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Breaking the Divide: Empowering Women and Attaining Sustainable Development Goal 5 Through Digital Financial Inclusion

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Abstract

This study seeks to examine the relationship between digital financial inclusion, Sustainable Development Goal 5 (Gender Equality), and women's empowerment in Jharkhand, India. The study used indicators for Digital financial inclusion (e-transactions) and Sustainable Development Goal 5 (SDG 5) (female-to-male labor force participation rate). The data were sourced from the Jharkhand Economic Survey report and the e-taal portal. The period of study was 2014-2022. The Augmented Dickey-Fuller test, Pearson correlation, regression, and lagged regression were employed to analyze the stationarity of the data, the relation, impact, and temporal effect between the variables. There was a moderate positive correlation between digital financial inclusion (in terms of e-transactions) and sustainable development goal 5 and women's empowerment (in terms of female-to-male labor force participation rate). However, regression analysis indicates that digital inclusion alone explains only a small fraction of the variation. The lagged regression model highlights an immediate impact of digital financial services on SDG 5. The study emphasizes the need for comprehensive and transformative interventions. Mere access to banking services does not have the full potential to remove gender disparity in Jharkhand's patriarchal society.

Categories: Banking and financial services, Fintech and Cryptocurrencies
Keywords: sdg 5, women empowerment, jharkhand, financial inclusion, digital

Introduction

The Millennium Development Goals (MDGs) served as a landmark achievement to tackle key issues from 2000 to 2015. The MDGs mainly focused on the developing world, with the expectation that wealthier nations will contribute through financial support and technological assistance. Although the MDGs led to significant achievements but many goals remain unmet, particularly the goal of achieving gender equality (MDG 3). The Sustainable Development Goals (SDGs) came into focus following MDGs, expanding on MDG's foundation to establish holistic and equitable development framework (Sachs, 2012). Gender equality, as highlighted in SDG 5, not only promotes micro-level objectives but also plays a critical role in achieving the broader SDGs framework. SDGs 5 (Gender Equality) aims to eradicate all forms of abuse and discrimination against women and girls. Although the 169 targets across the 17 SDGs may remain unfulfilled by 2030, prioritizing SDG 5 (Gender Equality) can speed up progress at the regional, national, and global levels (Küfeoğlu, 2022).

The concerns about women's empowerment in India have been rising over the last few decades. India has become the most populous country but there is a declining trend in its female population. Data reveal that during the lockdown period, one in three women faced gender-based violence (Mishra et al., 2023). Empowerment helps to exercise control over issues of significance and make independent choices. There are three dimensions of empowerment - social, political, economic (Bhatia and Singh, 2019). Women are more inclined to plan for future financial needs, allocate resources toward their children's education, and enhance the economic stability of their household (Showkat et al., 2024). Restriction of women from participating in the workforce and engaging in economically rewarding profession results into an economy where full potential remains untapped (Le Quoc, 2024). Individuals who are denied access to financial resources mainly belong to vulnerable groups and experience multiple challenges due to financial hardship and systematic bias (Huang et al., 2021). However, low financial literacy, banks' location, and a preference on informal providers over bank is some of the barriers against women in financial inclusion. Empirical evidence indicates that female headed households are approximately 10% less likely to access formal financial service than male headed households (Ghosh and Chaudhury, 2019). Women's empowerment has not only a positive impact on women individually but also on society at large. Gender equality and women's empowerment are essential components for worldwide development.

Fintech has the potential to reduce financial gender disparity. The adoption of digital banking services has gained momentum in India during the demonetization policy and the COVID-19 pandemic. During demonetization, there was a reduction in the circulation of cash and this compelled the public to seek alternative modes of transactions. Furthermore, the COVID-19 pandemic led to lockdowns and restrictions on movement. Both events acted as catalysts, forcing the public to shift from cash-based transaction to digital payments (Ahmed and Sur, 2023). India, being one of the largest and fastest growing digital service markets, offers a significant opportunity to promote financial inclusion through digital financial services. The three foundational enablers in fostering digital financial inclusion are - first, the assignment of biometric identity to every citizen through Aadhar. Second, under the Pradhan Mantri Jan Dhan Yojana, more than 460 million bank accounts were opened. Third, the spread of smartphones even in rural areas (Duvendack et al., 2023) (Paper and Haven, 2024).

Digital financial services serve as a pivotal strategy for empowering women. With the advent of digital technologies like mobile phones and internet, life is transforming for people. Access to digital financial services fosters saving and investment practices and helps manage risk among women. The adoption of mobile technologies and e-commerce platforms has proven instrumental in overcoming socio-economic barriers. Despite advancements in digital transformation, women fall behind men in accessing and utilizing mobile and internet services (Le Quoc, 2024) (Ghosh and Chaudhury, 2019). As awareness among women is increasing, they are highly influenced by financial inclusion programs. Financial inclusion has been recognized as a facilitator for achieving 7 of the 17 SDGs. The United Nation's SDGs that India is striving to achieve by 2030 are aimed at reducing inequalities, fostering peace, and ensuring decent living conditions for all (Funlayo et al., 2024).

Globally, 1 billion adults with access to bank accounts did not make any digital payments. In Indian context, about 70% of account holders remained non-user of digital payment system. Among India's unbanked adults, approximately 51% owned a mobile phone. A higher percentage of unbanked adults are female (Demirgüç-Kunt et al., 2022). However, the benefits are not equitably distributed, particularly for women and rural populations are still facing substantial barriers to inclusion (Khera et al., 2022). Despite the government's effort to enhance financial inclusion, these efforts have largely failed due to the persistent lack of formal account ownership among women.

Literature review

The pursuit of women's empowerment, SDGs, and digital financial inclusion has motivated researchers and governments to devise innovative solutions. Nagaraja (Nagaraja, 2013) examined various schemes and initiatives by the Government of India to empower women. The author highlighted the issues faced by women and emphasized the need for robust societal commitment toward gender equality. The article argued that women's empowerment plays a vital role in national development. Mader (Mader, 2018) recommended that simply providing access to financial services without addressing the structural barriers will not lead to desired developmental outcome. Hendriks (Hendriks, 2019) studied the strategies adopted by Bill and Melinda Gates Foundation to remove gender disparity. The author discussed D3 framework (Digitalize, Direct, Design) ensuring that all digital payments are reliable and transparent, every women should have an account to maintain control over the funds, and enhancing the effectiveness of financial inclusion programs and minimizing any unintended negative consequences. Ghosh and Chaudhury (Ghosh and Chaudhury, 2019) in their study investigated the presence of a gender gap in financial inclusion in India. The authors argued that lower education levels and employment status are crucial reasons for financial exclusion. Bhatia and Singh (Bhatia and Singh, 2019) conducted the study in the Ghettos of Ludhiana, where they examined the dimensions of women's empowerment and its relation to financial inclusion. The authors concluded that the Pradhan Mantri Jan Dhan Yojana scheme was successful in creating a positive influence on women's empowerment.

The authors (Kulkarni and Ghosh, 2021) examined the issues being faced by Indian women in accessing digital financial services and argued that economic development of state has no relation with gender disparity in digital financial inclusion, though digitalization can enhance women's social and financial independence. Khera et al. (Khera et al., 2022) demonstrated that representation can drive change. Their research highlighted that the presence of women in leadership positions within fintech industry is promoting financial inclusion by designing financial services tailored to women's need. The COVID-19 pandemic accelerated the adoption of digital financial services as documented by Tay et al. (Tay et al., 2022). The study revealed that COVID-19 pandemic has surged the use of digital technologies for financial services, and there is positive correlation between digital financial inclusion and national economic growth. Author recommended providing financial services that fit into local setting.

Ozili (Ozili, 2022) explored the linkage between financial inclusion and SDGs. Pearson correlation and granger causality test was applied. The study confirmed that financial inclusion positively impacts certain SDGs and identified unidirectional causality between the two. A comparative study on the relationship between digital financial inclusion and women's empowerment before and after COVID-19 pandemic was conducted in Saudi Arabia. Mabrouk et al. (Mabrouk et al., 2023) highlighted that there was surge in usage of digital financial services by women after pandemic and as a result their participation in economic decision-making increased. Le Quoc (Le Quoc, 2024) investigated the multidimensional linkage between digital financial inclusion, gender-based inequalities, and economic growth using panel vector autoregression model. Results uncovered fundamental contradiction that digital financial inclusion fosters economic growth in high as well as low financial developed countries but increases gender inequality in the latter. A regional study was conducted to explore the relationship between digital financial service and women's financial independence in northern Indian states. The study applied PLS-SEM. Showkat et al. (Showkat et al., 2024) identified statistically significant association between digital financial service and financial decision-making ability, directly contributing to the United Nation's SDG 5. Meanwhile, another study was done in Nigeria to assess the relationship between digital financial inclusion and women empowerment. Funlayo et al. (Funlayo et al., 2024) was of the view that usage of mobile phone for financial transaction strengthen the decision-making power of women.

Government initiatives for women's empowerment in Jharkhand

· Mukhya Mantri Maiya Samman Yojana: The scheme was introduced in 2024. Under the scheme, financial assistance is provided to women aged 18-50 years for promoting economic empowerment and improving their living standard. Women enrolled in the scheme is entitled to get INR 2500 per month directly into beneficiary account.

· Jharkhand Mahila Evam Kishori Kalyan Yojana: The scheme provides remarriage grants to widows and distribute health and hygiene products to women and girls.

· Sakhi Mandal: These are women's self-help groups formed and supported by Jharkhand State Livelihood Promotion Society. Sakhi Mandals empower women by providing them access to financial resources, training, and opportunities to improve their livelihoods and social standing.

· Beti Bachao Beti Padhao Scheme: This initiative focuses on comprehensive development of girl child. The scheme emphasize at saving and educating girl child.

· Pradhan Mantri Matru Vandana Yojana (PMMVY): It is maternity benefit program to provide financial and healthcare support to pregnant and lactating women; the benefit amount is directly transferred to beneficiaries' bank account. This scheme aims to reduce maternal and infant mortality rate. In Financial year 2022-2023, a total of 135569 women were enrolled under the scheme.

· Mukhya Mantri Rajya Nirashrit Mahila Samman Pension Yojana (MMRNMSPY): This pension scheme provide financial assistance to marginalized women in the state.

· Sakti Sadan: The scheme provides institutional support to women victims for rehabilitation. The scheme provides basic necessities, and economic and social security to women. In the financial year 2023-2024, a total of 267 women were benefited from the scheme.

· One Stop Center: It serves as support hub for women who have faced violence. It offers services like legal aid, police assistance, counseling, and long-term rehabilitation program.

· Jharkhand State Nutrition Mission (JSNM): This autonomous institution was established to address malnutrition among women and children residing in the state.

· Tejaswini scheme: The initiative is backed by the World Bank. The scheme seeks to empower girls and women through skill development and economic prospect. The scheme focuses on narrowing gender disparity by enhancing socio-economic status and encouraging entrepreneurship.

· Scheme for Adolescent Girls (SAG): SAG aims to empower girls aged 14-18 years. There is promotion of awareness on health, hygiene, and social issue. It also enables girls to explore economic opportunities.

Jharkhand often referred to as "The Land of forests" is inhabited by wide range of tribal communities. These communities have lived in close harmonious relationship with nature. Jharkhand has male dominated cultural practice. Women in these communities face various barriers that restrict their access to education, healthcare, and economic participation. Their participation in workforce and political decision-making is minimal (Ranjan, 2019). As per National Crime Record Bureau (NCRB, 2022) in the year 2022, Jharkhand recorded the highest number of registered dowry case with 1844 cases. Jharkhand ranked the second worst state in India for domestic violence, kidnapping of women, and child trafficking. As per NITI Aayog's SDG India Index (SDG India Index, 2023), Jharkhand's progress toward SDG 5 (Gender Equality) is unsatisfactory.

Research Gap

Despite the fact that there is extensive literature on women empowerment in Jharkhand, the intersection of SDGs remains underexplored. Existing literature on SDGs is either country-based or cross country-based, overlooking state- and district-level dynamics. Particularly, SDG 5 (gender disparity) is critically under-examined in the context of Jharkhand.

Objectives

The objectives of the study are as follows:

· To assess the role of digital financial inclusion in promoting SDG 5 (Gender Equality) and fostering women's economic empowerment in Jharkhand state. Specifically, it seeks to analyze relationship between e-transactions conducted during the year in Jharkhand and the female-to-male ratio of labor force participation rate.

· To assess whether digital financial inclusion has an immediate or temporal impact on SDG 5 and women's empowerment.

Hypothesis

H1: There is a significant relationship between digital financial inclusion, as reflected by the volume of e-transaction on SDG 5 and women's economic empowerment, as reflected by the female-to-male labor force participation rate in Jharkhand.

Research Method

The study is based on secondary data sources. The primary objective of the study is to assess the contribution of digital financial inclusion in attaining SDG 5, which focuses on gender disparity. The required data were sourced from the Jharkhand Economic Survey Report (Department of Finance Government of Jharkhand et al., 2024) and the e-taal portal (eTaal Dashboard, 2025). Since the Financial Inclusion Index and SDG Index for Jharkhand were not available for the specified time period, proxy indicators were therefore used. To measure the progress toward SDG 5, the female-to-male ratio of labor force participation rate was employed, which is one of the indicators of SDG 5 (SDG India Index, 2023). For measuring digital financial inclusion, the analysis relies on e-transactions made during the year in Jharkhand. To make the data suitable for analysis, some transformations were applied. This includes clearing missing values, aggregating annual figures, and calculating ratios. The period of study is from 2014 to 2022.

To ensure the reliability of the time-series data used in the study, the Augmented Dickey-Fuller (ADF) unit root test was employed to check the stationarity of the data. This test helped to determine whether the time-series data for digital financial inclusion (measured through e-transaction volume) and SDG 5 and women's economic empowerment (measured through female-to-male labor force participation rate) were stationary or required differencing to achieve stationarity. In order to avoid spurious regression results, it was important to ensure the stationarity of the data. After confirmation of stationarity, a correlation analysis was conducted to analyze the relationship between digital financial inclusion and female-to-male labor force participation rate. Correlation analysis provided insight into the nature of association between the variables. Subsequently, regression analysis was conducted to determine the extent of the impact of digital financial inclusion on SDG 5 and women's economic empowerment. The regression model explained the degree to which variation in the female-to-male labor force participation rate is due to variation in e-transactions. A lagged regression model up to 2 years was employed to identify the time lag at which the impact is most significant.

Results And Discussion

. Unit root test: The ADF unit root test in Table *1* shows that the time-series data for e-transactions is non-stationary at the level, as the p-value is more than the level of significance. Time-series data for e-transactions becomes stationary at their first-order difference. At the first-order difference, the p-value is less than the level of significance.

	t-statistic	Prob
Augmented Dickey-Fuller test statistic	-2.132312	0.2384
Test critical values: 1% level	-4.582648	
5% level	-3.320969	
10% level	-2.801384	

TABLE 1: E-transaction unit root test

The ADF unit root test in Table 2 shows that the time-series data for female-to-male labor force participation rate is non-stationary at the level, as the p-value is more than the significance level. The time-series data is transformed by taking the first difference of the time-series data.

	t-statistic	Prob
Augmented Dickey-Fuller test statistic	-0.390781	0.8664
Test critical values: 1% level	-4.582648	
5% level	-3.320969	
10% level	-2.801384	

TABLE 2: Female-to-male workforce participation rate unit root test

Correlation and regression of digital financial inclusion and SDG 5 (Gender Disparity) indicators

The Pearson correlation coefficient between e-transaction and female-to-male participation ratio is 0.590. This indicates that there is positive correlation between the variables, suggesting that increased digital transaction usage is associated with gender parity in economic participation but the strength of this association is limited as there is moderate degree of correlation.

The basic linear regression model was used to assess the impact of e-transactions on the female-to-male ratio of labor force participation.

$$\mathrm{FMR}_i = \beta_0 + \beta_1(\text{E-Transactions}_i) + \epsilon_i$$

FMR_i = female-to-male ratio of labor force participation

E-Transaction_i = E-transaction made

The regression analysis further supports this finding with an R^2 value of 0.348. This indicates that approximately 34.8% of the variation in female-to-male ratio of labor force participation rate can be explained by the variation in e-transaction usage. The relatively low R^2 value suggests that other factors also play a substantial role in influencing labor force participation rate. A 2-year lagged regression model was employed to assess the temporal impact of e-transaction on female-to-male ratio of labor force participation rate.

Lagged regression	R^2 value
No lag	0.348
1 year lag	0.086
2 year lag	0.049

TABLE 3: Lagged regression

Table 3 shows significant temporal variations in explanatory power across different lag specifications. The model with no lag accounted for only 34.8% of the variance in labor force participation rates, while the 1-year lag structure model's explanatory power decreased to 8.6%. However, the 2-year lagged model shows a remarkable decline in explanatory power to 4.9%. The findings suggest that the impact of e-transaction on labor force participation rate follows an immediate pattern. No improvement in model fit from no lag to 2-year lag specification supports that digital financial inclusion does not require time to exhibit its full benefit on workforce engagement. This significant drop indicates that the impact of digital financial inclusion on women's empowerment and gender equality weakens over time. Although initial benefits like digital saving, investment, access to credit, and other financial tools can offer immediate advantages, their long-term effectiveness remains limited without continuous improvement in policies that address wider socio-economic barriers.

The findings of the study provide evidence that the relation between digital financial inclusion and women's empowerment and gender equality is positive but in a moderate way. The study suggests that increased digital transaction usage is associated with gender parity in economic participation, as indicated by the correlation between e-transaction usage and the female-to-male labor force participation rate. However, regression analysis suggests that the relatively low R^2 value means that other factors also play a substantial role in influencing women empowerment and gender equality. The significant drop from no lag to 2-year lag indicates that the impact of digital financial inclusion on women's empowerment and gender equality weakens over time. No improvement in model fit from no lag to 2-year lag specification supports that digital financial inclusion does not require time to exhibit its full benefit on workforce engagement. There should be consistent policy interventions to maximize the benefits of digital financial tools.

Technologies enabling financial inclusion can provide immediate opportunities for women, which can in the short term translate into greater participation in the workforce. The findings also reveal that access to basic financial services alone is insufficient. It must be accompanied by broader socio-economic interventions. The study is in conformity with the prior research (Mader, 2018) (Duvendack et al., 2023), which highlights that digital financial inclusion alone cannot bridge the gender disparity. There are various socio-cultural norms and structural barriers, like low literacy, low digital and financial literacy, limited mobile phone ownership, and limited economic opportunities, that act as obstacles to digital inclusion of women. The results are consistent with the study's hypothesis, confirming a positive relationship between digital financial inclusion on SDG 5 and women's economic empowerment; although there are other social and cultural factors that have an impact on gender equality and women's economic empowerment.

The current research relies solely on secondary data and proxy indicators, as the financial inclusion index and SDG index were not available for the specified period. These proxy indicators may not fully capture the dynamics of digital financial inclusion and women's empowerment. The confinement of the study to the region of Jharkhand may result in limited generalization of the findings of the study to other states within India.

Conclusions

Findings, suggestions, and conclusion

This paper examined the role of digital financial inclusion in promoting SDG 5 and fostering women's empowerment in Jharkhand, India. The paper examined the correlation between digital financial inclusion (in terms of e-transactions made) and the female-to-male labor force participation rate, which is an indicator of SDG 5 (gender disparity) and women's empowerment. The paper also investigated the impact of this correlation by employing regression analysis, and lagged regression models were applied to determine the temporal impact of digital technologies.

The empirical findings revealed that digital financial inclusion (in terms of e-transactions) has a moderate positive relationship with SDG 5 (gender equality) and women's empowerment (in terms of female-to-male labor force participation rate), indicating that increased digital financial activity is associated with improved gender parity in economic engagement. However, the low R^2 value implies that digital financial inclusion plays a role, but other factors significantly influence women's workforce participation. The lagged regression model provides deeper insight into the temporal impact. The findings revealed that the impact of digital financial inclusion on workforce participation is immediate; it does not manifest over time.

Jharkhand, with its patriarchal norms and alarming rates of gender-based violence, presents a challenging environment for women's economic empowerment. Despite various government schemes like Mukhya Mantri Maiya Samman Yojana, Beti Bachao Beti Padhao Yojana, and other initiatives, women's participation in Jharkhand continues to face challenges. Jharkhand's poor performance in SDG 5 in NITI Aayog's SDG India Index, 2023, highlights the urgent need for comprehensive and transformative interventions that address the issues beyond basic financial access.

Future studies could expand this research to other Indian states. Further research can examine how digital financial inclusion intersects with other SDGs. Another area of study would be to assess the impact of digital financial inclusion on achieving multiple SDGs simultaneously.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Priyanjali ., Deepa Sharan

Acquisition, analysis, or interpretation of data: Priyanjali .

Drafting of the manuscript: Priyanjali .

Critical review of the manuscript for important intellectual content: Priyanjali ., Deepa Sharan

Supervision: Deepa Sharan

Disclosures

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