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Digital Transformation in Banking: A Case Study of E-Banking Services in Aligarh District during the Covid-19 Pandemic

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Abstract
This study investigates the transformative impact of e-banking services during the COVID-19 pandemic in Aligarh District, Uttar Pradesh. Utilizing a structured questionnaire and rigorous statistical analysis, the research examines patterns of usage, challenges faced, and motivations among residents. Key areas of focus include the significant increase in e-banking adoption, the influence of demographic factors such as age, education, and income, the perceived benefits of digital banking, operational difficulties encountered, and the preferences for specific e-banking services. The findings shed light on the rapid shift towards digital financial services in response to pandemic-induced

restrictions and highlight the behavioral adaptations of users during this unprecedented period. The study employs analytical tools, including simple percentage analysis, averages, and Pearson's Chi-square test for independence, to identify and assess the factors influencing e-banking usage. By providing a detailed understanding of the challenges and opportunities associated with e-banking in Aligarh District, this research contributes to the broader discourse on the digitalization of financial services, emphasizing its implications for user behavior and regional economic development during crises.

Keywords: *E-Banking, Covid-19, Digital Transformation, Financial Services, Chi-Square, Digital India*

1. Introduction

The COVID-19 pandemic has profoundly reshaped the global financial landscape, positioning e-banking as a transformative force in modern banking practices. Services such as ATMs, internet banking, smart cards, credit cards, and mobile banking have transcended their initial role as conveniences, becoming essential tools for financial transactions during a period marked by strict lockdowns and social distancing mandates. The pandemic-imposed restrictions on physical interactions compelled banks to reduce in-branch service capacities, prompting an intensified emphasis on digital payment platforms. Financial institutions have actively encouraged customers to transition to mobile and internet banking as safer, contactless alternatives, thus mitigating the risks associated with physical cash transactions.

The global impact of COVID-19 has significantly accelerated the adoption and integration of e-banking services into daily life. Adherence to social distancing measures has driven an unprecedented reliance on digital banking applications, enabling users to manage their financial activities securely and efficiently from their homes. This shift reflects a broader transformation where e-banking has evolved from a supplementary option into an indispensable necessity. Despite the economic disruptions caused by the pandemic, including currency depreciation and structural changes such as bank mergers, the resilience of e-banking usage remains robust. Banks have responded to these challenges by streamlining their operations, ensuring the continuity of services during mergers, and reducing branch operating hours to encourage digital adoption.

E-banking has demonstrated its potential to address key challenges of the pandemic era by offering cost-effective, real-time financial management solutions. Its accessibility, coupled with a wide array of features, aligns seamlessly with public health guidelines and consumer demands for convenience and safety. The transition to a digital-first banking model underscores the sector's adaptability and its ability to meet evolving consumer expectations.

The Aligarh District exemplifies this broader trend, serving as a microcosm of the digital banking revolution. Residents are not merely adapting to e-banking services; they are embracing them for their safety, efficiency, and ability to provide real-time financial insights. The pandemic has catalyzed a fundamental shift in the perception of banking services, fostering a deeper reliance on and trust in digital platforms. This transformation highlights the critical role of e-banking in supporting economic resilience and financial inclusion during times of crisis, emphasizing its potential to redefine the future of banking practices globally.

2. Literature Review

The COVID-19 pandemic has introduced unprecedented challenges, compelling individuals and organizations to adopt measures beyond maintaining physical distance and practicing hygiene. Among

these, the shift toward contactless payments has emerged as a significant adaptation to minimizing physical interactions in financial transactions. The World Health Organization (WHO) recommended, in 2020, replacing traditional cash, debit and credit cards, and touch-screen terminals with contactless technologies as part of global efforts to curb virus transmission. This recommendation underscores the importance of digital solutions in addressing both health and operational challenges during the pandemic.

In the context of electronic banking, Daniel (1999) defines e-banking as a method by which banks deliver information and services to customers through various electronic platforms, such as personal computers and mobile phones. Robinson (2000) further elaborates that this digital transformation enables banks to establish and strengthen customer relationships. With e-banking, customers are no longer restricted by traditional limitations of time and location. As Karjaluto et al. (2002) highlight, the 24/7 accessibility offered by e-banking has democratized financial services, empowering users across the globe with uninterrupted account management capabilities. Expanding on this, Yibin (2003) emphasizes the broader impact of e-banking, noting its role in enhancing access to financial resources and promoting competitive pricing structures.

Consumer behavior in the context of financial services has also evolved. According to Seitz and Stickel (2004), shifts in consumer preferences are driven by increased free time and characterized by an emphasis on individuality, mobility, and flexibility. These behavioral changes have influenced how financial services are consumed, with digital platforms gaining prominence for their ability to align with these preferences.

In the Indian context, research has explored various dimensions of internet banking adoption and satisfaction. Khan et al. (2009) examined the quality of internet banking services in India, reporting general satisfaction among users regarding reliability, accessibility, privacy/security, responsiveness, and fulfillment. However, their findings also pointed to areas needing improvement, particularly in enhancing user-friendliness. Addressing barriers to adoption, Rahmath et al. (2011) identified perceived usefulness, ease of use, and risk perception as significant factors positively influencing internet banking usage. These insights suggest a need for targeted interventions to further optimize user experiences and foster adoption.

Kesharwani and Gajulapally (2013) contributed to the discourse by identifying seven key factors that influence internet banking adoption in India, including perceived benefits, risk considerations, and social influences. Their findings underscore the multifaceted nature of consumer decision-making in adopting digital banking services. In a related South Asian study, Kariyawasam and Jayasiri (2016) investigated e-banking in Sri Lanka, identifying barriers such as limited knowledge and inadequate facilities, which contributed to a hesitancy toward adoption. These findings highlight the importance of addressing infrastructural and informational challenges to foster greater acceptance of digital banking solutions.

This body of literature collectively suggests that the ongoing evolution in the intersection of technology and finance is more than a fleeting trend—it signifies a transformative shift towards digital-first banking. The COVID-19 pandemic has amplified this transformation by accelerating the adoption of digital financial services due to heightened concerns about safety and the demand for convenience. The convergence of these factors positions e-banking as a pivotal component of the future financial ecosystem, offering an adaptive, user-centric solution to meet the dynamic needs of contemporary consumers.

3. Objectives of the Study

1. To study the usage of e-banking services during Covid-19.
2. To find out the difficulties faced by the respondents due to Covid-19.

3. To assess the issues respondents are facing when using e-banking services.
4. To understand why people, use e-banking and how it helps them.

4. Hypothesis

H0: There is no significant relationship between socio-economic variables and e-banking services during Covid-19.

H1: There is a significant relationship between socio-economic variables and e-banking services during Covid-19.

5. Database and Methodology:

5.1 Study Population: The study focuses on primary data collected through a structured questionnaire. The data collection period spans from December 2021 to February 2022, with an emphasis on understanding the usage patterns of e-banking services among the residents of Aligarh District, Uttar Pradesh.

5.2 Data Collection Tools: Amidst the challenges posed by the Covid-19 pandemic, we employed Google Forms as a tool for collecting primary data. A meticulously crafted structured questionnaire was disseminated to the populace of Aligarh District through various channels, including WhatsApp, LinkedIn, and email.

5.3 Sample Size and Selection: Out of 1500 individuals to whom the questionnaire was distributed, 544 responses were received. However, after a thorough review of completeness, only 300 questionnaires met the criteria for inclusion in the analysis. Random purposive sampling was the chosen method, ensuring a diverse yet targeted representation of the population.

5.4 Geographical Context: Aligarh District, Uttar Pradesh, serves as the geographical focus of the study. The district, with a population of 36,73,889 of which 19,51,996 are males and 17,21,893 are females, stands out in terms of population density, urban-rural distribution, and sociodemographic characteristics.

5.5 District Highlights - *2011 Census:* Aligarh District, ranked 19th in Uttar Pradesh, stands out with distinctive features. With 33.1% urban population, it exceeds the state average, reflecting a notable urban presence. The population density of 1,007 persons per square kilometer surpasses the state average, portraying a concentrated community. However, challenges emerge in the sex ratio, ranking 46th with 882 females per thousand males. This calls for a closer examination of gender dynamics. The literacy rate, at 67.5%, positions Aligarh at 41st, slightly below the state average, emphasizing the continuous pursuit of educational advancements. In essence, the 2011 Census encapsulates Aligarh's dynamics—urban prominence, population density, gender considerations, and educational landscape. These insights form a crucial backdrop for understanding the context in which the study on e-banking adoption in Aligarh unfolds.

5.6 Statistical Analysis: The data collected underwent rigorous statistical analysis, employing measures such as simple percentage analysis, averages, and the Pearson's Chi-square test for independence. These methods were instrumental in drawing meaningful insights and testing hypotheses related to e-banking usage in the specified context.

This meticulous approach, incorporating the latest data collection tools and robust statistical methods, ensures the reliability and relevance of the findings in understanding the dynamics of e-banking adoption during the specified timeframe and geographical setting.

6. Analysis and Result

The results and analysis of this study reveal a marked increase in the adoption and reliance on e-banking services during the COVID-19 pandemic, driven by safety concerns and the need for convenient, contactless financial transactions. Usage patterns indicate that residents of Aligarh District have embraced digital banking platforms for their ability to provide real-time account access, efficient fund transfers, and secure transaction mechanisms, even during periods of restricted mobility. The demographic analysis highlights significant influences of age, education, and income levels on the frequency and type of e-banking services used, while satisfaction levels correlate strongly with the perceived reliability, accessibility, and security of these platforms. Thus, the findings validate the transformative role of e-banking in enabling financial continuity and inclusion during crises, highlighting its potential to drive a long-term shift toward a digital-first banking paradigm.

Table 1: Demographic Profile of the Respondents in Aligarh District

Variables		Frequency	Percentage
Gender	Male	180	60.0
	Female	120	40.0
Age	Below 25	75	25.0
	25-35	162	54.0
	35-45	25	08.3
	45-55	24	08.0
	Above 55	14	04.7
Education	Below High School	32	10.7
	High School	12	04.0
	Intermediate	22	07.3
	Graduate	65	21.7
	Post Graduate	151	50.3
	Doctorate	18	06.0
Occupation	Service	97	32.2
	Business	32	10.7
	Self Employed	20	06.7
	House Wife	16	05.3
	Student	135	45.0
Income	Below 20,000	154	51.3
	20,000-40,000	93	31.0
	40,000-60,000	25	08.3
	Above 60,000	28	09.3

Source: Primary Data

The Table 1 provides an overview of the demographic profile of respondents from Aligarh District who participated in the study. It categorizes them based on gender, age, education, occupation, and income, with corresponding frequencies and percentages. The data highlights variations in participation across these categories, reflecting distinct demographic trends and patterns in e-banking adoption. The findings shows that male respondents (60%) significantly outnumber female respondents (40%). This reflects that males may have higher exposure to or comfort with e-banking tools, possibly due to differences in digital access, financial literacy, or decision-making roles in households. Regarding age distribution, the majority of respondents fall within the 25-35 age group (54%), followed by those below 25 (25%). Participation decreases significantly in older groups: 35-45 (8.3%), 45-55 (8%), and above 55 (4.7%). This indicates that younger individuals dominate the adoption of e-banking, likely due to greater digital literacy and adaptability. The steep decline among older groups suggests a digital divide, with older individuals possibly facing challenges in using digital platforms.

In case of education levels, Postgraduates (50.3%) and graduates (21.7%) form the largest segments, while individuals with education below high school (10.7%) are the least represented. This suggests that higher education correlates strongly with e-banking adoption, as educated individuals are more likely to possess the digital skills and financial awareness needed to engage with these platforms.

As far as Occupation is concerned, data shows that students (45%) are the largest occupational group, followed by those in service jobs (32.2%). Smaller proportions include individuals in business (10.7%), self-employed (6.7%), and housewives (5.3%). Thus, the Students and service employees are primary users of e-banking, driven by their need for convenient, real-time access to financial tools. Housewives and self-employed individuals exhibit lower participation, pointing to potential barriers such as digital unfamiliarity or limited access to technology. Regarding Income Levels, the study revealed that most respondents earn below ₹20,000 (51.3%), followed by ₹20,000-40,000 (31%). Higher income groups, earning ₹40,000-60,000 (8.3%) and above ₹60,000 (9.3%), are underrepresented. This indicates that E-banking adoption is prevalent across income groups, particularly among lower-income individuals. This suggests that the affordability and accessibility of e-banking services make them attractive to economically diverse populations. Therefore, from Table 1 it can be conclude that younger, educated, and economically active individuals dominate the use of e-banking services, while older, less-educated, and economically inactive groups lag behind. The lower representation of females, older individuals, and less-educated respondents highlights existing barriers such as limited digital literacy, access to technology, or sociocultural factors affecting digital adoption. The widespread adoption among lower-income groups demonstrates the potential of e-banking to drive financial inclusion and bridge economic disparities.

Table 2: Usage of E-Banking Services in Aligarh District

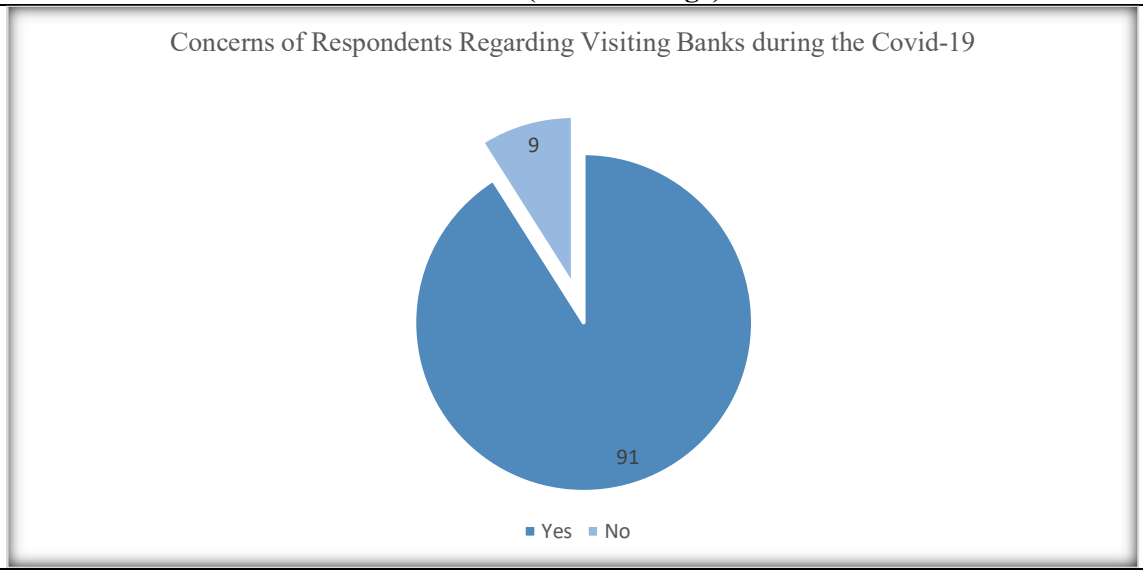
E- Banking Usage	Frequency	Percentages
Yes	254	84.7
No	46	15.3
Total	300	100.00

Source: Primary Data

The Table 2 illustrates the adoption and usage patterns of e-banking services in the Aligarh district based on a survey of 300 respondents. The findings indicate that a substantial majority, 254 respondents (84.7%), actively use e-banking services. This suggests a high level of digital literacy and familiarity with modern banking technologies among the population, which could be attributed to factors such as increased internet penetration, smartphone usage, and awareness campaigns by banks

promoting digital banking. On the other hand, a smaller segment, 46 respondents (15.3%), reported not using e-banking services. This minority group could reflect barriers such as limited access to digital infrastructure, lack of awareness or technical skills, concerns about security, or a preference for traditional banking methods. Thus, the data highlights a significant trend towards the acceptance of digital banking, pointing to a growing reliance on technology for financial transactions in the district.

Figure 1: Concerns of Respondents Regarding Visiting Banks during the Covid-19 in Aligarh District (In Percentage)



Source: Primary Data

This pie chart illustrates respondents' concerns about visiting banks during the COVID-19 pandemic. It shows that 91% of respondents (indicated by the larger dark blue section) expressed concerns about the risk of contracting COVID-19 when visiting banks. Conversely, 9% of respondents (depicted in the lighter blue section) reported no such concerns. The overwhelming majority expressing insecurity underscores the significant impact of health-related risks on customer behavior during the pandemic, likely contributing to the increased adoption of alternative banking methods, such as e-banking, as a safer option.

Table 3: Type of Account, Relationship with Bank Period and Usage of E-Banking Services in Aligarh District

Type of Account	Values	Percentage
Type of Account		
Saving Account	225	75.00
Current Account	31	10.33
Salary Account	29	09.66
Recurring Deposit Account	09	03.00
Fixed Deposit Account	06	02.00
Total	300	100.00
Relationship with Bank Period		
Period		

>1 Year	32	10.66
1-3 Years	82	27.33
3-5 Years	41	13.66
5-7 Years	38	12.66
7 Years <	107	35.66
Total	300	100.00
Usage Period of E-Banking Services		
Usage Period		
>6 Months	11	03.66
6 Months – 1 Year	07	02.33
1- 2 Years	12	04.00
2-3 Years	37	12.33
3 Years <	233	77.66
Total	300	100.00

Source: Primary Data

In examining the financial background, a significant proportion of respondents, constituting 75 per cent, primarily held savings accounts. Followed by current accounts, salary accounts, recurring accounts, and fixed deposit accounts, each contributing to the varied banking tapestry. To understand the relationship between account types and the adoption of E-Banking, a deeper exploration into the duration of respondents' banking affiliations became imperative. Notably, a substantial 35.66 per cent of respondents maintained a banking relationship for over seven years, underscoring a significant degree of customer loyalty. Additionally, 27.33 per cent had maintained such relationships for 1 to 3 years. This stability among long-term customers emphasizes the importance of fostering enduring relationships. The data highlights the varying durations of engagement with E-Banking services, with a majority 77.66 per cent having a usage period exceeding three years. Such insights into both account types and E-Banking usage periods provide a nuanced understanding of customer behaviours and pave the way for strategic considerations in the ever-evolving financial landscape. To foster enduring relationships and retain a customer base, the study suggests that banks should continually innovate, offering a spectrum of services including credit cards, internet banking, ATMs, and mobile banking. These strategies align with the demands of a dynamic customer base and contribute to the overall stability and growth of the banking industry.

Table 5: Result of Pearson Chi-Square testing

Variable tested	Pearson Chi-Square Value	Degree of Freedom	Significance
Gender X E-Banking usage	3.120	1	.077
Age X E-Banking usage	49.411	4	.000
Education X E-Banking usage	70.200	5	.000
Occupation X E-Banking usage	33.165	4	.000
Income X E-Banking usage	14.647	3	.002

Source: Primary Data

(H01): There is no significant relationship between the gender of respondents and E-Banking usage. The Pearson Chi-Square result is X2 = 3.120, df = 1, P = 0.077, which is greater than the 0.05

significance level. Therefore, we cannot reject the null hypothesis. This implies that there is no significant relationship between gender and the utilization of e-banking services. E-banking modes are used irrespective of gender.

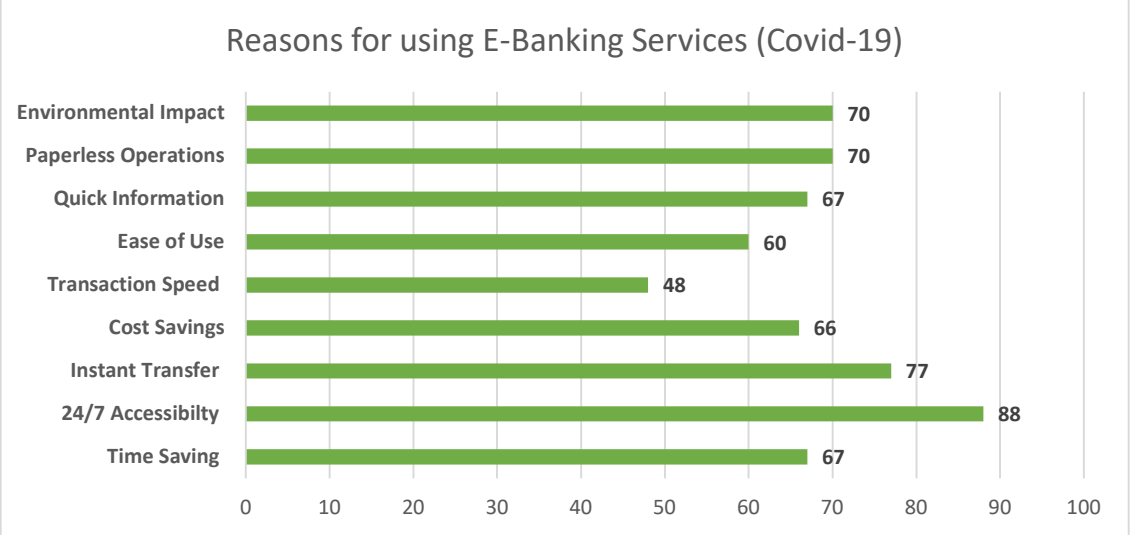
(H02): There is a significant relationship between the age of respondents and E-Banking usage. The result is X2 = 49.411, df = 4, P = 0.000, indicating a significant relationship between age and cashless usage. Consequently, we reject the null hypothesis at a 5% significance level. Specifically, the age group of 25 to 35 exhibits a higher likelihood of engaging in e-banking transactions, as evidenced by an expected count less than the actual count.

(H03): There is significant relationship between the education of respondents and E-Banking usage. The result X2 = 70.200, df = 5, P = 0.000, indicates a significant relationship. Consequently, the null hypothesis is rejected as the p-value is less than 0.05. Graduates and postgraduates are more likely to engage in e-banking services, as reflected by an expected count lower than the actual count.

(H04): There is a significant relationship between the occupation of respondents and E-Banking usage. The result X2 = 33.165, df = 4, P = 0.000, signifies a significant relationship. Thus, we reject the null hypothesis. Service personnel, businessmen, and students are more likely to engage in e-banking services, supported by an actual count higher than the expected count.

(H05): There is a significant relationship between the income of respondents and E-Banking usage. The result X2 = 14.647, df = 3, P = 0.002, indicates a non-significant relationship. Therefore, we cannot establish a significant relationship between income and e-banking usage. However, the income group above Rs. 20,000 shows a higher likelihood of engaging in e-banking services.

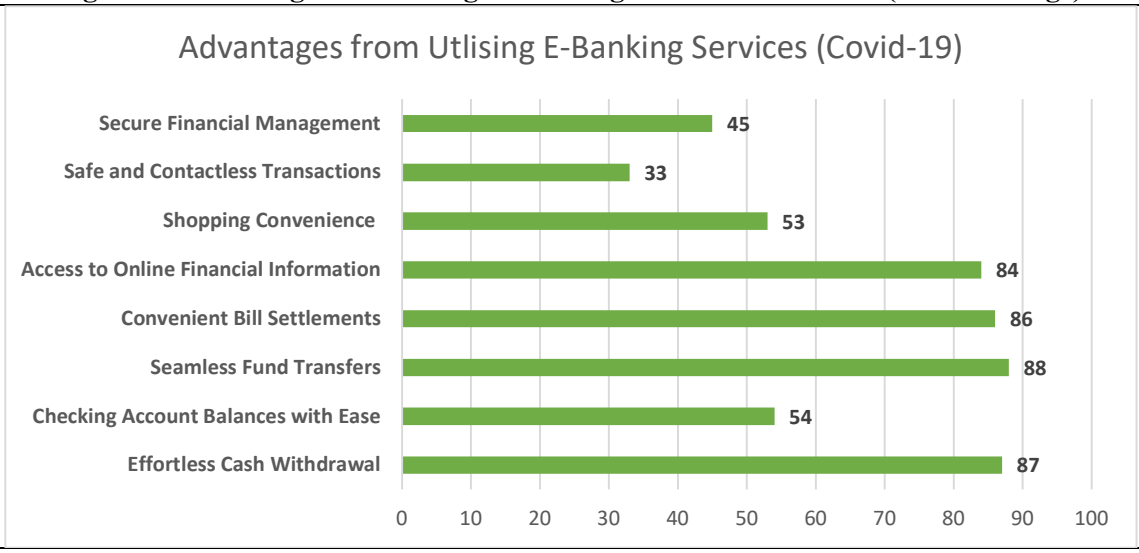
Figure 2: Reasons for using E-Banking Services Covid-19 (In Percentage)



Source: Primary Data

Figure 2: Reasons for Using E-Banking Services: A comprehensive analysis of the motivations driving the utilization of E-Banking services has been conducted, as depicted in Figure 2. The findings reveal that 24/7 banking stands out prominently as a key motivator, with 88% of respondents emphasizing its significance. Other significant drivers include Instant Transfer (77%), Environmental Impact and Paperless Operation (both at 70%), Quick Information and Time Saving (67%), Cost Savings (66%), Ease of Use (60%), and Transaction Speed (48%).

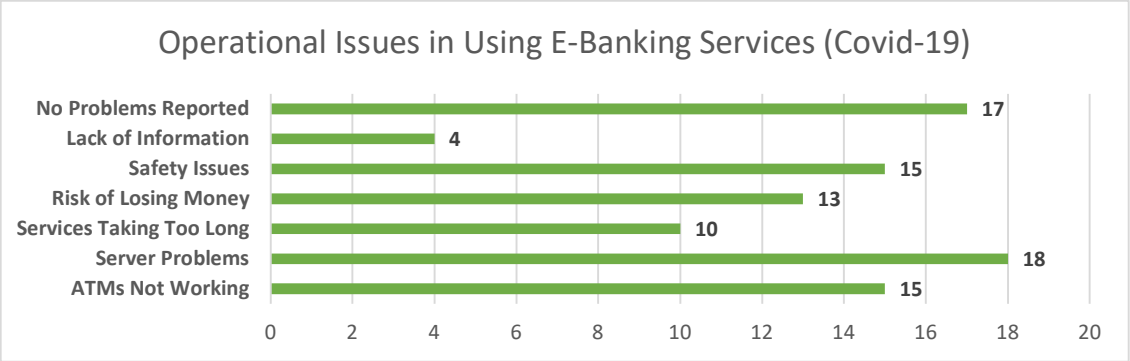
Figure 3: Advantages of Utilising E-Banking Services - Covid-19 (In Percentage)



Source: Primary Data

Figure 3 highlights the advantages accrued by individuals utilizing E-Banking services during the Covid-19 pandemic. Notably, 88% of respondents find seamless fund transfers to be a prominent benefit, closely followed by convenient bill settlements at 86%. Effortless cash withdrawal, checking account balances with ease, access to online financial information, shopping convenience, safe and contactless transactions, and secure financial management also contribute positively to the user experience. The results indicate a positive correlation between the benefits customers derive from these services and the enhancement of service quality. Additionally, the probability of customer satisfaction is expected to increase with the growing array of advantages offered by E-Banking services.

Figure 4: Operational Issues in Using E-Banking Services-Covid-19 (In Percentage)



Source: Primary Data

Examining operational challenges during the Covid-19 period, Figure 4 sheds light on specific issues encountered by users of E-Banking services. Noteworthy concerns include ATMs not working (15%), server problems (18%), services taking too long (10%), risk of losing money (13%), safety issues (15%), lack of information (4%), and a significant portion (17%) reported no problems. These insights contribute to a holistic understanding of the E-Banking landscape, recognizing both the motivations and challenges faced by users during the pandemic.

Figure 5: E-Banking Services most used during Covid-19 (In Percentage)

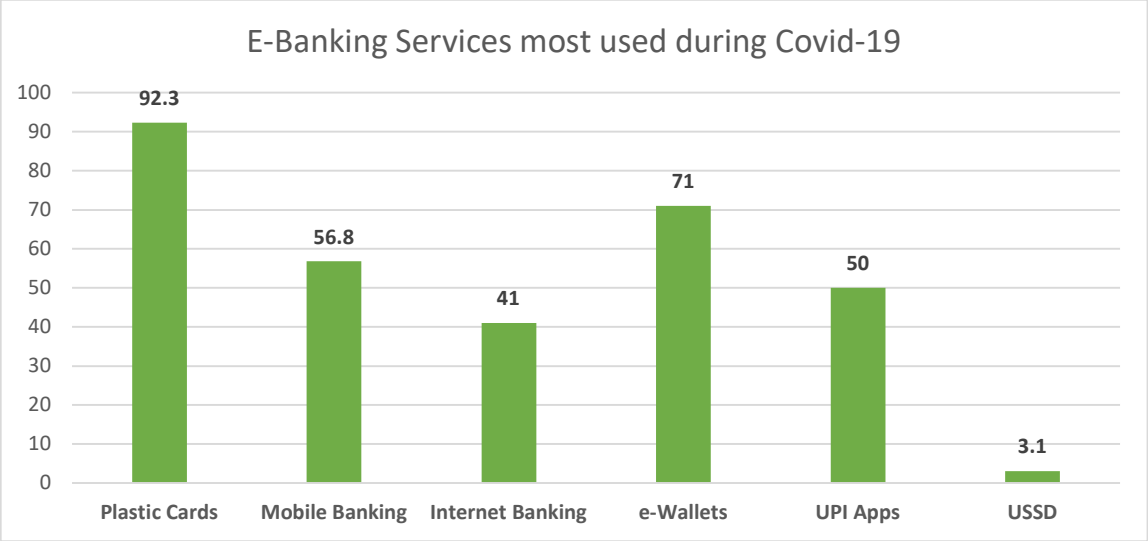


Figure 5: Amid the unique circumstances posed by the Covid-19 pandemic, respondents exhibit distinctive preferences in the realm of E-Banking services:
Plastic Cards: Demonstrating resilience during the pandemic, plastic cards emerge as the most widely utilized E-Banking service, with a robust adoption rate of 92.3%.
Mobile Banking: Acknowledging the convenience of mobile transactions during lockdowns, 56.8% of respondents actively engage with mobile banking services.
Internet Banking: Despite challenges, 41% of users continue to leverage internet banking services, highlighting its enduring relevance during the Covid-19 era.
E-Wallets: Positioned as a contactless alternative, e-wallets witness increased traction, with 71% of respondents opting for this secure mode of digital transactions.
UPI Apps: Facilitating seamless fund transfers during social distancing norms, UPI apps secure a substantial foothold, embraced by 50% of users.
USSD: With limited adoption, USSD technology accounts for a modest 3.1%, indicating a marginal role in the digital financial landscape during the pandemic.
This nuanced insight into E-Banking service preferences during the Covid-19 era illuminates the adaptability of users and the evolving dynamics of digital financial interactions in response to global challenges.

7. Conclusion

The study highlights the transformative impact of e-banking on the traditional banking system, particularly during the COVID-19 pandemic, when health concerns and the need for convenience reshaped consumer behavior. Conducted in the Aligarh District, the research underscores a significant

shift toward digital-first banking solutions as customers sought to minimize physical interactions and ensure seamless financial transactions. Demographic factors such as age, education, and occupation emerged as key determinants of e-banking adoption, reflecting varying levels of digital readiness and accessibility among different population groups. The primary advantages driving the sustained adoption of e-banking include 24/7 accessibility, which allows users to conduct transactions at their convenience, seamless fund transfers that simplify financial operations, and contactless transactions that align with safety priorities during the pandemic. However, the study also acknowledges certain operational challenges, including technical disruptions, cybersecurity concerns, and the digital divide, which limit universal adoption. Despite these barriers, the findings reveal a positive correlation between the benefits of e-banking and improved service quality, with users expressing higher satisfaction for banks that offer secure, user-friendly platforms and efficient services. These insights emphasize the need for tailored strategies by banking institutions, such as enhancing digital literacy, strengthening security measures, and investing in infrastructure to address challenges and promote inclusive access. Overall, the research provides valuable guidance for banks to adapt to the evolving digital landscape and effectively meet the changing expectations of their customers, ensuring resilience and growth in an increasingly digitalized financial ecosystem.

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