

Effect of Social Interaction on the Use of Mobile Payment Apps in Karnataka, India for 16 to 18-Year-Olds: The Effect of the Indian Demonetization in 2016

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ABSTRACT

This study looks at how the rural-urban divide and social influence (a factor that affects behaviour) impact mobile payment app use in 16-18-year-olds after the demonetization in India in 2016. The study uses participants from a Tier 1 city - Bangalore - and a Tier 2 city - Belgaum - both of which are located in Karnataka, India. A comparative quantitative method was used with the help of an online survey. A correlation coefficient was calculated from the data gathered, which helped us to conclude the level of influence one's surroundings may have on the use of mobile payments. In conclusion, it was found that social influence has a positive correlation with the use of mobile payments. However, the influence was not large enough to conclude that social influence is one of the major factors affecting mobile payment app use. Further research could find the correlation coefficient between mobile payment app use and all the other factors (listed in the paper) to find which has the most effect.

Introduction

India, in the recent past, has become a country of great economic growth and advancement. As reported by Morgan Stanley, India is the fastest-growing economy in the world mainly due to three “megatrends” - global offshoring, digitalization, and energy transition (Morgan Stanley, 2022). They also report that the Indian Demonetization, carried out in November of 2016, might have led to this fast growth (Morgan Stanley, 2022). Demonetization is defined “as the act of stripping a currency unit of its status as legal tender” (Investopedia, 2022).

While its success is controversial, a positive externality of demonetization emerged - the rise of digital transactions in India. In the last 3 years, the process of purchasing a product has evolved. Before, only a tiny part of the population used cashless forms of transaction (i.e. credit/debit cards), but today the majority have gained confidence in new technology. The creation of UPI (Unified Payments Interface) technology, an instant real-time payment system developed by the National Payments Corporation of India, is responsible for this change. Right from monthly phone bills to instalments on home loans, everything is done on apps like PhonePe or GPay which employ UPI technology.

There has been a lot of research surrounding the rise of digital transactions worldwide (Meher, 2017; Rosnidah et al., 2019; Sen, 2020; Shirisha, 2017). These studies inferred that the use of mobile payments had many positive knock-on effects such as a higher rate of creation and use of bank accounts and increased use of smartphones. However, the need for such facilities (i.e. bank accounts and smartphones) creates a population

who are marginalized from the new technology and digital advancement in the country - i.e. (a) minors who are less able to set up bank accounts and, (b) those who lack access to smartphones.

This study looks into the extent to which social influence has impacted 16-18-year-olds' financial independence in spending money in urban vs rural districts in Karnataka in response to the Demonetization. It is a comparative study using online survey methods to find a correlation between a district's development level and social influence in affecting young adults' financial independence. I hypothesize social influence will positively affect the use of mobile payment apps.

Literature Review

As mentioned, this study is going to examine a population gap by addressing young adults aged 16 to 18, since other literature on this subject does not address this population. The literature present at the time of writing this paper can be categorized into different effects of the 2016 Demonetisation.

Effect on Politics in India

When the Prime Minister (PM) of India, Shri Narendra Modi, announced the scrapping of certain currencies, it created a shock - across India and the world. It was a noticeable and consequential way of handling the black money market present, hence inviting strong opinions, both positive and negative, on the political ability of the Government. In the speech delivered by the PM, he outlined demonetization as a "fight against corruption, black money, fake notes, and terrorism, in this movement for purifying our country" (Business Standard, 2017). Black money, as defined by the government of India in 2012, is "income illegally obtained or not declared for tax purposes" (RBI, 2012).

The study "Theoretical Analysis of Demonetization" published in 2016 explores these different effects by using macroeconomic models to conceptualize them. It examines 5 areas: (1) how the banking system was affected by demonetization, (2) how the supply and demand of goods were affected by demonetization, (3) The interactions between the monetary and non-monetary variables in a closed economy, (4) then in an open economy and, (5) the impact of demonetization on inflation and prices. The study concluded that the short-to-medium-run scenario does not have many positives in it. None of the economic variables explored in the study are likely to move in a healthy direction. The author also states that "if corruption itself cannot be addressed, we may very well end up with a scenario where new black money will drive out old black money from the system" (Dasgupta, 2016). The scholarly article by S. Gopalan and R. Rajan, emphasizes the problem of black money and states that "the black economy in India is somewhere between 1/5th or 1/4th of its GDP as of 2007" (Gopalan & Rajan, 2017). However, they want readers to recognize that the majority of this is earned through legitimate sources but becomes black only because it has not been declared to tax departments (Gopalan & Rajan, 2017).

The article "The Great Monetary Gamble: Modi's Lee Kuan Yew Moment" draws a comparison between the steps taken by Narendra Modi to reduce the circulation of black money and those of Singapore's former Prime Minister Mr. Lee Kuan Yew when he hoped to reduce corruption in the system. Mr. Yew believed that he could govern the people of Singapore much better if he didn't need to consider the short-term inconveniences faced by the people, similar to Modi's decision of demonetization.

Effect On the Common Man

An article titled "Money and 'Demonetization': The Fetish of Fiat" by Kapadia considers the real value of the Indian Rupee and how demonetization has created a *fetish* or fear of money in the minds of Indians. Fiat money

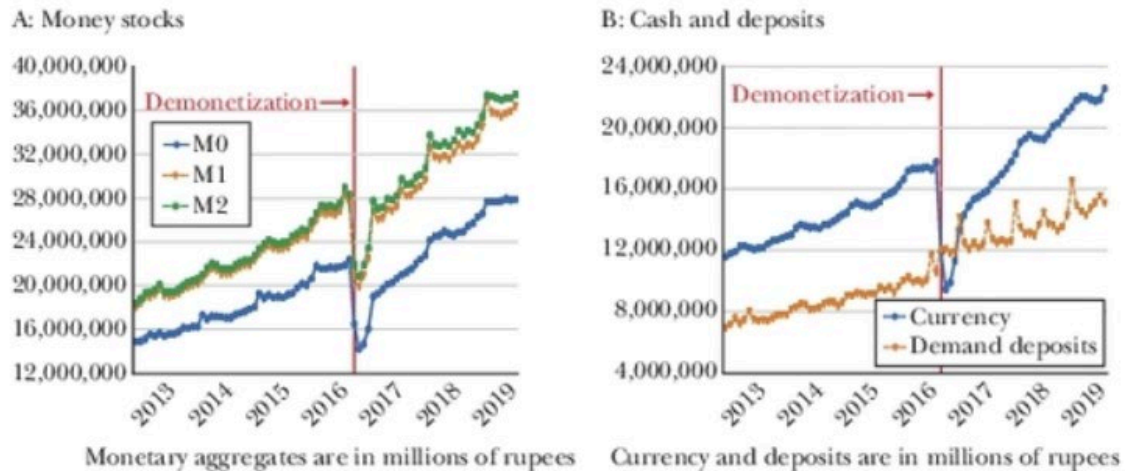
is defined as “a government-issued currency that is *not* backed by a physical commodity, such as gold or silver, but rather by the government that issued it” (Chen, 2021). And since there is no real backing to the value of the Indian Rupee, the article concludes that the government of India has induced fear into every citizen through demonetization due to the sudden lack of cash and the distrust in the legitimacy of the current money supply. (Kapadia, 2016). While demonetization didn’t change much of the black economy and most other objectives as listed out by the government, a positive externality of increased use of digital payment apps was observed. Most of these apps were either using UPI technology or included a digital wallet with which one can make payments. However, this sudden shift to digital banking required a quick adoption of technology. A study by Agarwal et. al investigates the effects of social interaction with our peers, and communities and the significance of one geographic location on one's internet use (Agarwal et al., 2009). They conclude that these factors have a very high influence on the use and adoption of technology. Even though this study was based in the US, it makes it clear that one's surroundings will be a factor in the acceptance of new technology.

Effect On Corporate Industry

While this study is focussing on individuals as their subjects, firms and business have also been affected by demonetization. This is an important area to examine since the performance of businesses will affect individuals’ expectations in the future of the economy. The performance of the companies will affect the stock market which also affects the wealth of the investors in India. A study titled “Impact of Demonetization on Stock Market Return” analyses the top 10 software companies and their stock prices for 3 months. “The reason behind choosing the sector (software company) is because they are considered to be the major contributors towards the economic growth, in terms of employment rate, inflation, etc.” (Divya & Sophia, 2017). It employed a case study method and found that the market was very volatile in the initial stage of the announcement of demonetization, being an unexpected event. “Though the hit was very big, the IT (Information Technology) industry wrapped up quickly with required measures and started to boom” (Divya & Sophia, 2017).

Effect on Digitization Across India

After PM Modi made the announcement, “there were two ways in which the Indian public could exchange demonetized cash; they could either swap their old currency for the new currency or deposit their cash into their bank account” (Lahiri, 2020). Here, there was a shift in consumer trends. Many people decided to reduce their use of cash to a great extent. In the graphs below, which were extracted from a study titled “The Great Indian Demonetization” by Amartya Lahiri, we can see how after demonetization there was a drastic drop in all three sections of the money supply in India: M0, M1, and M2. M0, also known as the monetary base consists of currency in circulation and deposits by bankers; M1 includes currency, demand deposits within the banking system, and other deposits with the RBI; M2 refers to M1 plus some other savings and checking accounts (Lahiri, 2020). In the left panel, M0 or physical currency dipped after demonetization and almost took 2 years to come back to the original value. In the right panel, while currency reduced suddenly, demand deposits increased steadily, illustrating the increased use of digital transactions with bank accounts.



Source: The data comes from Reserve Bank of India (2019).

Figure 1.

But the shift to digital methods was not only organic and passive, the RBI and many companies made active efforts to convert the reduction in currency to an increase in digital transactions. As listed in a study by Shirisha. P, the Modi administration “launched (UPI) unified payment interface, the mobile app” (Shirisha, 2017) and companies increased the number of payment terminals and “debit card transactions rose by 108% and credit card transactions by 60% on 9 November 2016” (which was just one day after demonetization took place) (Shirisha, 2017).

However, similar to any other drastic change, this too had its challenges. The academic paper “Hurdles in Metamorphosing India’s Economy to a Cashless Economy” conducts an empirical style survey method and concludes the following for making digital transactions widespread: (a) the bank charges for online payments discourages many users, (b) education in rural areas such as villages is necessary, (c) awareness programs which promote citizens will be needed, and (d) better infrastructure for this method is needed so peoples’ confidence can increase (Meher, 2017). Another study by Gaur. A and Padiya. J, which used only secondary data, aimed to analyse the “early effects of demonetization in India and to review the pros & cons of digitalization of the Indian economy” (Gaur, 2017). Through their analysis, they found that “curbing black money will not be achieved only with demonetization drive and the government must address the gold and real estate sector to defeat black money” along with many other trends and strategies.

Unified Theory of Acceptance and Use of Technology (UTAUT) method

There is a lot of literature about how we can measure the user acceptance of technology in different applications. However, one of the most widely used and discussed methods is the UTAUT method. It was first introduced by Venkatesh et al. in the academic paper “User Acceptance of Information Technology: Toward a Unified View”. The authors of the paper (1) review user acceptance literature and discuss eight prominent models, (2) empirically compare the eight models and their extensions, (3) formulate a unified model that integrates elements across the eight models, and (4) empirically validate the unified model. (Venkatesh et al., 2003). Another study “addresses why users accept or reject information systems and user acceptance is affected by system design features.” and “is not only wanting to find if the user acceptance model works or fails but also wants to know how to make it better” (Davis, 1991).

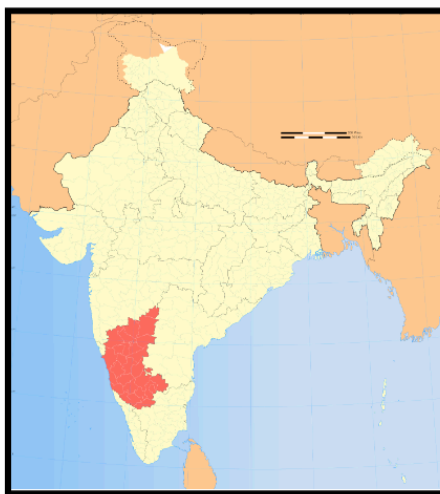
Similar Studies in Different Population Groups

This study, on the contrary, does not use the UTAUT method to find the factors that affect 16 to 18-year-olds' use of digital transactional apps. This study has closely reviewed an academic paper by Rosnidah et al titled "Critical Factor of Mobile Payment Acceptance in Millennial Generation: Study on the UTAUT method". This paper conducts a study very similar to mine but with a different population - millennials in Indonesia (Rosnidah et al., 2019). I modified their hypotheses to suit my research and created my questions for the survey. Another study that was used as inspiration was a comparative study that explores the rural-urban divide in terms of participation in the Indian digital economy (Sen, 2020). Furthermore, this paper conducted their research in the same state as this paper. Lastly, "Impact of Indian Demonetization on Working and Non-Working Married Women: An Interpretative Phenomenological Analysis." give me an interesting perspective on how women who didn't have financial independence (another group that was ignored during the shift to digital transactions) went about demonetization.

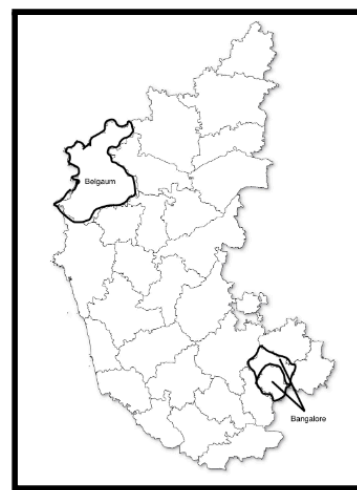
Methodology

The purpose of the study is to find the extent to which social influence has impacted 16-18-year-olds' financial independence in spending money in urban vs rural districts in Karnataka in response to the Demonetization. It focuses on two groups - those living in a rural district (Belgaum, Karnataka) and those living in an urban district (Bangalore, Karnataka). I used a survey as the method since it was the most feasible due to geographic constraints.

Participants



Karnataka on the map of India



Belgaum and Bangalore on the map of Karnataka

Figure 1. Location of the two areas in discussion.

The participants in this study were from two different cities in the state of Karnataka, India. The (rural) city of Belgaum is located in the North of Karnataka and is bordering the state of Maharashtra. Hence, it is influenced

by the lavish spending habits of Maharashtra while being contrasted with the low-income population of Belgaum which produces a complex interaction that might affect my responses. The participants from Belgaum study at KLS Shri Vasantao Poddar Polytechnic (VPP), a coeducational school only for grades 11 and 12. On the other hand, participants from the urban city were from Bangalore, the state's capital. The city, also known as Asia's Silicon Valley, is a hub for tech companies and has a strong start-up culture. This might influence the participants' responses since they are more exposed to new technology. The participants from Bangalore are all students at Sri Kumaran Children's Home (SKCH), a school in south Bangalore. The survey was collectively sent to 150 young adults (100 from VPP and 50 from SKCH) and 83 responses were recorded (58 from VPP and 25 from SKCH).

Data Collection

The study used a quantitative survey method and was completed using Google Forms since it allowed the recording of authentic responses despite the geographic constraints. It consisted of questions on two types of UPI payment methods: (a) through apps like GPay and PhonePe and (b) through mobile wallets like PayTM. The researcher modified and created the survey questions from a study by Rosnidah et al. in consideration of this unique sample population (16-18-year-olds, residents of Belgaum or Bangalore). In the paper "Critical Factor of Mobile Payment Acceptance in Millennial Generation: Study on the UTAUT model", Rosnidah et al. have curated a framework with 4 aspects that affect an individual's use of mobile payment: 1. Performance Expectancy, 2. Effort Expectancy, 3. Social Influence, and 4. Facilitating Conditions.

Performance Expectancy - It is defined as an individual's belief in certain innovations that will lead to positive results and it measures the extent to which the use of technology will provide benefits to users in carrying out certain activities (Rosnidah et al., 2019). In previous research, it has been shown that this influences behavioural intention.

Effort Expectancy - Refers to the individual's understanding of the ease of using the technology. When users feel that the use of technology is easy, the level of expectation for its good performance increases (Rosnidah et al., 2019). According to the UTAUT model, effort expectancy influences behavioural intention.

Social Influence - It is defined as the extent to which users feel significant people around them believe that they must use a certain technology (Rosnidah et al., 2019). Social influence is also said to have a significant effect on behavioural intention.

Facilitating Conditions - refers to the trust of individuals in the digital framework which supports the technology. It is believed that the use of technology is influenced by trusting technology.

Hypothesis: Considering all the different factors and the population I am observing, I hypothesize that social influence will positively affect the use of mobile payment apps.

Survey

The questions part of the survey and respective factors they were used to measure are listed in the table below:

Q No.	Question with answer choices	Used to measure which factor?
1	What is your gender? <ul style="list-style-type: none"> • Male • Female • Other 	Demographic of users

2	Which school are you studying in? <ul style="list-style-type: none"> • SKCH, Bangalore • VPP, Belgaum 	Rural or Urban town
3	Do you have a smartphone on which you can download payment apps such as PhonePe and GPay? <ul style="list-style-type: none"> • Yes • No 	Access to technology
4	Do you use PhonePe or GPay payment methods on your own phone? <ul style="list-style-type: none"> • Yes • No 	Financial independence for making transactions in the age group
5	Do you use apps with a wallet (such as PayTM) to make transactions? <ul style="list-style-type: none"> • Yes • No 	Use of digital wallet apps
6	Please choose the number (from 1 - 5) that best suits your experience with apps like PhonePe and GPay for the <ul style="list-style-type: none"> • Easy to use • Beneficial to my everyday life • Advantageous • Useful alternative to cash 	Effort expectancy & Performance expectancy for direct bank-to-bank transfer apps
7	Please choose the number (from 1 - 5) that best suits your experience with wallets like PayTM for the <ul style="list-style-type: none"> • Easy to use • Beneficial to my everyday life • Advantageous • Useful alternative to cash 	Effort expectancy & Performance expectancy for digital wallet apps
8	Do the people around you use GPay and PhonePe? (select all that apply) <ul style="list-style-type: none"> • My friends use it • My parents use it • My teachers use it • More people I know use it 	Social Influence for direct bank-to-bank transfer apps
9	Do the people around you use PayTM? (select all that apply) <ul style="list-style-type: none"> • My friends use it • My parents use it • My teachers use it • More people I know use it 	Social Influence for digital wallet apps

10	<p>Please choose the option (Yes or No) that best suits your experience with apps like PhonePe and GPay</p> <ol style="list-style-type: none"> Others having these apps influenced you to have them (Yes/No) Did you need help when using the apps initially (Yes/No) 	Social Influence & Facilitating Conditions for direct bank-to-bank transfer apps
11	<p>Please choose the option (Yes or No) that best suits your experience with apps like PayTM</p> <ol style="list-style-type: none"> Others having these apps influenced you to have them (Yes/No) Did you need help when using the apps initially (Yes/No) 	Social Influence & Facilitating Conditions for digital wallet apps
12	<p>Would you have wanted more training opportunities to help you use apps like GPay and PhonePe?</p> <ul style="list-style-type: none"> Yes No 	Facilitating Conditions for direct bank-to-bank transfer apps
13	<p>Would you have wanted more training opportunities to help you use apps like PayTM?</p> <ul style="list-style-type: none"> Yes No 	Facilitating Conditions for digital wallet apps

Procedure for Data Collection

The researcher asked her aunt - who is the head of the Math and Physics department at VPP - to share the survey with her students in the age group of 16-18. To get responses from students at SKCH, the researcher shared the survey with her friends in the school. Further, a snowballing sampling method was used to attain 25 responses from this population group. All the responses by the students were confidential. The data was stored on a password-protected device and was exported to Google Sheets to avoid any errors. All students completed a consent form before completing the survey.

Findings and Discussion

The researcher found that the results from the questionnaire relating to Social Influence would be most suited for analysis, taking into account the high school math level and the trends seen in this factor. However, before analysing Social Influence, we must look at a few interesting findings which are quite different from the literature present. If we take a look at the charts created with the responses from 3 initial questions which were used to learn about the access to technology and the usability of the two types of apps - digital wallet apps and bank-to-bank transfer apps - we infer that the issue of access to technology is not significant, both in the urban and rural towns. In many studies (Meher, 2017; Sen, 2020; Agarwal et al., 2009) this was considered a huge hurdle that the Indian government would struggle to overcome. Secondly, we can safely generalize that young adults from both towns prefer direct bank-to-bank transfer apps like PhonePe and GPay over payment wallet apps like PayTM. This is illustrated below where the percentage of respondents answering “Yes” for the second question is higher than the third question in both towns. Lastly, a very unusual inference we can make is that for both

types of apps, the percentage of respondents from the rural town (Belgaum) use these digital apps when compared to the urban town (Bangalore). This may be caused due to there being a higher number of participants from Belgaum than from Bangalore, which is one of the limitations of the study.

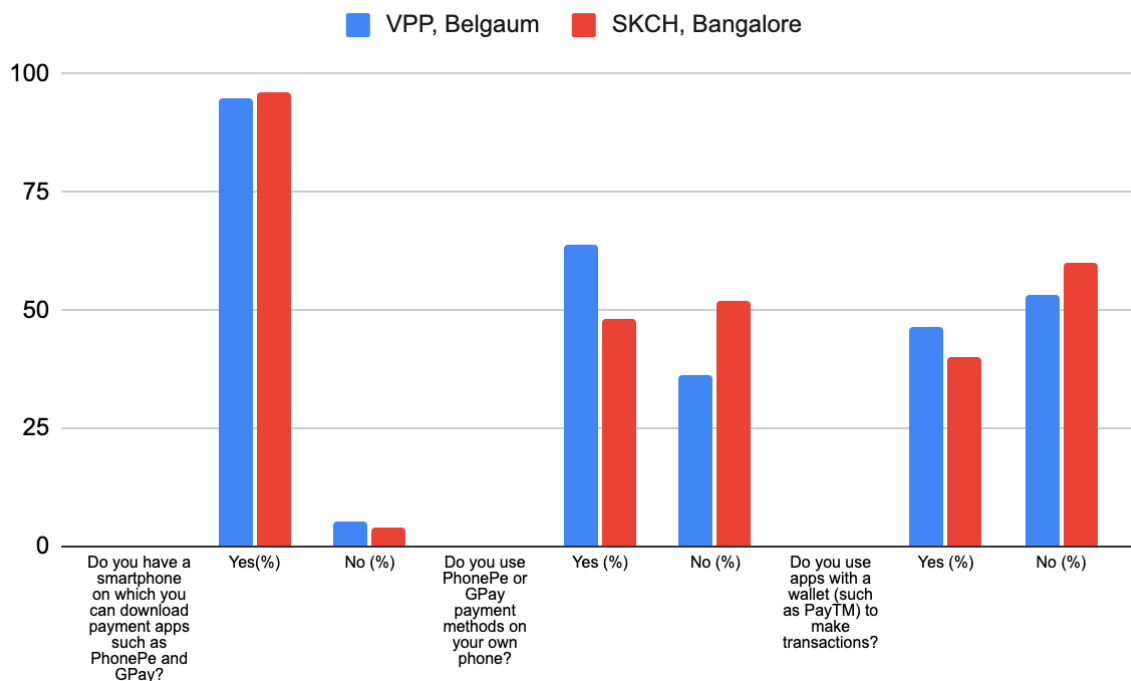


Figure 3. Data of selected questions from the survey

The data we are going to be analysing can be visualized as a two-way table shown below.

	Direct bank-to-bank transfer apps	Payment wallet apps
Rural town (Belgaum)		
Urban town (Bangalore)		

If we now go deeper into analysing the data, we see that the majority of the respondents were aged 18 (73.5%) and the rest were 17 (26.5%); 53.01% were male and 46.99% were female. A larger section of the participants responded that they used direct UPI apps such as GPay or PhonePe (59.04%) and a smaller section shared that they used online wallet payment apps such as PayTM (40.96%). However, 30 respondents (10 from SKCH and 20 from VPP) said they don't use either. The respondent profile is presented in the following table:

Table 1. Respondents' Profile

Item	Variable	All (%)	Bangalore (%)	Belgaum (%)
Gender	Male	53.01	13.64	86.36
	Female	46.99	33.33	66.66

	Other	0	0	0
Age	16	0	0	0
	17	26.5	22.73	77.72
	18	73.5	22.95	77.05
Mobile Payment	PhonePe or GPay	59.04	16.33	83.67
	PayTM Wallet	40.96	13.51	86.49
	Don't use either	36.14	33.33	66.66

The Partial Least Squares Structural Equation Model (PLS-SEM) was used to analyse the data for the different factors. To evaluate the dependability and validity of a construct in the research model, one must first investigate the outer model (Hair, 2014). According to Hair, the average variance extracted (AVE) and Cronbach's Alpha (CA) are two indicators of a construct's validity. For CA, a desirable value is over 0.7, while for AVE, it is above 0.5 (Hair, 2014). After that, a construct's dependability was assessed using the composite reliability (CR) test, whose recommended value, according to Hair et al., is 0.7. The CA, CR, and AVE values for each construct are displayed in the following table:

Table 2. AVE, CA, and CR test results

	Bangalore			Belgavi		
	AVE	CA	CR	AVE	CA	CR
Performance Expectancy	0.638	0.794	0.714	0.633	0.768	0.805
Effort Expectancy	0.711	0.736	0.891	0.785	0.881	0.776
Social Influence	0.709	0.849	0.873	0.612	0.802	0.744
Facilitating Condition	0.537	0.823	0.704	0.732	0.799	0.874

Based on the calculation, all values of AVE are greater than 0.5, and values of CA and CR are greater than 0.7. Hence the data is considered reliable.

Using the results from the survey, the R values (correlational coefficient) and R squared values were calculated to understand the relationship between social influence and the use of mobile payments. To do this I used a correlation calculator and got the following values:

Table 3. Correlation Coefficient values

	Direct bank-to-bank apps	Payment wallets
r	0.3324	0.3043
r squared	0.1105	0.0926

Results of the Pearson correlation ($r = 0.3324$) indicated that there is a significant medium positive relationship between the use of mobile payment apps like PhonePe and GPay (direct bank-to-bank apps) and Social Influence. The r-squared values for the same suggest that approximately 11% of the variability of the use of UPI apps with direct bank-to-bank transfers can be explained by social influence. Also, the results of the

Pearson correlation ($r = 0.3043$) for digital wallet apps indicated that there is a significant medium-positive relationship between the use of mobile wallet apps like PayTM and Social Influence. The r-squared values for the same suggest that approximately 9% of the variability of the use of UPI apps with Wallet can be explained by social influence. We see that there is not much difference between the effect of social influence on payment wallet apps vs bank-to-bank transfer apps.

However, since social influence seems to affect only 11% of the use of mobile payments, the hypothesis stated in the paper is accepted but it is noted that the results are not significant enough to safely say social influence is the main factor that affects the use of mobile payments.

Limitations

It must be noted that there was a range of limitations in the study, mainly in the method design, execution, and data analysis sections. Firstly, there is a skew in the size of the population of respondents from Bangalore and Belgaum (sample size from Bangalore < sample size from Belgaum). Due to this, we are more confident about the results from Belgaum. Also, the responses in both locations came from a single school in each city, hence there may be confounding variables related to the school which creates a trend across the participants in each group.

Furthermore, while the sampling method used in the school in Belgaum was random, a snowballing sampling method (convenience sampling) was used for the responses from Bangalore. Lastly, since this study was done at a high school level, the researcher had to simplify the math used to analyze the data and find correlations between the different factors. Other research done in this field employs a more sophisticated level of statistics used which affects the findings drawn.

Conclusion and Further Research

In this study I have investigated the effect of social influence on the use of mobile payments for teenagers in the age group of 16-18 in the state of Karnataka. There has been a steep rise in the use of mobile payment apps in India ever since the demonetization took place in 2016. There has been a lot of research around this event as mentioned in the literature review, but there was a population gap that was identified. The age group I have investigated was considered to be left behind since it was imperative to have a bank account to use these apps and the number of bank accounts for users < 18 years of age is quite low in India. Furthermore, this is a comparative study between an urban and a rural town to see how the location (i.e. Social Influence) affects this age. The findings of this study show that there is approximately an 11% correlation between social influence and the use of mobile payment apps. While this does provide evidence to support the hypothesis that social influence affects the use of UPI technology, it is not large enough to be completely confident.

Further research is needed in this area to confirm this hypothesis. Researchers could use different populations, which could be comparing different states in India or even extending the same to different countries. Moreover, new studies may choose to investigate the different factors mentioned in the study by calculating their r and r squared values and finding which is the main factor that influences the use of mobile payment apps.

My study has real world implications as seen with the rapid switch from cash to digital payments. A report by the telegraph states that by 2028, only 9% of transactions done in the UK will involve cash (Telegraph, 2023). The only difference between the rest of the world and India is that digitisation of payments is being done gradually across the world, while India pivoted drastically.

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