observation was that while DFL was a major predictor for greater levels of digital financial inclusion among both men and women, the association with increased use appeared to be stronger for females. This insight highlights the need for more gender-specific financial literacy tools and programming to increase women entrepreneurs' access to formal financing opportunities. It gives us a perspective that an all-encompassing understanding of DFL, and not a divided gender or no-gender policy, will foster inclusive, unique financial systems suitable to both genders.

Future research should explore the intersection of digital financial literacy and financial inclusion among women entrepreneurs, focusing on how digital skills can bridge the gender gap in financial access. Investigating the role of socio-economic and cultural factors in digital finance adoption and the impact of targeted training programs on enhancing financial self-efficacy could provide valuable insights (Rashedul Hasan et al., 2023), (Oggero et al., 2020), (Tubastuvi & Purwidiyanti, 2023) (Goel & Madan, 2019).

2.1 Financial literacy as a catalyst for empowerment

Financial literacy is crucial in ensuring women are empowered to make informed decisions that will be able to contribute towards the success of their business. According to (Basar et al., 2024), it was found that the adoption of i-FinTech significantly contributes to sustainable entrepreneurship among Bumiputera SMEs in Malaysia through enhanced financial and digital literacy. This is in line with (Aristei et al., 2024), who depict that business owners with financial literacy are attracted to ethically based assets and companies managing environmental and social corporate governance. Moreover, financial literacy is also crucial for fostering inclusive finance development ecosystem. "Belt and Road" countries contribute to reinforcing the conclusion by (Song et al., 2024) on how indispensable it is for supporting better levels of financial inclusion.

2.2 Digital financial literacy and sustainable entrepreneurship

DFL, as an emerging critical success factor of sustainable entrepreneurship with a particular focus on women entrepreneurs is broadly being acknowledged based upon shared experience. Basar et al. (2024) highlighted that i-FinTech adoption serves as a significant mediating variable between financial literacy as well as sustainable entrepreneurship, particularly in the context of DFL. This corresponds to the findings of Aristei et al. (2024), who demonstrated that DFL positively influences entrepreneurs' preferences with regard to ethical financial intermediaries and their willingness to make sustainable investment choices. This is further supported by (Affandi et al., 2024) where they are proving that digital adoption within ultra-micro, micro, and small enterprises (UMSEs) in Indonesia has contributed to an escalation in business performance and financial literacy. Collectively, these studies also offer

empirical evidence of the synergistic relationship between financial and digital literacy in the adoption of sustainable business practices.

2.3 Barriers to financial inclusion and the role of digital tools

Financial and digital literacy are crucial for fostering entrepreneurship, yet substantial obstacles to financial inclusion persist among women entrepreneurs. (Kandpal, 2024) discusses the challenges faced by different sections of the population in India, including problems like restricted bank access, limited digital infrastructure for transfer, and lack of trust in banking systems. The study of (Broekhoff et al., 2024), finds low digital skills and financial adversities to be major reasons that insecure people in the Netherlands doubt using a fully digital payment system. (Song et al., 2024), further underscore the critical role of digital tools in improving financial inclusion among developing countries, as they prove that taking advantage of technological innovation and combining it with enhanced know-how in finance can contribute to bridging these gaps.

2.4 Impact of financial and digital literacy on risk-taking behavior

Another key area of research explores the intersection of risk-taking behavior, digital literacy, and financial literacy, which has important implications for women entrepreneurs. (Hu et al., 2024) suggest digital finance increases household risk-taking when financial literacy mediates this. The research proposes that higher financial literacy enables individuals to better manage risks also about digital financial products and helps make their financial decision making more rational. Similarly, (Jones et al., 2024) illustrate a direct effect of cryptocurrency literacy and financial literacy where better knowledge of digital assets may well advise economically more informed decisions. The findings point to enhanced financial and digital literacy amongst this group of entrepreneurs, thereby avoiding pitfalls associated with enhanced utilization of digital finance.

2.5 Interconnection between financial literacy, digital inclusion, and sustainable development

The connection of sustainable development, digital inclusion, as well as financial literacy, particularly in the women entrepreneurs cases, seems to be more visible. The research by (Sualeh Khattak et al., 2024) highlights the factor of managerial competencies applicable to financial as well as digital literacy in nature for initiatives executed pertaining to sustainable development plans within SMEs. (Chavriya et al., 2024) argued that financial inclusion with robustly established and multiple corroborated evidence is important in the long-term growth of developing countries owing to its facilitated by digital tools via financial literacy. The findings of these studies are important for the requirement of financial as well as digital literacy in encouraging sustainable entrepreneurship, which will also lead to overall economic development.

3. RESEARCH QUESTIONS

Research questions (RQs) are considered essential in systematic literature review (SLR) because they provide the foundation and direction of the entire review process. They can navigate and guide the scope and focus of SLR by determining what studies should or should not be included or excluded, keeping the review relevant and specific

over its main topic. A clear RQ ensures an exhaustive and systematic literature search, including all relevant studies that cover key areas of interest. This reduces the risk of bias and enables systematic exploration of all available evidence. In addition, RQs allow the data from included studies to be classified and arranged according to the framework for analyzing findings and collectively implementing results to draw meaningful conclusions. They provide clarity and focus. They do not add ambiguity or other issues that are a distraction from the review tasks, which can be used to reduce the utility of findings. Well-formulated RQs also foster transparency and reproduce the ways in which human beings can follow to verify findings or extend systematized review to other relevant topics. As a result, RQs determine the scope and appropriateness of a review to address the study objectives, whether these are defined as identifying key literature deficiencies, evaluating intervention success, or exploring broader scientific trends, and hence serve as guiding principles within any solid systematic map framework.

Defining the RQs is a critical step in the planning process and a fundamental component of an SLR, which shapes the entire review methodology (Kitchenham, 2007). The objective of our SLR is to assess as well as examine key contemporary aspects.

The PICo framework is a mnemonic style used to formulate RQs, particularly in qualitative research. PICo stands for Population, Interest, and Context. Here's what each component means:

- i. Population (P): This refers to the group or participants of interest in the study. It specifies who the research is focused on, such as a specific demographic, patient group, or community.
- ii. Interest (I): This represents the main focus or phenomenon of interest in the study. It could be a particular experience, behavior, intervention, or issue that the research aims to explore or understand.
- iii. Context (Co): This defines the setting, environment, or specific context in which the population and interest are situated. It might refer to geographical location, cultural or social settings, or any other relevant backdrop for the research.

Using the PICo framework is beneficial for the clear and systematic construction of RQs by breaking down the key elements of the study into three components. This leads to the focus of the research and better-defined questions making it easier for one to search relevant literature or design a study.

This study achieved two RQs:

- i. How does digital financial literacy influence financial inclusion among women entrepreneurs?
- ii. What is the impact of financial literacy on the economic empowerment and business sustainability of women entrepreneurs?

4. MATERIAL AND METHODS

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) is a well-recognized guideline that aims to help ensure transparency, thoroughness, and consistency at every stage in performing SLRs. The PRISMA

guidelines direct researchers in their identification, screening, and selection process, thereby systematically improving the accuracy and rigor of analysis. It is also symptomatic of the necessity to conduct as many randomized comparisons and fewer non-randomized comparisons, which are inherently more susceptible to bias and provide less strong evidence for review-based conclusions. In the uses of this kind, randomization studies work better against selection bias and give stronger evidence to the review.

The main subsections of PRISMA are as follows: identification, screening, eligibility, including, data abstraction. Thus, in the identification phase, we conduct a comprehensive database search to generate an inventory of potentially relevant studies. Based on these predefined criteria, each study is reviewed in the process of screening, and irrelevant or low-quality research will be eliminated. This is followed by an eligibility phase in which potentially relevant studies are screened to see if they meet the inclusion criteria. Lastly, data abstraction combines and selects relevant information about included studies to inform conclusions made through reasoning. Utilizing a predefined protocol ensures that the systematic review is conducted with a high level of rigor and thus produces findings from which broad research and practice recommendations can be generated.

4.1 Identification

Numerous works of literature that were highly pertinent to this topic had been gathered using essential elements in the systematic review process for this paper. The process began with selecting keywords, followed by identifying related terms through previous research, encyclopedias, thesauri, and dictionaries. All relevant terms were compiled, resulting in the creation with regard to search strings for the Scopus as well as Econbiz databases (refer to Table 1). The systematic review found a total of 260 publications related to the study topic in both databases during this phase.

Table 1: The search strings

Scopus	TITLE-ABS-KEY (financial AND literacy OR digital AND inclusion) AND (women AND entrepreneur) AND PUBYEAR > 2018 AND PUBYEAR < 2025 AND (LIMIT-TO (SUBJAREA, "ECON") OR LIMIT-TO (SUBJAREA, "BUSI")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (EXACTKEYWORD, "Financial Literacy") OR LIMIT-TO (EXACTKEYWORD, "Financial Inclusion"))
Date of Access: August 2024	
Econbiz	(financial literacy OR digital inclusion) AND (women entrepreneur)
Date of Access: August 2024	

4.2 Screening

Screening is used to examine relevant research items for content that matches predefined research question(s). Here, financial literacy and digital inclusion among women entrepreneur were employed to select research items in the screening phase. This step removed duplicate papers from the searched list. The first screening eliminated 212 publications, and the second step comprised the examination of 48 papers based on this study's exclusion and inclusion criteria (see Table 2). The first criterion was literature, given its role as the primary source of practical recommendations, including reviews. Publications written in English released from

2019 to 2024 were analyzed and considered for coverage. Note that 26 articles were removed because of their premature results and because they did not discuss the financial literacy and digital inclusion among women entrepreneur. Some articles were also due to the out of field, title is insignificant, abstract not associated with the study’s objective and no full text access.

Table 2: The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2019 – 2024	< 2019
Literature type	Journal (Article)	Review, Book, Conference
Publication Stage	Final	In Press
Subject	Economics, Econometrics and Finance, Business, Management and Accounting	Besides Social science, computer science and engineering

4.3 Eligibility

In the third step, known as the eligibility phase, 48 articles were prepared for review. At this stage, the titles as well as key content of all articles, were thoroughly assessed to ensure they met the inclusion criteria and aligned with the current research objectives. Correspondingly, 22 articles were excluded because they were outside the study’s scope, had titles that were insignificantly relevant, contained abstracts unrelated to the study's objectives, or lacked full-text access based on empirical evidence. Consequently, a total of 26 articles remain for the upcoming review.

4.4 Data abstraction and analysis

An integrative analysis was utilised among the assessment strategies in this study to assess and synthesize various research designs, particularly quantitative methods. Here, the study’s primary aim was to examine relevant subtopics as well as topics. The data collection phase marked the first step in theme development. Subsequently, Figure 2 illustrates how the authors meticulously reviewed a compilation of 26 publications for claims or materials pertinent to the topics of the current study. Correspondingly, they evaluated substantial existing studies related to financial literacy and digital inclusion, investigating both the methodologies used and the research findings. Following this, the authors collaborated with co-authors to develop themes based on the evidence within the context of the study. Throughout the data analysis process, a log was maintained to document any analyses, insights, questions, or other reflections relevant to data interpretation. Finally, the authors compared results to identify any inconsistencies in the theme development process. Notably, if any disagreements arose regarding the concepts, the authors discussed how to resolve them.

4.5 Quality of appraisal

In this study, we implement the quality assessments (QAs) framework developed by Anas Abouzahra et al. (2020), which consists of six QAs for our SLR. The evaluation process for each criterion uses three possible ratings: "Yes" (Y) is assigned a value of 1 when the criterion is fully satisfied, "Partly" (P) receives a value of 0.5 when the criterion is partially fulfilled but exhibits gaps or shortcomings, and "No" (N) is allocated a value of 0 when the criterion is entirely unmet.

Applying this framework allows for a structured evaluation of selected studies, supporting a robust analysis that strengthens the reliability of the findings. Each QA score contributes to a comprehensive view of the quality of research, ensuring consistency and transparency in the assessment. This detailed process mitigates potential biases and underlines the credibility of the results within the context of this SLR.

Quality Assessment	Expert 1	Expert 2	Expert 3	Total Mark
<i>Is the research purpose clearly stated?</i>	Y	Y	Y	3
<i>Is the interest as well as the usefulness of the work clearly presented?</i>	Y	Y	Y	3
<i>Is the research methodology clearly established?</i>	Y	Y	Y	3
<i>Are the approach concepts clearly defined?</i>	Y	Y	Y	3
<i>Is the work compared and measured with other similar work?</i>	Y	Y	Y	3
<i>Are the limitations of the work clearly mentioned?</i>	Y	Y	Y	3

Notes: The table presents a QA framework employed to assess a research according to specific criteria. Three experts review the study using these criteria, scoring each one as "Yes" (Y), "Partly" (P), or "No" (N). Below is a detailed clarification:

1. **Is the study's purpose clearly articulated?**
 - This criterion assesses whether the study's objectives are well-defined as well as clearly expressed. A clear purpose establishes the research's scope and direction.
2. **Is the significance and relevance of the work clearly conveyed?**
 - This criterion assesses whether the potential and significant contributions of the study are adequately discussed. It gauges the research's impact as well as relevance.
3. **Is the study methodology clearly defined?**
 - This evaluates whether the research methodology is clearly defined as well as suitable for obtaining the study's objectives. Clear methodology is essential for the reproducibility as well as the validity of the study.
4. **Are the concepts of the approach clearly articulated?**
 - This criterion examines whether the theoretical framework as well as key concepts are clearly articulated. Precise definitions are vital for comprehending the study's approach.

5. **Is the work compared and evaluated against other similar studies?**

- This assesses whether the study has been benchmarked against existing research. Comparing it with other research helps situate the work within the broader academic context and emphasizes its contributions.

Each expert evaluates the study independently based on these criteria, and the scores are then combined to calculate an overall mark. To advance to the next stage, a study must achieve a total score exceeding 3.0, which is obtained by summing the scores from all three experts. This threshold guarantees that only studies meeting a specific quality standard move forward.

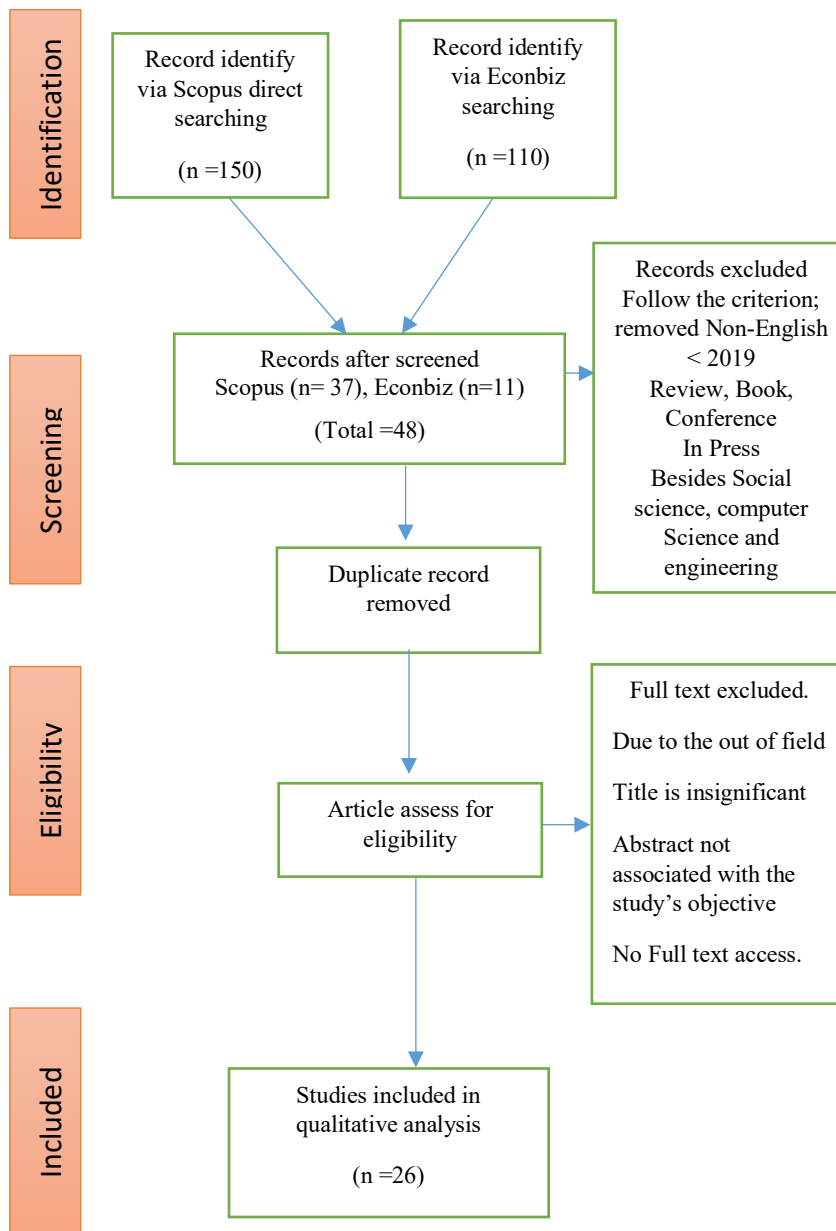


Figure 1: Flow diagram with regard to the proposed searching study [1]

5. RESULT AND FINDING

Background of selected study:

No.	Authors	Title	Year	Source Title	Scopus	Econbiz
1	Amnas et al., (2024)	FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy and the Moderating Influence of Perceived Regulatory Support	2024	Journal of Risk and Financial Management	/	
2	Nizam & Rashidi, (2024)	Barriers to digital financial inclusion and digital financial services (DFS) in Pakistan: a phenomenological approach	2024	Qualitative Research in Financial Markets	/	
3	Ahmad et al., (2023)	Financial Literacy to Improve Sustainability: A Bibliometric Analysis	2023	Studies in Business and Economics	/	
4	Jin & Liu, (2024)	Unlocking Financial Opportunities: The Substantial Alleviation of Financing Constraints on Small and Micro Enterprises Through Digital Inclusive Finance	2024	Journal of the Knowledge Economy	/	
5	Cicchello et al., (2021)	Financial inclusion and development in the least developed countries in Asia and Africa	2021	Journal of Innovation and Entrepreneurship	/	
6	Kiwanuka & Sibindi, (2024)	Digital Literacy, Insurtech Adoption, and Insurance Inclusion in Uganda	2024	Journal of Risk and Financial Management	/	
7	Zahid et al., (2024)	Do Women's Financial Literacy Accelerate Financial Inclusion? Evidence from Pakistan	2024	Journal of the Knowledge Economy	/	
8	(Hapsari et al., 2024)	Antecedents of Islamic welfare: productivity, education, and the financial aspect	2024	International Journal of Islamic and Middle Eastern Finance and Management	/	
9	Korir & Hack-Polay, (2024)	Understanding generational differences for financial inclusion in Kenya	2024	African Journal of Economic and Management Studies	/	
10	Noor et al., (2020)	Financial literacy, financial self-efficacy, and financial account ownership behavior in Pakistan	2020	Cogent Economics and Finance	/	
11	Akomea-Frimpong et al., (2023)	Financial Literacy of Legislators in Africa: An Exploratory Study	2023	International Journal of Public Administration	/	
12	(Angeles, (2022)	The Moderating Effect of Digital and Financial Literacy on the Digital Financial Services and Financial Behavior of MSMEs	2022	Review of Economics and Finance	/	
13	(Hendrawaty et al., (2024)	The determinants of the financial inclusion of Indonesian female entrepreneurs	2024	International Journal of Management and Sustainability	/	
14	Mpofu & Mhlanga, (2022)	Digital Financial Inclusion, Digital Financial Services Tax, and Financial Inclusion in the Fourth Industrial Revolution Era in Africa	2022	Economics	/	

15	Orozco-Orozco et al., (2024)	Financial Literacy and Financial Well-Being Among Businesspersons from Victoria, Tamaulipas, Mexico; [Alfabetismo financiero y bienestar financiero entre empresarios de Victoria, Tamaulipas, México]	2024	Revista Mexicana de Economía y Finanzas Nueva Época	/	
16	Setiawan et al., (2024)	Quest for financial inclusion via digital financial services (Fintech) during COVID-19 pandemic: a case study of women in Indonesia	2024	Journal of Financial Services Marketing	/	
17	Raheem et al., (2024)	Designing for financial inclusion in developing countries: Digital financial service for low-income women in Ghana	2024	Information Society	/	
18	R Hasan et al., (2023)	Financial inclusion – does digital financial literacy matter for women entrepreneurs?	2023	International Journal of Social Economics	/	
19	Afolabi & Akinlolu, (2021)	Evaluation of women's access to building credits from banks in Nigeria	2021	Banks and Bank Systems	/	
20	Berguiga & Adair, (2024)	Determinants of youth financial inclusion in MENA countries: account holding versus the use of digital services	2024	Journal of Financial Reporting and Accounting	/	
21	Nandru et al., (2021)	Examining the influence of financial inclusion on the financial well-being of marginalized street vendors: an empirical evidence from India	2021	International Journal of Social Economics	/	
22	Singh & Singh, (2024)	Financial literacy and its determinants among the scheduled tribes: evidence from India	2023	International Journal of Social Economics	/	
23	Koomson et al., (2021)	Accelerating the impact of financial literacy training programmes on household consumption by empowering women	2021	Applied Economics	/	
24	R Hasan et al., (2023)	Financial inclusion: does digital financial literacy matter for women entrepreneurs?	2023	International journal of social economics		/
25	Oggero et al., (2020)	Entrepreneurial spirits in women and men: the role of financial literacy and digital skills	2020	Small business economics: an international journal,		/
26	(Peter et al., (2024)	Navigating the digital financial landscape: unraveling the impact of financial behavior traits on women-owned enterprises in the new normal perspective	2024	Cogent business & management		/

The primary themes uncovered in this research underwent rigorous validation to ensure coherence and relevance. Experts in financial management, financial technology, and behavioral finance collaboratively examined the themes, evaluating each sub-theme for relevance and clarity within the field. This expert review phase was essential to confirm that each sub-theme directly addressed critical issues within digital financial literacy (DFL) and financial inclusion, especially among underserved populations. In cases of thematic inconsistencies, the research team engaged in further discussion to reconcile differences, ultimately refining the themes to ensure consistency and thoroughness. Subsequently, two additional experts, specializing in

oncology and biomedical science, reviewed the sub-themes to confirm their comprehensiveness and relevance, making final adjustments based on expert insights to enhance domain validity.

5.1 Digital financial literacy and financial inclusion

Several studies highlight DFL as an essential factor in financial inclusion, particularly for women entrepreneurs, by facilitating access to formal financial systems through FinTech. For instance, in countries like India and Pakistan, where FinTech promises financial inclusivity, the effectiveness of these services is contingent upon users' DFL levels. This literacy enables women entrepreneurs to bypass barriers, such as lack of awareness and reliance on intermediaries, which traditionally obstruct access to digital financial services. The findings underscore the potential for enhanced DFL to bridge financial access gaps for women, particularly by providing them with tools to manage their finances independently.

Moreover, DFL has broader implications for financial behaviors among women entrepreneurs beyond access to banking services. For example, research from Uganda shows DFL significantly impacts insurtech adoption, promoting insurance coverage among women. This points to the necessity of digital literacy programs not only for basic banking access but for engagement with diverse financial products, which can provide women with greater financial autonomy. Targeted interventions to improve DFL could elevate women entrepreneurs' financial empowerment, especially in developing regions, by fostering inclusion across a spectrum of financial tools and services. Policies focusing on literacy gaps and barriers could play a crucial role in realizing the full potential of digital finance for economic growth.

5.2 Gender and financial inclusion

DFL's role in enhancing financial inclusion among women entrepreneurs is evident across numerous studies. Research highlights that women with higher DFL levels are more inclined to participate in formal banking, often reducing their exposure to financial risks like fraud. For example, Hasan et al. (2023) suggest that DFL is a crucial driver of women's financial autonomy, fostering engagement with banking channels that support economic stability. Meanwhile, Kumaralalita and Zheng (2023) argue that DFL promotes economic empowerment, particularly in developing nations where traditional financial systems are less accessible. Studies show that digital platforms, similar to micro-lending solutions, can empower women to manage their finances more effectively, reducing the financial inclusion gap by providing sustainable financial access.

Further research, such as Khan and Shahid's (2024) study, emphasizes digital tools' role in increasing financial resilience, particularly for women affected by crises like the COVID-19 pandemic. Alternative digital platforms, such as mobile payments, are especially beneficial for marginalized communities, enabling financial inclusion and social empowerment. Other researchers, such as Adbi and Natarajan (2023), point out that while FinTech services can provide a valuable alternative, they must work alongside traditional banking systems to enhance the financial security of under-resourced women. These findings suggest that DFL and digital financial tools play a transformative role in narrowing gender disparities in financial inclusion.

5.3 Financial literacy's influence on economic development

Evidence underscores a positive relationship between financial literacy and economic progress among women entrepreneurs, with DFL serving as a key enabler of financial engagement. Studies indicate that higher DFL levels encourage women entrepreneurs to utilize formal banking channels, which broadens their access to secure financial options. Researchers like Hasan et al. (2023) and Berguiga and Adair (2023) find that combining FinTech with traditional banking structures can improve financial inclusion, particularly for women from lower-income backgrounds. This integration is vital for fostering financial security and is seen as a prerequisite for economic empowerment.

Studies from regions such as Indonesia reveal that adapting digital financial services to local resource limitations can strengthen women's financial resilience. The literature proposes that addressing women's financial challenges with targeted digital tools can create lasting improvements in inclusive finance. Furthermore, reports emphasize digital financial services' potential in narrowing financial inequalities, especially during economic disruptions like COVID-19. Research by Isaacs et al. (2022) and Mustafa et al. (2019) shows that digital tools, including blockchain and mobile money, offer essential support for women-led microenterprises. However, effectively leveraging these tools requires dismantling structural barriers and ensuring that platforms meet the unique needs of women in patriarchal societies. Ultimately, the studies underscore that DFL and FinTech are indispensable for fostering women entrepreneurs' economic empowerment.

6. DISCUSSION AND CONCLUSION

For women entrepreneurs, the significance of digital financial education, especially DFL, in fostering empowerment is now broadly acknowledged. Women pursuing entrepreneurship are facing barriers to starting and sustaining businesses, with DFL being an invaluable asset, beginning to provide lifesaving financial services but also enhancing their aptitude of gaining from digital platforms for business expansion. This research expresses that women having more DFL proportion are expected to take up their interaction with formal financial systems instead of falling back on informal mechanisms, putting them at a low risk anytime when it comes to the threat of being financially extracted. Due to this literacy, women can also bank digitally and make use of fintech services. It helps them overcome the barriers that most women in developing regions face to get financial services. Strengthening the DFL can thus enable women entrepreneurs to increase their financial resilience and business sustainability, thereby fostering economic development and underscoring the critical need for interventions or policies aimed at encouraging digital financial education for this target group. The policy recommendations aim to improve digital financial literacy (DFL) and inclusion among women entrepreneurs, particularly in underserved areas. Suggested actions include tailored DFL programs, awareness campaigns in rural regions, and the development of women-focused financial products that simplify access. Additionally, incorporating financial literacy into school curricula would prepare young women early on, while incentives, partnerships, and regulatory protections could further encourage digital finance use. Community mentorship networks and regular feedback collection are essential to adapt these initiatives, ensuring they meet evolving needs and enhance women's financial empowerment.

7. LIMITATIONS

The study has several limitations, including its focus on specific regions, which may limit the findings' relevance to other cultural or economic settings. The data largely relies on self-reported responses, which may be biased, and it emphasizes digital literacy without fully addressing access to digital infrastructure, a crucial factor in underserved areas. Additionally, the cross-sectional nature of the study offers only a current view, lacking insight into potential long-term trends. Finally, expert evaluations were limited to certain fields, and input from additional disciplines could further enhance the findings.

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