Indian Journal of Information Sources and Services
ISSN: 2231-6094 (P) Vol.14, No.2, 2024, pp.28-33

DOI: https://doi.org/10.51983/ijiss-2024.14.2.05

Strategies for Leveraging Digital Libraries to Improve Financial Literacy among Rural Entrepreneurial Women

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(Received 06 April 2024; Revised 24 April 2024; Accepted 14 May 2024; Available online 10 June 2024)

***Abstract* - The topic of women's financial inclusion has gained international attention, and prior research has shown conflicting results about the factors that influence financial inclusion among Rural Women Entrepreneurs (RWE) worldwide. Nonetheless, previous research has seldom examined how women's financial inclusion is impacted by digital financial literacy and Digital Libraries (DLs). An individual with financial literacy is equipped with the information and abilities needed to make wise business choices. The ability of business owners to get the capital they need has a beneficial impact on the expansion of the national economy. Making sure vulnerable populations, including low-income RWEs, have affordable access to suitable financial goods and services is known as financial inclusion. The geographical region under investigation was the southern part of India. The participants in the study were 499 RWE from five different states (Tamilnadu, Kerala, Karnataka, Andra Pradesh and Telangana). A total of 259 respondents who used Digital Financial Goods & Services (DFG & S) using DLs and 240 respondents who did not utilize financial services took part in the survey. The statistical analysis compares the revenue of individuals who use DFG&S through DLs and those who do not use DFG & S. The annual savings exhibit a substantial disparity, shown by a T-ratio of 2.684 and a p-value of 0.015, which suggests a noteworthy difference at a significance level of 1.5%. Results indicate that those who answer save more money each year than those who do not react. On the other hand, the wealth parameter exhibits a T-ratio of 1.987 and a p-value of 0.123, indicating no statistically significant wealth disparity between the two respondent groups.**

***Keywords:* Digital Library, Financial Literacy, Rural Women Entrepreneurs, Digital Financial Services**

I. INTRODUCTION

The International Federation of Library Associations and Institutions (IFLA & I) acknowledges libraries as essential collaborators in promoting equitable and equitable development (IFLA). Their primary function is to provide significant accessibility to data, which is vital for advancing financial, social, and ecologically sustainable growth. Lack of access to information hampers the ability to make educated decisions, stifles innovation, and limits full engagement in scientific and cultural activities, affecting people, communities, and the global community. Libraries are recognized as crucial collaborators in accomplishing policy objectives following the United Nations 2030 Agenda.

Women's financial inclusion affects the economy more broadly. The prosperity of microfinance initiatives in Asian and African nations fosters a favorable correlation between economic growth and women's empowerment (American Library Association (ALA)). However, rural women are more vulnerable to financial risks like money laundering since they do not have access to official financial institutions (Pradeep et al., 2017). As a result, developing nations are implementing legislative measures to lessen the prejudice that financial institutions currently have when assessing loan applications (Shaik, 2021; Adam et al., 2018). Although it offers a framework to guarantee equity in loan applications, the Equal Credit Opportunity Act (ECOA) of 1974 is not widely accepted and is not adhered to outside of the US. If women possess a substantial cash balance or enough financial collateral, banks will fairly evaluate them (Cowling et al., 2020).

A greater level of financial knowledge has a favorable impact on women's saving behavior, as shown by previous research (Lyons & Kass-Hanna, 2021). Additionally, the research show that males are more financially literate than women. These results are consistent with (Klapper & Singer, 2017) for the adult population worldwide, including developing and developed nations. Encouraging financial inclusion, safeguarding customers, and eventually advancing financial stability and capacity all depend heavily on financial literacy (Pržulj & Tunguz, 2022). This is where the problem is. A greater level of financial literacy among female entrepreneurs would be beneficial in order to get a favorable financial decision via the official financial channel.

There is evidence that women face unjust prejudices when it comes to credit risk evaluation procedures. Due to societal and cultural constraints that limit women's independence in developing nations, educating women about money is also a difficult undertaking. The authors of (Rushi, 2022) discuss the male-dominated Indian culture in which women are often unable to make independent financial choices. According to the World Economic Forum (2021), among the nations under review, the gender pay gap in economic participation and opportunity continues to be the second greatest. Afghanistan is the nation that has made the least progress in closing the gender gap in terms of economic opportunity, engagement, and educational achievement in 2021.

Women's financial exclusion is caused by a number of causes, according to the United Nations (Udayakumar et al., 2023): (1) income and property; (2) transaction costs; (3) cultural norms; and (4) supply and demand restrictions. It is more difficult for women employed in the rural agriculture industry to get financing from the official banking sector. The capacity of women to retain pertinent paperwork that financial institutions need throughout the loan application process is impacted by their lack of formal education, which raises the cost of transactions. Cultural norms increase transaction costs by restricting the mobility of the parties involved. Lastly, women's access to asset ownership is often restricted by the supply-side. All of the aforementioned barriers are now surmountable for women thanks to the digital financial revolution (Kofman & Payne, 2021; Leu, 2011).

Financial literacy is essential for business achievement as it empowers people to make well-informed choices about expenditures, funds, and handling resources. Financial knowledge among RWE may result in increased economic autonomy, higher business efficacy, and enhanced standards of life. Nevertheless, conventional financial education programs often encounter difficulties reaching rural regions due to operational and organizational obstacles. Internet-accessible DLs provide a comprehensive and efficient method for imparting financial literacy to underrepresented people (Buteau et al., 2021).

II. Review of Literature

The influence of financial inclusion on entrepreneurs and the economy has been the subject of an increasing amount of study, according to the authors in (Oleksandr et al., 2024). Furthermore, a number of research have used Global Findex data to ascertain the factors that influence financial inclusion in a more comprehensive worldwide setting. Financial inclusion, according to writers in (Ozili, 2021), is the ability of people and organizations to get practical and reasonably priced financial goods and services, such as transactions, payments, savings accounts, credit, and insurance, that satisfy their requirements in an ethical and sustainable manner.

Financial inclusion may be defined on a number of levels, including the individual and corporate levels. For instance, economic integration may directly affect outcomes like gender equality, health, and education at the individual and family levels. Financial inclusions are often linked to more general macroeconomic indicators at the national level, including as GDP growth, employment, poverty, and income and wealth inequality.

Financial inclusion is increasing the availability of banking services in (Bire et al., 2019; Lee, 2014), particularly for low-cost services in rural areas. It entails raising the standard of savings programs, educating people about money, putting Financial Identification Codes (FIC) into place, and surveying people about financial literacy. Financial inclusion faces several obstacles, and numerous supply-side factors—such as high transaction costs, uncertainty, information asymmetry, or lack of physical access—have been covered in a number of studies. Each of these elements has an impact on how financial services are used effectively. Financial literacy research often demonstrates the connection between financial knowledge and wise financial choices.

Additionally, financial literacy describes a person's capacity to find, comprehend, and assess information relevant to making decisions by being aware of the financial ramifications.

The financial inclusion of established economic infrastructure is positively impacted by increasing levels of financial literacy, according to the authors of (Klühs et al., 2017). In less developed nations, financial assistance for access to financing is reliant on financial literacy. Better financial inclusion has reportedly been linked to greater levels of financial literacy. Additionally, when financial institutions grow, financial literacy may work in tandem with them to promote increased usage of business services by the public. In addition to creating financial institutions and using these links to inform economic strategies, many nations might take a more proactive approach to raising financial literacy.

Digital literacy instruction focuses on cultivating digital abilities and fostering comprehension of the social and cultural norms of utilizing online media. The goals of learning about digital literacy may vary, ranging from equipping individuals with the necessary skills to participate in the information economy to fostering civic engagement and empowering society (Pangrazio et al., 2020).

"The Digital Literacy Mandate" asserts that digital literacy is crucial for individuals to effectively communicate, get career opportunities, acquire complete education, and engage in social interactions worldwide. "Knowing and Promoting Digital Literacy" is a thorough manual for educators and educational administrators on incorporating digital literacy into the curriculum. According to UNESCO, modern skills are essential for continuous development and employment. The primary objective of financial literacy is to offer persons who lack digital abilities unstructured educational possibilities and accessibility to digital assets, enabling their interaction and integration into the digital realm (Snousi et al., 2022).

Gerald Leitner, the Secretary General of the International Federation of Library Associations and Institutions (IFLA), stresses the need to consider connection, content, and expertise while striving to promote digital inclusion. Libraries, serving as public places, repositories, and gateways to information and staffed by knowledgeable instructors in knowledge management, are responsible for fostering DI and improving digital literacy (Eyerinmene Friday & Zaccheaus Godfrey, 2023). Libraries must actively promote integrating their services into broader government initiatives and get the requisite regulatory and monetary support (Quan et al., 2021).

Innovation in Library Digital Inclusion Initiatives demonstrates how community libraries are at the forefront of offering diverse technology and digital material to their populations. The document titled "Public Libraries Pave the Path to DI" provides a concise overview of the main discoveries from an investigation. The study focuses on the role of public libraries in fostering digitally and financially inclusive communities. An initiative undertaken in Nepal, community libraries and information centers provide complimentary internet and computer accessibility, benefiting more than 42,000 girls and women in remote regions by enhancing their digital abilities and self-assurance (Nikou et al., 2022).

Within digital technology, the concept of digital inclusion addresses two primary issues: facilitating widespread general access to the Internet and the dissemination of technical advancements. Additionally, it strives to assist individuals in navigating the Internet without encountering difficulties or confusion (Wang & Si, 2024). Libraries serve as community resource centers, offering the general public a wide range of information and expertise. They also play a crucial role in promoting DI.

Given the growing significance of DI and financial literacy education, it is imperative to examine the present state of these issues in Indian society, particularly the role of libraries in advancing DI and improving financial literacy. Understanding the policies and activities to tackle these difficulties is crucial for developing successful strategies and suggestions to help libraries realize their function as DI and financial literacy instruction enablers.

III. MATERIALS AND METHODS

3.1 Leveraging Digital Libraries for Financial Literacy

Not only is digital literacy essential for RWEs' changing duties, but it's also a key component of RWEs' revenue-generating strategies. Numerous academics have pointed out the ways in which self-sufficiency might be achieved via improved digital literacy through DL.

- **Ongoing Education:** Digital literacy requires ongoing education and adaptation; it is not a static ability. It is important for RWEs to put a high priority on professional development and keep up with the latest developments and trends in the information industry. Online training are excellent tools for raising digital literacy using DL.
- **Information Management and Analytics:** RWEs may efficiently handle and analyze data by using their digital literacy through DL. They may learn more about data patterns, collection utilization, and customer behavior by using data analytics solutions. The distribution of resources and DL services may both benefit from data-driven decision-making.
- **Automation and AI:** Using technologies with AI capabilities may help users have a better experience by streamlining repetitive processes. For example, chatbots may instantly help users, freeing up RWEs to concentrate on more complicated requests and services. It need digital literacy to comprehend and use these kinds of technology.
- **Collection of Digital Materials:** With the abundance of digital materials, RWEs need to be very skilled in compiling and arranging digital collections. They can efficiently choose, categorize, and manage digital information with the use of DL abilities, guaranteeing that consumers have access to excellent resources.
- **Critical Assessment of Online Data:** RWEs with a solid background in digital literacy through DL may instruct patrons in the process of evaluating online material critically. They may provide customers the necessary skills for the digital era by teaching them how important it is to evaluate the validity and dependability of DLs.
- **Digital Acceptance:** By tackling the digital gap and guaranteeing that all RWEs have comparable access to online tools and possibilities, RWEs may encourage digital literacy through DL within their local areas. To close the knowledge gap, they might provide training courses and seminars on digital literacy using DL.

3.2 Ethics and Consent

Financial literacy is essential for successful entrepreneurship as it empowers people to make well-informed choices about expenditures, savings, and resource management. Financial knowledge among RWEs may result in more economic autonomy, higher business efficacy, and increased overall well-being. Nevertheless, conventional financial literacy initiatives often encounter difficulties reaching rural regions due to organizational and structural obstacles. Internet-accessible DLs provide a flexible and efficient method for imparting financial knowledge to underrepresented people.

3.3 Area of Study

The geographical region under investigation was located in South India. South India, often referred to as Southern India or Peninsular India, is the southern region of the Deccan Peninsula in India. It includes the states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana. South India covers 19.31% of India's total land, which amounts to 635,780 square kilometers or 245,480 square miles. Additionally, it is home to around 20% of India's population. The region is surrounded by the Bay of Bengal to the east, the Arabian Sea to the west, and the Indian Ocean to the south. The area exhibits geographical diversity, characterized by two mountain ranges, namely the Western and Eastern Ghats, which form the borders of the plateau heartland. The Godavari, Krishna, Kaveri, Tungabhadra, and Vaigai rivers are significant intermittent water sources. In South India, agriculture is the predominant profession, with around 5.31 crore people involved in agricultural and related activities in 2021. Rice is the primary food source and the area's predominant crop. South India is a prominent hub for spice production, particularly for black pepper, cardamom, clove, and nutmeg, which are cultivated alone in this area. The primary crops grown in South India are sugarcane, chilli, banana, cotton, turmeric, millets, and pulses.

3.4 Data Samples

The research deliberately chose two agricultural villages from each state, resulting in 25 farming communities. The selection process was deliberate and focused on choosing participants from rural villages that had banking institutions present. Professional data collectors, known as enumerators, were used to aid in collecting participants. They utilized key informants within the designated areas. Participants were solicited in agricultural fields, retail establishments, residences, and designated gathering places. Within each chosen community, a deliberate selection was made of ten RWEs who engage with DFG&S and ten RWEs who do not use DFG&S. There was a total of 250 individuals who possessed access to DFG & S and another 250 individuals who have no accessibility to any financial goods. Out of the 250 questionnaires sent to participants with a choice of financial services, 239 were successfully answered and utilized for analysis. Throughout the whole study, a total of 449 RWEs were recorded.

3.5 Data Gathering

Data collection began on 10/11/2023, using organized surveys. Proficient respondents independently completed the survey, whereas illiterate people had oral interviews facilitated by respondents who completed the survey on their behalf. The study instrument underwent validation by a team of agricultural economics and security specialists to ensure that it held both face and content relevance. Before finalizing the document, the examiners made care to integrate all the identified errors. The research included one pair of assessments for those who utilize DFG&S, and another for those who do not. The surveys consist of open-ended queries that need a Yes/No response.

3.6 Data Analysis

The information was evaluated using two separate methodologies: statistical analysis and inferential statistical methods, namely the Z-Test. The research was conducted independently for income, wealth, and savings, evaluating these variables across RWEs who use DFG & S and those who do not. The Z-statistic is defined formally as:

$$Z = \frac{\hat{P}-\hat{Q}}{\sqrt{\frac{V^2p}{N_p}+\frac{V^2q}{N_q}}} \qquad (1)$$

Z is the criterion determining the statistically significant nature of the mean difference would be evaluated. $\hat{P}$ is the average assets, income, and savings of RWEs who are using DFG&S. $\hat{Q}$ is the average assets, income, and savings of RWEs not using DFG&S. V^2p is the variance of average assets, income, and savings of RWEs using DFG&S. V^2q is the variance of average assets, income, and savings of RWEs not using DFG&S. N_p and N_q denotes the sample size of RWEs accessing and not accessing DFG & S, respectively.

IV. Results and Discussion

Utilizing DLs to enhance financial literacy among RWE in South India is a viable approach that tackles the distinct obstacles encountered by this group. By providing easily available, pertinent, and captivating financial education, DLs can empower women in rural areas to make well-informed financial choices, improve their entrepreneurial endeavors, and contribute to overall economic progress.

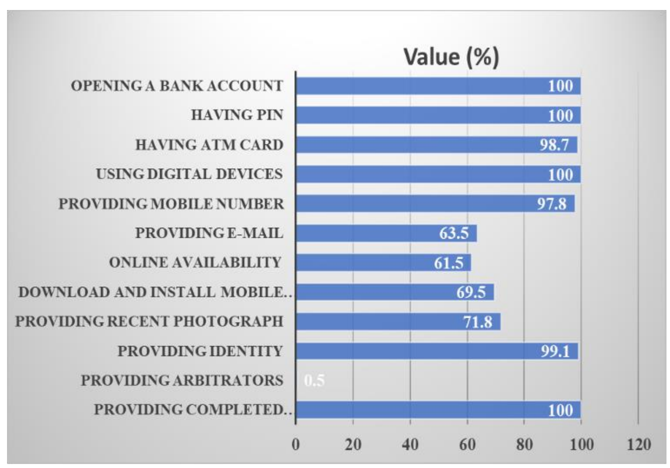

Fig. 1 Criteria for Accessing DFG & S among RWE in South India

Fig. 1 depicts the criteria for accessing DFG & S among RWE in South India. The chart demonstrates that the criteria of "Providing a completed application form," "Using digital devices," "Having a PIN," and "Opening a bank account" all have a 100% compliance rate. This indicates that women easily and widely adopt these processes. Almost all participants, namely 99.1%, can "Provide identity," 98.7% possess an ATM card, and 97.8% can provide a cellphone number. This demonstrates high compliance with the essential requirements for obtaining financial services.

Nevertheless, alternative criteria exhibit diminished percentages, indicating specific areas that need more enhancement or assistance. For instance, a mere 71.8% of individuals can "Furnishing a recent photograph," while a smaller percentage of 69.5% can "Acquire and deploy a mobile banking application." These data suggest the existence of possible obstacles in terms of accessing resources or technical expertise. Furthermore, the categories of "Providing E-mail" and "Online availability" exhibit substantial deficiencies, with rates of 63.5% and 61.5%, respectively, underscoring the need for improved internet access or training in DL. The most notable disparity is shown in the criteria "Providing arbitrators," which is fulfilled by just 0.5% of women.

TABLE I Z-TEST RESULTS COMPARING RESPONDENTS AND NON-RESPONDENTS WEALTH, YEARLY INCOME, AND YEARLY SAVINGS IN DFG & S

Statistical parameters	**Yearly income**		**Yearly savings**		**Wealth**	
	Respondents	Non-Respondents	Respondents	Non-Respondents	Respondents	Non-Respondents
Data samples	259	240	259	240	259	240
T-ratio	3.124		2.684		1.987	
P-value	0.001		0.015		0.123	

Table I shows the results of the Z-test comparing wealth, yearly income, and yearly savings of respondents and non-respondents (RWE from South India) in DFG & S. The T-ratio for annual income between the respondents and non-respondents is 3.124, with a p-value of 0.001. This suggests a significant difference in yearly income at a 0.1% significance level, with respondents having a greater income. The annual savings exhibit a substantial disparity, shown by a T-ratio of 2.684 and a p-value of 0.015, which suggests a noteworthy difference at a significance level of 1.5%. This suggests that those who answer save more money each year than those who do not react. On the other hand, the wealth parameter exhibits a T-ratio of 1.987 and a p-value of 0.123, indicating no statistically significant wealth disparity between the two groups. This suggests that while the respondents had larger salaries and savings, their total accumulation of wealth was not substantially different from that of non-respondents.

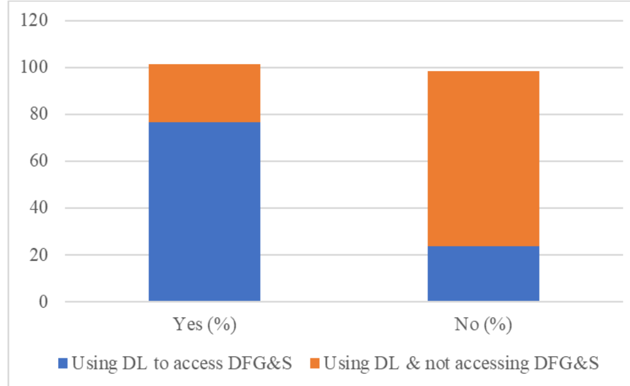

Fig. 2 Criteria for Using DL with and Without Access to DFG & S for RWE in South India

Fig. 2 illustrates the criteria for DL with and without access to DFG & S for RWE in South India. Based on the statistics, 76.5% of respondents use DL to access DFG & S, suggesting a strong inclination towards using DLs for financial resources. Conversely, 23.5% of individuals do not use DL for this objective. In addition, 25% of the participants use DL but do not utilize it to access DFG&S, and a significant 75% do not employ DL for any other objectives. This indicates that while RWE widely uses digital libraries to access financial services, a significant proportion of individuals either do not use them for financial reasons or do not interact with digital libraries. These observations indicate the possibility of further marketing the many advantages of DL beyond financial services to increase their general acceptance and usefulness.

V. CONCLUSION

Digital Libraries (DLs) provide a viable solution to the problem of limited financial knowledge among RWE due to their vast data collections and easy accessibility. This research investigates several methodologies for using DLs to enhance financial literacy, enabling rural women to manage their finances and fortify their entrepreneurial pursuits proficiently. The area being studied was the southern portion of India. The research included 499 RWE from five distinct states: Tamil Nadu, Kerala, Karnataka, Andra Pradesh, and Telangana. The poll included 259 participants who used Digital Financial Goods & Services (DFG & S) via DLs and 240 who did not use any financial services. The statistical study compares the income of persons who use DFG&S via DLs with those who do not utilize DFG & S. The yearly savings show a significant discrepancy, as indicated by a T-ratio of 2.684 and a p-value of 0.015, implying a notable difference at a significance level of 1.5%. This implies that those who respond save a larger sum of money annually than those who do not. However, the wealth parameter shows a T-ratio of 1.987 and a p-value of 0.123, suggesting no statistically significant wealth difference between the two groups of respondents.

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