EXTENDED ESSAY

THE BENEFITS AND DRAWBACKS OF USING UPI PAYMENT APPS, A CASE STUDY ON GOOGLE PAY

Research Question: **To what extent has Covid-19 boosted the use of Google Pay, a UPI (Unified Payments Interface) app, and how effective has it been for payments amongst retailers and consumers in Surat, India?**

Subject Area: INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

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Word Count: 3950

Contents

List of Abbreviations

UPI - Unified Payments Interface

NCPI - National Payment Corporation of India

RBI - Reserve Bank of India

VPA - Virtual payment address

ID - Identification

QR - Quick Recognition

PIN - Personal Identification Number

App - Application

BHIM - Bharat Interface for Money

OTP - One Time Password

QR - Code Quick Response Code

Wi-Fi - Wireless Fidelity

MB - Megabyte

GB - Gigabyte

SOP - Standard Operational Procedure

PSP - Payment System Provider

Covid-19 - Corona Virus

1. Introduction

1.1 Background

Unified Payment Interface (UPI) is a system that enables instant money transfer between two bank accounts using a mobile phone. It was developed by the National Payments Corporation of India (NPCI) and launched in 2016. UPI allows users to send and receive money, pay bills, and make purchases online or in-store by simply using their mobile phone number and a personal identification number (PIN). UPI is built on top of the Immediate Payment Service (IMPS) infrastructure, which allows for real-time money transfer between bank accounts. UPI is widely used in India and has been instrumental in driving the adoption of digital payments in the country.

On 11 April 2016, NPCI launched the UPI system with 21 member banks. UPI aimed to create a secure, effective, open, inclusive, interoperable, and regulated payment and settlement system in India and reduce domestic paper use (RBI, 2012). Cash was a dangerous and insecure method of transaction due to theft and hygiene issues (ENS Economic Bureau, 2022), so the government created a secure and effective payment system. The government realized the payment system and social order needed technological upgrades. The government ordered India's National Payment Corporation.

National Payment Corporation of India was founded in April 2009 to integrate and standardize national retail payment systems. Despite 10 million (1 crore) merchants accepting card payments, there are only six non-cash transactions per person in India each year, according to the RBI 145 million families are bank less (Datta, 2020). The RBI published a four-year vision statement in 2012 to build this system in India (RBI, 2012). Under RBI direction, NPCI created a new, simple, interoperable payment system. Netmagic Solutions' CEO called UPI one of India's most successful deep-tech innovations (Patnaik, 2021).

1.2 Contextual Perspective

Numerous studies conducted by “International Journal of Science and Research (IJSR)”, “International Research Journal of Engineering and Technology (IRJET)” and “International journal of creative research thoughts (IJCRT)” shows that that the implementation of the UPI system was beneficial for the economies of the country. Based on these studies the launch of UPI, digital payments in India were primarily made through debit and credit cards, or through online banking platforms. These payment methods had several limitations, including the need for a physical card or access to a computer, and the need to remember multiple account numbers and passwords. UPI was developed with the goal of making digital payments more accessible and convenient for the average user. By using a mobile phone and a PIN, UPI lets users make financial transactions without a card or computer. This has helped drive digital payments in India, especially among those without access to traditional methods, according to IJSR research. When this technology was introduced, it attracted international investors who drove India's urbanization. Rise in restaurants, supermarkets, and street vendors. Based on these studies, NPCI conducted a pilot launch for this highly sophisticated payment system in India, costing $524,000 (Rs 200 crore) (ENS Economic Bureau, 2022).

1.3 Conceptual Perspective

Unified Payments Interface (UPI) is a digital payment system through which a user can both send and receive money through a Virtual Payment Address (VPA). It is a system that powers multiple bank accounts into a single mobile application (of any participating bank) (Tungare, 2019). The word COVID-19 comes from the coronavirus disease in 2019 which is a communicable respiratory disease caused by a new strain of coronavirus that causes illness in humans (this caused a lockdown in India). The definition of a retailer is a company that buys products from a manufacturer or wholesaler and sells them to end users or customers, A customer is a person who purchases goods and services for personal use. Effectiveness is

described as the capability of something to produce a desired result. In this research, the effectiveness of the UPI payment system after Covid-19 will be judged (Cambridge Dictionary, 2022).

1.4 Statement of the problem

The introduction of UPI was intended by the government for a push in the cashless society. The Indian government had encouraged the adoption of digital payments as a way to reduce the reliance on cash, which is expensive and logistically challenging to manage. UPI has made digital payments easier and more accessible for many Indians. Due to the second and third waves of the covid-19 pandemic, UPI payments became a temporary alternative while maintaining covid-19 SOPs. Therefore, it is essential to determine if the governments adoption of digital payments was boosted by the Covid-19 pandemic and if the implementation of UPI payments in Surat, India has eliminated the need for physical interactions in the transfer of money, if the payments for goods and services could be done through UPI with an ease, and if it was a practical alternative to physical payments for Indian citizens, which leads me to my research question ***"To what extent has Covid-19 boosted the use of Google Pay, a UPI (Unified Payments Interface) app, and how effective has it been for payments amongst retailers and consumers in Surat, India?"***

1.5 Purpose

The purpose of carrying out the research is to understand the impact of Covid-19 on the usage of Google Pay, a UPI app, and evaluate its effectiveness for payments among retailers and consumers in Surat, India. Specifically, the study aims to assess the extent to which the pandemic has influenced the adoption of Google Pay as a payment method, as well as its ease of use, security, and overall reliability. Additionally, the research seeks to gather insights into the challenges that retailers and consumers may face when using Google Pay, such as technical issues, network connectivity problems, and potential security threats.

1.6 Methodology and scope

I used a combination of secondary as well as primary research. For my secondary source of data I used a report of transactions from the NPCI (National Payments Corporation of India) from April 2016 to August 2022 and a newspaper article by Live mint to get the general public's opinion (Mint, 2022). "International Journal of Science and Research (IJSR)". For my primary data collection, I used online questionnaires (google forms) to conduct an in-depth survey. The users of the UPI system were sent a google form link, out of which I interviewed a few of them to get more explanation on their choice of answer. I conducted some interviews with different type of shop retailers (grocery shop, Online tutor and an electronic shop) this data helped me understand and get an in-depth analysis experiences faced and the effect before and after the lockdown by them related to UPI payment systems.

Google forms were useful for my research because they allowed me to get data of a wide population all around the city (by sending a link and asking to share) without using a lot of time. Also, because respondents' identities were protected, they were more likely to give neutral feedback. However, follow-ups could not be conducted via questionnaires. To dive even further into the perspective, I used interviews. Although interviews improved data quality, the sample size was limited due to the time-consumption and the possibility of bias and nervousness of certain respondents.

2. How the system works?

2.1 How Google Pay work

Download and setup: To use Google Pay, users must download the app from the Google Play Store or Apple App Store and set up an account using their bank-linked mobile number. To verify transactions, they must create a UPI PIN.

After setting up the account, users can add one or more bank accounts to Google Pay using their registered mobile number.

The app lets users send and receive money. Sending money requires entering the recipient's UPI ID or mobile number, the amount, and the UPI PIN. Users must give senders their UPI ID or mobile number to receive money.

Payment requests: Google Pay lets users ask other users for money. The recipient approves and sends the money.

Bill payments: Google Pay lets users enter their utility bills, mobile recharge, and other bills to pay them.

Google Pay offers cashback and rewards for transactions. Sending money, paying bills, and participating in promotions earns cashback and rewards.

2.2 About Google Pay

Google Pay is a digital payment system that uses the UPI technology. You can use it to pay in stores and web-based payments. To utilize Google, Pay, users link their credit card, debit card, or bank with their Google Pay account and then make purchases using that method in-store or online. Google pay has a limit of 10 transactions per day it also has transfer limit from ₹5,000 to ₹25,000 transaction limit (depending on the user's bank) and from ₹5,000 to ₹100,000 daily limit (depending on the user's bank) (Contributor, 2019).

Google Pay features sending and receiving money between people and businesses, paying utility bills like electricity, gas, water and many others. You can even pay for a landline, mobile, and broadband, Google Pay also offers rewards and cashback benefits.

Alphabet Inc, the parent company of Google, owns the Google Pay brand. Google pay has its headquarters in New Delhi. Over 150 million people across the world use Google Pay (Ians,

2022). The users are split into two groups, businesses and individual users. Businesses such as a grocery store, food vendor, pharmacy, or any other type of businesses primarily use google pay to collect payments and monitor daily revenue. On the other hand, individual users might use Google Pay to make quick payments without using cash or credit/debit cards.

2.3 Stake holders and role in the UPI payment system

NCPI: The NPCI runs the UPI payment system. It regulates UPI transactions and manages the technical infrastructure.

Participating banks: UPI-enabled banks let customers send and receive payments. Indian public and private banks participate.

Merchants and consumers: Use UPI-enabled payment service providers (PSPs). They facilitate UPI transactions between banks and customers with a simple interface.

Merchants: UPI payments are accepted by merchants. Merchants can securely receive payments without cash or cards using UPI.

Consumers: UPI lets consumers pay merchants, transfer money, and pay bills. UPI lets consumers make cashless digital payments quickly and easily.

2.4 Conceptual framework of how Google pay works

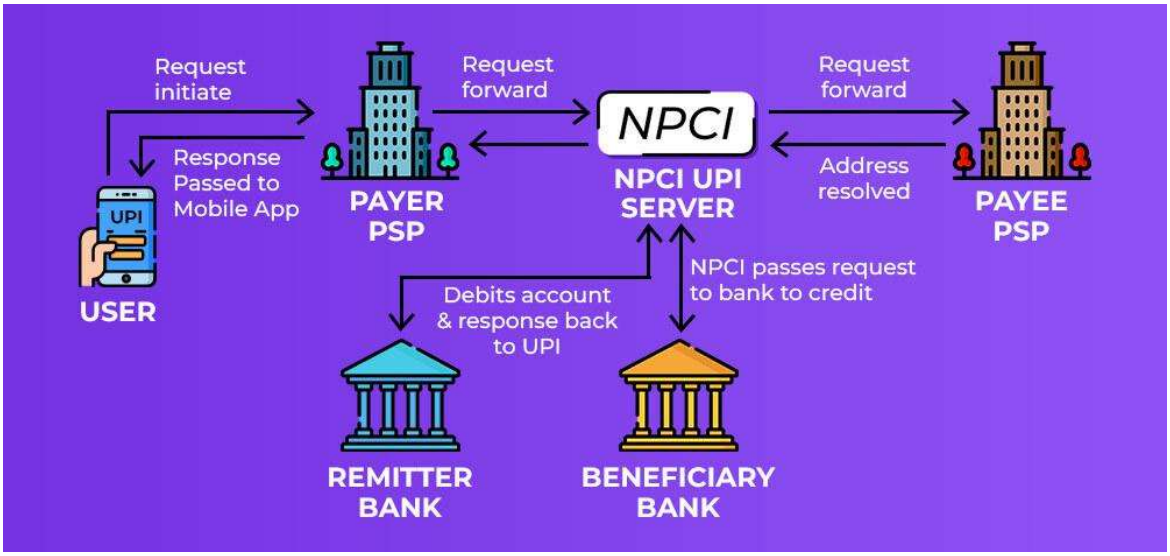


Figure 2.41: Diagram showing how a Google Pay transaction is carried out.

Source: (GeeksforGeeks, 2022)

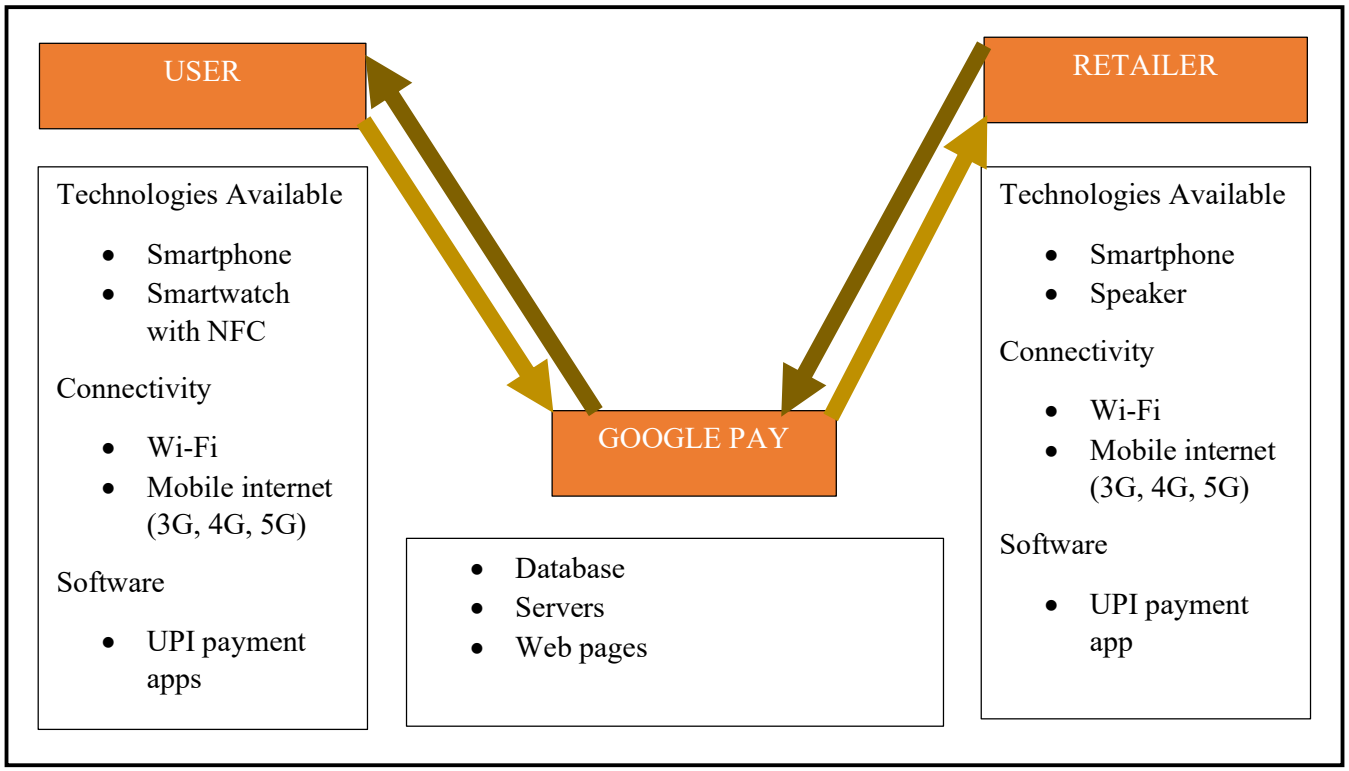


Figure 2.42: Diagram showing converging technologies needed to successfully use Google Pay. *Source: (self-generated)*

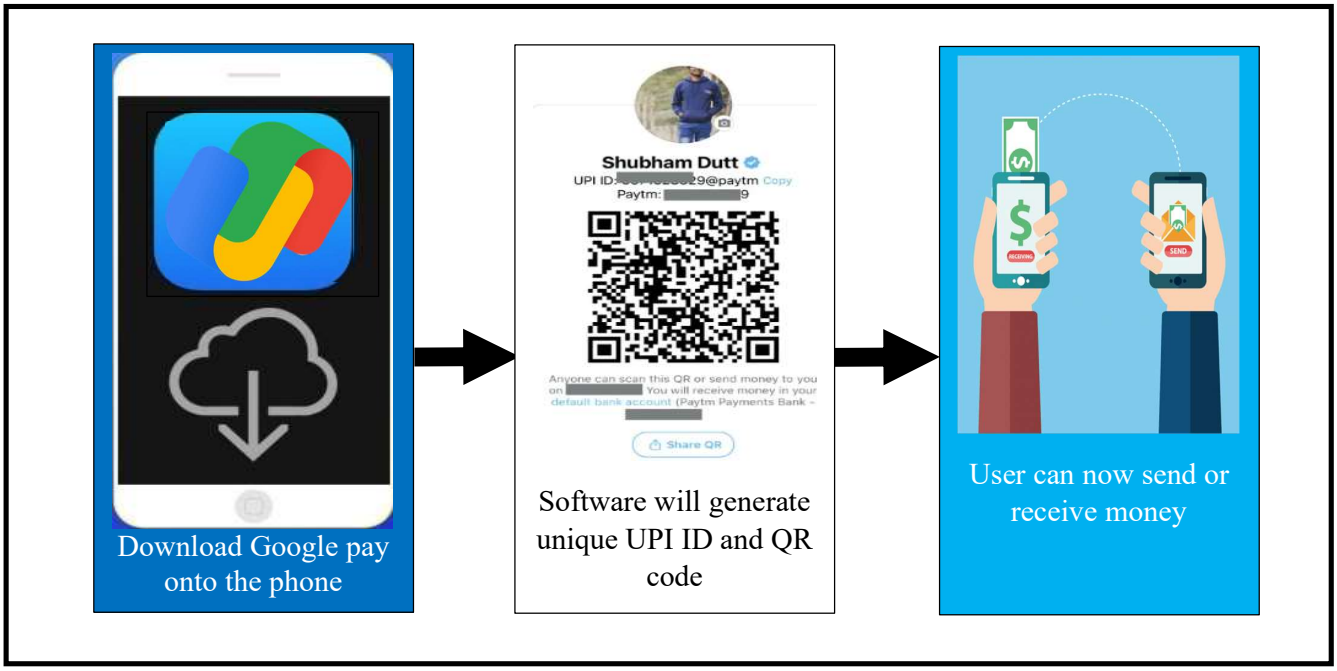


Figure 2.43: Diagram showing how Google Pay works from the user end. *Source: (self-generated)*

Money Sending and Receiving Image (Money Sending and Receiving Image [Digital Image], 2022)

UPI ID Screenshot Image (UPI ID Screenshot Image [Digital Image], 2022)

Phone Icon (Phone Icon [Digital Image], 2017)

2.5 Hardware specifications for Google pay to function

Minimum Hardware Specification for Google Pay			
Google Pay on Android		Google Pay on IOS	
Component	Requirement	Component	Requirement
Processor	Clock speed above 1.5 GHz	Processor	Apple A8
Memory	3GB RAM	Memory	1GB RAM
Storage	250MB available storage	Storage	200MB available storage
Camera	12 MP	Camera	8 MP
Network/COMMS	GSM / CDMA / HSPA / LTE / Wi-Fi 802.11 a/b/g/n/ac, dual-band	Network/COMMS	GSM / CDMA / HSPA / EVDO / LTE / Wi-Fi 802.11 a/b/g/n/ac, dual-band
Software Version	Android 5.0 (Lollipop)	Software Version	iOS 12.0.0

Table 2.51: Hardware specification for Google Pay on a smartphone *Source: (self-generated)*

2.6 Installation and logging in /sign up process

After the application has been installed, when you open the app a log-in or registration page will appear (See figure 2.1).

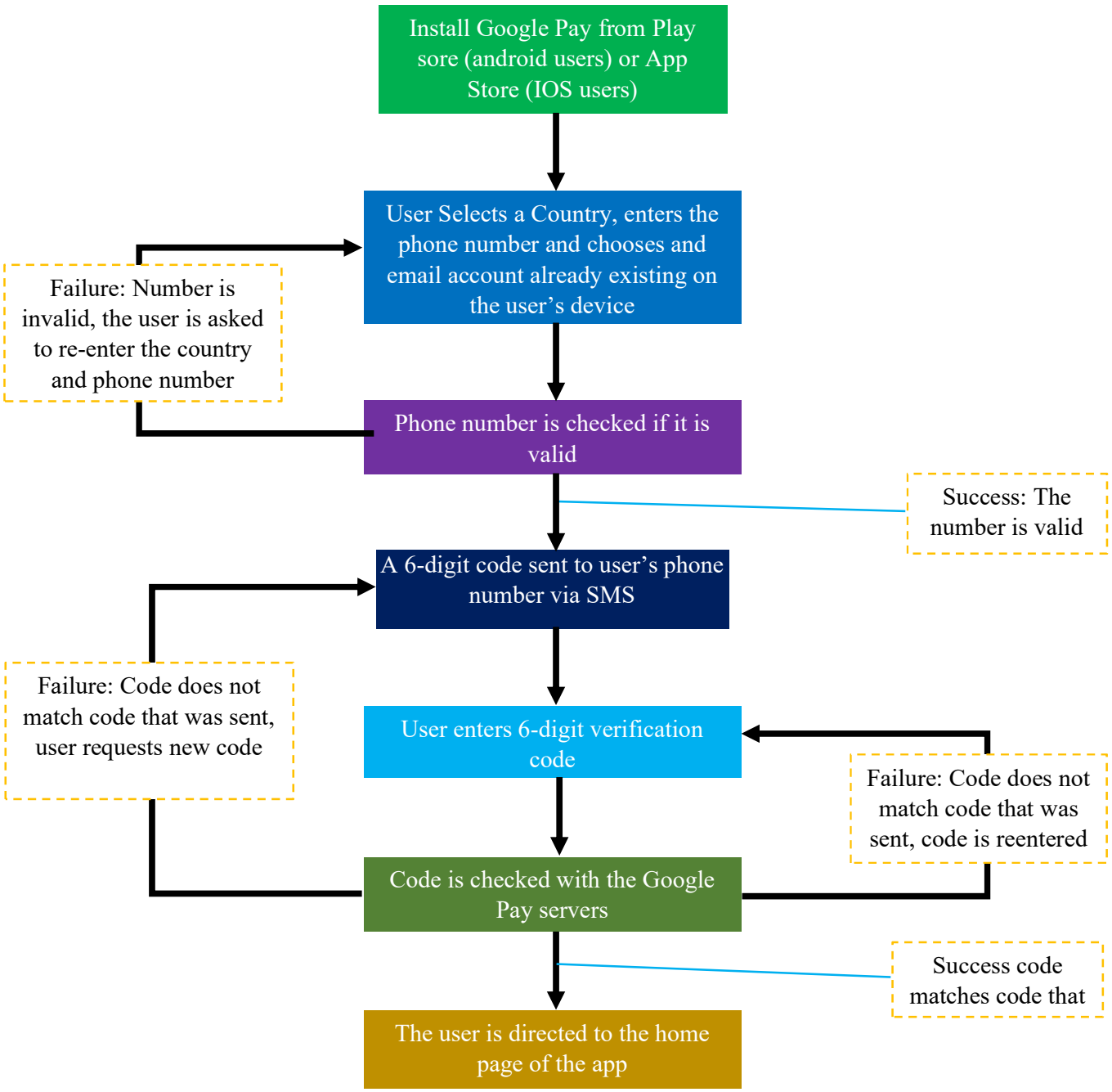
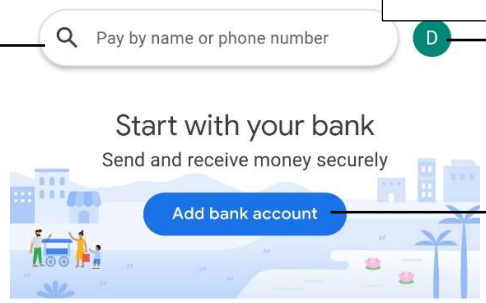


Figure 2.61: Flow diagram showing Sign up/ Log in process of google pay *Source: (self-generated)*

2.7 Screen options and layout of different windows

Figure 2.71: shows app interface on google pay homepage *Source: (self-generated)*



Search bar to search for business or person by name and to carry out transactions like requesting, sending money or splitting bills

Button for Profile Screen to view user-profile, and additional settings

Button to link bank account

Button to scan QR code to pay retailers

Button to pay someone from your contact list

Button to pay using UPI ID or UPI number

Button to transfer money from users one bank account to another

Button to Pay and use online app services through google pay app for quicker payment

Button to pay money to a phone number

Button to recharge bundle on phone number

Button to pay utility bills

Quick toggle button to carry out payments made with regular people

Quick toggle button to carry out regular payments

Promotions to promote the app

Button to view the balance in the bank

Button to show recent transactions made

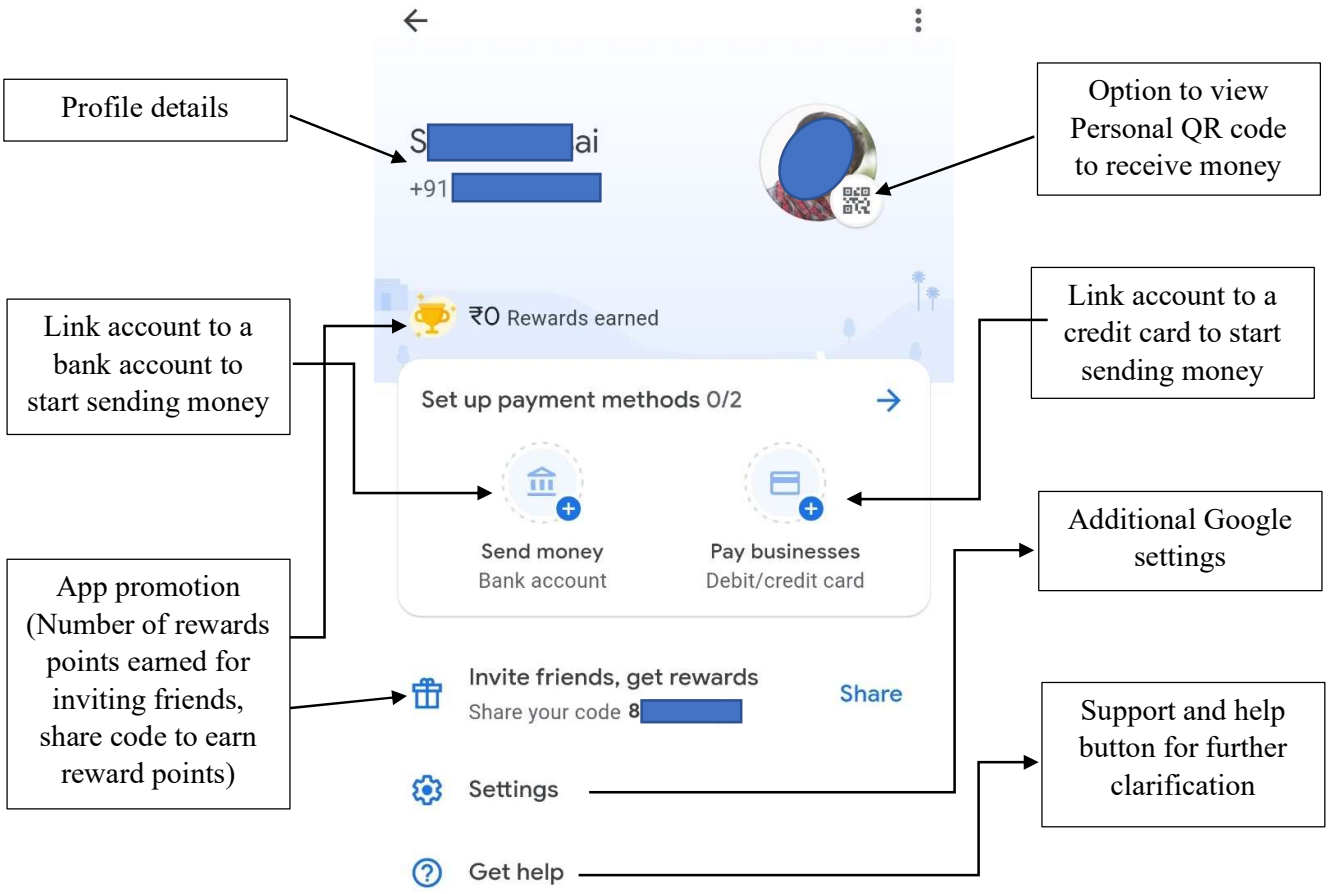
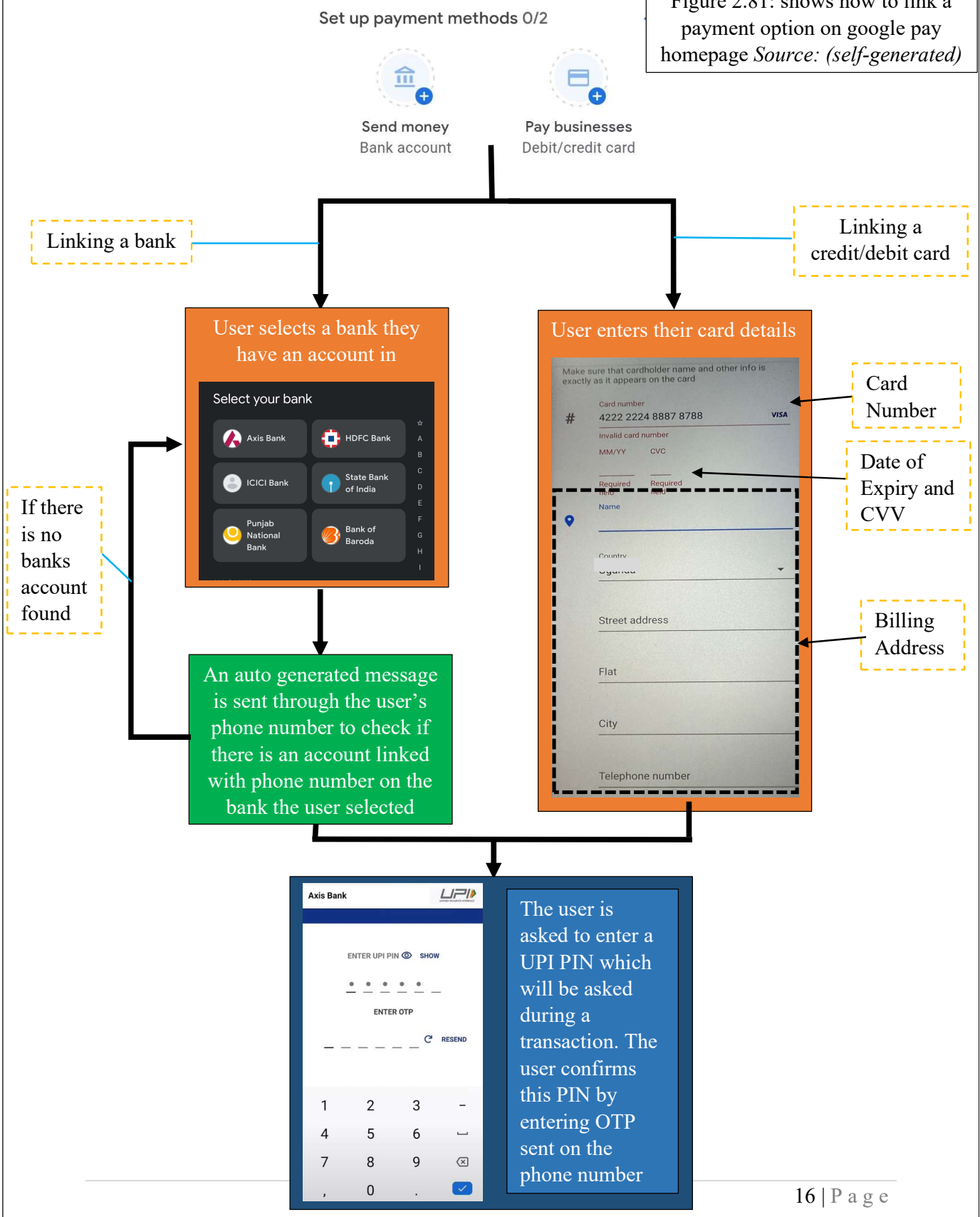


Figure 2.72: shows navigations available on google pay profile page *Source: (self-generated)*

2.8 Linking google pay with a bank/credit or debit card

Figure 2.81: shows how to link a payment option on google pay homepage *Source: (self-generated)*



2.9 Scanning QR codes

Google pay Opened after installation

A prompt notification appears requesting permission for Google Pay to access the camera of the device.

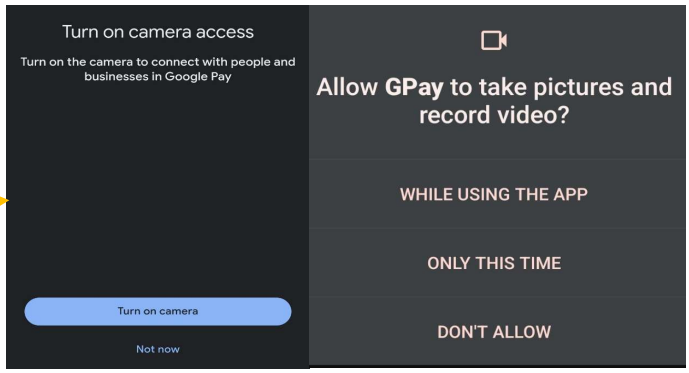


Figure 2.91: shows an Access Camera Permission Screenshot

If user doesn't allow the permission

If allows the permission

User redirected to Main-screen

Home screen appears

User clicks "Scan Any Qr Code" button to scan QR code

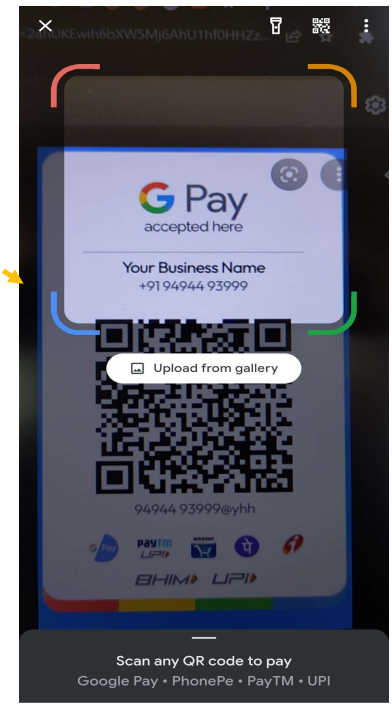


Figure 2.92: Flow diagram showing how to scan a QR code on google pay *Source: (self-generated)*

2.10 How the transaction occurs

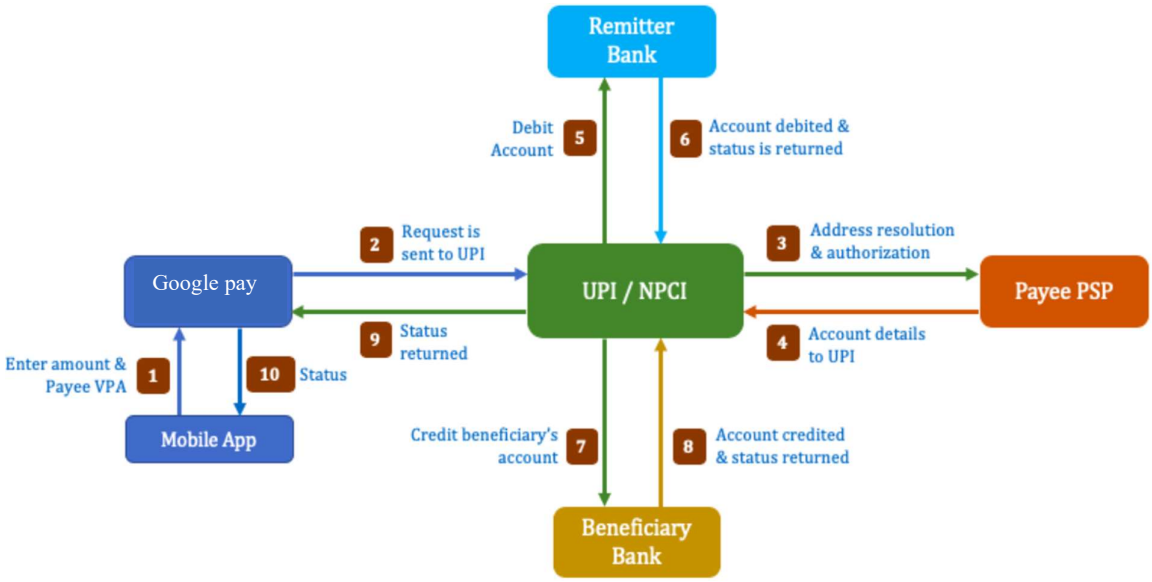


Figure 2.101: A diagram showing how a UPI payment occurs Source: (Sambodhi, 2021)

2.11 Payment through QR Codes

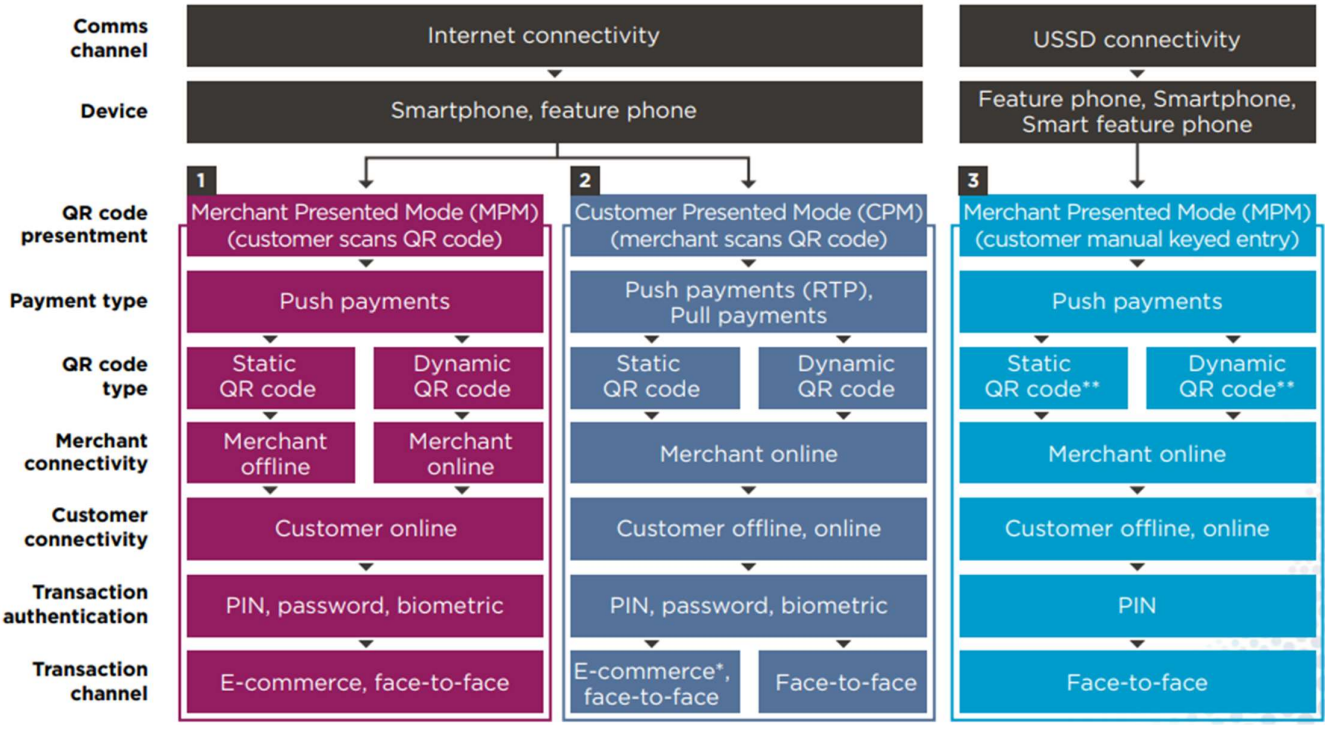


Figure 2.111: A diagram showing ways of QR code payment to a merchant Source: (GSMA et al.,2022).

Method 1: Merchant presented mode (customer scans QR code)

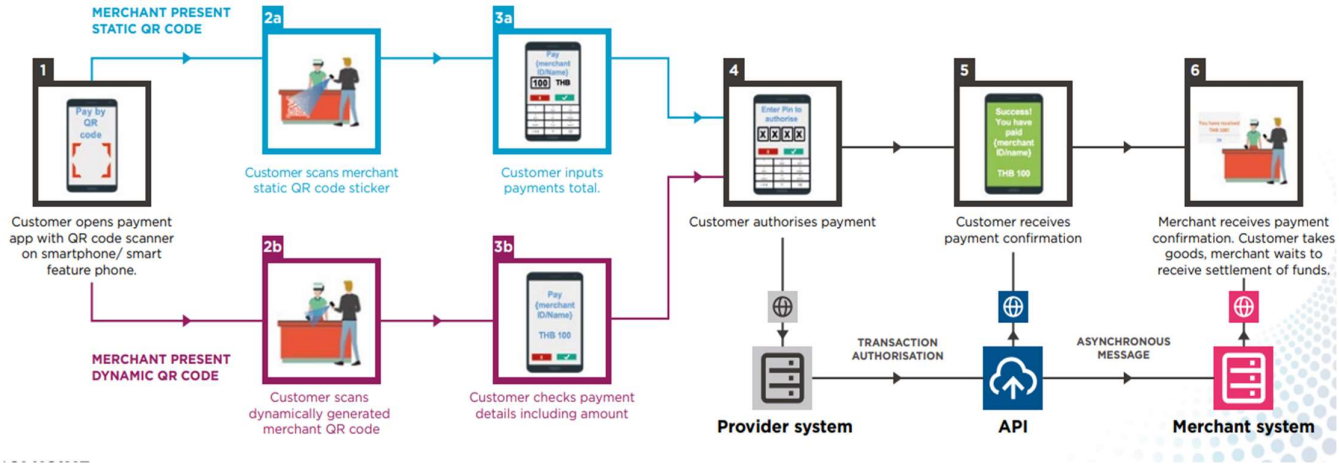


Figure 2.112: Showing diagrams of different ways to pay through a QR code to a merchant

Source: (GSMA et al., 2022).

Method 2: customer presented mode (merchant scans QR code)

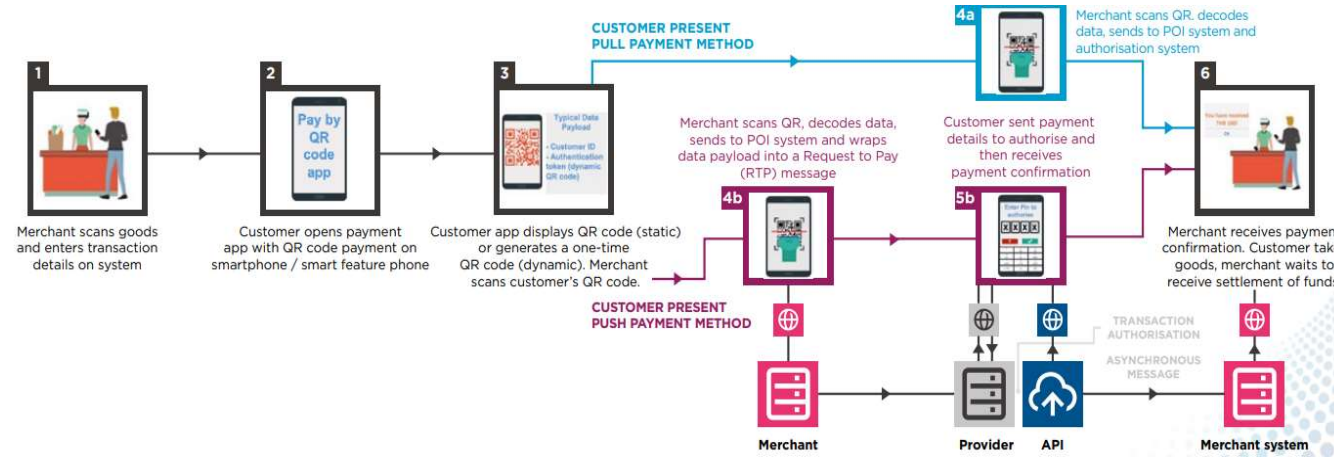


Figure 2.113: Showing diagrams of different ways to pay through a QR code to a merchant

Source: (GSMA et al., 2022).

Method 3: USSD

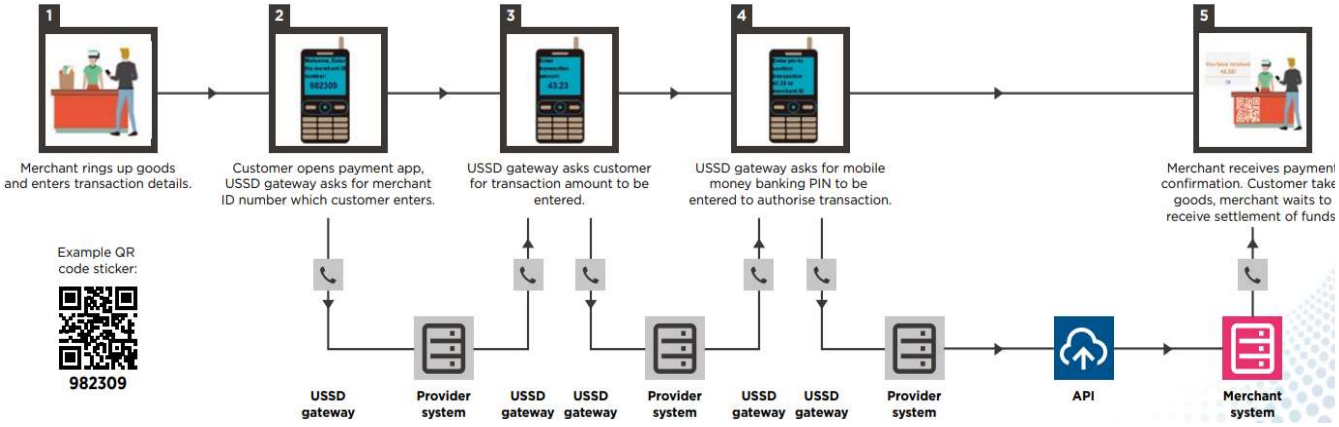


Figure 2.114: Showing diagrams of different ways to pay through a QR code to a merchant

Source: (GSMA et al., 2022).

2.12 UPI Push and Pull payments

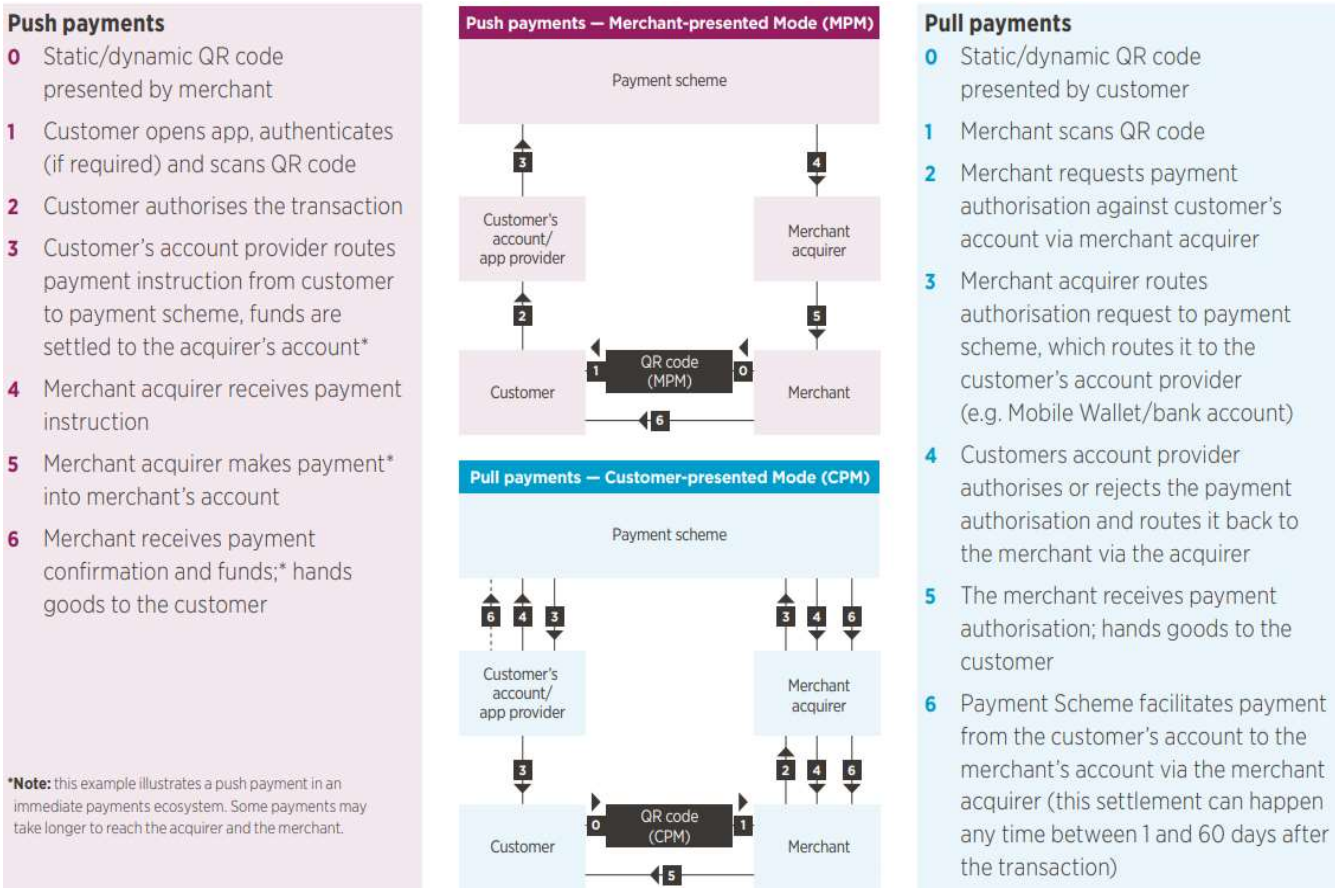
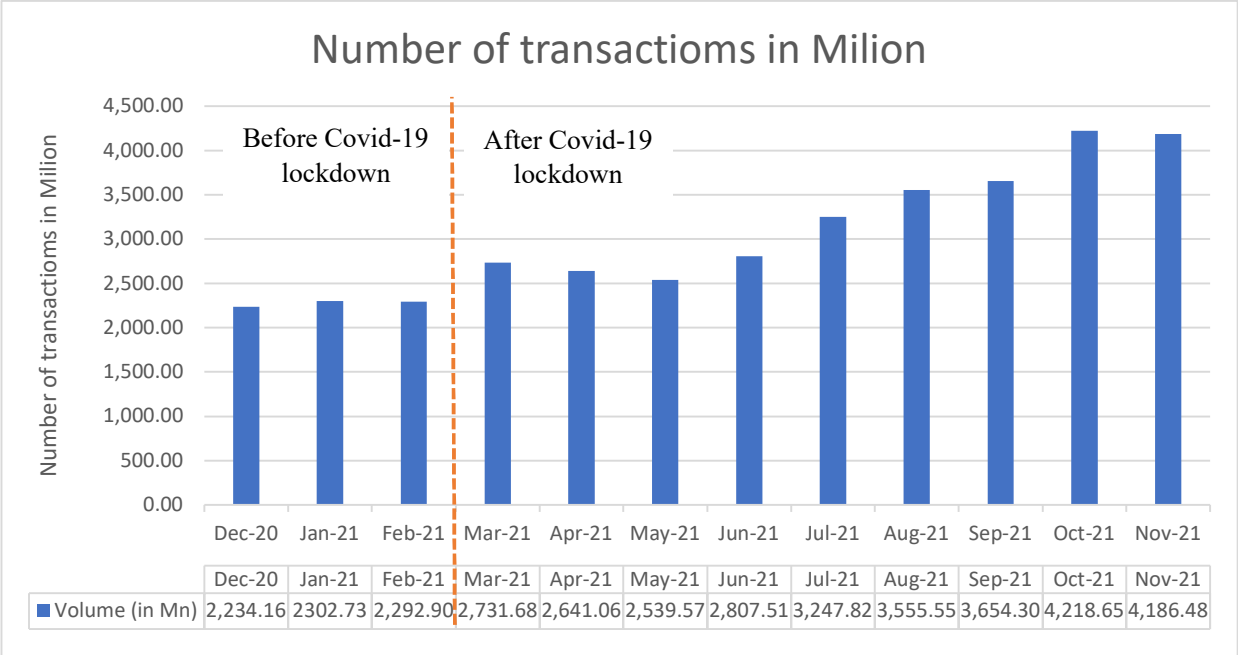


Figure 2.121: Showing technical flows in push and pull payments

Source: (GSMA et al., 2022).

3. Secondary Data Analysis

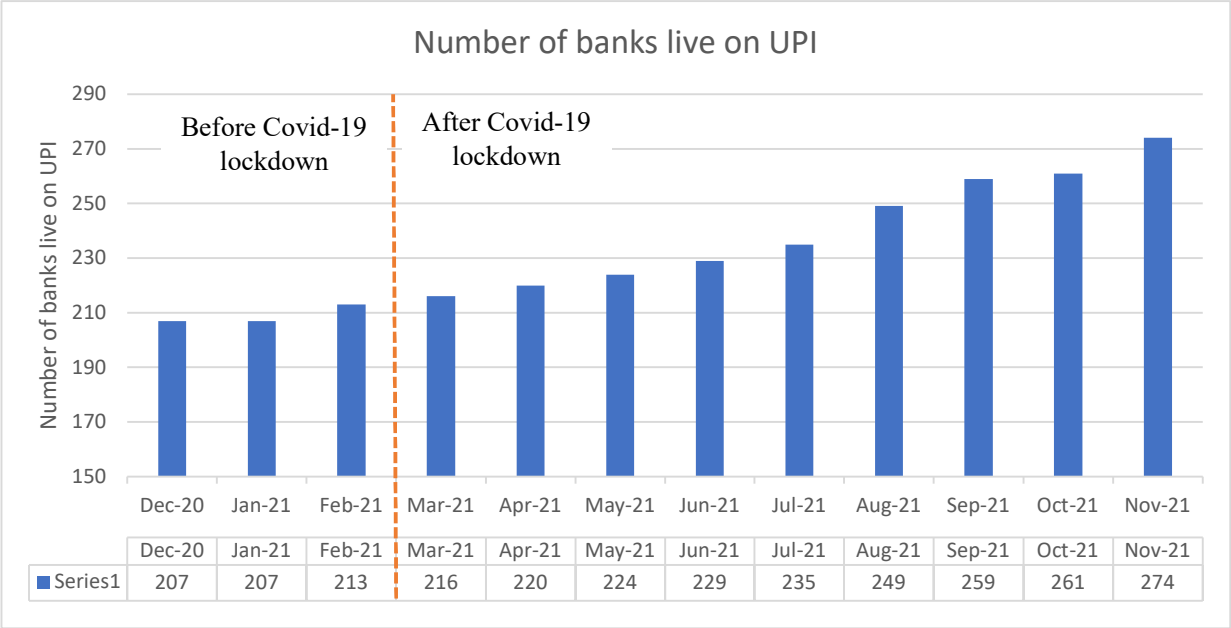
3.1 Number Transactions carried using UPI



Graph 3.11: Showing Number Transactions carried using UPI *Self-generated from table 1 in appendix 1*

As can be seen in Graph 3.11, the use of UPI payment systems in India had been on a rise since March 2021, after the Covid 19 lockdown. Sending and receiving digital payments through the UPI eliminated the need for physical interactions in the transfer of money. Payment for goods and services could be done through UPI which helped in reducing the contact of money and maintaining social distancing. In March 2021, there was a significant increase in the number of transactions.

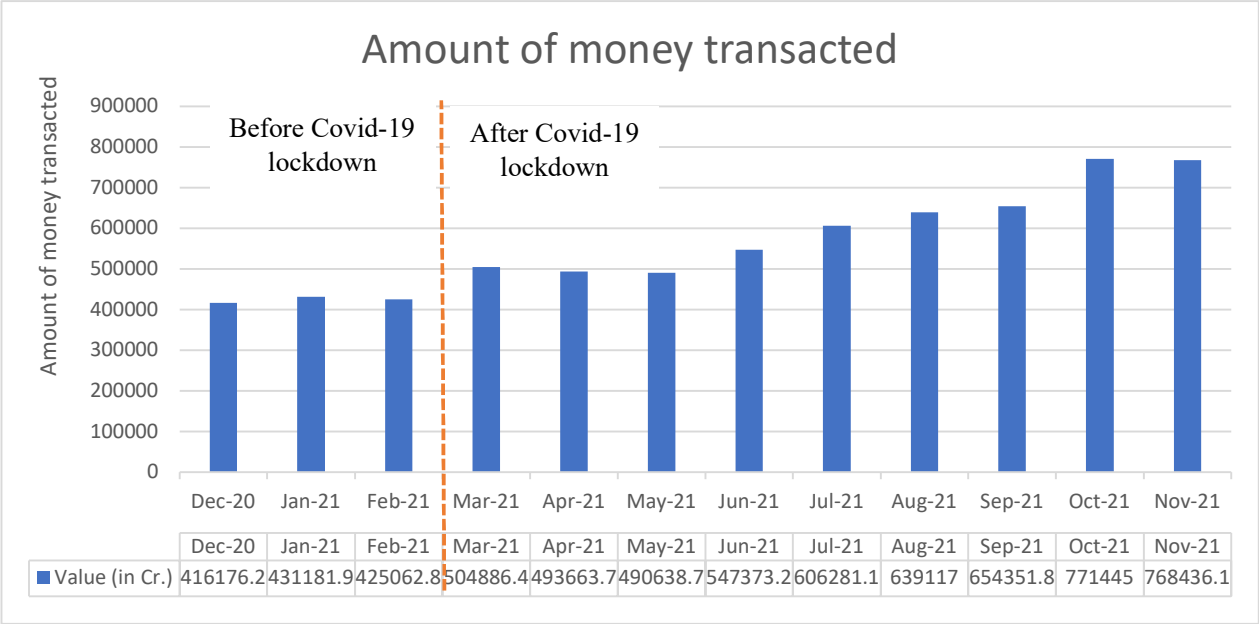
3.2 Number of banks live on UPI



Graph 3.21: Showing Number of banks live on UPI *Self-generated from table 2 in appendix 1*

As Covid-19 spread and other countries implemented lockdown, more banks started using UPI technologies, making it easier for users to use this system. In December 2020, 207 banks joined. Due to Covid-19, 67 more banks joined UPI, making it more accessible. However, banks may enrol because UPI is a convenient function for a large population.

3.3 Amount of money transacted



Graph 3.31: Showing Amount of money transacted using UPI *Self-generated from table 3 in appendix 1*

According to the graph above, UPI payments increased by 73% during lockdown due to COVID-19 and its protocols. Users may prefer to send large amounts online because it's dangerous to carry a lot of money.

This takes my analysis further to primary data analysis.

4. Primary Data Analysis

In this analysis, I will be presenting the results from the questionnaire I carried out. I used Google forms to carry out the survey which was also used for compilation and analysis of the data.

4.1 Section A: Respondent's Background

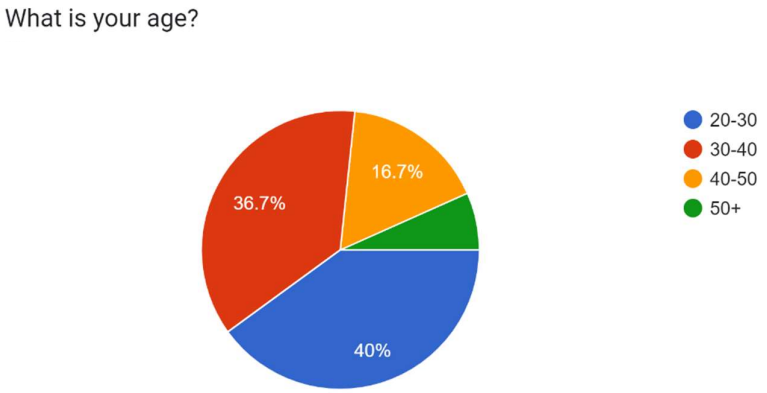


Figure 4.11: Shows the age of the people who took the survey.

Source: Self-Generated (through Google forms).

From the figure 4.11, most of the respondents were aged between 20 and 40 (77%) which shows most users over the age of 40 still use other payment options and not UPI.

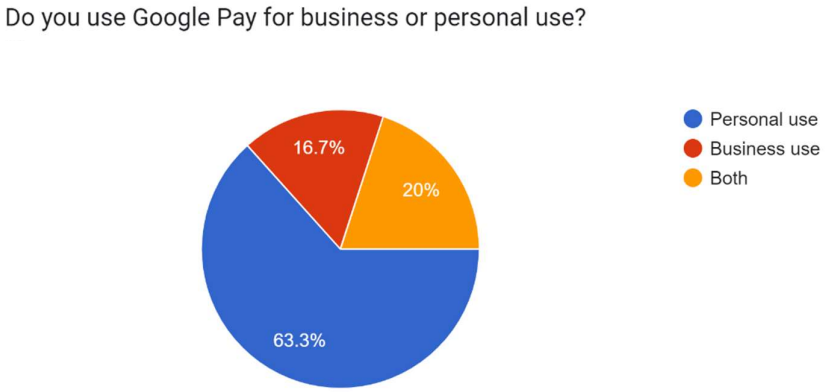


Figure 4.12: Shows what the respondents use Google pay for.

Source: Self-Generated (through Google forms).

From figure 4.12, most users use Google pay for their personal use (83%) which shows that the current UPI users use this system by choice and not due to the convictions of businesses forcing on consumers.

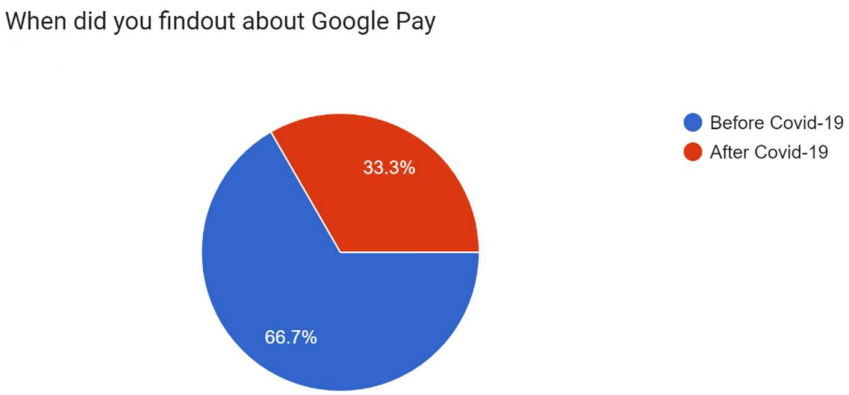


Figure 4.13: If the respondent found out about Google pay before or after Covid-19

Source: Self-Generated (through Google forms).

From figure 4.13, we see that (33%) of people found out about UPI payments after Covid-19 which shows Covid-19 did have an impact on the number of consumers.

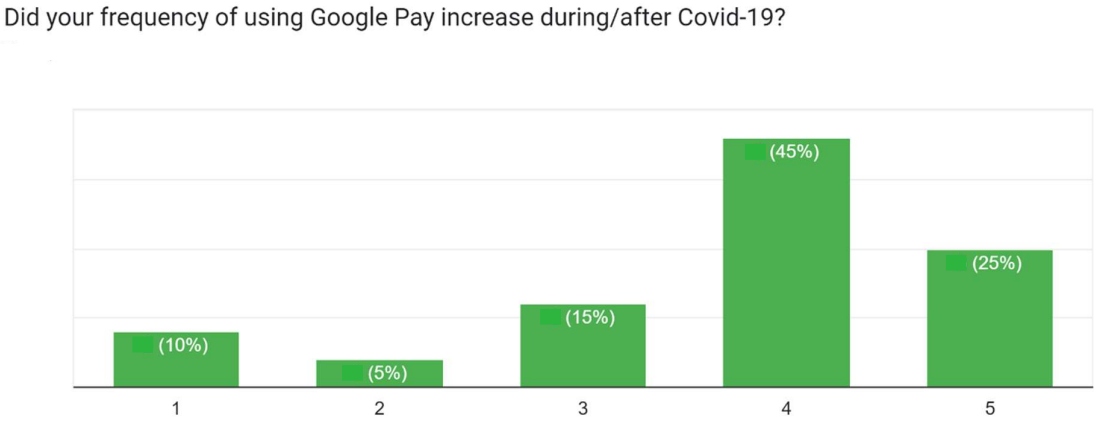


Figure 4.14: Shows if the respondents frequency increased during Covid-19.

Source: Self-Generated (through Google forms).

Figure 4.14 shows that 70% of users used Google pay more after Covid-19 which again shows Covid-19 had an impact on UPI payments.

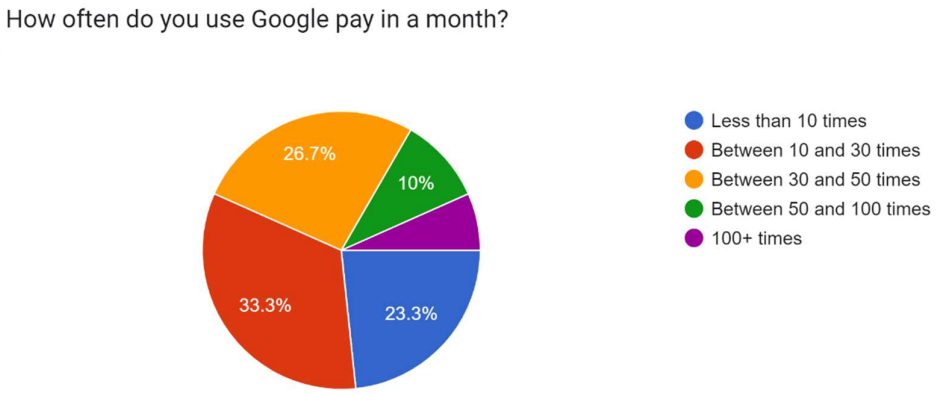


Figure 4.15: Shows how often the respondents use Google Pay.

Source: Self-Generated (through Google forms).

Figure 4.15 shows that most respondents use Google Pay around 10 to 50 times in a month (60%) which means that most of the people haven't completely shifted to using UPI and are still using other forms of payment over UPI.

4.2 Section B: Effectiveness of the system (Google Pay)

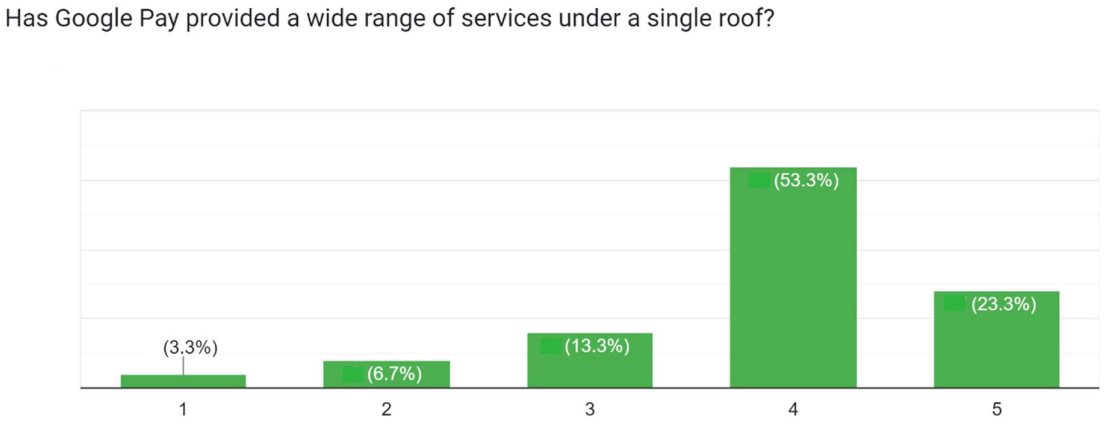


Figure 4.21: Shows if Google pay covers most of the payment services in their app.

Source: Self-Generated (through Google forms).

Figure 4.21 shows that 77% of the users find the Google Pay app very effective and the app covers most of their payments.

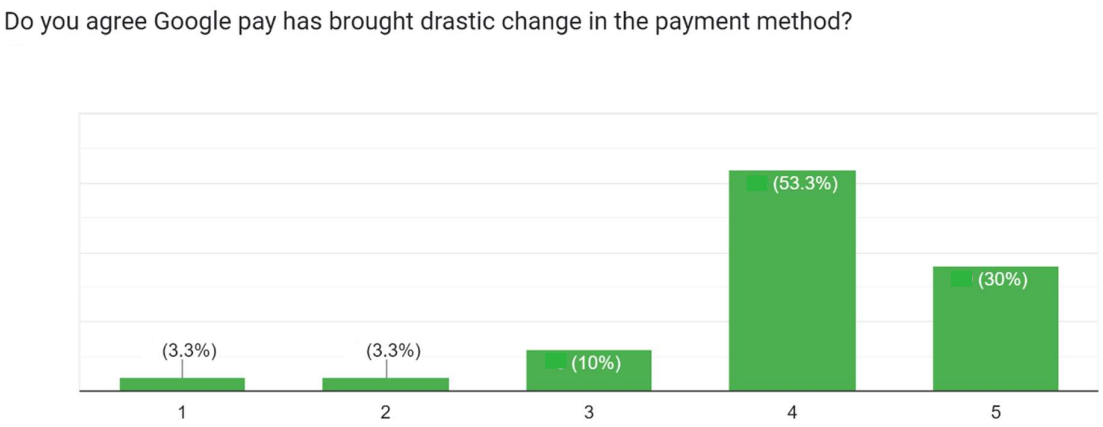


Figure 4.22: Shows if Google pay has brought a drastic change in payment method.
Source: Self-Generated (through Google forms).

Figure 4.22 shows that most respondents think Google pay has brought a big change to the payment method hence proving that the system is very effective.

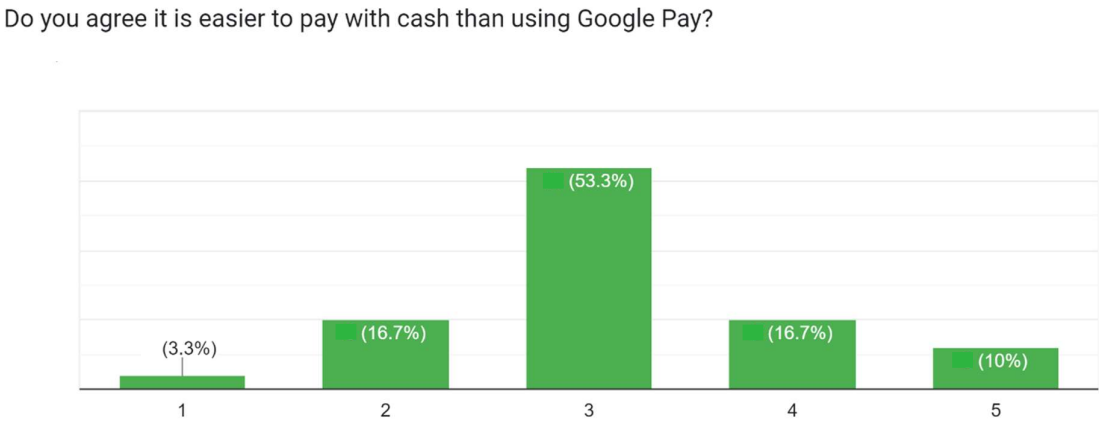


Figure 4.23: Shows if respondents find it is easier to use Google pay or cash.
Source: Self-Generated (through Google forms).

Figure 4.23 shows that most respondents are neutral although feel Google pay is a bit more easier proving the system is very slightly effective.

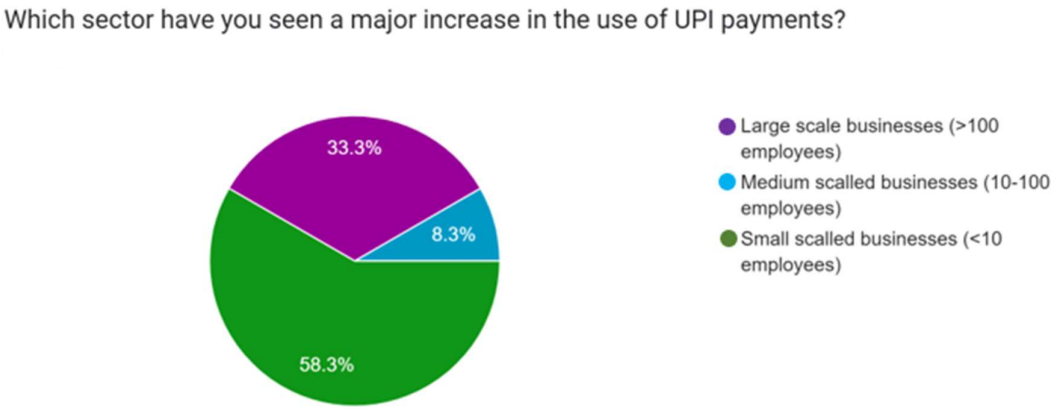


Figure 4.24: Shows which sector uses UPI payments the most

Source: Self-Generated (through Google forms).

Figure 4.24 shows that there are more retailers using Google pay which means more consumers can use this technology hence making the system is effective.

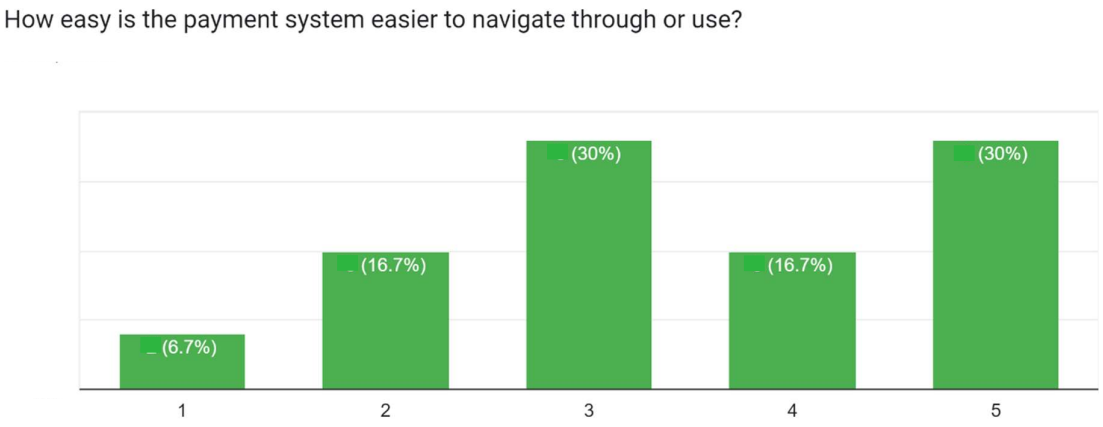


Figure 4.25: Shows if the respondents find Google Pay easy to navigate or not.

Source: Self-Generated (through Google forms).

Figure 4.25 shows Google pay is a mid-user-friendly application which makes the system is slightly more effective.

4.3 Section C: Security of the system (Google Pay)

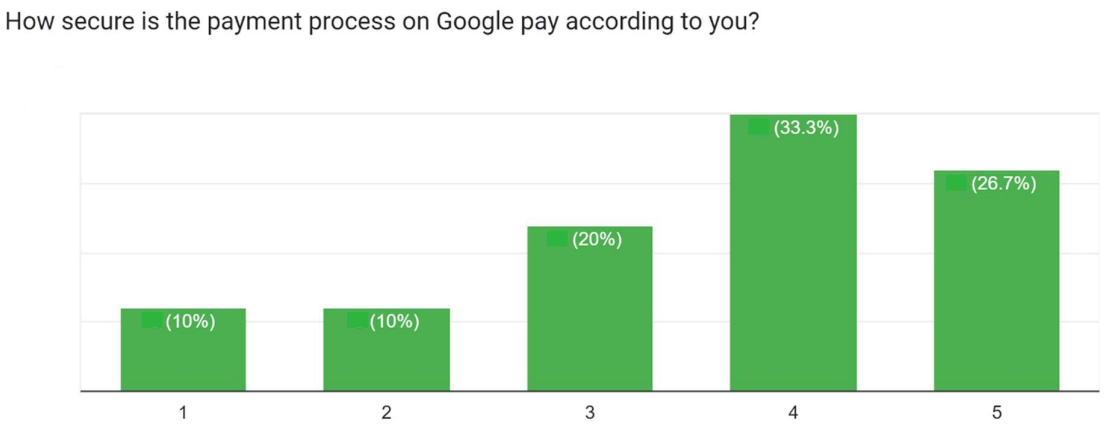


Figure 4.32: Shows if the respondents find the payment process secure.

Source: Self-Generated (through Google forms).

Figure 4.32 shows 60% of the respondents find that Google Pay has a secure payment procedure.

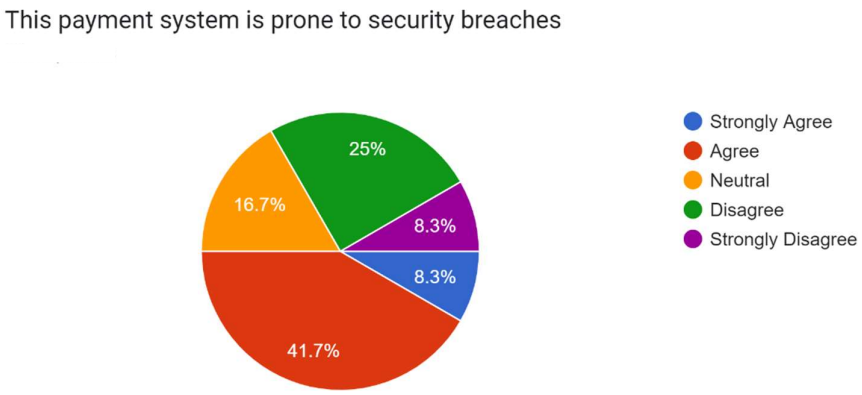


Figure 4.33: Shows if the respondents think Google Pay is prone to security breaches.

Source: Self-Generated (through Google forms).

Figure 4.33 shows 60% of the respondents believe that Google Pay is prone to a security breach means most users don't have a lot of confidence in the security measures taken by Google.

Figure 4.31: Shows if the respondents have been a part of a Google Pay fraud.

Source: Self-Generated (through Google forms).

Figure 4.31 shows 13% of the respondents have been a part of a Google Pay fraud, 13% isn't a big number but it is a concern for Google pay users.

4.4 Section D: Reliability of the system (Google Pay)

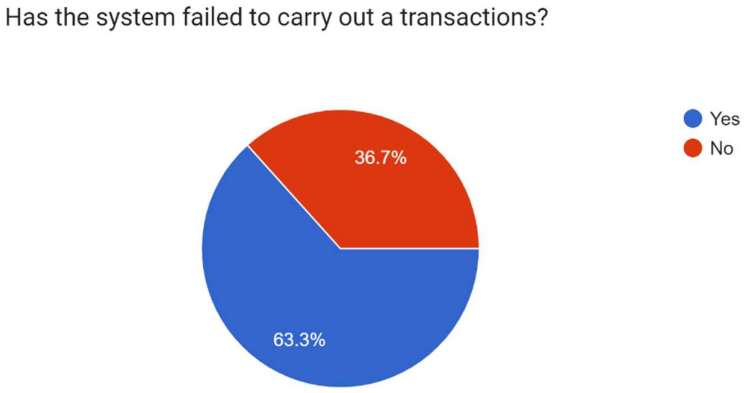


Figure 4.41: Shows if the respondents have failed to carry out a transaction.

Source: Self-Generated (through Google forms).

Figure 4.41 shows that Google Pay is not very reliable and 63% of the respondent's transaction did not go through which makes users stick to old payment methods which are way more reliable similar results were obtained.

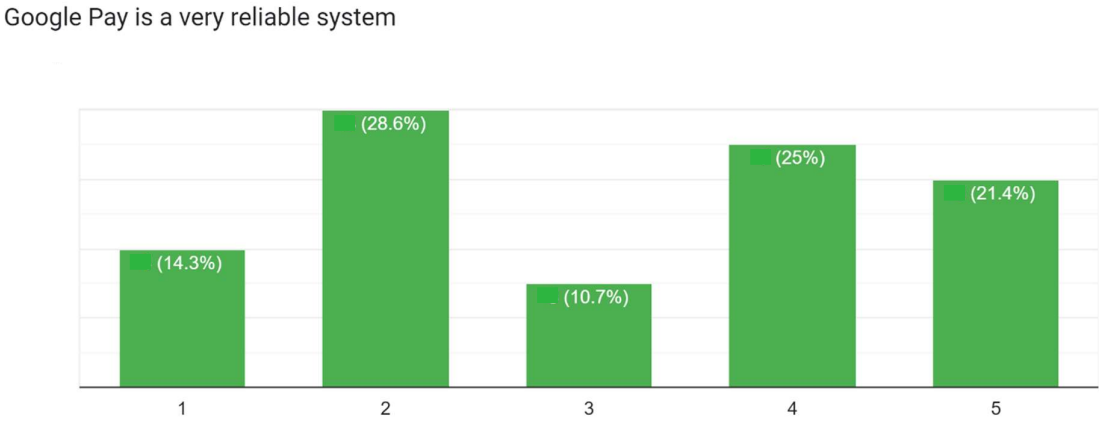


Figure 4.42: Shows if the respondents think Google Pay is a reliable payment system.

Source: Self-Generated (through Google forms).

From figure 4.42 as only 46% of respondents found Google pay reliable.

4.5 General rating of the system (Google Pay)

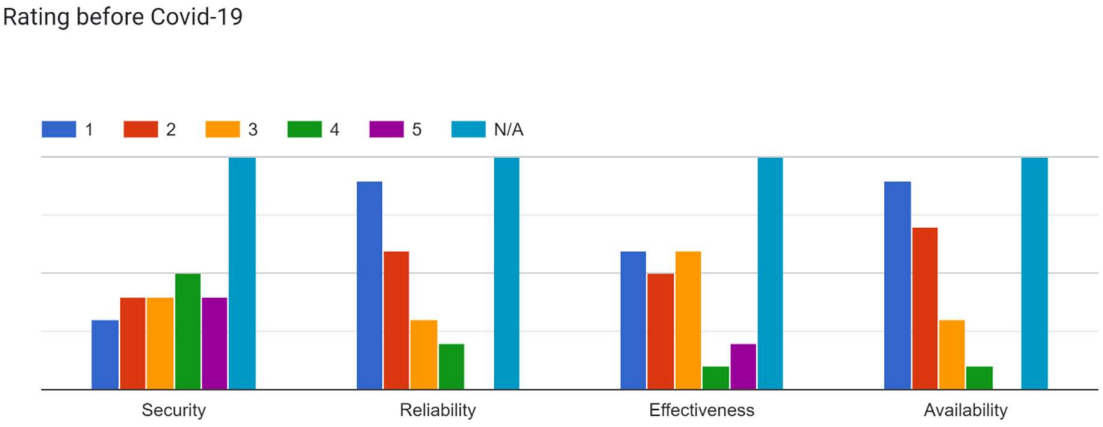


Figure 4.51: Shows how respondents felt about the system before covid-19.

Source: Self-Generated (through Google forms).

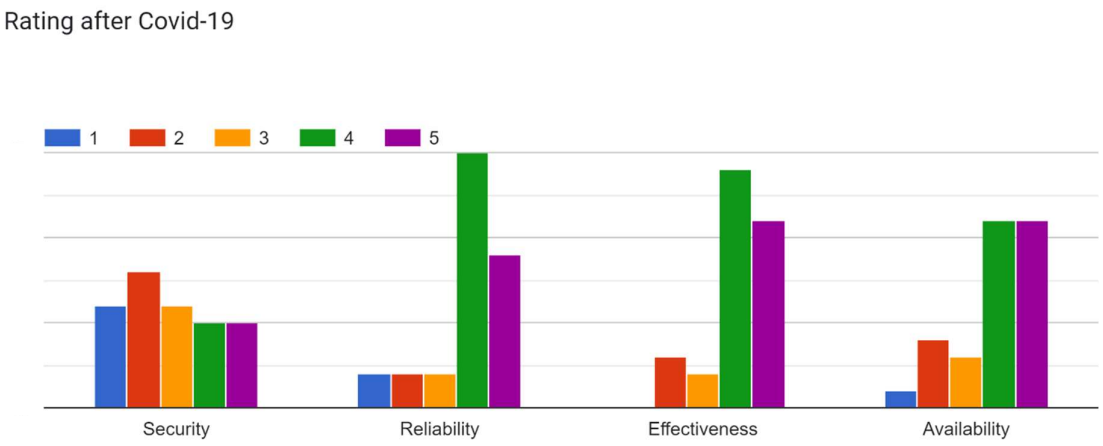


Figure 4.52: Shows how respondents felt about the system after covid-19.

Source: Self-Generated (through Google forms).

From figure 4.51 and 4.52 we see that more people find the security of rating after covid-19 less as they there have been more users hence more hackers desperate to hack which is the reason for higher votes on lower security. From the interviews conducted the users also claim that the system has become more reliable after covid-19 this maybe be due to Google finding it necessary to make the system more reliable and less prone to errors. The system got more effective as users found it easy to pay most of their payments through the app. Users also found Google pay more available after covid-19 as the number of retailers using UPI increased.

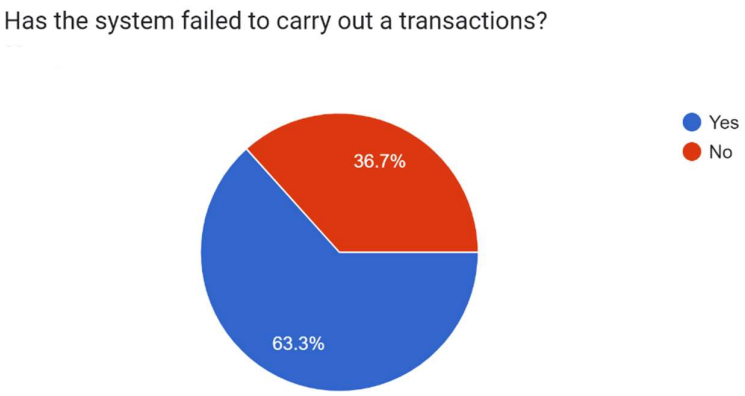
5. Social and Ethical Issues

5.1 Reliability

Reliability refers to the ability of a computer system or software application to perform its intended functions consistently and accurately, without errors or failures. (Gray, 2013)

The level of ultimate confidence in the machines' value depends on how well they can be functioned. In this instance, a significant portion of UPI payments are dependent on the

transaction's viability. To begin with, it is important to analyze the likelihood of the payments not going through.



From the graph above it is noted that 63% of users have had problems carrying out transactions.

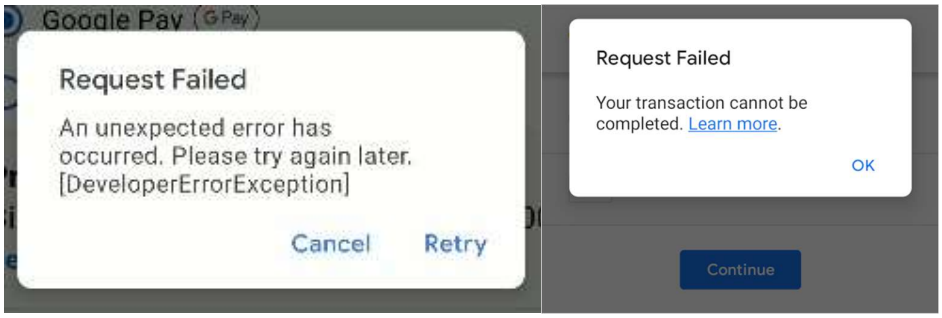


Figure 5.11: Shows a screenshot of a transaction error on google pay

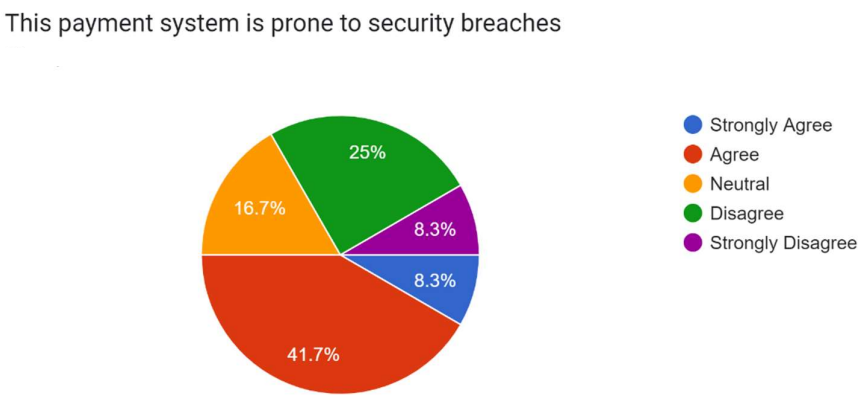
Source: Google pay error [Digital Image]. (2021)

When Google Pay was newly released most of the payments were not going through due to slow servers and a lot of transactions taking place. Additionally, from the interview in appendix 3C the retailer claims it has not been very effective for the due to the transaction limit.

Google pay claims to have a very strong UPI payment system with no down time and errors unless it is by the users.

5.2 Security

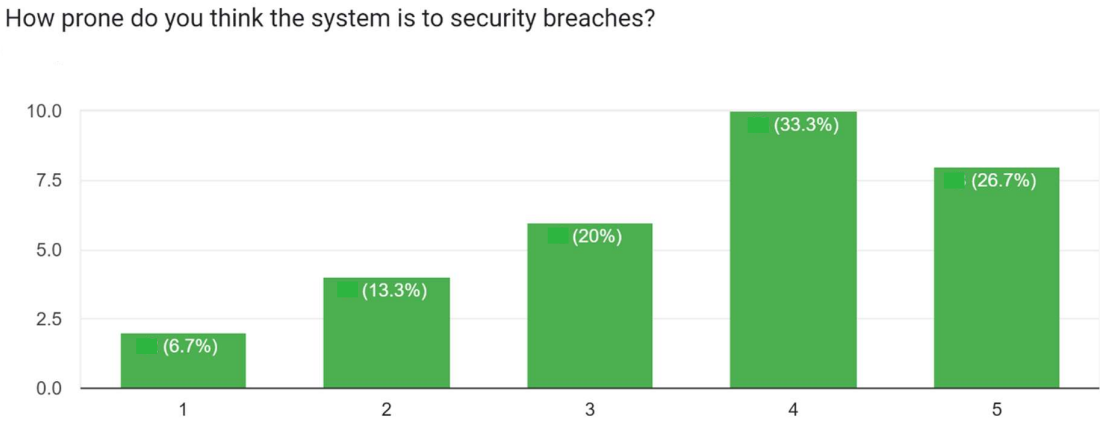
Security refers to the protection of computer systems and data from unauthorized access, theft, damage, or disruption. (Gray, 2013).



The majority of respondents did not have confidence in the safety precautions that Google Pay takes to protect their financial transactions. This is a significant drawback considering that the system has only been fully operational for over three years. Although, so far there has not been any security breaches encountered up to this point, if any breaches occur, the chances of data of user's personal information like card number and personal identities being leaked are high. From the interview in appendix 3A a user claimed that as Google is a big company there are many hackers trying to obtain their data.

"The most significant benefit of using a server hosted in the cloud is that, in spite of the fact that certain data centers housing computers could go offline, it is quite unlikely that the cloud server as a whole will become inoperable" (McIntosh, 2012). However, due to the fact that it

is online, the cloud is always at risk of being attacked from the outside by cybercriminals or gaining unauthorized access.



From this response it is clear that the users are certain that there will be a security breach from Google Pay as even in the system majority of the rating said that it is prone to attack.

From the interview and the questionnaire, a major security issue of UPI frauds was spotted. For example, Misleading UPI handles – where many fraudsters set up bogus accounts with names that resemble those of other companies in the hopes that money will be sent accidentally. Request Money fraud – Fraudsters may deceive individuals who are unaware that scanning a

QR code or entering a UPI pin is not necessary to receive money on a UPI platform. These individuals are tricked into scanning a QR code and entering their UPI pin under the pretense of receiving a prize, which results in fraudulent activities on the UPI platform. Phishing – Users receive fraudulent links through emails or SMS messages from fraudsters, and when they click on those links, fraud occurs.

5.3 Privacy

Privacy refers to an individual's right to control their personal information and to keep it confidential. This includes protecting personal information such as name, address, phone number, email address, financial information, medical records, and other sensitive data from unauthorized access, use, or disclosure. (Gray, 2013).

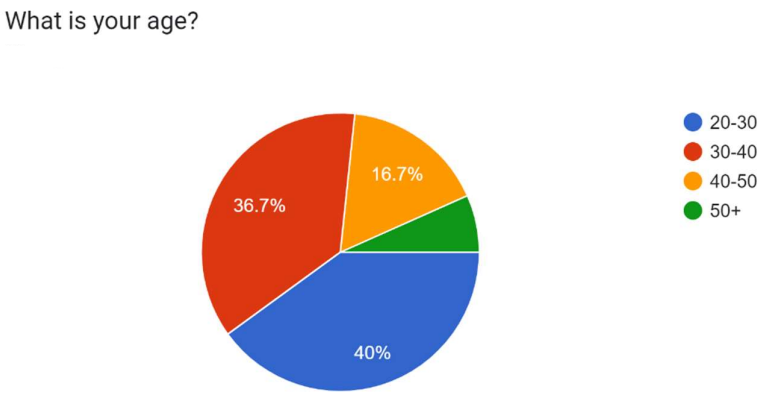
Google Pay keeps diverse data. Google Pay stores personal and financial information, including your name, address(es), phone number, email address, device ID, and more (Google Pay Help, 2022). This data falling into the wrong hands will cause a privacy breach. In settings, users can prevent Google from tracking their activity and data. Opting out of data recording makes the app permission-based, meaning it asks for every data permission. This reduces the risk of a data breach.

5.4 Digital Divide

Digital divide refers to the gap between individuals and communities who have access to digital technologies and those who do not.

When evaluating access equality, it is critical to include internet connectivity or a Google Pay equipped device (hardware specifications required for Google Pay, table 2.31) as well as IT literacy. In 2021, 45% of people in the country had internet connection (Individuals Using the Internet India, 2022). More and more Indians have internet access. As a result, integrating UPI with a digital wallet will boost UPI payments and provide access to a larger

population, However, half of the country still lacks internet connectivity, and it will take some time for the rest of the population to gain access.



Looking and analyzing the age group that uses this technology, we can see about 77% of the respondents were aged between 20 and 40 which shows the people above 40 (33%) of the respondents do not use this technology. Which may be because old people find using a smartphone very complicate hence they prefer to stay away from them.

Lack of literacy in UPI payments and the app may prevent most people from understanding the system's full benefits or losing money to fraud. If the government educates people about the system and improves customer service, this problem can be solved.

5.5 People and Machines

People and machine refer to the interaction and collaboration between humans and computer systems. This involves the use of technology to enhance human productivity, decision-making, and problem-solving capabilities. (Gray, 2013).

As users are required to use their devices in order for UPI payments to go through, this might eventually lead to the development of an addiction to their device. Eye strains and other ailments might occur from spending a significant amount of time in front of a screen every day.

After compulsive use of devices for an extended period of time, quitting such use might be challenging but is absolutely needed.

6. Conclusion

From the findings above we can conclude that COVID-19 pandemic has had a positive impact on the growth of UPI and other digital payment methods, as people have sought out more convenient and secure ways to make financial transactions. Covid-19 has vigorously increased the use of UPI payments as the number of UPI transactions in August 2020 was more than double the number of transactions in August 2019, according to the National Payments Corporation of India (UPI | NPCI, 2022). COVID-19 has forced us to go cashless due to people not wanting to use cash despite the security, reliability, network and technical issues with the app.

Google Pay is easier to use. Surat retailers and customers like Google Pay's simplicity. Transactions are simple with the app's interface. It handles bill payments, mobile recharges, and money transfers. The app's instant receipts reduce manual record-keeping and errors for Surat retailers. Google Pay allows cashless payments. 24/7 mobile app Google Pay. This system safeguards funds. Surat retailers and customers trust Google Pay. Biometric and UPI PIN authentication protect transactions in the app. The app prevents fraud and unauthorized transactions. Google Pay supports most Indian banks for fast, secure transactions. Encryption, multi-factor authentication, and not sharing data protect privacy. Surat Google Pay has drawbacks. Poor network coverage hinders connectivity. Failed transactions frustrate retailers and customers. App crashes have also hurt users. Google Pay has many drawbacks, including the digital divide. Many security issues, including frauds, can deter new Google Pay users or switchers. Most people think the system is vulnerable because Google is a large company with thousands of hackers trying to access its data.

After assessing various parameters, weighing the benefits and drawbacks, the use of google pay for users and retailers, and referring back to my research question, I can conclude that Covid-19 has indeed boosted the growth of UPI payment, helped the government implement it faster, and changed the method of payment from traditional to digital.

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Appendices

Appendix 1: Secondary research tables

Information in the tables below was retrieved from an online website of NPCI showing UPI statistics (Unified Payments Interface (UPI) Product Statistics | NPCI, 2022-b)

Table 1: Number Transactions carried using UPI

Month	Volume (in Mn)
Nov-21	4,186.48
Oct-21	4,218.65
Sep-21	3,654.30
Aug-21	3,555.55
Jul-21	3,247.82
Jun-21	2,807.51
May-21	2,539.57
Apr-21	2,641.06
Mar-21	2,731.68
Feb-21	2,292.90
Jan-21	2302.73
Dec-20	2,234.16

Table 2: Number of banks live on UPI

Month	No. of Banks live on UPI
Nov-21	274
Oct-21	261
Sep-21	259
Aug-21	249
Jul-21	235
Jun-21	229
May-21	224
Apr-21	220
Mar-21	216
Feb-21	213

Jan-21	207
Dec-20	207

Table 3: Amount of money transacted using UPI

Month	Value
Nov-21	768436.11
Oct-21	771444.98
Sep-21	654351.81
Aug-21	639116.95
Jul-21	606281.14
Jun-21	547373.17
May-21	490638.65
Apr-21	493663.68
Mar-21	504886.44
Feb-21	425062.76
Jan-21	431181.89
Dec-20	416176.21

Appendix 2: Questionnaire

Questionnaires distributed to consumers using UPI payment technologies

Questionnaire on UPI payments

The aim of this questionnaire is to find out "To what extent has the introduction of Google Pay, a UPI (Unified Payments Interface) app, been effective for payments amongst retailers and consumers after the Covid-19 pandemic in Surat, India?" Only answer this questionnaire: If you use Google Pay, If you use it from Surat, India. Please note the information obtained will be treated with strict confidentiality and only for the purpose of this research. Thank you for your co-operation.

Section A - Background

1. **What is your age?**

Mark only one oval.

- 20-30
- 30-40
- 40-50
- 50+

2. **Do you use Google Pay for business or personal use?**

Mark only one oval.

- Personal use
- Business use
- Both

3. **When did you find out about Google Pay?**

Mark only one oval.

- Before Covid-19
- After Covid-19

4. **Did your frequency of using Google Pay increase during/after Covid-19?**

Mark only one oval.

Not very

1

2

3

4

5

Very much

5. **How often do you use Google pay in a month?**

Mark only one oval.

- Less than 10 times
- Between 10 and 30 times
- Between 30 and 50 times
- Between 50 and 100 times
- 100+ times

Section B - Effectiveness of Google Pay

6. **Has Google Pay provided a wide range of services under a single roof?**

Mark only one oval.

Not very

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very much

7. **Do you agree Google pay has brought drastic change in the payment method?**

Mark only one oval.

Not very

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very much

8. **Do you agree it is easier to pay with cash than using Google Pay?**

Mark only one oval.

Not very

1 ◯

2 ◯

3 ◯

4 ◯

5 ◯

Very much

9. **Which sector have you seen a major increase in the use of UPI payments?** *

Mark only one oval.

◯ Large scale businesses (>100 employees)

◯ Medium scaled businesses (10-100 employees)

◯ Small scaled businesses (<10 employees)

10. **Which sector have you seen a major increase in the use of UPI payments?** *

Mark only one oval.

- ◯ Large scale businesses (>100 employees)
- ◯ Medium scaled businesses (10-100 employees)
- ◯ Small scaled businesses (<10 employees)

11. **How easy is the payment system easier to navigate through or use?**

Mark only one oval.

	Not very
1	◯
2	◯
3	◯
4	◯
5	◯
	Very much

Section C - Privacy and Security

12. **How secure is the payment process on Google pay according to you?**

Mark only one oval.

	Not secure
1	◯
2	◯
3	◯
4	◯
5	◯
	Very secure

13. **This payment system is prone to security breaches** *

Mark only one oval.

- ◯ Strongly Agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

14. **Have you ever been a victim of a Google Pay fraud?**

Mark only one oval.

- Yes
- No

Section D - Reliability of the system

15. **Has the system failed to carry out a transaction?**

Mark only one oval.

- Yes
- No

16. **Google Pay is a very reliable system**

Mark only one oval.

	Not reliable
1	
2	
3	
4	
5	
	Very reliable

General rating before and after Covid-19

17. **Rating before Covid-19**

Vote N/A if you did not use system before Covid-19

1 = Very dissatisfied 5 = Very satisfied

Mark only one oval per row.

	1	2	3	4	5	N/A
Security	◯	◯	◯	◯	◯	◯
Reliability	◯	◯	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯	◯	◯
Availability	◯	◯	◯	◯	◯	◯

18. **Rating after Covid-19**

1 = Very dissatisfied 5 = Very satisfied

Mark only one oval per row.

	1	2	3	4	5
Security	◯	◯	◯	◯	◯
Reliability	◯	◯	◯	◯	◯
Effectiveness	◯	◯	◯	◯	◯
Availability	◯	◯	◯	◯	◯

Appendix 3: Interview Transcript

Appendix 3A – Interview with a grocery shop owner

Interviewer: Desai

Person being interviewed: (Anonymous) Shop owner

Time: 02:00 pm

Date: Monday 17th October 2022

Location of interview: Online video call

Desai: Have you noticed any changes in customer behavior towards using Google Pay?

Shop owner: Yes, there has been a significant change in customer behavior towards using Google Pay. Earlier, customers were hesitant to use digital payment methods but now they prefer using Google Pay as it is easy and convenient.

Desai: Do you think Google Pay is more secure than other digital payment methods?

Shop owner: Yes, I believe Google Pay is more secure than other digital payment methods because it has multiple layers of security and uses encryption to protect user information.

Desai: How has Google Pay helped in managing your business finances?

Shop owner: Google Pay has helped us in managing our business finances as we can easily track our transactions and keep a record of all the payments received. This has made our accounting process more efficient and hassle-free.

Desai: Are there any fees associated with using Google Pay for business transactions?

Shop owner: No, there are no fees associated with using Google Pay for business transactions. It is completely free to use and does not charge any transaction fees.

Desai: Are there any additional features of Google Pay that you find useful for your business?

Shop owner: Yes, the loyalty program feature of Google Pay is quite useful for our business. We can easily set up a loyalty program for our customers and reward them for their purchases. This helps in retaining our customers and increasing customer loyalty.

Desai: Do you think Google Pay has the potential to replace traditional payment methods in the future?

Shop owner: Yes, I think Google Pay has the potential to replace traditional payment methods in the future as it is more convenient and efficient. However, it will take some time for people to completely shift to digital payment methods.

Appendix 3B – Interview with an Online tutor

Interviewer: Desai

Person being interviewed: (Anonymous) Online tutor

Time: 04:10 pm

Date: Monday 17th October 2022

Location of interview: Online video call

Desai: Have you noticed any changes in customer behavior towards using Google Pay?

Online Tutor: Yes, there has been a noticeable increase in the number of customers who prefer using Google Pay for online transactions. Many customers now find it more convenient to use digital payment methods instead of traditional methods.

Desai: Do you think Google Pay is more secure than other digital payment methods?

Online Tutor: Yes, I do believe Google Pay is one of the most secure digital payment methods available. It has multiple layers of security and uses encryption to protect user information.

Desai: How has Google Pay helped in managing your online tutoring business?

Online Tutor: Google Pay has been extremely helpful in managing my online tutoring business as it provides a hassle-free way for my students to make payments. I can easily keep track of all my transactions and it makes the accounting process much smoother.

Desai: Are there any fees associated with using Google Pay for business transactions?

Online Tutor: No, there are no fees associated with using Google Pay for business transactions. It is completely free to use and does not charge any transaction fees.

Desai: Are there any additional features of Google Pay that you find useful for your business?

Online Tutor: Yes, I find the ability to send reminders to my students for payments through Google Pay very useful. This ensures that my payments are received on time and helps me manage my finances better.

Desai: Do you think Google Pay has the potential to become the primary mode of payment for online businesses in the future?

Online Tutor: Yes, I think Google Pay has the potential to become the primary mode of payment for online businesses in the future as it is a reliable and convenient way of making transactions. However, it will take some time for people to completely shift to digital payment methods.

Appendix 3C – Interview with an electronics shop manager

Interviewer: Desai

Person being interviewed: (Anonymous) Shop manager

Time: 05:30 pm

Date: Monday 17th October 2022

Location of interview: Online video call

Desai: Have you noticed any changes in customer behavior towards using Google Pay?

Shop manager: Yes, customers have become more comfortable using digital payment methods like Google Pay after the pandemic hit. Many people now prefer contactless payments and avoid using cash.

Desai: Do you think Google Pay is more convenient than traditional payment methods?

Shop manager: Yes, Google Pay is more convenient as it eliminates the need for cash and the transaction process is very fast. It also allows us to easily track transactions and manage our finances.

Desai: Have you faced any issues with refunds or disputes using Google Pay?

Shop manager: No, we haven't faced any issues with refunds or disputes using Google Pay. It has a very user-friendly dispute resolution process which makes it easy for both the buyer and seller to resolve any issues.

Desai: How has Google Pay helped in managing your electronic shop?

Shop manager: Google Pay has been very helpful in managing our electronic shop as it provides a secure and efficient way for our customers to make payments. It also allows us to keep track of all our transactions and generate digital receipts which makes accounting much easier.

Desai: Are there any additional features of Google Pay that you find useful for your business?

Shop manager: Yes, I find the ability to customize and add a personal touch to our business profile on Google Pay very useful. It helps us to stand out and provides our customers with a more personalized experience.

Desai: Do you think Google Pay has the potential to become the primary mode of payment for businesses in the future?

Shop manager: Yes, I think Google Pay has the potential to become the primary mode of payment for businesses in the future as it is a secure, convenient, and user-friendly digital payment method. However, it may take some time for people to fully adopt digital payment methods and trust them completely.