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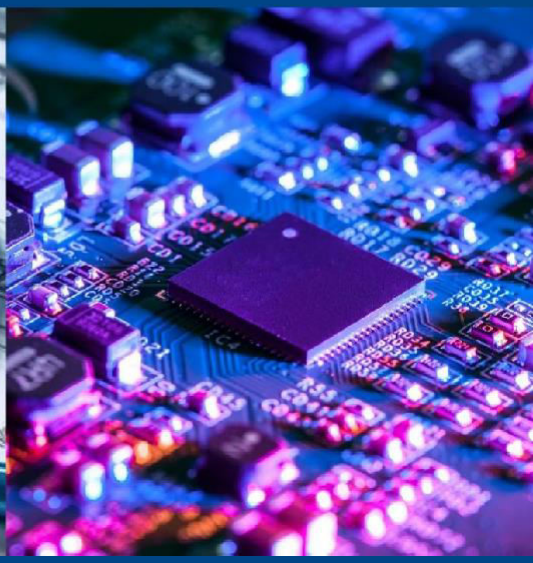

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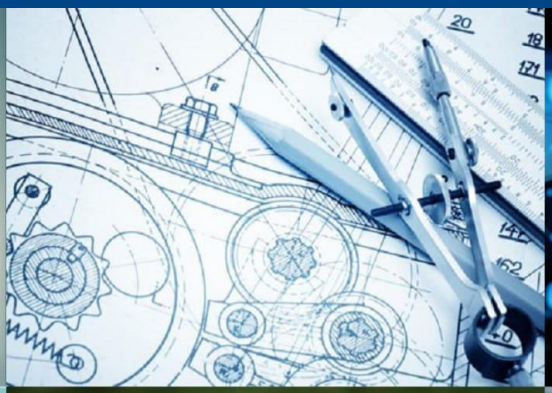

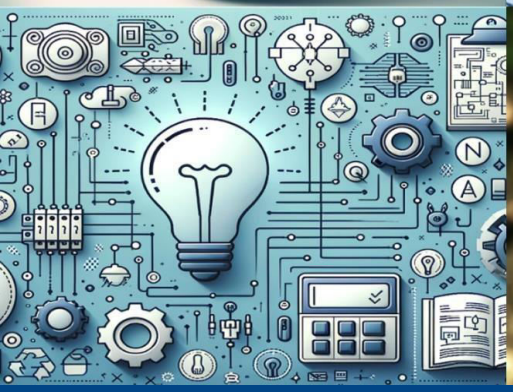

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Bridging The Digital Divide: Analysing E-Banking Satisfaction & Futuristic Prediction using Arima

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ABSTRACT: E-banking has moved traditional banking operations to digital channels. It enables customers to conduct financial transactions online. Banking across desktops and mobile devices has become easier thanks to the transition. Banking services have increased customer satisfaction in urban areas due to technological advances. Dindigul, Tamil Nadu, has explored this effect partially. The study measures customer satisfaction with e-banking services from commercial banks in Dindigul. An analysis of 150 individuals in different demographic groups in the city analyzed how well they understand and how often they utilize e-banking services. It appears that most respondents belong to the age group 28-38, and 53% identify as female. 52% of respondents use ATMs every month, and 65% are satisfied with ATM accessibility. Online transaction safety is a concern for 67% of participants. The findings indicated that 56.5% of participants rated private banks as more technologically advanced. This work uses an ARIMA Model to predict how many ATM's will be needed in the future.

KEYWORDS: Electronic Banking, Digital Banking, Customer Satisfaction, E – Banking, ARIMA.

I. INTRODUCTION

Technological advances have led to major changes in the banking industry in recent decades. By introducing e-banking, financial services are provided and obtained in a novel manner. The shift from traditional banks to digital platforms has changed how customers interact with their banks. An internet connection allows customers to conduct banking activities from anywhere and at any time. Banking has boosted efficiency and met customers' rising expectations for speedy, simpler financial services by making the shift. In the 1960s, ATM introduced e-banking, which has evolved into sophisticated mobile apps today. Each technological leap has increased customer options while presenting new challenges regarding security, user experience, and infrastructure. Urban areas in India have seen significant growth in e-banking. Smaller cities like Dindigul in TamilNadu, remain worth exploring. Customers' satisfaction with e-banking in these regions is crucial to tailoring digital offerings and improving service quality. Indian banking has experienced a profound transformation thanks to technological advances. Digital platforms are revolutionizing customer interaction with financial institutions through electronic banking (e-banking). Electronic fund transfers, bill payments, and online account management are all part of e-banking. Banking transactions can be performed anywhere with the internet. In small cities such as Dindigul, Tamil Nadu, e-banking remains understudied, despite its popularity in urban areas.

The purpose of this study is to assess customer satisfaction with e-banking services in Dindigul. Researchers examine various factors, such as accessibility, security, and user-friendliness, to enhance the digital offerings of banks in such regions. Dindigul banks' e-banking services are evaluated for customer satisfaction. This study aims to assess awareness, usage patterns, and perceptions. E-banking accessibility, security, and user-friendliness are analyzed. By providing insights, banks can enhance their digital services and improve customer satisfaction. E-banking is becoming increasingly critical as the banking sector evolves.

A study on digital banking in India contributes to the growing literature. An analysis of customer satisfaction in a Tier-2 city. In similar urban centers across India, bank managers, policymakers, and researchers can learn from this research.

The research focused on:

1. Dindigul customers' awareness and adoption of e-banking services.
2. Analyze customer satisfaction with different e-banking services offered by banks in Dindigul.
3. To identify E-banking satisfaction and dissatisfaction.
4. Investigate customer preferences for various e-banking channels.

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5. In Dindigul, investigate the challenges and concerns customers face with e-banking.
6. Comparing public and private sector banks' e-banking perceptions.

This research has the potential to create significant impact in several areas:

1. Banking Strategy: Dindigul and similar tier-two cities will benefit from the findings. It helps them tailor e-banking strategies for customers.
2. Customer Service Enhancement: Banks can identify pain points and areas of satisfaction. It enhances customer loyalty and e-banking services.
3. Financial inclusion: Strategies can be developed by understanding customers' adoption patterns. Increased e-banking penetration may increase financial inclusion.
4. Policy Formulation: Researchers found that small urban centers have a high adoption rate of e-banking. In the banking sector, it guides policies and regulations.
5. Academic Contribution: Tier-two cities, which are often underrepresented in such studies, contribute to the body of knowledge on e-banking in India.
6. Technological investment: This study provides insights that banks can use. Infrastructure and technologies for e-banking were discussed.

II. REVIEW OF LITERATURE

Khanet.al (1) proposed that E-Banking has radically changed the banking industry. With this arrangement, customers can bank whenever, wherever, and wherever they want. Using conventional banking, however, raises risks. Most customers approve of online banking transactions due to its many benefits. Customer satisfaction is strongly correlated with E-Banking. The majority of customers are committed to using the service. Customer satisfaction and internet banking are discussed by Perera et.al (2) Data was collected from 285 customers who used internet banking facilities at the Bank of Ceylon's Panadura Branch. Customer satisfaction and seven aspects of internet banking were tested in the study.

Customers are the source of service efficiency, according to Hindu et al (3). Efficiency is not the same as satisfaction. Service efficiency and customer satisfaction are not agreed upon. Customers are more satisfied with efficient service. The purpose of Jamil et.al [4] focused study was to determine which factor of E-Banking service quality has the greatest potential impact on customer satisfaction. Survey instruments were used to collect responses from Lebanese bank clients. Statistical analysis was performed with SPSS. Jagdeep Singh et al. (5) using five-point Likert scales examined E-banking's impact on service quality. To achieve this goal, 42 statements were added to the Service quality model. The analysis included 42 statements. E-Banking services were rated according to respondents' experiences. There are nine factors that affect service quality in E-banking: connectivity, tangibility, understanding, credibility, stability, access, responsiveness, competence, and reliability. The study found that factors affecting E-Banking usage varied significantly. E-banking service providers must address these considerations.

Emad Hashiem Abualsauod and colleagues (6) developed a conceptual framework for online banking (OB). Based on the existing literature, it identified gaps in OB quality in the banking sector. There were five online banking quality gaps, along with three stages of customer interaction. Online banking services in Saudi Arabia are evaluated for their quality disparities. The study by Sangeetha et.al (7) analyzes customers' satisfaction with E-Banking Services. The use of electronic banking technology benefits both customers and banks. In addition, there are no significant differences between customer satisfaction levels and personal factors.

In this research, Tahtamouni et al. (8) examine the advancements and the advantages of banks and clients using electronic methodologies. Using a descriptive-analytical framework, this shift has led to a disparity in understanding customer interactions with electronic banking. Study variables were gathered through a questionnaire. There were 170 participants across three Jordanian banks. Sunith C K (9) conducted a study on customer satisfaction with E-banking services Electronic banking facilitates customers' access to their accounts A variety of channels are used to inform about financial products such as the internet, telephone, and television.

State Bank of India (SBI) customers utilizing E-banking services were studied by Sandhya et al. (10). 50 participants in the study used SBI Mysore E-banking services. Quality services lead to customer satisfaction, according to the findings. E-banking services provided by SBI in Mysore are highly rated by customers. Gunavardana et al. (11)

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research suggests that many modern banking institutions are adopting advanced electronic banking methods rather than sticking with conventional practices. According to secondary sources, Sri Lanka's e-services fall short of expectations. Researchers examined why some customers embrace e-banking while others avoid it. 150 participants participated in this study in the Galle district of Sri Lanka. Suresh Kumar and colleagues (12) aim to bridge the considerable gap in understanding customer perspectives regarding internet banking and trace its current expansion. Their study gathers insights from a survey targeting internet banking users and service providers, ultimately crafting a practical model designed to enhance value for consumers. Asjitha Angusamy proposes (13) that customer satisfaction with e-banking be examined. Customer satisfaction is examined by examining E-banking security, privacy, responsiveness, and reliability. The results will provide valuable insights on improving E-banking services. Through convenience sampling, 200 responses were collected. Daqar and colleagues (14) conducted this study. In this study, artificial intelligence (AI) was investigated to improve customer experience. AI-powered services significantly enhanced customer satisfaction and loyalty, according to a study of 412 digital banking users in India. Customers' technology readiness moderated the relationship between AI-enabled services and satisfaction. Singh and Srivastava (15) conducted a thorough study of e-banking adoption in India. Efficacy, usability, and trust were identified as determinants of e-banking adoption. Researchers found that demographic factors, such as age and education level, affect e-banking usage. Chauhan et al (16) investigated the correlation between service quality dimensions and customer satisfaction. Customer satisfaction was driven by reliability, responsiveness, and empathy, according to their study of 384 internet banking users in India. The impact of these factors varied to age and income.

Research Gap

Research on e-banking and customer satisfaction has made remarkable advances and discoveries. The influence of particular elements such as reliability, responsiveness, and privacy on user experiences has been investigated in various studies. Research still lacks a complete understanding of how these diverse factors shape customer satisfaction across different demographic and geographic landscapes. Typically, investigations focus on specific areas, financial institutions, or select service aspects, which leads to a piecemeal understanding. A more comprehensive view of the effects of e-banking could be gained by bridging these gaps.

III. RESEARCH ANALYSIS

E-banking service satisfaction in Dindigul is assessed quantitatively in this study. Despite the practical limitations of reaching a broad population within a constrained timeframe, 150 individuals were selected through convenience sampling. The results may not be as applicable with this method. Diverse demographic backgrounds in Dindigul were included to reduce bias. Hypotheses based on previous research:

- H1: There is a positive relationship between reliable banking services with ATM for customer satisfaction.
- H2: There is a positive relationship between frequency of usage with ATM for customer satisfaction.
- H3: There is a positive relationship between transaction on commercial banks and ATM.
- H4: There is a positive impact that Problems Faced by the Customers.

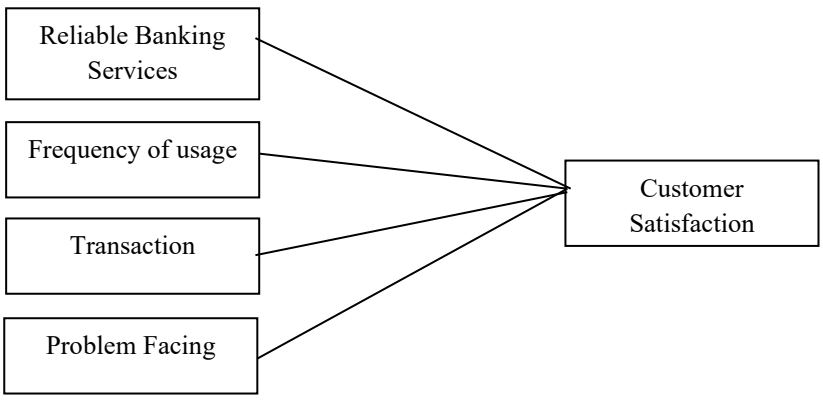

Figure 1: Objective of the hypothesis in this work

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Examining e-banking services in small cities like Dindigul is imperative for various reasons. Most research and advancements in digital banking have centered on urban areas, making it essential to investigate the adoption and satisfaction with e-banking in smaller locales.

Broadening Financial Inclusion:
Smaller cities often feature a diverse mix of residents from various economic and educational backgrounds. This study examines the effectiveness of e-banking services in reaching these communities, an essential aspect of financial inclusion. To address the needs of underserved populations in smaller cities like Dindigul, banks must gain a clear understanding of these specific requirements.

Understanding Regional Variations:
Depending on infrastructure, digital literacy, and cultural considerations, e-banking services are adopted and used differently in urban centers and smaller cities. Detailed regional insights may be uncovered by Dindigul research. Smaller urban communities can benefit from such localized knowledge by developing customized banking solutions.

Enhancing Service Delivery:
Smaller cities like Dindigul often navigate a shift from traditional banking to full digital services. Analyzing customer satisfaction in these regions can reveal service delivery gaps not present in larger markets. Banks can leverage these findings to enhance the accessibility, usability, and security of their e-banking platforms, ensuring broad appeal across diverse demographics.

Identifying Growth Opportunities:
Smaller cities are emerging markets for e-banking services, with growth potential still being realized. Identifying the factors influencing e-banking adoption in Dindigul enables banks to discover growth opportunities. Tailored marketing strategies, specialized products, and customer education efforts can enhance market presence and foster customer loyalty.

Informing Policy and Regulation:
Research from smaller cities like Dindigul can guide policymakers in evaluating current regulations and identifying the necessity for new policies to enhance digital banking in rural regions. This is crucial as authorities seek to advance digital financial services within their economic development strategies.

Source of Data Collection

This research used a quantitative method to assess customer satisfaction with e-banking services in Dindigul. A sample of 150 respondents was strategically chosen from different regions serviced by Commercial Banks in the area. The sample size was based on the local bank customer population and the practicality of data collection within the project's timeline.

Table 1: Data Source

Primary data	Secondary data
Data collected for the first time from the source and never have been used earlier. The data can be collected through interviews, observations and questionnaires.	Data collected from already been use or published information like journals, diaries, books, etc. In this research project, secondary source used were various journals, and website of various online journals.

This study employed a convenience sampling technique for its practicality in reaching respondents. While this method may not fully represent the population, we sought to reduce bias by including individuals from various demographic backgrounds across Dindigul. A total of 150 respondents were selected to maintain a balance between statistical integrity and practical execution. This sample size reflects the diverse e-banking user base in Dindigul, allowing for comprehensive data collection and analysis. Statistically, 150 participants provide sufficient power for rigorous analyses, such as factor analysis, ensuring reliable outcomes. Furthermore, this sample size is consistent with those used in similar research, making it an effective and pragmatic choice within our time and resource constraints.

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Demographic Profile of the Respondents

Table 2 shows a balanced representation of males and females in the study. A total of 150 participants had 80 women (53%), and 71 men (47%). The slight majority of women using e-banking is significant. Nearly equal gender distribution enhances survey reliability. By comparing the experiences of males and females in Dindigul, this enables potential gender-based analyses of e-banking preferences and behaviours.

Table 2: Gender of Respondents

GENDER WISE RESPONDENTS		
GENDER	**NO. OF RESPONDENTS**	**PERCENTAGE OF RESPONDENTS**
Male	71	47%
Female	80	53%
TOTAL	150	100%

Table 3 shows the age distribution of e-banking users in Dindigul. There were 68 respondents, 45% of whom were between 28 and 38 years old. 18-28 year olds have 26.5% (40 respondents) and 38-48 year olds have 25.5% (38 respondents). The three age ranges make up 97% of the sample, suggesting people between 18 and 48 are the most likely to use e-banking. Over 48 respondents make up only 3%, reflecting a significant decline. In general, young and middle-aged adults are most likely to use e-banking.

Table 3: Age of Respondents

AGE WISE RESPONDENTS		
AGE	**NO. OF RESPONDENTS**	**PERCENTAGE OF RESPONDENTS**
18-28 Years	40	26.5%
28-38 Years	68	45%
38-48 Years	38	25.5%
Above 48 Years	5	3%
TOTAL	150	100%

Almost evenly represented at 41% and 40%, respectively, is the Service sector, followed by the Business sector. At 12%, students are the next largest group, followed by professionals at 4.5%, and others at 2.5%.

A significant number of students come from business and service backgrounds. A lower percentage of professionals and others may reflect the target population or challenges in achieving diversity.

Table 4: Employment

EMPLOYMENT WISE RESPONDENTS		
EMPLOYMENT	**NO. OF RESPONDENTS**	**PERCENTAGE OF RESPONDENTS**
Student	18	12%
Business	60	40%
Professional	7	4.5%
Service	62	41%
Other	4	2.5%
TOTAL	150	100%

According to Table 5, most respondents are middle-income. The largest segment, 41.5%, earns between 100,000 and 300,000. The next largest, at 33%, falls between 300,000 and 500,000. Additionally, only 5.5% earn more than 500,000, while 20% earn less than 100,000. There is a skew towards lower- to middle-income earners in this distribution.

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Table 5: Income

INCOME WISE RESPONDENTS		
INCOME (PER YEAR)	**NO. OF RESPONDENTS**	**PERCENTAGE OF RESPONDENTS**
Upto 1,00,000	30	20%
1,00,000-3,00,000	62	41.5%
3,00,000-5,00,000	50	33%
Above 5,00,000	8	5.5%
TOTAL	150	100%

According to the data collected, it is found that 56.5% of respondents consider private sector banks as most technologically advanced as compare to public sector banks.

Table 6: Bank OPTIONS

OPTIONS	NO. OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Public sector banks	65	43.5%
Private sector banks	85	56.5%
TOTAL	65	100%

Table 7 illustrates how Dindigul customers engage with various e-banking services. In fact, 52% of respondents use ATMs four to eight times per month, while 21% use them eight to twelve times per month. In the same range, 51% use Internet banking. There is also strong usage of SMS banking, as 53% use it 4-8 times per month. In contrast, 41% and 46% of users access mobile and phone banking only 1-4 times a month, respectively. Approximately 1% of respondents do not use some services at all, ranging from 8% for phone banking to 1% for internet banking.

Table 7: FREQUENCY OF USAGE

OPTIONS	NIL	1-4 TIMES	4-8 TIMES	8-12 TIMES	12 & ABOVE
ATM	3%	17%	52%	21%	7%
Internet Banking	1%	34%	51%	10%	3%
Phone Banking	8%	41%	39%	11%	1%
Mobile Banking	6%	46%	32%	14.5%	1.5%
SMS Banking	6.5%	22%	53%	15.5%	3%

Although ATMs, internet banking, and SMS banking have been widely adopted and used, mobile and phone banking services have potential for growth. By promoting mobile and phone banking services, banks can increase usage frequency, while maintaining the quality of their most frequently used services. The frequency of use is shown in Figure 2.

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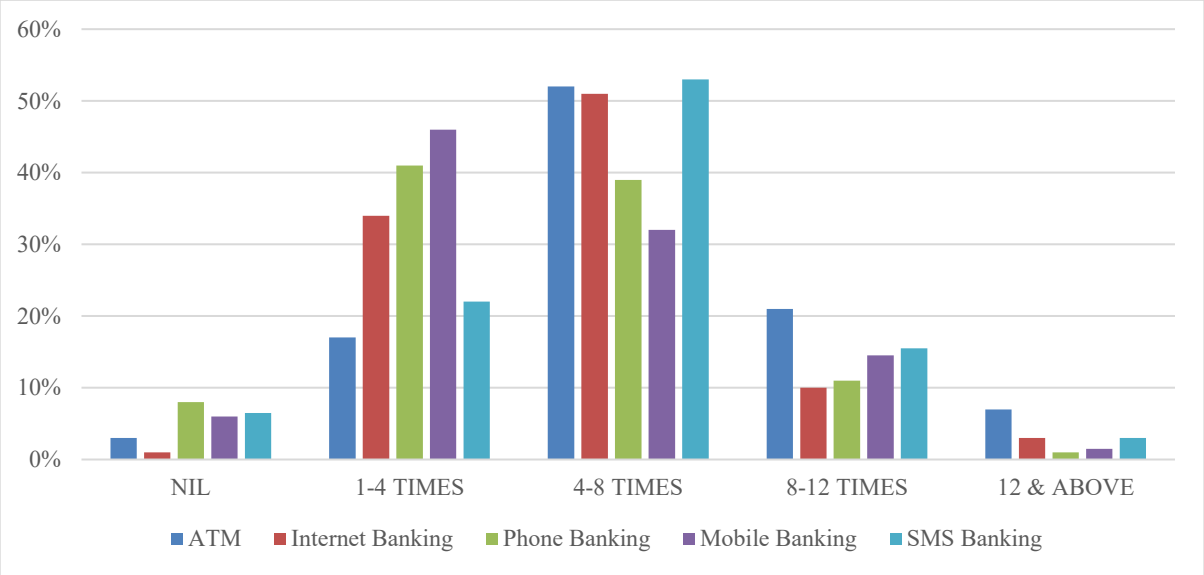

Figure 2: Frequency of Usage

Data indicates that 65% of respondents are pleased with ATM locations. Additionally, 69% express satisfaction with access to account information and balance inquiries. 48% are satisfied with account-to-account transfers.

Table 8: Customer Satisfaction about the E - Banking Services of Commercial Banks

OPTIONS	EXTREMELY DISSATISFIED	DISSATISFIED	NEUTRAL	SATISFIED	EXTREMELY SATISFIED
ATMs are conveniently located.	0%	1%	3%	65%	33%
Accounts information and balance enquiry.	1%	1%	4%	69%	26%
Account to account transfer.	1%	5%	7%	48%	41%
Transaction status	2%	5%	8%	37%	50%
Statement Request	2%	5%	9%	49%	36%
SMS alerts	3%	4%	6%	57%	32%
The charges are reasonable.	3%	6%	8%	51%	34%

50% people are extremely satisfied for their transaction status.49% people are satisfied on statement request.57% are satisfied for SMS alerts about the bank services.50.5% people are satisfied for the charges that the bank collects from you are reasonable services.

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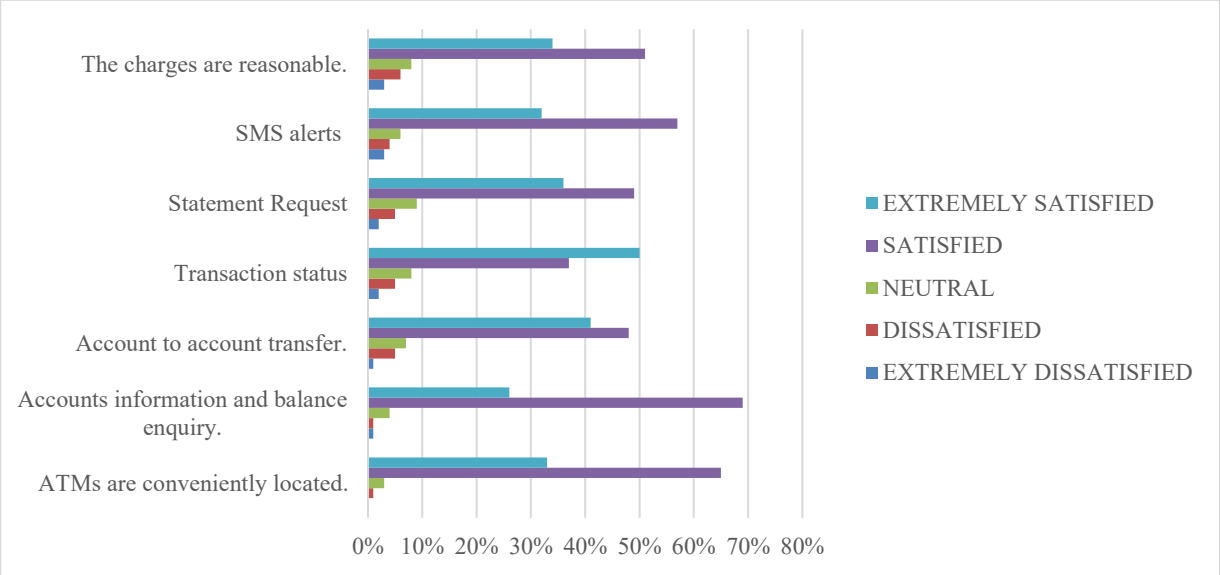

Figure 3: Customer Satisfaction

According to the study, 81% respondents think that ATM machines never go out of cash. 53% of respondents think that they do not have to wait in long queues. 46% respondents think that rarely internet banking can be tampered with by others.67% of respondents think that rarely there is lack of security in transactions.

Table 9: Problems Faced by the Customers

OPTIONS	OFTEN	RARELY	NEVER
Machine out of cash.	9%	11%	81%
Long waiting time in queues.	6%	42%	53%
Internet banking can be tampered with by others.	20%	46%	34%
Lack of security in transactions.	9%	67%	24%
Too many steps in processing transaction.	14%	26%	61%

61% of respondents think that they do not have to follow to many steps in processing transactions.

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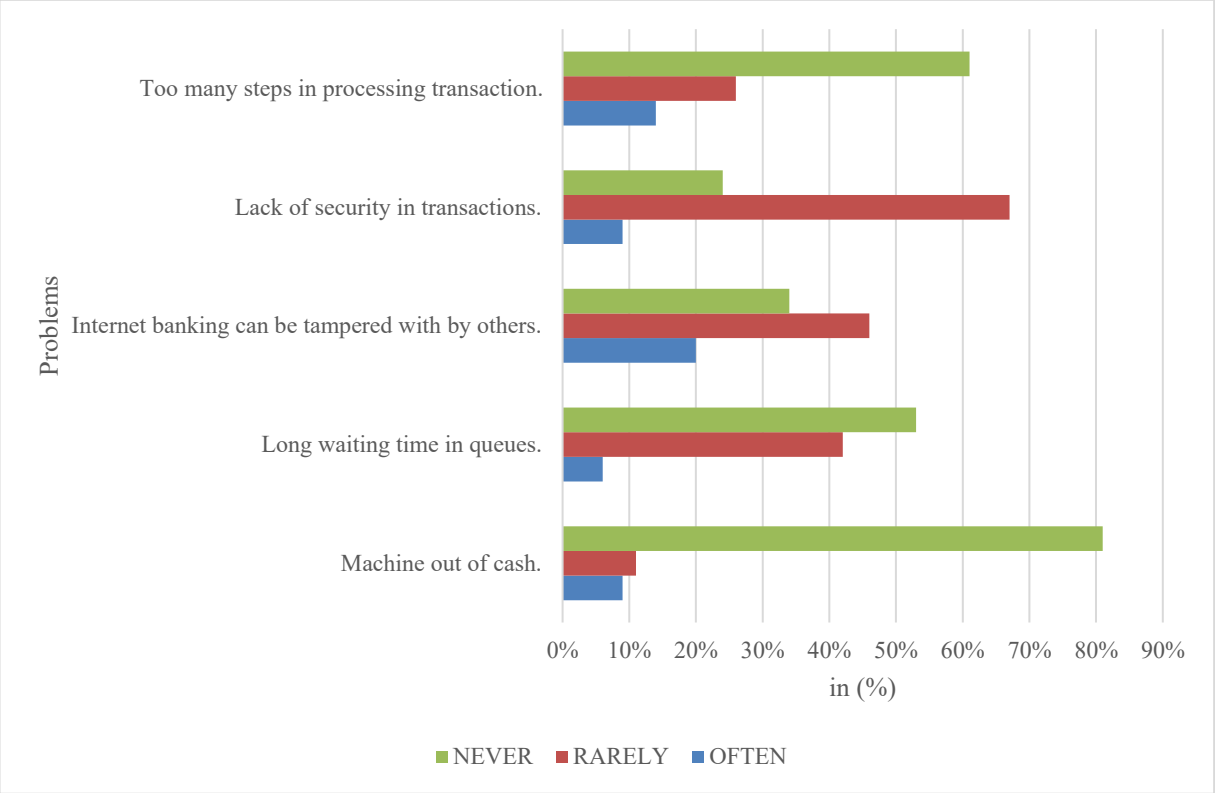

Figure 4: Problems Occurred

IV. RESEARCH ANALYSIS

The study reveals that in Dindigul, e-banking services like ATMs and internet banking are widely adopted and integral to customers' daily financial routines. However, mobile, phone and SMS banking are used less frequently. Identifying the reasons for this lower adoption is essential for banks seeking to improve customer engagement and satisfaction.

a. Usability and Complexity:

- **Mobile Banking:** Mobile banking provides the advantage of managing finances conveniently; however, some users may struggle with complex interfaces. This can be particularly challenging for older adults or those with limited smartphone experience. Additionally, cumbersome login processes and unclear menu options can hinder regular usage.
- **Phone Banking:** Phone banking involves customers engaging with automated systems or representatives over the phone. It can feel less convenient than digital options. The need to navigate various options using a keypad or voice can be tedious and frustrating. It prompting a preference for quicker digital alternatives such as ATMs or online banking.
- **SMS Banking:** SMS banking provides convenient updates and transactions, but limited character counts can hinder its effectiveness for complex banking tasks. Customers may also view it as antiquated, especially when compared to mobile applications.

b. Security Concerns:

- **Mobile and Internet Banking:** Despite the convenience, customers often express concerns about the security of their transactions on mobile and internet banking platforms. Fear of data breaches, phishing attacks, and other cyber threats can lead to hesitation in using these services. Customers may lack confidence in the security measures in place or may not fully understand them, which can result in underutilization.

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- **Phone Banking:** Security concerns in phone banking can arise from the potential for identity theft or unauthorized access, especially if authentication procedures are not perceived as robust. The fear of disclosing personal information over the phone to automated systems can also deter usage.

c. Lack of Awareness and Education:

- A major obstacle to adopting these services is the limited awareness of their availability and advantages. Many customers may not fully understand the features of mobile, phone, or SMS banking, resulting in low usage. Moreover, there is often a gap in knowledge regarding effective use, especially among older clients or those less acquainted with digital tools.

d. Perceived Redundancy:

- **Phone and SMS Banking:** Customers accustomed to internet or mobile banking may find phone and SMS banking outdated. With more efficient options available through apps or online portals, there's limited motivation to rely on these traditional methods.

Banking services for mobile, phone, and SMS can be significantly increased through strategic interventions. By leveraging digital banking technologies, banks will enhance their overall service delivery and competitiveness in the market, as well as improve customer satisfaction.

V. HYPOTHESIS TESTING

The hypothesis is evaluated and results are analysed using p-values. A relationship's statistical significance is determined by both p-values and coefficients. P-values reveal the significance of the relationships between dependent and independent variables. E-Banking customer satisfaction is assessed using the convenience and security p-values at a 5% significance level. P-values below 0.05 reject the null hypothesis for the overall population. There is a non-zero correlation between the independent variables and the dependent variable. Statistical significance is demonstrated by p-values of 0.000 and 0.001, respectively, for both correlated and independent variables.

Table 10: Hypothesis Testing

	Co-efficient	Standard Error	t-stat	P-value
Intercept Convenience	0.765	0.344	2.260	0.026
Average	0.356	0.093	3.816	0.000
Security average	0.288	0.087	3.316	0.001

Because the p-values of convenience and security average are smaller than the usual significance level, they are statistically significant. The convenience average and the security average have 49 significant relationships. There is a significant relationship between security measurement and satisfaction level of E-Banking customers, indicating null hypothesis H01 is rejected. E-Banking customer satisfaction levels are significantly correlated with Convenience measurement, indicating that null hypothesis H02 is rejected.

Major Findings

The study provides valuable insights into e-banking customer satisfaction in Dindigul. Most respondents (53%), ages 28-38 (45%), were female. The largest occupational group was the service sector. The majority of 56.5% viewed private sector banks as more technologically advanced. With more than 50% of respondents using these services 4-8 times per month, ATMs and internet banking emerged as the most popular banking services.

Overall customer satisfaction levels were high, with 65% satisfied with ATM accessibility and 69% with account information. Some respondents reported issues with ATM shortages or transaction security, while others raised concerns about internet banking security. In Dindigul, mobile banking adoption and security measures can be enhanced by enhancing e-banking services. With a p-value below 0.05, the data suggest a significant non-zero correlation between the variables, underscoring the importance of including this variable. P-values of 0.000 and 0.001 indicate statistical significance for the dependent and independent variables.

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ARIMA Based Forecasting

ARIMA (AutoRegressive Integrated Moving Average) forecasting is a statistical method for time series analysis and prediction. This study uses ARIMA to analyze and forecast ATM transaction trends in Dindigul. The model combines autoregressive elements, differencing for data stationarity, and moving average components to assess historical forecast errors. By examining past ATM transaction data, ARIMA identifies patterns, seasonality, and trends for future predictions. This method is especially valuable for e-banking, allowing banks to anticipate ATM usage, improve cash management, and optimize resources. The findings not only illuminate current e-banking satisfaction but also provide insights for future improvements. As a result, banks can enhance ATM operations and services, leading to better customer experiences and operational efficiency. Integrating ARIMA forecasting with e-banking satisfaction analysis offers a comprehensive view of customer needs and future trends in digital banking services in Dindigul.

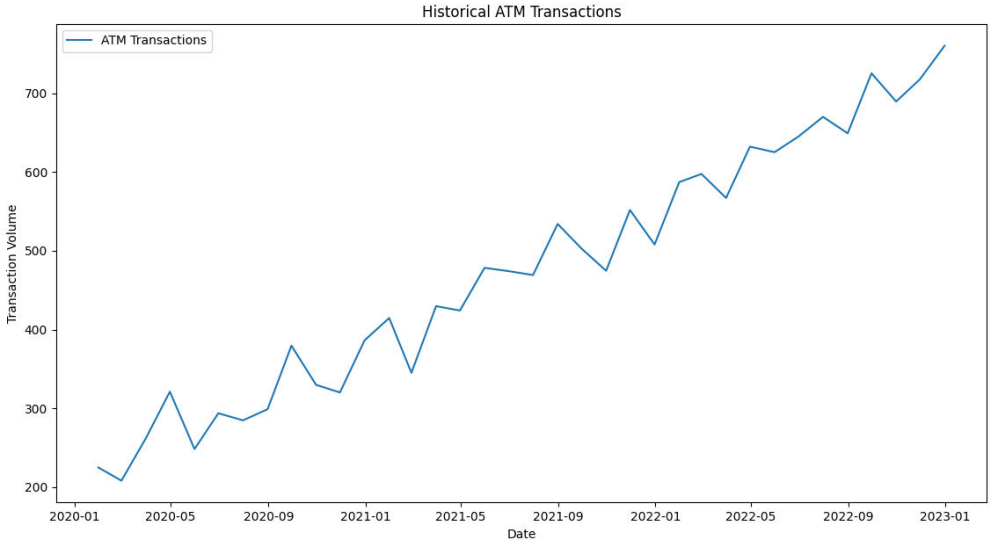

Figure 5: History of ATM Transaction

Figure 5 illustrates a significant increase in ATM transactions from 2020 to 2023. The volume grew from approximately 200 transactions in early 2020 to over 700 by early 2023, marking a more than threefold rise. This trend highlights a heightened dependence on ATM services by customers in the area. Although some short-term fluctuations are noted, likely due to seasonal factors, the overall trajectory is robustly positive. The incline's steepness appears to increase in the latter half of the period, suggesting a faster adoption rate. This growth may stem from factors like improved financial inclusion, enhanced trust in electronic banking, or the expansion of ATM networks. The insights from this data can guide banks and financial institutions in their ATM strategic planning and future cash service demand forecasting

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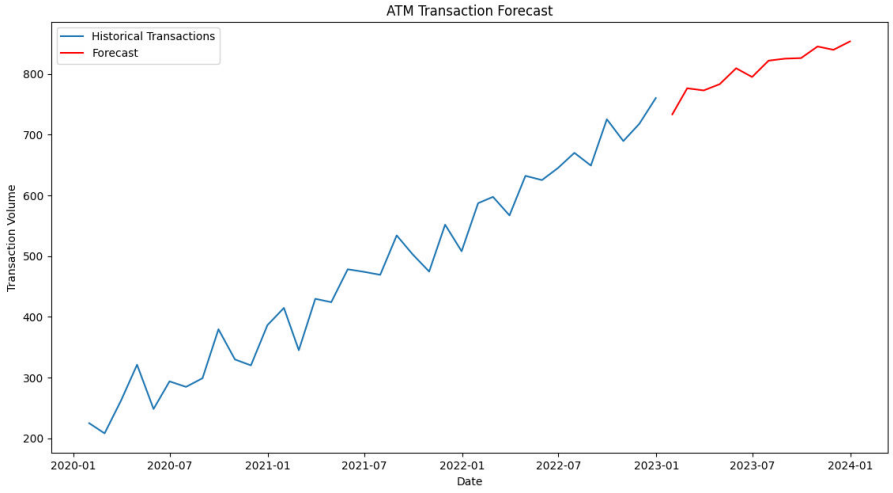

Figure 6: Forecast of ATM Transaction

Figure 6 illustrates historical and projected ATM transactions. The blue line captures historical data from early 2020 to mid-2022. It reflects a consistent upward trend, despite occasional fluctuations. The red line, extending from the end of the blue line, presents forecasts through early 2024, indicating ongoing ATM transaction growth. This projection smooths out short-term fluctuations, typical of forecasts, while suggesting sustained upward momentum. The transition from historical to projected data is seamless, indicating that the model accurately reflects current trends. The anticipated growth rate aligns with historical patterns, implying that ATM usage drivers are likely to remain in effect. This forecast serves as a crucial tool for banks in strategizing ATM placement, cash management, and resource allocation. It highlights the need for ongoing investment in ATM services to address expected demand. Actual outcomes may vary due to unforeseen factors or banking behavior shifts.

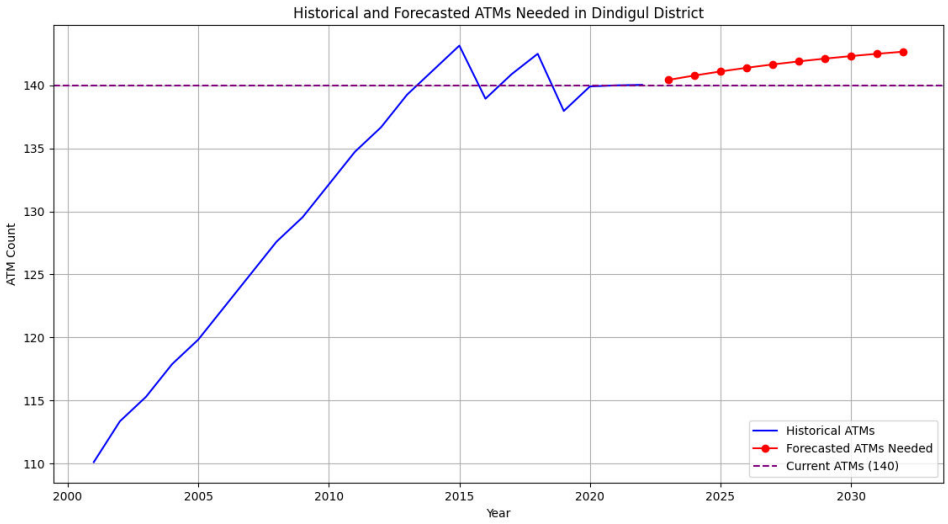

Figure 7: Required ATM Forecasting

Figure 7 illustrates the evolution of ATM requirements over time. The blue line shows historical data from 2000 to 2020. It indicates a rise in ATM numbers from approximately 110 to 140, with notable peaks in 2015 and 2020. The red line projects ATM needs from 2020 to 2030, revealing a steady increase but at a slower pace. The horizontal dashed line at around 140 ATMs likely signifies a target threshold. Forecasts indicate stability in future needs, suggesting only a slight uptick over the coming decade. This graph is instrumental for banking infrastructure planning in Dindigul

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District, highlighting the rapid past growth of ATMs and predicting a slower future increase. This is critical for banks and policymakers in determining ATM deployment and maintenance strategies.

VI. DISCUSSION

This study provides valuable insights into Dindigul, a tier-two city in Tamil Nadu. It adoption and satisfaction with e-banking services. Digital banking researchers, policymakers, and banks should take note of these results.

Demographic Patterns and Service Adoption: The majority of female respondents (53%) and the significant representation of the 28-38 age group (45%) in e-banking. This usage challenge conventional views on technology adoption. This indicates that banks may need to adjust their target demographics, placing an emphasis on women and young adults in their marketing and product strategies. Additionally, the strong presence of service sector employees and business owners among user's highlights e-banking's growing importance in professional and entrepreneurial activities in small urban areas like Dindigul.

- **Perception of Bank Technological Advancement**: A significant finding reveals that 56.5% of respondents view private sector banks as more technologically advanced than public sector banks. This perception gap may impact public sector banks' market share. This highlights the necessity for these institutions to enhance their technological infrastructure. In this way, the public is effectively informed of these advances.
- **Usage Patterns of E-Banking Services**: E-banking channel usage patterns reveal important insights. Over 50% of customer's access ATMs and internet banking four to eight times a month, showing their integration into customer routines. Conversely, mobile and phone banking are under-adopted. There is an opportunity for banks to improve and market these services, especially by resolving usability and security challenges.
- **Customer Satisfaction and Service Quality**: E-banking services are promising, particularly with a 65% satisfaction rate for ATM accessibility and 69% for account inquiries. These results indicate that banks meet customer needs in these areas. Nonetheless, the study highlights the need for improvements, especially regarding online banking security.
- **Security and Trust**: The study revealed that issues like ATMs draining cash or security issues are uncommon among customers. However, the concern about potential tampering in internet banking remains critical. This underscores the need for banks to implement strong security measures. It clearly communicating these efforts to foster trust in digital banking.

The study reveals strong satisfaction with traditional e-banking services, such as ATMs and internet banking, vital to Dindigul's residents. However, the limited use of mobile and phone banking points to improvement opportunities. Banks should prioritize enhancing the usability and security of these services to promote wider adoption. Furthermore, the perception that private sector banks are more technologically advanced underscores a competitive challenge that public sector banks need to tackle by investing more in digital infrastructure.

Theoretical Framework

E-banking customer satisfaction is analyzed using TAM and SERVQUAL theoretical frameworks. In this field, these models cover the technological and service quality dimensions of satisfaction. By combining aspects of TAM and SERVQUAL, we develop a thorough framework for assessing e-banking satisfaction. This approach enables a complete analysis of both technological acceptance and service quality factors impacting customer satisfaction. It systematically evaluates how customers in Dindigul perceive e-banking services, focusing on the technological functionalities and service quality of digital platforms. This study aims to uncover key factors influencing e-banking satisfaction in Dindigul, providing essential insights for banks and policymakers to improve digital banking experiences.

VII. CONCLUSION

Banking sector's shift towards digital technologies has transformed customer interactions with financial institutions. In Dindigul, e-banking services have become vital, with most customers satisfied with ATMs and online banking convenience. This reflects successful digital platform adoption by banks, aligning with customer expectations for accessibility, speed, and reliability. However, the study reveals that mobile and phone banking have lower usage and satisfaction levels. It indicating barriers related to usability, security, or awareness. Furthermore, the belief that private

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banks are more advanced technologically highlights a competitive gap that public banks must address through focused technology investments and enhanced customer engagement strategies.

The findings highlight the necessity of ongoing innovation and customer education for e-banking services growth. Banks should prioritize improving the user experience across digital platforms, implementing strong security protocols, and effectively communicating these enhancements to their clientele. As customer expectations shift, banks must adapt to emerging technological trends and demands. While e-banking in Dindigul has made notable progress in customer satisfaction, the journey continues. Banks should stay attentive and responsive to evolving needs. It ensures that their digital offerings meet present expectations but also sets the stage for future advancements. This study provides valuable insights into e-banking in a tier-two city in India, with practical implications for banks and policymakers focused on improving digital financial inclusion and customer satisfaction.

The findings of this study open several avenues for future research, which can further enrich our understanding of e-banking services and their impact on customer satisfaction:

- **Longitudinal Studies:**
  - Research could include longitudinal studies to track customer satisfaction and usage patterns over time. Studies like these would help understand how banks introduce new technologies and services to their customers.
- **Comparative Studies Across Regions:**
  - A comparative study across rural and urban areas. It provides deeper insights into the differences in e-banking adoption and satisfaction. It could help identify regional factors that influence customer preferences.
- **Impact of Emerging Technologies:**
  - Research could be conducted on the impact of new technologies such as blockchain, AI, and ML on customer satisfaction and trust in e-banking. Considering the impact these technologies have on customer experience and service quality is valuable for banks.
- **Security and Privacy Concerns:**
  - With rising digital security concerns, future research should examine the specific challenges e-banking customers encounter and how these affect their satisfaction and trust. Additionally, it would be valuable to assess the effectiveness of different security measures adopted by banks in addressing these issues

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