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THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN FINANCIAL INCLUSION IN INDIA: SOME OBSERVATIONS

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ABSTRACT

In the modern digital world, technological advancements influence the domains of business, society, and the economy. Today, we live in an era where highly developed technologies are transforming our lifestyles, activities, and the way we engage with various processes. Information and Communication Technology (ICT), in particular, is driving rapid changes in banking operations. The methods of delivering customer services, sanctioning credit, and reaching potential customers are evolving swiftly due to advancements in ICT.

A crucial aspect of these developments is financial inclusion, which focuses on providing financial services to underserved, low-income, and marginalized segments of society at affordable costs. This includes services such as credit facilities, entrepreneurial loans, mortgages, payment and remittance services, and savings accounts. The goal of financial inclusion is to ensure that everyone has access to

financial services. In this context, ICT plays a pivotal role in enabling and supporting financial inclusion. This paper will explore the key components of financial inclusion and the related ICT developments that make it possible.

Key words: Technology, ICT, Financial Inclusion, Customers' Satisfaction.

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1. INTRODUCTION

The socio-economic development of a country is intricately linked to the level of financial inclusion achieved within its population. Across most nations, one consistent pattern that emerges is the concentration of wealth, leading to income inequality and social disparity. India is the home to nearly one-third of the world's poor, yet only 35% of its population holds accounts in formal financial institutions (World Bank, 2014).

India's population, which stood at approximately 1.25 billion as per Census 2011, reveals that 65% of adults remain excluded from the formal financial system (Census of India, 2011). The World Bank Global Findex Database (2014) reported that only 35.2% of adults over the age of 15 had a formal bank account and a mere 9% accessed credit through formal institutions. Further evidence of this exclusion is seen in infrastructural limitations, with only one bank branch serving approximately 14,000 individuals and one branch for every 12.5 villages (RBI, 2013). Moreover, the penetration of banking products remains minimal—just 18% hold debit cards and less than 2% are credit card users (World Bank, 2014). Insurance coverage is similarly poor, with only 20% of the population possessing life insurance and 9.6% holding non-life policies (IRDAI, 2014).

Despite India's post-liberalization economic growth, paradoxically, poverty levels have persisted or even increased in certain segments. The vast majority of India's poor lack access to formal financial services, even though they require these services for basic needs such as savings, emergency funding, livelihood development, and consumption smoothing (Chakrabarty, 2013). The extent of financial exclusion is strongly tied to financial illiteracy, which remains pervasive among low-income populations, especially in rural and marginalized communities (Bihari, 2011).

The existing traditional banking model has proven inadequate in addressing these disparities. Scholars have argued that economic colonization has replaced political colonization, with conventional banking systems contributing to the continued marginalization of the poor (Fasih, 2012). Recognizing the scale of this problem, financial inclusion has emerged as a central policy priority. It is broadly defined as the provision of affordable and accessible financial services to underserved and low-income groups (Rangarajan Committee, 2008).

Historically, financial inclusion is not a novel concept in India. Several initiatives have been undertaken since independence, including the nationalization of banks in 1969, the establishment of Regional Rural Banks (RRBs), Cooperative Banks, and the introduction of Banking Correspondents (BCs). More recent initiatives such as Swabhiman (2011)—which aimed to bring banking services to over 74,000 villages with populations above 2,000—Swavlamban, Microfinance initiatives, No-Frill Accounts, and the establishment of the Bharatiya Mahila Bank have all aimed to improve outreach and inclusion (GOI, 2012; RBI, 2015).The core objective behind these programs has been to achieve inclusive growth, generate employment, and most importantly, eradicate poverty by integrating disadvantaged populations into the formal financial system (Chattopadhyay, 2011). At the global level, the significance of financial inclusion was emphasized by then-UN Secretary-General Kofi Annan in 2003, who stated, “The great challenge before us is to address the constraints that exclude people from full participation in the financial sector” (UN, 2003). In India, the concept of financial inclusion was formally endorsed by the then RBI Governor Y.V. Reddy in 2005, which led to the introduction of Branchless Banking through agents known as Bank Mitras in 2006 (RBI, 2006).

In recent years, Information and Communication Technology (ICT) has played a transformative role in reshaping banking operations and extending financial services. Through mobile banking, digital wallets, SMS alerts, and core banking solutions, banks have leveraged ICT to increase outreach, lower transaction costs, and enhance customer experience (Kumar, 2013; Singh & Kaur, 2014). These advancements have enabled banks to design and deliver products that are tailored to low-income populations in cost-effective and user-friendly ways, thus enhancing the scope of financial inclusion.

ICT Applications in Banking:

a. Bank Website: The bank's website is the foundational step in ICT applications, displaying all relevant information and presenting the bank's activities to prospective clients and stakeholders.
b. Internet Banking: The use of the Internet to deliver banking services at various locations, enabling customers to manage their accounts and conduct transactions online.
c. Electronic Banking: Electronic banking offers 24-hour services, including ATM access for cash withdrawals and direct deposits of paychecks into checking or savings accounts. It focuses on various transactions, rights, responsibilities, and fees.
d. Mobile Banking: The use of mobile phones and smartphones for banking purposes allows customers to process and receive services on the go. Features like SMS alerts help customers stay informed about their transactions.
e. ATM (Automated Teller Machines): ATMs, located in various zones, enable customers to withdraw money instantly, update checkbooks automatically, and perform user-friendly banking operations.
f. Debit Card: Issued by banks, debit cards allow customers to withdraw money from ATMs and make payments for goods and services.
g. Credit Card: A credit card offers short-term financing, allowing customers to make purchases and pay later.
h. Electronic Fund Transfer Systems (EFTS): EFTS enables the instant transfer of funds between bank accounts, either within the same bank or across different banks, through computerized systems without human intervention.
i. Real-Time Gross Settlement (RTGS): RTGS allows banks to give electronic instructions for transferring funds from one account to another in real time.
j. Automated Clearing Houses (ACH): ACH is an electronic network for processing large batches of debit and credit transactions, facilitating efficient financial transactions across multiple accounts.

2. REVIEW OF LITERATURE

The concept of financial inclusion, which is a key focus of various financial institutions and banks, is explored through literature reviews and an examination of critical technological applications in the banking sector.

In India, 50% of the adult population remains excluded from the financial system. Gangopadhyay (2009) highlighted that this exclusion affects not only rural populations but also lower-income groups in urban areas. He attributed this exclusion to the organized nature of banking services and raised essential questions about reducing transaction costs, developing intermediaries between banks and underserved populations, and creating technology platforms to address these challenges.

Financial inclusion involves providing access to formal financial services at affordable costs for all members of an economy, particularly targeting low-income groups. This inclusion is crucial for poverty reduction and economic growth. The role of ICT in enhancing financial inclusion by offering better services was emphasized by Diniz, Birochi, and Pozzebon (2012). Technology has the potential to connect people and businesses, providing access to education, entertainment, and services, with a focus on its applications in banking and commerce (Foley & Ferri, 2012).

Financial inclusion offers incremental and complementary solutions to combat poverty and promote inclusive development. Chibba (2009) argued that in times of global financial crises, there is a need to scale up financial inclusion efforts. Sarma and Pais (2011) examined the relationship between financial inclusion and development, considering country-specific factors such as income, inequality, literacy, urbanization, and physical infrastructure. Midgley (2005) addressed geographical issues in policy discussions and examined the institutional role of the Post Office in financial inclusion.

Advancements in electronic banking technology have facilitated banking through online channels. Pikkarainen, Karjaluoto, and Pahnila (2004) studied online banking acceptance using the traditional technology acceptance model with a sample size of 268, concluding that the usefulness and information provided on online banking websites are crucial for adoption. The role of technology in banking has also led to cost reduction and the elimination of uncertainties, significantly impacting perceived service quality (Joseph et al, 1999).

A descriptive study by Akinci, Aksov, and Atilgan (2004) explored consumer attitudes and the adoption of Internet banking, revealing significant differences between the

demographic profiles and attitudes of users and non-users. The impact of IT on relationship marketing was discussed by Lang and Colgate (2003), who emphasized how customers use a combination of IT channels to interact with their financial service providers.

3. OBJECTIVES

Following are the objectives of the study:

- To know the status of Financial Inclusion in the country.
- To know the ICT services used by the bank's customers in the order of their preferences.
- To know relationship between the ICT services of the banks with the satisfaction of the bank's customers.

4. DATA AND METHODOLOGY

The present study adopts an exploratory and empirical research design, utilizing both primary and secondary sources of data. Secondary data were collected from credible institutional sources, including annual reports published by the Reserve Bank of India (RBI), government publications, and other relevant documents. Primary data were obtained through a combination of structured questionnaires, direct observations, and personal interactions with respondents. The study involved a sample of 50 individuals, 25 from rural area and 25 from urban area, selected using a judgmental (purposive) sampling technique. To address the third objective of the study, the selected parameters representing ICT-enabled banking services included Automated Teller Machines (ATMs) and Mobile Banking services, specifically SMS alert functionalities. Along with the tools like tables, charts etc. the regression technique has also been utilized in the study.

5. LIMITATIONS OF THE STUDY

The present study is made with the intension of finding the performance result in the study area with the following limitations;

a) The present study is only restricted to the Nalbari and Barpeta district of lower Assam with a very sizable size of sample.

b) The findings of the study have been derived depending absolutely on the views and opinions given by the respondents only

6. DATA ANALYSIS AND FINDINGS

In order to find the first objective, the RBI annual report was explored and following things were obtained:

Table 1: Targets and Achievements for Agricultural Credit (Rs. Billion)

End of March	Scheduled Commercial Banks		Cooperative Banks		RRBs		Total	
	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
2013-14	4750	5090	1250	1199	1000	827	7000	7116
2014-15	5400	5997	1400	1384	1200	1025	8000	8406

*Source: RBI Annual Report 2015, *provisional*

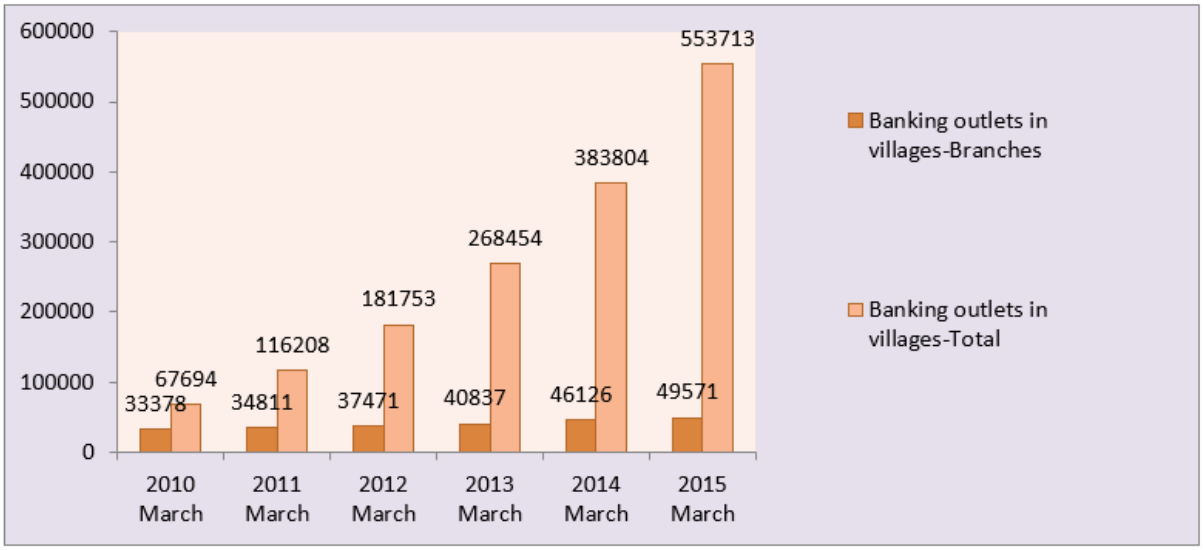
During 2013-2014 it was observed that total target by Banks for agricultural credits was Rs.7000 billion and the achievement was Rs 7116 billion. In 2014-15 the target was Rs 8000 billion and the achievement was Rs 8406 billion.

Table 2: Financial Inclusion Plan Summery Progress of All Banks Including RRBs.

Particulars	Year ended March 2010	Year ended March 2014	Year ended march 2015	Progress April 2014- March 2015
Banking outlets in villages-Branches	33378	46126	49571	3445
Banking outlets in villages-Branchless mode	34316	337678	504124	166446
Banking outlets in villages-Total	67694	383804	553713	169909
Urban locations covered through BCs	447	60730	96847	36117
Basic Savings Bank Deposit A/C through branches (No in Million)	60.2	126	210.3	84.3
Basic Savings Bank Deposit A/C through branches (Amt Rs Billion)	44.3	273.3	365	91.7
Basic Savings Bank Deposit A/C through BCs (No in Million)	13.3	116.9	187.8	70.9
Basic Savings Bank Deposit A/C through BCs (Amt Rs Billion)	10.7	39	74.6	35.6
BSBDAs Total (no in million)	73.5	243	398.1	155.1
BSBDAs Total (Amt Rs Billion)	55	312.3	439.5	127.2
OD facility availed in BSBDAs (no in million)	0.2	5.9	7.6	1.7
OD facility availed in BSBDAs (Amt Rs Billion)	0.1	16	19.9	3.9
KCCs (no in million)	24.3	39.9	42.5	2.6
KCCs (Amt Rs Billion)	1240.1	3684.5	4382.3	697.8
GCC (no in million)	1.4	7.4	9.2	1.8
GCC (Amt Rs Billion)	35.1	1096.9	1301.6	204.7
ICT A/Cs BC Transactions (No in million)*	26.5	328.6	477	477
ICT A/Cs BC Transactions (Amt Rs Billion)*	6.9	524.4	859.8	859.8

*Source: RBI Annual Report 2015, * During the financial year*

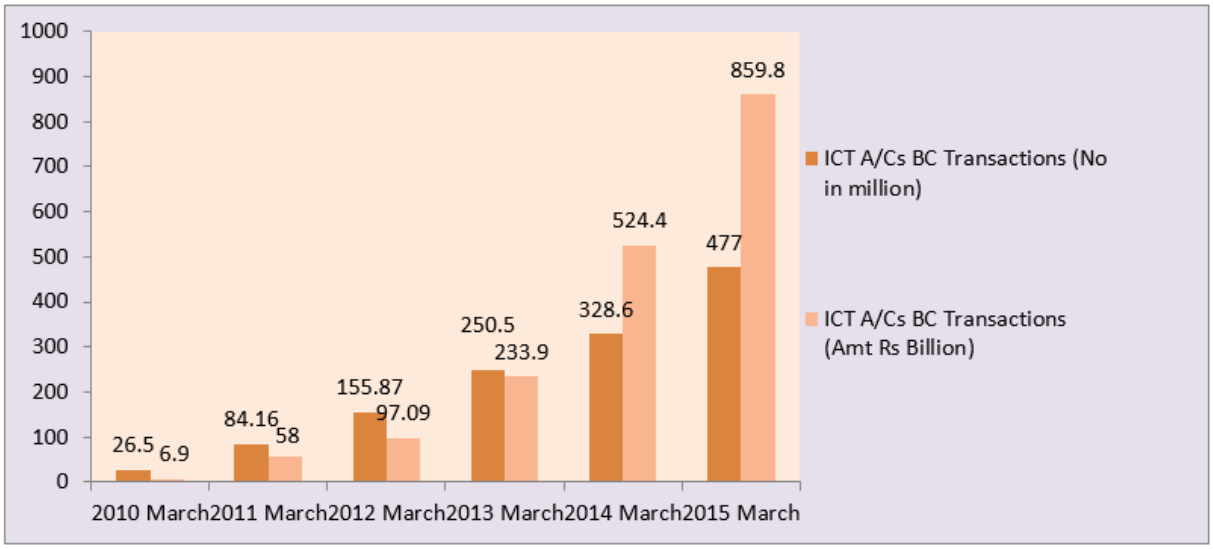
From the above table the information about the financial inclusion is obtained, and regarding ICT A/Cs it is 477 in millions for 2015 March and Rs 859.8 billion ICT A/Cs BC Transactions during March 2015.



Source: RBI annual reports of various years.

Figure 1: Banking Scenario in Villages from March, 2010 – March, 2015

The data clearly shows that there is a substantial increase in the Banks Branch Outlets in villages from March 2010 to March 2015.



Source: RBI annual reports of various years.

Figure 2: ICT A/Cs Branch Transactions

It is clear that the ICT A/Cs BC Transactions have increased from 2010 March to 2015 March.

To obtain the second objective the responses were obtained the sample and following facts were revealed which is presented in the form of table.

Table 3: ICT Services Used by Bank Customers

ICT Services	Customers Used	Percentage
ATM Services	50	100%
Direct deposit and withdrawal services	50	100%
SMS Alert (Mobile)	30	60%
Point of sale	0	0%
Internet banking	0	0%
Electronic cheque conversion	0	0%
Personal computer banking	0	0%

Source: Field Survey -2015

It was observed that 100% of the beneficiaries in the study were using the ATM services and 60% were using SMS alert (Mobile).

To derive the third objective, i.e. relationship between the banks ICT service and the customers' satisfactions, the ICT parameter ATM service is chosen and the customers' satisfactions parameter sufficient and real time information by the banks were chosen in the study.

The parameter chosen ATM services is selected as X1, whereas customers' satisfactions parameter sufficient and real time information by the banks is chosen as Y. The study generated following table in the regression analysis in Excel 2013:

Regression Statistics	
Multiple R	0.608234522
R Square	0.369949233
Adjusted R Square	0.356823176
Standard Error	0.345990817
Observations	50

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.373937008	3.373937	28.184337	2.79418E-06
Residual	48	5.746062992	0.11971		
Total	49	9.12			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.950787402	0.344283896	5.666217	8.077E-07
ATM services	0.407480315	0.076754301	5.308892	2.794E-06

Thus the equation becomes:

Y= 0.407480315 X1 + 1.950787402

The coefficient of correlation between the parameters is moderate with 60.82%.

Explanation of the Regression Analysis:

1. Multiple R (0.6082):

This is the correlation coefficient between the independent variable (ATM services - X1) and the dependent variable (customer satisfaction via sufficient and real-time information - Y). A value of 0.6082 suggests a moderate positive linear relationship between ATM services and customer satisfaction.

2. R Square (0.3699):

This is the coefficient of determination, indicating how much of the variation in customer satisfaction (Y) can be explained by ATM services (X1). Here, approximately 37% of the variation in customer satisfaction is explained by ATM services, which shows a moderate explanatory power.

3. Adjusted R Square (0.3568):

This adjusts the R Square value for the number of predictors in the model. Since there's only one predictor here, the difference between R^2 and Adjusted R^2 is small. It still reflects that about 35.7% of the variance in satisfaction is accounted for, adjusting for any sample size bias.

4. Standard Error (0.3460):

This measures the average distance that the observed values fall from the regression line. A lower standard error indicates better fit. At 0.346, it's reasonably low, though context and the scale of Y would determine how acceptable this is.

5. Observations (50):

The regression results suggest that ATM services have a moderate and positive impact on customer satisfaction in terms of providing sufficient and real-time information. While ATM services alone do not account for all variation in satisfaction ($R^2 = 37\%$), they are a significant contributing factor, indicating a meaningful relationship that banks can focus on to improve customer experience.

To derive the -relationship between the banks ICT service and the customers' satisfactions, the ICT parameter SMS service is chosen and the customers' satisfactions parameter sufficient and real time information by the banks were chosen in the study.

The parameter chosen SMS services is selected as X2, whereas customers' satisfactions parameter sufficient and real time information by the banks is chosen as Y. The study generated following table in the regression analysis in Excel 2013:

Regression Statistics	
Multiple R	0.504128285
R Square	0.254145328
Adjusted R Square	0.238606689
Standard Error	0.511233712
Observations	50

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4.274724	4.274724	16.3557	0.000189492
Residual	48	12.54528	0.26136		
Total	49	16.82			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.903543307	0.508711577	3.741891073	0.000487842
SMS Services	0.458661417	0.113411641	4.044218171	0.000189492

The equation becomes:

Y=0.458661417 X2+1.903543307

The coefficient of correlation between the parameters here is 50.41%.

Explanation of the Regression Analysis:

1. Multiple R (Correlation Coefficient = 0.5041)

This represents the strength of the linear relationship between the SMS service (X2) and customer satisfaction in terms of sufficient and real-time information (Y). A value of 0.5041 indicates a moderate positive correlation, suggesting that as SMS service improves, customer satisfaction tends to improve as well, though not perfectly.

2. R Square (Coefficient of Determination = 0.2541)

This shows the proportion (25.41%) of the variation in customer satisfaction (Y) that can be explained by the SMS service (X2). The remaining 74.59% of variation is due to other factors not included in this model.

3. Adjusted R Square (0.2386)

Adjusted R^2 accounts for the number of predictors in the model. Since only one predictor (X2) is used, this value is slightly lower than R^2. It still indicates that about 23.86% of the variance in customer satisfaction is explained by SMS services when adjusted for sample size and number of predictors.

4. Standard Error (0.5112)

This indicates the average distance that the observed values fall from the regression line. A lower value would suggest predictions are more accurate; a value of 0.5112 shows moderate variability in predictions.

5. Observations (n = 50)

The model is based on 50 data points, which is a reasonable sample size for a simple regression model.

The regression results suggest that the bank's ICT service through SMS has a moderate and positive impact on customers' satisfaction with the timeliness and sufficiency of information. However, since only about 25% of the variation is explained, other factors (e.g., mobile apps, customer service, and ATM functionality) may also significantly influence satisfaction and should be considered in a broader model.

7. CONCLUSION

It is evident that both the Government of India and the banking sector have made considerable progress in advancing the agenda of financial inclusion. A range of policies and initiatives, such as Jan Dhan Yojana, Aadhaar-enabled payment systems, and direct benefit transfers (DBTs), reflect a strategic commitment to bringing the unbanked population into the formal financial system. The increasing penetration of the Internet and the government's strong emphasis on "Digital India" have further accelerated this transformation by expanding the reach of banking services to remote and underserved areas.

One of the most significant enablers in this process has been the integration of Information and Communication Technology (ICT) into the core functioning of banks. ICT has revolutionized the way banking operations are conducted—facilitating real-time fund transfers, mobile banking, digital payments, and remote account management. These technological advancements have enhanced the efficiency, accessibility, and transparency of banking services, contributing to the overall circulation of funds within the formal economy and fostering financial empowerment.

Despite these advancements, the full potential of financial inclusion cannot be realized solely through technological adoption. A significant challenge remains in terms of ensuring that both customers and banking personnel possess the requisite knowledge and digital literacy to effectively use these services. Financial literacy and capacity-building initiatives are thus crucial. Many individuals, particularly those from rural and marginalized communities, are still unaware of how to access or benefit from these digital financial tools.

To address this gap, robust e-governance frameworks can play a transformative role. E-governance initiatives—such as community service centers (CSCs), mobile banking kiosks, and digital literacy campaigns—can support the dissemination of financial knowledge and bridge the digital divide. These platforms can be instrumental in providing training, building trust, and promoting the safe use of digital financial services. By complementing ICT-driven banking with targeted educational efforts and inclusive governance structures, India can move closer to achieving meaningful and sustainable financial inclusion.

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