

Infrastructure Availability to Support Digital Payment System in Rural India

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ABSTRACT

Digital technology has revolutionized financial transactions worldwide, but rural India is hesitant to accept. This study examines rural Punjab digital payments to discover adoption difficulties and potential. Digital payments are growing, but they confront several challenges. Lack of internet, financial knowledge, and cultural change reluctance are big hurdles. Digital India and other government programs can boost digital infrastructure and financial literacy. Financial institutions and tech companies should cater to rural areas. Policymakers, financial institutions and technology providers can apply this study's recommendations to boost rural digital payment uptake and efficiency. The study stresses constant involvement with rural residents to learn their needs and preferences. Infrastructure improvement help close urban-rural digital payment adoption gaps. Government, financial institutions, and tech companies must collaborate to accelerate the digital payment revolution and make financial services more accessible to rural areas.

KEYWORDS: *Digital Payments, Rural, Digital Infrastructure, Financial Services.*

INTRODUCTION

Digital or electronic payments transfer value between payment accounts using a digital device or channel. This definition may include bank transfers, mobile money, QR codes, credit, debit, and prepaid cards.

From 1952 to the present, the Indian government has led rural development through various plans. Because over 65% of Indians live in and depend on agriculture, the sector is important to the economy. Cash ruled rural India until demonetization, and it still does because rural people work in agro-industries and make daily cash payments (Sheetal Thomas et al., 2017). By installing first ATMs in Kolkata in 1987, India took its first step toward a digital economy. Since the government demonetized at the end of 2016 and launched UPI, BHIM, BBPS, mobile wallets for financial transactions, and digital payment systems, the Indian government focused on a cashless economy from 2014 to 2016. Fake currency, abuse of cash to fund illegal activity and terrorism, etc are some reasons for government demonetization and cashless economy. India has the world's largest cash-based economy, but it needs a cashless or digital economy to compete with the world. Digital alternatives cost money because most users are hesitant to try new things and lack the technical know-how to pay digitally (Creehan, 2018).

The Indian government has a dream of digital economy that can be achieved when rural India is covered. However, inadequate infrastructure, financial illiteracy, rural economies, customer perceptions, etc. require more attention (Sheetal Thomas et al., 2017). A study found that the digital economy would thrive when rural people fully adopted e-commerce, online shopping, plastic money, and other non-cash payments (Srihari Kulkarni et al., 2019). Studies show a huge change after demonetization.

The reality of digital India differs from the dream due to obstacles. These include cyber fraud, privacy, online frauds, and poor internet connectivity in rural/remote India, which require government security and attention. If the Indian government reduces digital payment fees, provides swipe machines free of charge to shopkeepers, and launches digital payment education programs for people of rural India, so they don't fear technology and India will become the world's largest digital economy in a few years. Because more educated and tech-savvy

generations will adopt cashless payments in the coming years, India's digital/cashless economy will thrive (Srihari Kulkarni et al., 2019).

Rural India's socioeconomic profile presents unique challenges and opportunities for digital payment system adoption. This study investigates these technologies and how rural residents can use digital payment methods. Punjab is a good case study because it shows rural India's diversity and offers lessons for other regions.

REVIEW OF RELATED LITERATURE

The literature review forms the main platform of the dissertation as the consequent analysis and future result is based on it. A brief review of the related literature is of huge importance with respect to any research and following are the sources of related literature like-various articles in different journals, books, newspapers & magazine and different sites. In this section, attempts have been made to review the previous studies on digital payments in India in order to identify the existing research gaps and research problem that has been given no attention to identify yet. Below is the review of the studies for the purpose of current study.

Desai et al. (2017) conducted the study to examine the digital payment mechanisms and infrastructure that is available in India. The study examined Indian digital payment processes using bibliometric review of many publications, journals, and research. The study asked financial professionals to promote digital payments. The literature suggested that the government should provide infrastructure and technology to traders and businessmen to encourage cashless payments. Banks should have technology to streamline and integrate financial transactions with service providers. The literature also showed that India lacks financial training, infrastructure, and digital financial transaction trust. India can become a cashless and digital economy if it can overcome obstacles and provide infrastructure and advertising for digital financial transactions, products, and services. According to literature review, demonetization improved India's digital payment system by increasing rupee volume and value across all digital transaction modalities.

Kaur (2017) conducted the study to examine the cash situation and cashless economy. The study found that cash is still king in the market and that people prefer cash because they feel secure with money in their hands, despite governments' efforts to promote cashless payments with online transaction apps. The government encourages digital financial payment transactions and mechanisms, but poor internet facilities, cyber fraud, infrastructure, and online payment awareness hinder their success. Social barriers are slowing digital financial services and new payment methods as well as technical ones. Rural and elderly people view cash as an ego buster, and digital payment mechanisms are promoting a cashless economy where they can buy or give gifts without cash. Accepting and changing this is hard. By improving infrastructure, network connections, and security, and by educating people about digital financial services and payment mechanisms, the study suggests removing technical and social barriers. To move toward a cashless economy and financial system, governments must build trust.

Singh et al. (2017) examined demographic factors that can influence digital financial payment mechanisms. The demographic-based study was conducted in Delhi NCR to understand motivational factors. The study found that only consumer education motivates or changes the use of digital payment modes, not gender, age, profession, or annual income. The study also found that Delhi NCR residents with high education levels use digital payment methods more than those with low education levels.

Byakod et al. (2018) examined how Panchayati Raj initiatives for digital financial transactions and payment mechanisms will affect digital economy. Panchayats are government mouthpieces in rural India, according to the study. Every new rural scheme and technology is implemented by Panchayats. Panchayats also run awareness campaigns. With Panchayati Raj, digitalization initiatives can be more effective. The research suggested Panchayati Raj institutions address advanced economies locally. The government must run a large-scale nationwide campaign twice or three times a year, like the Pulse Polio Campaign, to educate the public. These campaigns will increase digital financial payment and service adoption.

Jaiswal et al. (2018) studied the future of digital financial services and e-wallets. Hospitals, banks, and retail shopkeepers use wallet money to encourage mobile wallet use and other digital financial services and payment

methods. BHIM UPI and other payment portals and apps have increased the use of these payment mechanisms in many stores, even small vendors, making them easier to use and pay with. The study also found that mobile wallet use is growing rapidly from urban to rural areas, indicating a bright future. To encourage more people to use e-wallets for payments, the government must provide safety and security.

Erandekar et al. (2020) examined that Infrastructure development promotes digital transactions, which reduces the burden on bank branches. With the increase in smart phones' digital transaction systems every month, there is a huge change for UPI and e-wallet transactions after demonetization. Artificial intelligence and machine learning are some areas that require more attention from the government.

Kafley et al. (2021) conducted the study to examine the relationship between the factors that influence the consumers to adopt digital financial payment mechanisms. The demographic profile of respondents was used to study these factors to better understand relationships. The study found that trust, perceived usefulness, and perceived ease of use positively influence people's adoption of digital payment mechanisms. Regardless of age, gender, or education, users will automatically adopt technology that saves them time, energy, and effort, according to the study.

Siby (2021) examined demographically defined individuals who use and adopt digital financial payment mechanisms and services. The study found that 20–30-year-olds are the most likely to use digital payments, followed by 30–50-year-olds and 50-plus-year-olds. Senior citizens are least likely to use them. Digital payment methods were similar before and during the COVID-19 pandemic.

Kumar (2023) stated that farmers in rural India rely on cash for daily purchases and labor payments, especially during seeding and harvest season. Additionally, rural businesses need cash for immediate liquidity. Digital technology adoption requires more mobiles, point-of-sale devices, and a stable internet connection to support digital payments. Financial literacy workshops to educate people about cashless payments could help overcome poor infrastructure and digital financial literacy, according to the article.

NEED FOR STUDY

After demonetization, especially when government of India try to promote digital system of transactions then this is necessary to know about ground level reality of digitization in real India means rural India because approximately 66% population of India lives in rural area and their large contribution in GDP by agriculture and other self-employment.

Many studies have examined the adoption of digital payment mechanisms and digital financial services in daily life. Further, studies have examined the importance of digital financial services adoption, perception, and demographic profiles of respondents. Also, some studies were conducted in cities with a small sample size and respondents were students, service class people, businessmen, and other trained technology users.

Some studies discussed digital financial services adoption, digital payment trends, and challenges/opportunities in digital India (Ravi, 2017; Narayana Swamy et al., 2017; Reddy, 2017; Shakir Ali, 2017; Thomas, 2017; Vally, 2018; Sharma, 2018; Aggarwal, 2019; Sribala, 2019; Rahmani, 2020; Ghosh, 2021; Nath, 2022; Ranjan, 2023).

For widespread adoption of digital financial services, especially in rural areas, researchers argue that digital financial literacy is essential. Buckley, 2015; Potrich, 2015; Finau, 2016; Prasad, 2018; Nedungadi, 2018; Morgan, 2019a; Yang, 2019; Morgan, 2019b; Gupta, 2019; Shen, 2020; Goyal, 2020; George, 2020; Hasan, 2020; Lyons, 2021; Azeez, 2021; Raj Kumar.

Above literature shows that in Punjab region there is no research under which rural area was studied to know the perceived impact of financial literacy on digital payments, so we will try to explore ground reality of digital payments in different regions of Punjab.

RESEARCH OBJECTIVES

To study the infrastructure availability to support digital payment system in rural India.

Hypotheses of the Study

H0: There is no significant difference in the perception of people regarding the infrastructure availability to support digital payment system in rural India.

Ha: There is a significant difference in the perception of people regarding the infrastructural availability to support digital payment system in rural Punjab across different regions.

SCOPE OF STUDY

The scope of the study will be confined to know ground level reality of digital payments in rural India for this study we confined to different regions of Punjab. For the purpose of this primary data will be collected from different rural areas of Punjab. There are three regions Majha, Malwa and Doaba under which 04, 15 and 04 districts and 2509, 6369 and 3528 villages are covered respectively. We will target householders so that we can collect adequate data for our research.

DATA COLLECTION METHOD

The data is collected from primary sources through structured questionnaire. Purposive sampling method is used for village selection and data collection from consumers (householders). There are 276 villages in Majha, 845 villages in Malwa and 224 villages in Doaba region only 100 villages has been targeted out of these. From these 100 villages, 20 villages of Majha, 63 villages of Malwa and 17 villages of Doaba are related to this research.

SAMPLE SIZE

Sample size is based on 100 villages of Punjab regions so 4 persons are targeted from these then 400 respondents are targeted as consumers (householders) from different areas/regions of Punjab.

DATA ANALYSIS AND INTERPRETATION

To study objective intends to investigate the various perceptions of consumers in the rural areas in terms of infrastructure facilities available to support digital payment mechanism. The success of digital payment mechanisms and digital economy depends upon the basic infrastructure that is available in the area to support the services. As the penetration of digital services are increasing in rural areas there is need to assess and investigate the facilities available as perceived by different sections of society. The main aim of this objective is to assess perceptions of the infrastructure facilities by different demographic variables for consumers (householders).

Perceived Infrastructure Available across different regions:**Table 1: Region Wise (Infrastructure Available)**

	Region					
	Doaba		Majha		Malwa	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Infra-1 There are scheduled commercial banks to support digital payments.	3.90	0.69	3.90	0.30	3.33	1.40

Infra-2 There are sufficient numbers of ATM's are available to support digital payments.	3.99	0.68	3.90	0.30	3.24	1.07
Infra-3 There are POS (Point of Sale) to support digital payments.	2.66	0.70	2.40	0.81	3.03	0.82
Infra-4 There are Paytm and other similar QR codes to support digital payments.	3.87	0.75	3.50	0.68	3.53	1.21
Infra-5 There is availability of debit/credit cards to support digital payments.	3.65	0.66	3.30	0.64	3.43	1.21
Infra-6 There is availability of internet/mobile banking to support digital payments.	3.24	0.74	2.70	0.64	3.54	1.02
Infra-7 Availability of high speed internet in the area is helpful for doing digital payments.	3.32	0.76	2.50	0.50	3.55	0.96
Infra-8 Availability of smart phones in consumers is a motivator for digital payments.	3.34	0.75	3.20	0.88	3.45	1.09
Infrastructure – Overall Perceived infrastructure available	3.49	0.45	3.18	0.32	3.39	0.82

Source: SPSS Output

Table 1 entitled “Region Wise (Infrastructure Available)” represents descriptive statistics for perceived infrastructure to support digital payments across three regions of Punjab: Doaba, Majha, and Malwa means how well people in these three regions of Punjab think the infrastructure is set up to support digital payments. Mean is the average score for each type of infrastructure in an area. Higher means mean that people think the system is better. The standard deviation shows how spread out the scores are for each type of infrastructure in an area. Perceptions are more reliable when the standard deviation is lower. From Infra-1 to Infra-8, each row shows a

different part of infrastructure. Infrastructure - Overall Perceived a general idea of how well the infrastructure for digital payments was thought to be in each area.

This table shows that overall infrastructure perception scores about Doaba are 3.49 with standard deviation - 0.45; Majha are 3.18 with standard deviation - 0.32; Malwa are 3.39 with standard deviation - 0.82. The mean score indicates that availability of infrastructure to support digital payments is high in Doaba, moderate in Malwa and low in Majha. However, according to standard deviation variability in perceptions is high in Malwa, moderate in Doaba and low in Majha.

This information shows that Majha does not have as much infrastructure as other regions of Punjab. Doaba has the highest mean scores for most infrastructure factors, which suggests that people there have the best opinions about digital payment infrastructure. Malwa usually has moderate mean scores, which means that it might have problems or infrastructure that isn't as good as the other areas. Majha usually has the smallest standard deviations, which means that people in the area have more consistent perceptions.

Table 2: Descriptives (Region Wise)

Infrastructure - Overall Perceived Infrastructure available

	N	Mean	Std. Devia-tion	Std. Error	95% Confidence Interval for Mean		Mini-mum	Maxi-mum
					Lower Bound	Upper Bound		
Doaba	68	3.49	0.45	0.05	3.39	3.60	1.75	4.13
Majha	80	3.18	0.32	0.04	3.10	3.25	2.75	3.88
Malwa	252	3.39	0.82	0.05	3.28	3.49	1.75	4.75
Total	400	3.36	0.70	0.03	3.29	3.43	1.75	4.75

Source: SPSS Output

Table 2 entitled "Descriptives (Region Wise)" shows the "Overall Perceived Infrastructure available" for all three regions (Doaba, Majha, and Malwa), with a total number that shows all three areas together. N stands for the sample size, which is the number of people who answered from each area. The mean score for "Perceived Infrastructure available" is in each area. It looks like the scores are on a scale, with higher marks indicating better infrastructure. Standard Deviation is a way to find out how spread out the scores are around the mean. The scores are more spread out when the standard deviation is high. When the standard deviation is low, the scores are more closely grouped around the mean. Standard Error is the difference between the mean and the sample distribution of that mean. The accuracy of the sample mean as a guess of the overall mean is shown by this number. The square root of the sample size is divided by the standard deviation to get this number. 95% Range of Confidence for Mean gives you a range where the real mean of the community lies. Minimum is the area where the lowest score for "Perceived Infrastructure available" was found. Maximum means that the area has the best "Perceived Infrastructure available" score.

Doaba has the highest average perception of infrastructure, while Majha has the lowest. This suggests that people in Doaba generally perceive the infrastructure to be better than in the other two regions. Perceptions of infrastructure are most variable in Malwa and most consistent in Majha because the standard deviation is highest for Malwa and lowest for Majha. The range of scores is widest in Malwa, indicating a greater diversity of opinions on infrastructure. This is reflected in both the larger standard deviation and the higher maximum score. This table provides a valuable snapshot of how people in different regions perceive the available infrastructure. It highlights both the average perceptions and the variability in those perceptions, raising questions about the factors that might be contributing to these differences.

The average opinion of facilities in Doaba is the best, while the average opinion in Majha is the worst. This means that most people in Doaba think the infrastructure is better than in the other two areas. Malwa has the most varied views on infrastructure, while Majha has the most constant views. This is because Malwa has the highest standard deviation and Majha has the lowest. Malwa has the biggest range of scores, which means that people there have more different thoughts on infrastructure. This can be seen in both the higher maximum number and the larger standard deviation. This table gives us a good idea of how people in different regions perceive the available infrastructure means they see the infrastructure that is present in different area.

Table 3: Test of Homogeneity of Variances (Region Wise)

Infrastructure - Overall Perceived Infrastructure available

Levene Statistics	df1	df2	Sig.
49.049	2	397	.000

Source: SPSS Output

Table 3 entitled "Test of Homogeneity of Variances (Region Wise)" shows the results of a Levene's Test for Equality of Variances, a statistical test was used to see if the variances of a measure are the same across different groups. This is often used before conducting an ANOVA (Analysis of Variance) test.

In the above table, Levene Statistics (49.049) is the calculated value from the Levene's test. It measures the difference between the groups in terms of variation. A larger number means that the differences between the variances are bigger. df1 (Degrees of Freedom 1 is 2) is the number of degrees of freedom for the grouping variable, which is subtract 1 from the number of groups.

This information proves that "Levene's test is significant." That makes Robust test more reliable." The very small p-value (.000) shows that Levene's test is statistically significant; it rejects the null hypothesis means rejects the idea that the variances are equal. In other words, the assumption of uniformity of variance is broken. These differences in "Infrastructure - Overall Perceived Infrastructure Available" are very different between the three groups.

Table 4: Robust Tests of Equality of Means (Region Wise)

Infrastructure - Overall Perceived Infrastructure available

	Statistics	df1	df2	Sig.
Welch	13.820	2	189.361	.000
Brown-Forsythe	8.313	2	329.373	.000

a. Asymptotically F distributed.

Source: SPSS Output

Table 4 entitled "Robust Tests of Equality of Means (Region Wise)" shows the results of a statistical test, are here. When using a test like the t-test or ANOVA to compare means, it is assumed that the data in each group is normally distributed and has equal variances. If these assumptions are broken, like when the data is not normally distributed or when the differences are not equal, robust tests are used. In these cases, they give more reliable results. Statistics are the test statistics that are generated for each test. This number tells us how important the results are; think of it as a way to see how different the group means are. df1 has something to do with how many groups are being compared. There are two tests in this study, and df1 = 2. This means that three groups are being compared, since the number of groups minus one equals 2. df2 has to do with the sample size and how different the groups are from each other. Welch's df2 is 189.361, and Brown-Forsythe's is 329.373. There is a p-value called "Sig." It represents the probability of observing the data (or even more extreme data) if there were no change in the means between the groups. If the p-value is small, it means that the difference between the means is statistically significant.

In the analysis, the Welch test shows a significant result (Sig. = .000). Here is strong proof that the three groups do not have the same "Infrastructure - Overall Perceived Infrastructure Available" means. It's also important that the Brown-Forsythe Test shows a result (Sig. =.000). This further supports the conclusion that that there are big differences in the means between the groups.

There is a statistically significant difference between the three groups in how is available perceived infrastructure. Both tests show that there is a statistically significant difference between how the three groups of people think about the availability of infrastructure.

Table 5: Post Hoc Tests (Multiple Comparisons - Region Wise)

Dependent Variable: Infrastructure - Overall Perceived Infrastructure available

(I) Region / (J) Region		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval		
					Lower Bound	Upper Bound	
Bonferroni	Doaba	Majha	.31949*	.11408	.016	.0452	.5938
		Malwa	.10808	.09452	.761	-.1192	.3353
	Majha	Doaba	-.31949*	.11408	.016	-.5938	-.0452
		Malwa	-.21141	.08876	.053	-.4248	.0020
	Malwa	Doaba	-.10808	.09452	.761	-.3353	.1192
		Majha	.21141	.08876	.053	-.0020	.4248

* The mean difference is significant at the 0.05 level.

Source: SPSS Output

Table 5 entitled "Post Hoc Tests (Region Wise)" shows the results of post hoc tests for multiple comparisons. In the analysis, Doaba vs. Majha p-value (.016) is less than 0.05, and the confidence interval (.0452 to .5938), it means there is a statistically significant difference between Doaba and Majha; Doaba vs. Malwa p-value (.761) is greater than 0.05, and the confidence interval (.1192 to .3353), means there is no statistically significant difference between Doaba and Malwa; Majha vs. Malwa p-value (0.053) is very close to 0.05, and the confidence interval (.4248 to .0020), it suggests a potential difference that's almost significant. The mean difference between Doaba and Majha is .31949. This means that the "Doaba" region has a higher mean perceived infrastructure score than the "Majha" region i.e. average people in the "Doaba" region think that their infrastructure is better than people in the "Majha" region.

These outputs show that, there is a statistically significant difference between the Doaba and Majha areas in perceived infrastructure availability i.e. how accessible people think infrastructure is. The difference between Majha and Malwa is almost important, but not quite. The difference between Doaba and Malwa is not significant.

Further, while studying the results of significant difference in perception of consumers (householders); the results all of above tables are show that there has been found to be statistically significant which means that there is significant difference while comparing the perception of consumers (householders) regarding the digital payment mechanism in rural Punjab across different regions. These results reveal that there exists significant difference in the perception of consumers (householders) regarding the infrastructural availability to support digital payment system in rural Punjab across different regions.

Therefore, alternative hypothesis **Ha: There is a significant difference in the perception of people regarding the infrastructural availability to support digital payment system in rural Punjab across different regions stands accepted.**

FINDINGS OF THE STUDY

For this study, some descriptive questions were asked and descriptive analysis was done to explore perception level of the respondents to reveal the way people are using or adopting the digital payment mechanisms in rural Punjab. For exploratory analysis, independent T – test and ANOVA are applied to study and understand the perceptions of consumers (householders) regarding the infrastructure facilities available in rural Punjab and how consumers (householders) perceive the perceptions regarding availability of infrastructural facilities.

The main aim of the objective was to get answer to the research question which was to understand the level of infrastructural availability to support digital payment systems in rural Punjab. The perceptions of consumers (householders) were compared with the help of Descriptive Analysis, Independent T – Test and ANOVA for overall perceptions and among various regions of Punjab.

- The overall perceptions of the consumers (householders) were found to be statistically significant, meaning that there exists difference in perceptions of people (consumers) regarding the infrastructural availability to support digital payment systems in rural Punjab. Therefore, it is evident that respondents' overall perceptions regarding the availability of proper infrastructure in rural Punjab are inadequate.
- When the analysis is done on the basis of demographic variables, it was found that the consumers (householders) have significant difference across different regions (i.e. Majha, Malwa and Doaba) and Majha region is low infrastructure availability, Doaba have high Infrastructure availability and followed by Malwa.
- It was also found that the availability of infrastructural facilities to avail the digital payment mechanism is inadequate across all demographic variables namely region, age, gender, educational qualification, occupation and income level.

CONCLUSION

The step of the government of India towards cashless economy is absolutely good but it will take some years to completely transformation as digital economy because there are major hurdles in the path of digital India poor infrastructure availability in rural area like availability of proper internet coverage in far flung areas, non-working of ATM machines, usability of smart phones is less in rural areas, less availability of POS machines. If government of India comes up with these hurdles by providing high speed internet facility in rural areas, directing banks to maintain working of ATM machines properly etc., then in coming few years India will become world's largest digital economy. This is beginning time for digital India/cashless economy and future of India as digital/cashless economy is bright.

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