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The Extent of Financial Inclusion among Peri-urban Population of India

Vandana Tokas[1], Kavita Indapurkar[2], Abha Mittal[3]

[1]PhD scholar, Amity School of Economics, Amity University, Noida, Uttar Pradesh, India, Vandanatokas1994@gmail.com, https://orcid.org/0000-0002-7194-8320

[2]Professor and Head , Amity School of Economics, Amity University, Noida, Uttar Pradesh, India, kindapurkar@amity.edu, https://orcid.org/0000-0003-4388-2915

[3]Professor, Maharaja Agrasen College, University of Delhi, India, abha.mittal@yahoo.com

ARTICLE INFO	ABSTRACT
	Introduction: Financial inclusion means providing access to financial services to all, regardless of place or people. With rapid urbanization, peri-urban areas occupy a significant position in terms of economic, social, and environmental transformations and focus on sustainable development. **Objectives:** The study examines the relationship between sustainable economic growth and financial inclusion, especially with respect to peri-urban regions of India, and identifies the factors influencing financial inclusion. **Methods:** A survey was conducted in which descriptive analysis, factor analysis, and Structural Equation Modeling were applied to analyze quantitative data from 500 respondents from five major urban agglomerations by using a bilingual structured questionnaire. **Results:** The study highlights key dimensions of financial inclusion, including the duration, regularity, frequency, and usage of financial services. **Conclusions:** The findings suggest that financial inclusion is vital for achieving sustainable economic growth in peri-urban areas, which is further highlighted by the model explaining the factors affecting inclusion. **Keywords:** Financial Inclusion, Peri-urban Population, Extent of Financial Inclusion, Structural Equation Modelling (SEM), Sustainable Economic Development, Digital Payments.

INTRODUCTION

These days sustainable economic development becomes one of the top priorities for states, cities, and people everywhere. It represents the necessity of attaining environmentally sustainable, economically stable, and socially inclusive growth. To achieve sustainable economic development, a comprehensive strategy is needed that considers the social, environmental, and economic aspects simultaneously. The idea of financial inclusion is essential for sustainable development. Financial inclusion includes more than just having access to financial services; it also includes more general objectives such as enabling people and communities from urban population to rural population to take an active role in the economy, accumulate wealth, and manage risks. With the expansion of urban population and emergence of peri urban population is it imperative to understand the dynamics of sustainable economic development, financial inclusion and how it is beneficial for peri urban population.

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When referring to the urban expansion that occurred in Europe during the 1980s, the "Organization for Economic Co-operation and Development (OECD)" in 2007 coined the term "peri-urban," which describes a transitional zone that is classified as a "grey area" which is neither urban nor rural (MehebubSahana, 2023). Peri-urban populations are those that reside in the peri-urban areas that are close to metropolitan/urban areas and are characterized by their rural traits, such as a significant dependence on agricultural production, yet are situated on the periphery of larger metropolitan centres. Peri-urban areas are defined as having a combination of urban and rural features and are those where rural and urban areas converge and primarily involve employments in waste treatment facilities, warehouses, agricultural markets, labour, and industrial agglomerations. Presence of peri-urban populations in the periphery underline the existence of development programmes that are working as catalyst to transform agrarian economy to service and industry-based economy. India is one such economy that has increasing peri-urban population (Subrata Haldar, 2023).

Financial inclusion is particularly beneficial to peri-urban populations, who often straddle the divide between rural and urban environments and face unique economic challenges. By providing access to essential financial services such as "savings accounts, credit, insurance, and digital payment systems", financial inclusion empowers peri-urban residents to better manage their finances, invest in education, health, and businesses, and improve their overall quality of life. Access to credit can enable small entrepreneurs and informal sector workers to expand their businesses, leading to increased income and job creation. Savings and insurance products help families build financial resilience against unforeseen expenses and economic shocks. Additionally, digital financial services reduce the need for costly and time-consuming travel to distant banks, making financial management more convenient and efficient. Overall, financial inclusion fosters economic stability, enhances social mobility, and promotes sustainable economic development within peri-urban communities, bridging the gap between rural and urban prosperity.

This study focuses and enquire on identifying and analyzing the variables that affect financial inclusion among the peri-urban population in India. By employing "factor analysis and Structural Equation Modeling (SEM)", the research aims to propose a robust model that explains the extent of financial inclusion in these regions. Data for this study were collected from 500 respondents through a structured bilingual questionnaire, ensuring a comprehensive understanding of the peri-urban demographic's financial behavior and access to services.

The study will proceed in an organized manner, starting with defining financial inclusion in India. Then the article talks about critical review of the literature, next section consist of research methodologies selected to carry out the analysis and a critical assessment of the current literature in the topic. The systematized presentation of the research results will be followed by a discussion section, allowing for the unambiguous drawing of conclusions at the conclusion.

FINANCIAL INCLUSION AND ITS TOOLS

Financial inclusion is a critical global objective, integral to economic development and growth. By providing access to financial services, financial inclusion facilitates social and economic progress, narrowing the wealth disparity and promoting equitable growth (Iqbal, 2017). Digital finance has significantly enhanced financial inclusion by improving accessibility and the quality of financial services, thereby contributing to economic development and the better implementation of public welfare programs (Mothobi and Kebotsamang, 2024). In peri-urban areas, the necessity for financial inclusion tools is pronounced. These regions, which lie at the intersection of urban and rural zones, often face unique challenges that hinder financial access. For individuals, the use of formal financial accounts brings numerous advantages, such as improved financial management and access to credit. However, the underlying causes of financial exclusion are multifaceted. Allen (2016) explores individual and country characteristics linked to financial inclusion, highlighting that low account costs, proximity to banks, and stable political conditions are crucial factors. Gender disparities, as identified by Demirguc-Kunt (2013), also play a significant role, with notable differences in account ownership and

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the use of financial products between men and women, even when controlling for factors like age, income, and education.

The rapid advancement of digital payment systems, driven by the widespread use of mobile phones and technology, has furthered financial inclusion. Fintech innovations offer quicker and more efficient access to financial services, particularly during health crises like the COVID-19 pandemic. One of the most significant impacts of fintech is its ability to include diverse and previously marginalized groups in the financial system. Women, rural populations, and young people, who often face barriers to accessing traditional financial services, can benefit from tailored fintech solutions that cater to their specific needs. Elouaourti and Ibourk, (2024) mentioned in their paper that mobile money services have transformed the financial landscape in Sub-Saharan Africa, providing millions of people with gate to financial services for the first time. Nathan (2022) examined the financial well-being of Vietnamese consumers, noting that fintech adoption positively influences financial inclusion, especially among those with lower financial literacy, by providing accessible financial tools. India's "Jan Dhan Yojana" initiative in 2014, aimed at transforming the large unbanked population into account holders, is a notable example of a financial inclusion effort. However, issues of non-usage and dormancy persist, indicating that mere access to financial services is insufficient (Desai, 2018). Effective financial inclusion requires active engagement with financial tools, which remains a challenge due to factors such as user unfamiliarity with formal financial systems and resistance to adopting new technologies (Cámara, 2017). The dynamic nature of peri-urban areas, influenced by human activity and characterized by diverse purposes, further complicates financial inclusion efforts. Iaquinta (2001) and Douglas (2012) highlight the changing landscape of these regions, shaped by factors such as population density, infrastructure, and proximity to urban centers. The emergence of mobile wallets represents a significant financial innovation, offering secure and convenient currency storage. However, continued usage of mobile wallets varies among individuals, influenced by factors like trust and user experience (S. B., 2024). Fintech and digital banking have revolutionized the way financial services are delivered, making them accessible to individuals who were previously excluded from the traditional banking system. Mobile banking applications, digital wallets, and online lending platforms allow users to perform transactions, access credit, and manage savings from their smartphones or computers. This ease of access is particularly beneficial in regions with limited physical banking infrastructure, such as rural and peri-urban areas. (Wu and Peng, 2024). Financial inclusion tools are essential for the peri-urban population, offering a pathway to economic empowerment and reduced disparities. By addressing the unique challenges faced by these regions and leveraging digital finance innovations, it is possible to create a more inclusive financial ecosystem that benefits all segments of society.

REVIEW OF LITERATURE

The intricate relationship between financial inclusion, peri-urban population dynamics, and sustainable economic growth has become a focal point in global development discussions. Various studies, particularly from the developing world, highlight numerous impediments to financial inclusion for example financial inclusion in diverse populations. A study focusing on the Indian Muslim minority in Tamil Nadu utilized moment structure analysis tools and SPSS to analyze data from 300 respondents in the Vellore area collected between April 2022 and March 2023. The research employed "Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA)", revealing that financial inclusion is significantly and positively influenced by factors such as financial awareness, access, and quality. In Indonesia, a quantitative cross-sectional study examined the factors influencing e-wallet usage, such as perceived simplicity of use, reliability, risk, utility, social impact, enabling conditions, and new technology. The study found that these factors significantly impacted consumers' intentions to use e-wallets, except for social influence and simplicity of use, which did not show a significant effect on e-wallet adoption (Nawi, et al., 2024). A similar study in Vietnam involving 431 mobile wallet users found that trust negatively impacted consumer usage (S., B., Y.T.H., & S., 2024). This highlights the role of trust as a critical factor in the adoption of digital financial services. Further there are evidence which

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shows demographic influences on Financial Inclusion like a research conducted on Africans that has consistently shown that age and gender significantly influence financial inclusion. One study analyzed national-level data from 39 African nations collected in 2014, 2017, and 2022 using principal component analysis. Another empirical study on a dataset of 29,042 individuals from 29 countries employed the instrumental variable probit technique, utilizing the Global Findex 2021 database. The findings indicated that access to digital financial services is impeded for women, lower-income individuals, and those with less education (Elouaourti and Ibourk, 2024). In another study, international organizations and researchers argue that mobile finance can help narrow the financial inclusion gender gap for rural women in the Global South (Taylor, et al., 2024).

Now look upon how various Financial Technology and Digital Banking solution create the ecosystem for financial inclusion. The "Unified Payments Interface (UPI)" in India represents a significant development in mobile payment systems. However, its adoption among the low-income population remains low. Key factors influencing user intentions include perceived security risk, knowledge, pricing value, facilitating conditions, social advantages, performance expectancy, and social influence, collectively explaining 52% of the variance in behavioral intentions (Rahman, et al., 2024). Using the "Technology Acceptance Model (TAM), a study in Saudi Arabia found that perceived utility (PU) and ease of use (PEOU)" strongly and positively impacted digital banking adoption (Alnemer, 2022). Fintech and digital banking have revolutionized entry to financial services, particularly in zones with controlled physical banking infrastructure, such as rural and peri-urban areas (Sandhu, K., Dayanandan, A., & Kuntluru, S., 2023). These technologies offer lower transaction fees and reduced operational costs, making financial services more affordable (Cyn-Young Park, R. V., 2015). There are lot of studies which gave emphasis on technology and financial literacy like A study using "the 2021 National Financial Inclusion Survey" aimed to calculate the "Financial Literacy Index (FAI)" and identify influencing variables. The index was measured using the OECD (2015) methodology, adapted by the CNBV (2019), and analyzed using a generalized "linear model with complex samples and SPSS version 26 software". Key factors included faith in the system, sex, education, and access to financial education (García Martínez, Cruz Delgado, & Torres Ramírez, 2024).

Research on peri-urban populations is limited, despite India's high urbanization rate of approximately 35.87% (Statista, 2022). Peri-urban areas, as described by Douglas and Ashkenazi (2008), are dynamic zones where urban and rural areas interact. Huang et al. (2011) also emphasize the transitional nature of these regions there are various pattern on adoption of various tools of financial inclusion which also talk about different factor that influence the use of financial tools and techniques by peri-urban population around the globe. Despite the potential of digital wallets, adoption rates remain low in certain regions. For example, only 12 million Peruvians own a digital wallet. A study based on 185 online observations identified key factors influencing continued use, including interoperability, social distance, system availability, perceived security, and perceived usefulness (Inciso-Vera, 2023). A study using TAM in Algeria gathered data from users and non-users of mobile financial services, identifying variables such as perceived utility, perceived usability, perceived risk, convenience, trust, and social image as significant factors for global fintech adoption (Abdelhak, Sharofiddin, & Mahadi, 2023). Research in Colombia examined how lower-class urban consumers' tech-readiness affects their adoption of mobile payment applications. The study found that perceived usefulness is the primary predictor of intention to use mobile payments, with significant gender differences observed in the influence pathways (Tavera-Mesías, 2023). The reviewed literature underscores the complexity and multifaceted nature of financial inclusion, particularly in peri-urban and low-income populations. Factors such as trust, perceived utility, and demographic influences play crucial roles in the adoption of digital financial services. Future research should continue to explore these dynamics to develop more inclusive financial systems.

OBJECTIVES OF THE STUDY

This research has been undertaken with the following objectives:

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- To determine the factors affecting extent of financial inclusion among Peri-urban population.
- To suggest suitable model best fit to explain the components affecting the extent of financial inclusion among Peri-urban population.

RESEARCH METHODOLOGY

This section will capture the rationale behind selected research tool and techniques; sampling method; data collection etc.

Data Collection

Primary Data was collected using structured questionnaire using five-point Likert where questions related to usage, trust, risk and utility (Nawi, et al., 2024) were asked from the respondents from majorly five urban agglomeration of India namely, "National Capital Region (Delhi, Haryana, Rajasthan, Uttar Pradesh); Mumbai (Maharashtra); Kolkata (West Bengal); Bangalore (Karnataka) and Chennai (Tamil Nadu)". Secondary data was collected majorly from academic writing including journals, magazine and reports along with electronic data base were also utilized like census data of India from its official website, research data base are also used from statistia.com etc.

Sampling

In recent decades, peri-urbanization has become a noticeable and developing phenomenon in the areas around India's major cities/metropolitan cities. Numerous push and pull forces brought forth by city growth encourage individuals to move from rural to urban areas and the hinterland. Because it is situated between two extremely different character spaces—rural and urban—peri-urban communities encounter issues related to their nearby rural and urban areas due to their dual character (Tiwari, 2019). According to Government of India census report 2011 (censusindia.gov.in, 2024), there are 12 metro cities shown in Table1.

Table 1: List of Metro cities of India

S No	Metro city	State/Union Territory	Area (KM²)	Population
1	National Capital Region	Delhi, Haryana, Rajasthan, Uttar Pradesh	55,083	58,150,000
2	Mumbai	Maharashtra	6,328	23,598,000
3	Kolkata	West Bengal	1,876	15,870,000
4	Bangalore	Karnataka	8,005	11,490,000
5	Chennai	Tamil Nadu	5,904	8,696,010
6	Hyderabad	Telangana	7,257	7,677,018
7	Pune	Maharashtra	7,256	7,276,000
8	Ahmadabad	Gujarat	1,866	6,357,69
9	Surat	Gujarat	722	4,591,246
10	Jaipur	Rajasthan	484.64	3,073,350
11	Lucknow	Uttar Pradesh	1,150	2,902,920
12	Kanpur	Uttar Pradesh	301.16	2,920,067

The above cites are also urban agglomeration of India with a population of over one million (censusindia.gov.in, 2024). According to recent research by (SHAW, 2005) based on data from the 2001

census, among larger states including Karnataka, Andhra Pradesh, Madhya Pradesh, and Tamil Nadu, has demonstrated the highest level of awareness and responsiveness to the rise of peri-urban regions. The population and geographic distribution of the four major cities—Delhi, Mumbai, Chennai, and Kolkata—have increased (Shaw, 1999). The urban land area grew at a decadal rate of 8.72% from 1961–1971, 20.54% from 1971–1981, and 21.81% from 1981–1991, indicating a dramatic rise in the area devoted to urban use since 1971 (SHAW, 2005). According to Pradhan, approximately 37% of the newly declared census towns in India are centered around major metropolises (AIJAZ, 2019). As peri-urban is also a population and area dimension, therefore for the current study, the first five metro cities/urban agglomeration of India with highest population was selected. (Dinabandhu Mondal, 2021). The peri-urban population from the states of West Bengal, Karnataka, Maharashtra, Tamil Nadu and National Capital region were considered primarily using Stratified sampling (Nathan, 2022).

So, there is no data for exact number of peri urban population with specific metro city, so it is decided to take 100 sample from each selected five metros/urban agglomeration of India, as shown in the Table 2

Table 2: List of five metro cities with highest population

S No	Metro city	State/Union Territory	Area(KM²)	Population	Sample Size
1	National Capital Region	Delhi, Haryana, Rajasthan, Uttar Pradesh	55,083	58,150,000	100
2	Mumbai	Maharashtra	6,328	23,598,000	100
3	Kolkata	West Bengal	1,876	15,870,000	100
4	Bangalore	Karnataka	8,005	11,490,000	100
5	Chennai	Tamil Nadu	5,904	8,696,010	100
Total Sample Size					500

So, the sample size was 500, for which 660 respondents were reached and 500 valid sample were collected from each selected urban agglomeration (Wamba, 2022) of India. This data was collected using a bi- language structured questionnaire (Abdelhak, Sharofiddin, & Mahadi, 2023).

Data Analysis Tools

The Kaiser Criteria was utilized for component extraction, and the Varimax rotation method was employed to simplify the structure and improve interpretability (García Martínez, Cruz Delgado, & Torres Ramírez, 2024). The "Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy" was calculated, lead to a value of 0.679, indicating the sample size was appropriate for doing "Principal Component Analysis (PCA)" (Muwal, et al., 2023). Bartlett's Test confirmed that the selected indicators of financial inclusion were inter correlated. The rotated principal components were then analyzed, and the sums of squared loadings were reviewed to determine the amount of variance explained. "Structural Equation Modeling (SEM)" was used to examine the structural relationships between the measured variables and latent constructs (Setiawan, 2023; Tikku & Singh, 2023). The factor loadings of the selected indicators were assessed to determine the strength and direction of their relationships with the underlying factors. The indicators with the highest factor loadings on each component were identified as the most significant in explaining the variance in factors affecting access to financial services. Regression analysis was also utilized to get the understanding of causal relationship between dependent and latent variables. SPSS 21 was used for data cleaning, removing outliers, descriptive and statistical analysis.

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RESULTS AND INTERPRETATION

Descriptive statistics was used and the results were included. Of the respondents, 31% are between the ages of 25 and 35, 27.8% are between the ages of 36-45, 26% are between the age group of 46-55 and 15.2% are from 56-65 age group. The aforementioned finding indicates that a larger proportion of responses were from adults than from older age groups. Men make up 53% of the respondents, while women make up 47%. 58% of the population is Hindu, and 15% is Muslim. 9% of people identify as Christians, and 13% are other. The Sikh response rate is 5%. The result above demonstrates that responses are from people of all religious backgrounds. There are Hindus everywhere, and they make up the bulk of the study population. 40% of responders are single and 50% are married. A portion of 5% are widowed and separated. Of the respondents, 71.6% said they were separated, and 28.4% said they were with them only. The outcome demonstrates that while some partners work together at the same location, the majority do not. It is extremely uncommon for the partners to work together in one location. 24% of respondents have three children, and 40% of respondents have two. Of the respondents, 16% have four children, and 20% have one. Most of them have two kids. Families' perspectives are shifted by modern living. Their family planning is based on the comfortable amenities they could provide for their child. According to 60% of respondents, their company does not support the banking channel. According to 40%, their employer promotes similarly. The outcome demonstrates the need for greater awareness of banking and other sector facilities in peri-urban areas. Of the respondents, 20% have post-graduate degrees, and 34% have completed their higher education. Twenty percent have completed higher secondary education, the highest qualification, and 26 percent have completed a diploma. Most of the respondents have studied up to the graduate level. This illustrates how people in the peri-urban area left the villages to acquire knowledge and seize chances that were not accessible to them back home. A child's family must move to the city if they want to pursue higher education because the village only provides possibilities for education up to the high school graduation level. 30% of the total respondents are from the state of Delhi NCR, followed by 16% from Madhya Pradesh and 12% from Gujarat. 8% of respondents are from West Bengal, 4% are from Tamil Nadu, and 10% are from Maharashtra, Uttar Pradesh, and Karnataka. Many responders were from the Delhi NCR state area, but they have since moved elsewhere. Due to its dense population and high cost of living, Delhi NCR is not a place that everyone can live in. The questionnaire inquiries about the respondents' present source of income. Of the respondents, 40% work in services for a living, 20% are in production and manufacturing, and 20% are in construction. Ten percent of them work in the tourism and health sectors. The results show that most people work in the service industry because there are more career and opportunities there than in any other industry. For workers in service-related industries, it means a lower chance of unemployment, furloughs, layoffs, or business closures during recessions. The skill that the respondents have acquired for their livelihood is displayed in the above table and graph. 36% agreed with driving, and 30% agreed with household jobs. 10% of respondents have Masson skills, and 24% have carpentry skills. Because they moved from the village to the city for work, many respondents are skilled drivers and household workers, but the city demands the highest level of education and talent. Therefore, a person makes use of whatever skills he must support himself. People use the technology that is available on the market these days. However, the figure demonstrates that many people are unaware of this kind of technology use, and because they are not using it, they are unable to keep up with the demands of the modern world. It sets them apart from other people.

The dimensions that lead to the extent of financial inclusion (Upasana Sharma, 2022) were explored for the peri-urban population using factor analysis. Accordingly, KMO Barlett test was performed Kaiser (Watkins, 2018), the value of which came out to be 0.679, which indicates appropriateness for the factor analysis. The eigen values above one was considered to determine the cumulative variance explained by the components which came out to be 79.69 percent. This shows that the various components extracted explain about 79 percent of the extent of financial inclusion of the group under study.

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Table 3: KMO and Bartlett' test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.679
Bartlett's Test of Sphericity	Approx. Chi-Square	10289.840
	Df	120
	Sig.	.000

The data's eligibility for factor analysis is evaluated using the "Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity", which are presented in Table 3. A result of 0.679 for the KMO measure of sample adequacy indicates a satisfactory degree of adequacy; values closer to 1 indicate that the data is more appropriate for factor analysis, and values below 0.5 indicate that the data is insufficient. The null hypothesis that the correlation matrix is an identity matrix is strongly rejected by Bartlett's test of sphericity, which includes 120 degrees of freedom (df), an estimated chi-square value of 10289.840, and a significance level (Sig.) of 0.000. It is reasonable to move further with factor analysis based on this finding, which suggests that the variables are probably linked and good candidates for structure discovery.

Table 4: Total Variance Table

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.298	39.362	39.362	6.298	39.362	39.362
2	3.090	19.314	58.676	3.090	19.314	58.676
3	2.157	13.480	72.156	2.157	13.480	72.156
4	1.188	7.425	79.581	1.188	7.425	79.581
5	.980	6.124	85.705			
6	.605	3.779	89.484			
7	.462	2.890	92.373			
8	.397	2.484	94.858			
9	.291	1.821	96.678			
10	.223	1.392	98.070			
11	.115	.717	98.788			
12	.068	.424	99.212			
13	.066	.412	99.624			
14	.036	.227	99.850			
15	.016	.097	99.948			
16	.008	.052	100.000			

Extraction Method: Principal Component Analysis.

The table 4 titled "Total Variance Explained" displays the results of a "Principal Component Analysis (PCA)", illustrating how much variance in the data each principal component accounts for. The first component has an eigenvalue of 6.298, explaining 39.362% of the total variance. The second component explains 19.314% with an eigenvalue of 3.090, and the third explains 13.480% with an eigenvalue of 2.157. Together, these three components explain 72.156% of the total variance. The fourth component adds another 7.425%, bringing the cumulative variance explained to 79.581%. Subsequent components contribute progressively smaller amounts, with all 16 components together explaining 100% of the variance. However, typically only components with eigenvalues greater than 1 are considered significant, thus the first four components are the most meaningful in this analysis.

Table 5: Rotated Component Table

Rotated Component Matrix[a]			
	Component		
	1	2	3
Debit card/ATM (duration)	.856		
Paytm or similar wallet (duration)	.579		
No frills/zero balance account (duration)	.529		
LIC policy or any other life insurance policy (duration)	.875		
Old age pension (duration)	.669		
Bank correspondent account/credit society/micro-finance/credit card (LOAN) (duration)	.949		
How often do you update your pass-book? (frequency)		.936	
How often do u visit your bank? (frequency)		.920	
How often do you use your debit card/ATM on Point Of Sale while shopping/buying daily need goods (frequency)		.805	
How often do you use your debit card/ATM card in taking out cash (R)		.695	
How often do you use digital payment apps like Paytm/Bhim pay/google pay etc at POS shopping/buying daily need goods (frequency)		.525	
How often do you use digital payment apps like Paytm/Bhim pay/google pay etc to payment of rent/mobile bills/tuition fee etc. (frequency)		.688	.557
How often do you re-pay your loans on time/on due date (regularity)			.654
How often you are able to pay credit card bill on time/due date? (regularity)			.853
How often you are able to save for your pension fund (regularity)			.550
How often you are able to pay the insurance premium on time/by due date? (regularity)			.823
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.[a]			
a. Rotation converged in 7 iterations.			

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Factor analysis was undertaken, and rotated component matrix was determined using varimax with Kaizer normalization. The factors were supressed to three components and the factor loading were found. The factor loadings above 0.5 were considered. Three factors to be duration, frequency and regularity. The duration is for the time for which the financial products were used. Frequency was about the number of times the financial products were used while regularity was about how regularly the financial products were served in terms of re-payment etc.

Table 6: Model Summary table

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Model Summary				
1	.960a	.922	.922	6.29470
2	.979b	.958	.958	4.64062
3	.983c	.967	.967	4.12035
a. Predictors: (Constant), Duration				
b. Predictors: (Constant), Duration, Frequency				
c. Predictors: (Constant), Duration, Frequency, Regularity				

The Model Summary table 6 shows the results of three regression models predicting an outcome variable using different sets of predictors. Model 1, which uses "Duration" as the sole predictor, explains 92.2% of the variance in the outcome (R^2 = .922) with a standard error of 6.29470. Model 2, which includes both "Duration" and "Frequency" as predictors, improves the explanation of variance to 95.8% (R^2 = .958) and reduces the standard error to 4.64062. Finally, Model 3, which incorporates "Duration," "Frequency," and "Regularity," further increases the explanatory power to 96.7% (R^2 = .967) and achieves the lowest standard error of 4.12035, indicating this model provides the best fit among the three. In this instance, the independent variables included in the model account for 98% of the variance in the dependent variable.

Table 7: ANOVA Table

	Model	Sum of Squares	df	Mean Square	F	Sig.
	ANOVAa					
1	Regression	233928.456	1	233928.456	5903.817	.000b
	Residual	19732.382	498	39.623		
	Total	253660.838	499			
2	Regression	242957.789	2	121478.894	5640.917	.000c
	Residual	10703.049	497	21.535		
	Total	253660.838	499			
3	Regression	245240.086	3	81746.695	4815.052	.000d
	Residual	8420.752	496	16.977		
	Total	253660.838	499			
a. Dependent Variable: Extent of Financial Inclusion						
b. Predictors: (Constant), Duration						
c. Predictors: (Constant), Duration, Frequency						

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d. Predictors: (Constant), Duration, Frequency, Regularity

Table 7 presents the results of an ANOVA analysis evaluating the impact of different predictors on the extent of financial inclusion. Model 1 includes only 'Duration' as a predictor and explains a significant portion of the variance (Sum of Squares = 233928.456, F = 5903.817, p < .001). Model 2 adds 'Frequency' alongside 'Duration', resulting in a further increase in explained variance (Sum of Squares = 242957.789, F = 5640.917, p < .001), indicating that both predictors significantly contribute to financial inclusion. Model 3 includes 'Duration', 'Frequency', and 'Regularity', achieving the highest explained variance (Sum of Squares = 245240.086, F = 4815.052, p < .001). The decrease in Residual Sum of Squares from Model 1 to Model 3 suggests that each additional predictor improves the model's explanatory power.

Table 8: Coefficients Table

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
1 (Constant)	23.639	1.431		16.514	.000
Duration	4.863	.063	.960	76.836	.000
2 (Constant)	7.565	1.315		5.751	.000
Duration	3.855	.068	.761	56.827	.000
Frequency	1.811	.088	.274	20.476	.000
3 (Constant)	8.777	1.173		7.486	.000
Duration	3.220	.081	.636	39.562	.000
Frequency	1.404	.086	.213	16.316	.000
Regularity	1.330	.115	.199	11.594	.000
a. Dependent Variable: Extent of Financial Inclusion					

The table 8 provides the results of three regression models predicting the extent of financial inclusion based on various predictors: duration, frequency, and regularity. In Model 1, duration alone significantly predicts financial inclusion (B = 4.863, p < .001) with a high standardized coefficient (Beta = .960). Model 2 introduces frequency, which also significantly predicts financial inclusion (B = 1.811, p < .001), alongside duration (B = 3.855, p < .001), with duration having a stronger effect (Beta = .761) than frequency (Beta = .274). Model 3 includes regularity as an additional predictor, which is significant (B = 1.330, p < .001) but has the smallest effect size (Beta = .199) compared to duration (B = 3.220, Beta = .636) and frequency (B = 1.404, Beta = .213). Each model has a significant constant term, indicating a strong baseline level of financial inclusion. After controlling for the variation explained by all other factors in the model, the Beta values show which variable has the highest unique contributions to describing the dependent variable. To determine if a variable is significantly uniquely contributing to the model, look at its Sig value.

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Table 9: Excluded Variables table

Excluded Variables[a]						Collinearity Statistics
Model		Beta In	t	Sig.	Partial Correlation	Tolerance
1	Frequency	.274[b]	20.476	.000	.676	.473
	Regularity	.314[b]	16.152	.000	.587	.272
2	Regularity	.199[c]	11.594	.000	.462	.226
a. Dependent Variable: Extent of Financial Inclusion						
b. Predictors in the Model: (Constant), Duration						
c. Predictors in the Model: (Constant), Duration, Frequency						

The table 9 provides information on excluded variables from models predicting the extent of financial inclusion. In Model 1, "Frequency" and "Regularity" were not included but showed significant relationships with the dependent variable (p = .000), with high t-values and partial correlations of .676 and .587, respectively, suggesting strong individual effects. However, their collinearity statistics indicated moderate tolerance levels (.473 and .272), suggesting some multicollinearity issues. In Model 2, only "Regularity" remained excluded, maintaining significance (p = .000) with a t-value of 11.594 and a partial correlation of .462, but with a lower tolerance of .226, indicating higher multicollinearity when both "Duration" and "Frequency" are included. This suggests "Duration" and "Frequency" are better predictors when combined, potentially due to multicollinearity reducing the unique contribution of "Regularity". After applying the regression analysis, the researcher further tries to formalize the structural relationship between cause-and-effect variables to derive an equation system. The below mention table indicates the observed variables taken for the study.

Table 10: Variables for the study

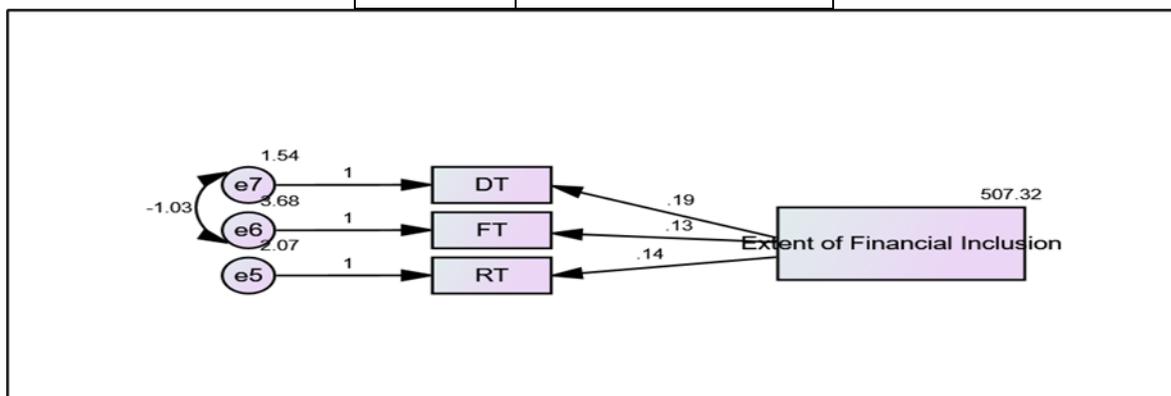| Variables	Variable Short Name
Duration	DT
Frequency	FT
Regularity	RT

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Figure 1: Path Diagram of Structure Equation Model

The association and causation relationships between latent variables are defined by the structural model. A discussion of error variations not explained by the model is also included. The one-way arrow in the path diagram presented in Figure 1 alludes to the researcher's theory that the variables are causally related. The path diagram illustrates the researcher's hypothesis, which states that duration, frequency, and regularity are related to the latent variable extent of financial inclusion.

Using SEM, the connection and covariance of the latent variables can be explained. The results of a "structural equation modelling (SEM)" investigation concerning the extent of financial inclusion are presented in this model (Ishtiyaq Nadeem, 2024). Numerous estimates, statistics, and significance tests are included in the output. Additionally, the important tests are dissected to offer an explanation for each.

Goodness of Fit

A deficient goodness-of-fit compromises the reliability of the results, as it serves as an indicator of how accurately the established SEM represents the data situation (Kline, 2023). Thus, model evaluation via the goodness-of-fit indices is the principal procedure to follow when interpreting the outcomes of "structural equation modelling (SEM)" (Hong S. H., 2000). The identification of the most suitable goodness-of-fit index for an evaluation task becomes challenging due to the fact that each index assesses distinct facets of the model's fit (Jichuan Wang, 2020). The literature recommends the "chi-square statistic and degrees of freedom (c2/df), goodness-of-fit index (GFI), adjusted goodness of fit index (AGFI), root mean squared error of approximation (RMSEA), and standardized root mean square residual (SRMR) as absolute fit indices; comparative normed fit index (CFI) and Tucker-Lewis index (TLI) as incremental fit indices; parsimony normed fit index (PNFI) as a parsimonious fit index; and expected cross validation index (ECVI) as a predictive fit index" (Schermelleh-Engel, 2003).

Table 11: CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	8	8.789	2	.012	4.394
Saturated model	10	.000	0		
Independence model	4	2813.964	6	.000	468.994

Chi-Square Test (CMIN/DF): This test evaluates how well the proposed model and the observed data fit each other. In this instance, 4.394 is the result of dividing the chi-square value (8.789) by the degrees of freedom. A good fit is indicated by a reduced CMIN/DF ratio. Generally speaking, a fit score of five or less is deemed appropriate(Duygu Toplu Yaşlıoğlu, 2020). In the present model summary, the value is 4.39 which indicates the model fit.

Table 12: RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.098	.991	.957	.198
Saturated model	.000	1.000		
Independence model	42.880	.319	-.135	.192

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Improved fit is indicated by values nearer 1 for the "Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and Root Mean Square Residual (RMR)". The value above is close to 1, indicating that this is a well-fitting model. In the present model summary, the value of GFI (.991), AGFI (.95) and RMR (.098) is less than one which indicates the model fit.

Table 13: Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.997	.991	.998	.993	.998
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Values above 0.90 for the "Normed Fit Index (NFI), Tucker-Lewis Index (TLI), and Comparative Fit Index (CFI)" indicate an appropriate fit. In the Present Model the values of NFI (.997), TLI (.993) and CFI (.998) which is above .90 which indicates the model fit.

Table 14: Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.332	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

Table 15: NCP

Model	NCP	LO 90	HI 90
Default model	6.789	1.062	19.991
Saturated model	.000	.000	.000
Independence model	2807.964	2637.139	2986.094

Table 16: FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.018	.014	.002	.040
Saturated model	.000	.000	.000	.000
Independence model	5.639	5.627	5.285	5.984

Table 17: RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.082	.033	.142	.125
Independence model	.968	.939	.999	.000

Acceptable values for the "Root Mean Square Error of Approximation (RMSEA)" are less than 0.08. In the present model summary, it is .082 which further indicates the model fit.

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Table 18: AIC

Model	AIC	BCC	BIC	CAIC
Default model	24.789	24.950	58.505	66.505
Saturated model	20.000	20.202	62.146	72.146
Independence model	2821.964	2822.045	2838.822	2842.822

"Lower Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC)" values further demonstrate an acceptable match. Several fit indices and significance tests indicate that the model has overall, produced a reasonable fit. The parameter estimates and significance levels show the relations between the observable variables and the latent variables.

DISCUSSION

Global financial systems have seen significant improvements due to innovations and technological advancements. However, about 1.7 billion individuals worldwide remain excluded from financial systems, significantly limiting their economic participation and utilization of available financial resources, thus hindering sustainable development (Statista, 2023). This exclusion exacerbates poverty and inequality, affecting the social and environmental well-being of marginalized communities (Shen Yap, 2023). In India, despite the launch of the Pradhan Mantri Jan Dhan Yojana (PMDJY) aimed at promoting inclusive growth by opening bank accounts, many accounts were initially inactive. However, significant progress has been made in the adoption of financial services and increased financial inclusion (Mahajan, 2023). Researchers have identified key dimensions such as duration, regularity, and frequency of financial service usage as critical factors contributing to financial inclusion among peri-urban populations. These variables reliably determine the extent of financial inclusion, with "usage" encompassing both the depth and breadth of engagement with financial services and products. Understanding these aspects is crucial, as improved technological innovations have made financial instruments more user-friendly, encouraging greater adoption of the digital infrastructure offered by the government in peri-urban areas (Broby, 2021). Digitalization has revolutionized financial transactions, promoting online payments and digital wallets over cash. To enhance financial inclusion, the government should employ advanced techniques like artificial intelligence to mitigate financial fraud, thus reducing perceived risks and encouraging more significant participation from the peri-urban population. A qualitative study by Barik (2019) investigated financial inclusion trends among the urban poor in Pune, India, using data from 202 slum dwellers. India offers easily accessible gender-focused household-level data on financial inclusion programs like the PMJDY, launched in 2014, targeting individuals aged 20 to 65. The program aims to provide banking, insurance, and pension services to lower- and middle-class citizens at affordable rates, focusing on women's financial stability (Bhatia Shivangi, 2019). India's insurance market is expanding rapidly due to the lack of domestic safety nets and vulnerability to natural disasters, prompting financial companies to broaden their offerings (Ravi, 2019). Furthermore, age significantly influences financial inclusion, with older individuals having more accounts, savings, loans, and credit/debit cards, while younger people are more inclined to use digital and mobile payment methods (Bakhshi, 2020). This emphasizes the need for targeted strategies to enhance financial inclusion and leverage technology to address diverse demographic needs effectively.

Despite the advancements in financial inclusion, significant barriers remain. For instance, socio-economic disparities and limited financial literacy often hinder the effective use of financial services in peri-urban areas. Research by Sandhu, Dayanandan, and Kuntluru (2023) highlights that user experience and the desires for digital payments promote fintech innovation, ultimately contributing to financial inclusion. However, cultural values did not significantly impact perceived usefulness and ease of use in fintech innovations, dispelling myths about their importance. In Peru, despite the potential of

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digital wallets, adoption rates remain low, with only 12 million Peruvians owning one. A study identified key factors influencing continued use, such as interoperability, social distance, system availability, perceived security, and perceived usefulness (Inciso-Vera, 2023). Technological advancements, particularly in fintech and digital banking, have transformed access to financial services, especially in zones with controlled physical banking infrastructure, such as rural and peri-urban areas (Sandhu, K., Dayanandan, A., & Kuntluru, S., 2023). These technologies offer lower transaction fees and reduced operational costs, making financial services more affordable and accessible (Cyn-Young Park, R. V., 2015). In Algeria, a study using the Technology Acceptance Model (TAM) gathered data from users and non-users of mobile financial services, identifying perceived utility, perceived usability, perceived risk, convenience, trust, and social image as significant factors in fintech adoption (Abdelhak, Sharofiddin, & Mahadi, 2023). To address these challenges and enhance financial inclusion, it is essential to implement targeted strategies that consider the unique needs of different demographic groups. For instance, gender-specific factors must be addressed, as seen in Colombia, where perceived usefulness significantly impacts the intention to use mobile payments, with notable differences between men and women (Tavera-Mesías, 2023). Additionally, improving financial literacy and trust in financial systems can empower marginalized communities, enabling them to participate more actively in economic activities and contribute to sustainable development.

CONCLUSION

The intricate relationship between financial inclusion, peri-urban population dynamics, and sustainable economic growth has become a key topic in global development discussions. Various studies, particularly from developing nations, highlight numerous barriers to financial inclusion. For instance, research in Tamil Nadu, India, using SEM and CFA, showed that financial inclusion is positively influenced by financial awareness, access, and quality. Similarly, studies in Indonesia and Vietnam found that factors like perceived reliability, risk, and utility significantly impact e-wallet usage, while trust plays a crucial role in consumer adoption of digital financial services. Demographic factors such as age, gender, and socioeconomic status significantly influence financial inclusion. Research on African nations and the Global Findex 2021 database highlighted that women, lower-income individuals, and those with less education face greater barriers to accessing digital financial services. Despite the potential of mobile finance to narrow the financial inclusion gender gap, particularly for rural women in the Global South, adoption remains uneven. In India, the adoption of the Unified Payments Interface (UPI) among low-income populations is hindered by perceived security risks, knowledge gaps, and social influences, though it has significantly impacted mobile payment systems overall. Fintech and digital banking have transformed access to financial services, especially in zones with controlled banking infrastructure. Studies in Saudi Arabia and Algeria using the "Technology Acceptance Model (TAM)" identified perceived utility and ease of use as crucial factors for digital banking adoption. Despite the benefits of digital wallets, adoption remains low in some regions, such as Peru. Research highlights that factors like interoperability, system availability, and perceived security are critical for continued use. Gender-specific factors also influence fintech adoption, as seen in Colombia, where perceived usefulness significantly impacts the intention to use mobile payments, with notable differences between men and women. These findings underscore the need for targeted strategies to enhance financial inclusion and leverage technology to bridge existing gaps. Peri-urban areas host diverse enterprises such as markets, transportation hubs, and ecotourism, playing a crucial economic role in ensuring the smooth functioning of cities. Enhancing financial inclusion in these areas can empower residents, providing a viable solution to the high cost of urban living that often prevents people from moving to cities to pursue economic opportunities. Many find it more practical to reside in rural areas on the city outskirts, and planned township developments also contribute to population shifts toward these peri-urban regions. Such shifts, driven by land speculation and economic factors, have introduced various challenges and changes in these areas. Both indigenous populations and migrant settlers benefit differently from their proximity to cities. This research highlights that improving factors such as the duration, regularity, and frequency of using financial inclusion tools can

significantly enhance the quality of life for peri-urban populations. By adopting smarter, more sustainable practices, these communities can contribute to the overall sustainable economic development of the nation.

Future Scope

The results of this study present numerous prospects for further investigation, such as broadening the geographical focus to encompass peri-urban and rural regions of greater diversity, in addition to the five major cities and urban agglomerations of India. By doing so, a more holistic comprehension of the regional disparities in financial inclusion could be achieved. Also, conducting longitudinal studies could offer insights into how financial inclusion evolves over time and the long-term impacts of different financial policies and interventions on peri-urban populations. Furthermore, in-depth behavioral studies could be conducted to understand the psychological and social factors influencing financial inclusion. This might include examining the impact of cultural attitudes, trust in financial institutions, and peer influence on financial behaviors. Another avenue for further scope expands the area of cross country comparative studies between India and other developing or developed nations could provide a broader perspective on financial inclusion challenges and solutions. This would help in understanding global best practices and adapting them to the Indian context.

Limitations

Despite its significant contributions, this study has several limitations like the sample size of 500 respondents, while substantial, may not fully capture the diversity of the peri-urban population across all metro cities 12 in number and urban agglomeration of India 65 in number (data as per censusindia.gov.in, 2024). Future studies with larger and more representative samples would be beneficial. This study provides a snapshot of financial inclusion at a particular time. It does not account for dynamic changes over time or the influence of recent policy changes. Longitudinal data would provide more robust insights. Future the study identifies key factors influencing financial inclusion, it may not cover all possible variables. Factors such as education, gender, cultural norms, and specific government programs could also play significant roles and should be explored further. The study highlights the importance of national variables but does not delve deeply into the implementation gaps of existing financial policies. Future research could focus on the effectiveness of policy implementation and the challenges faced at the ground level. By addressing these limitations and exploring the future research directions, a more nuanced and comprehensive understanding of financial inclusion in peri-urban areas can be achieved, ultimately aiding in the formulation of more effective policies and interventions.

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