Configuration Manual

MSc Research Project

MSC Fintech

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MSc Project Submission Sheet

School of Computing

Student Name:	Shrey Bhagat …………………………………………………………………………….
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Programme:	MSC Fintech…………………………………… **Year:** 2020………
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Lecturer:	Noel Cosgrave…………………………………………………….………
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Project Title:	A Study on E-wallet Adoption Among Customers And Business In Delhi……………………………………………………..……….
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Configuration Manual

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1.Introduction

This configuration manual guide is accompanied by the research paper submitted as part of the MSC Fintech module. This manual details the steps that were followed for doing the study. Moreover, it talks about the technologies and the hardware configuration of the machine that is used in this research work to accomplish the results and also aims to teach other researchers so that the results of the study can be reproduced.

2.Specification of the System

2.1 Hardware of the System

As described below, work was conducted on Windows 10 computer for the research project:

- 64-bit Operating System; Windows 10 Pro
- Processor: Intel Core i7-7500U CPU @ 2.70GHz 2.90GHz
- RAM: 8GB
- Storage: 236 GB

2.2 Software and Tools

- **R Software-** The statistical techniques that were used in this research for analysis purposes were performed using R and R Studio Version 1.3.1056. Various statistical techniques including Exploratory Factor Analysis, Confirmatory Factor Analysis, Descriptive Statistics and nonparametric tests like Chi-Square Test, Kruskal Wallis Test, Mann-Whitney U Test and Goodman Kruskal's Gamma Test are performed on the R Studio for the analysis purpose.
- **Google Forms-** This tool was used in the study for framing questionnaires which were distributed among the respondents to gather data for the study. The collected data was stored on the google spreadsheet which was extracted into a password protected Excel csv file.
- **Microsoft Excel 2016 (64 bit):** Excel was used to extract the data from google form into csv file. Moreover, the software was also used to build pie charts which are mentioned in this manual.

3. Installation of Software

3.1. R Studio

In this research project, R and R Studio software are used which have a large number of libraries and it supports various machine learning and statistical models for analysing the data. One can download the R Studio Software as depicted from the figure 1 below.
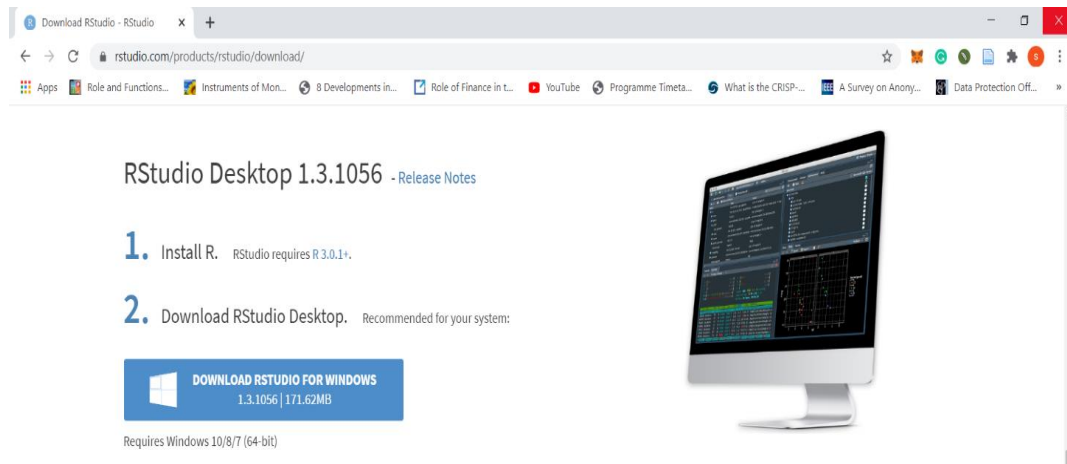
Downloading R Studio on the System (Figure1)

After the software has been successfully installed, it can be accessed by searching for 'RStudio' from the windows prompt button. 1.3.1056 Version of R Studio was used in this research project for performing statistical techniques. The entire code file is submitted on the Moodle along with the research paper.
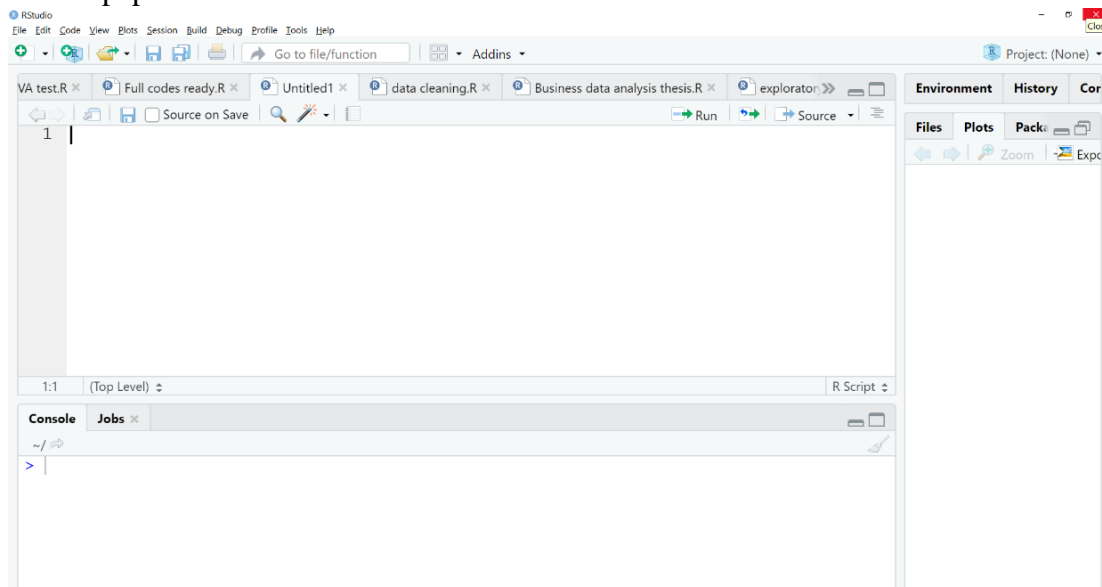
Figure 2

All the coding was performed in the R script file for analysing the data. (as shown in Figure 2)

4. Data Source

This study was quantitative research. Therefore, data were collected using various methods such as online surveys, telephonic interviews and face-to-face interviews.

5. Respondents who didn't give their Consent

Before any analysis in R, the data of respondents who didn't give their consent for participation, those responses were removed from the csv excel file where the data was imported from the google spreadsheet.

6. Importing the data from Excel csv to R Studio:

Initially, the data was stored in the google spreadsheet that was imported into the Excel csv folder. After removing the data of respondents who didn't give their consent for participation, the data was then imported into R Studio for conducting statistical techniques for the analysis.

7. Packages Used

- **plyr-** For using the count() function in R, to count the number of occurrences. This package was installed.
- **FSA-** For performing the Dunn test which is a post hoc test of Kruskal Wallis test, using dunntest() function, this package was installed.
- **vcdExtra-** This package was used for conducting Goodman-Kruskal's Gamma Test.
- **Psy-** This package is available in R, it was installed for conducting Cronbach Alpha Test, for testing the reliability of the data
- **Psych-** KMO test was applied using this package.
- **GPArotation-** For using oblimin rotation in factor analysis, this package was used.
- **lavaan-** Using this package, a confirmatory factor analysis test was applied
- **semPlot-** For using semPath() function in R to create a path diagram of CFA model

Using install.package() function, the appropriate packages were downloaded and were loaded by library() function.

8. Missing values

Missing values in the data were also computed through sum(is.na()) function.

9. Data Cleaning Process

In the collected data, few responses were not reliable and few of them were duplicates. Therefore, they were removed before the analysis stage for getting better and accurate results.

Once the data was cleaned, various statistical techniques were used for analysing it and for obtaining the results.

10. Techniques Used

1. Descriptive Statistics

The R codes for generating the frequency table for analysing categorical demographic variables of data such as the age, gender, income and education of respondents as discussed in the paper are included in the code file. count() function was used that is available in plyr package for counting the occurrences. Similarly, to know which m-wallet is used by customers the most for making payments count () function was used as seen from Table 1 below.

Table: 1		
No.	**Which Mobile wallet you Use for making payments**	**Frequency**
1.	Airtel Money	1
2.	Airtel Money; Any other	2
3	Amazon Pay	1
4.	Amazon Pay; Any other	2
5.	Any other	19
6.	Google Pay	29
7.	Google Pay; Amazon Pay	2
8.	Google Pay; Amazon Pay; Airtel Money; Any other	1
9.	Google Pay; Any other	1
10.	Google Pay; Phone Pay	4
11.	Google Pay; Phone Pay; Airtel Money	1
12	Google Pay Phone Pay; Amazon Pay	1
13.	Paytm	126
14.	Paytm; Airtel Money	1
15.	Paytm; Amazon Pay	18
16.	Paytm; Amazon Pay; Any other	1
17.	Paytm; Amazon Pay; Any other	2
18.	Paytm; Any other	3
19.	Paytm; Google Pay	60
20.	Paytm; Google Pay; Airtel Money	6
21.	Paytm; Google Pay; Amazon Pay	14
22.	Paytm; Google Pay; Amazon Pay; Airtel Money	1
23.	Paytm; Google Pay; Any other	5
24.	Paytm; Google Pay; Phone Pay	28
25.	Paytm; Google Pay; Phone Pay; Airtel Money	2
26.	Paytm; Google Pay; Phone Pay; Amazon Pay	12
27.	Paytm; Google Pay; Phone Pay; Amazon Pay; Airtel Money	4
28.	Paytm; Google Pay; Phone Pay; Amazon Pay; Airtel Money; Any other	3
29.	Paytm; Google Pay; Phone Pay; Amazon Pay; Any other	1
30.	Paytm; Phone Pay	17
31.	Paytm; Phone Pay; Airtel Money	1
32.	Paytm; Phone Pay; Amazon Pay	3
33.	Paytm; Phone Pay; Amazon Pay; Any other	1
34.	Phone Pay	10

Further in descriptive statistics, mean and standard deviation were imputed (as seen in table 2 below) of all variables using mean() and sd() function that influenced the consumer's willingness to adopt mobile wallet service along with their purpose and level of satisfaction.

Table 2: Descriptive Statistics (N =383)			
Q No.	**Statements**	**Mean**	**SD**
Q1	Satisfaction Level	4.344648	0.7061927
Q2	Using E-wallets are Easy	4.422977	0.7334167
Q3	Interaction with mobile payment is clear and understandable.	4.357702	0.7588824
Q4	Doing payments through these Electronic Wallets is convenient.	4.51436	0.7046425
Q5	E-wallet services provide security to transactions	3.879896	0.9714177
Q6	Paying money through mobile wallets is a trusted source of payment mechanism	3.942559	0.9851466
Q7	I believe that my Personal Information which is stored on mobile wallets is protected.	3.71802	1.099471
Q8	I believe that using Mobile-Wallet puts my privacy at risk	2.97389	1.184254
Q9	There is a great potential to lose money if I buy goods on the Internet/social networking using mobile payments.	2.718016	1.159466
Q10	There is significant risk in Internet shopping/social network using mobile payments	2.97389	1.152892
Q11	I think dealing with mobile payments is a risky choice.	2.543081	1.103349
Q12	Brand Loyalty of E-wallet companies affects the usage of these services.	3.613577	1.124233

Q13	Quality of E-wallet service providers also affect the intention to use these services	3.801567	1.107943
Q14	E-wallet services provide a reduced time of transactions	4.399478	0.8248114
Q15	Discounts and cashback offers, attracts you to use these services	3.984334	1.164377
Q16	Mobile wallets reduces the cost of transactions.	3.582245	1.194621
Q17	The E-wallets system is considered as an useful payment method.	4.391645	0.7979904
Q18	E-wallets serves as an appealing alternative for making payments.	4.417755	0.7256686
Q19	I am likely to continue using mobile wallet services in the future	4.443864	0.7935326

2. Frequency Analysis

Moreover, in the study, frequency analysis was carried out (as seen in Table 3 below) for analysing and summarizing the data. table() function was used to do the frequency analysis.

Table 3: Frequency Analysis of Respondent's Perception and Satisfaction					
Statement	Strongly Agree	Agree	Moderate	Disagree	Strongly Disagree
Satisfaction Level	176	169	34	2	2
Using E-wallets are Easy	212	126	41	3	1
Interaction with mobile payment is clear and understandable.	196	135	45	7	0
Doing payments through these Electronic Wallets is convenient.	237	112	29	4	1
E-wallet services provide security to transactions	121	128	107	21	6
Paying money through mobile wallets is a trusted source of payment mechanism	133	131	89	24	6
I believe that my Personal Information which is stored on mobile wallets is protected.	91	112	123	39	18
I believe that using Mobile-Wallet puts my privacy at risk	42	87	123	81	50
There is a great potential to lose money if I buy goods on the Internet/social networking using mobile payments.	27	73	112	107	64
There is significant risk in Internet shopping/social network using mobile payments	41	82	130	86	44
I think dealing with mobile payments is a risky choice.	21	52	111	129	70
Brand Loyalty of E-wallet companies affects the usage of these services.	95	123	110	32	23
Quality of E-wallet service providers also affect the intention to use these services	121	131	82	32	17
E-wallet services provide a reduced time of transactions	220	110	42	8	3
Discounts and cashback offers, attracts you to use these services	168	107	64	22	22
Mobile wallets reduces the cost of transactions.	103	114	95	45	26
The E-wallets system is considered as an useful payment method.	210	126	37	7	3
E-wallets serves as an appealing alternative for making payments.	207	135	36	4	1
I am likely to continue using mobile wallet services in the future	227	112	34	7	3

3. Chi-Square Test

R has been used for the Chi-Square Test as described in the result section of the research paper. The results of chi-square test were formulated into table format using Microsoft Word. For making tables, a lot of manual work was involved. The chi-square test was applied on R using chisq.test() function. Before applying chi-square test a contingency table was produced using the table() function. All the coding can be seen from the code file.

4. Kruskal Wallis Test

In the study Kruskal Wallis test was performed. The results of the study are discussed in the result section of paper (in tables 13-17). This test was performed using kruskal.test() function. The results of these tests were then presented in the table format formed using Word to summarize the results.

5. Mann-Whitney U Test

R is used to apply Mann Whitney U Test in the paper for testing the differences in intention between Males and Females for using the mobile wallets. For doing this test wilcox.test() function was used.

6. Goodman-Kruskal's Gamma Test

For conducting this test in R, vcdExtra package was installed and GKgamma() function was used to obtain the results. This is a nonparametric test that measures the intensity and direction of association between two variables.

7. KMO & Bartlett Test

Using R, KMO and Bartlett Test were conducted. Psych package was installed in R and using KMO() function and Cortest.bartlett() function, the factorability of data was analysed. Using cor() function, correlation coefficient was computed.

8. Exploratory Factor Analysis

In this study, Exploratory Factor Analysis was done in R. Maximum Likelihood Method of factor analysis was performed in this study using factanal() function. For determining the number of factors Eigen values greater than 1were used. To calculate eigen values eigen() function was used.

9. Cronbach's Alpha Test

For testing the reliability of the collected data, this test was conducted in R. Psy package was installed and cronbach() function was used to obtain the reliability.

For checking the reliability of each factor that is formed using Exploratory Factor Analysis, data.frame() function is used to make a subset of data and then the reliability of that data is evaluated.

10. Confirmatory Factor Analysis

Confirmatory factor analysis is done in this paper using R. For applying CFA test on the data lavaan package was installed and cfa() function was used. The accuracy of the model was tested by calculating goodness of fit index, RMSEA, CFI, TLI by fitmeasures() and using summary() function, hypothesis of the study was tested.

Then Using semPaths() function the path diagram of the CFA model was produced which is depicted in the research paper.

7

11. Analysing the Adoption of Mobile Wallets among the Small Businesses of Delhi

For further analysis about the adoption of mobile wallets among the small businesses of Delhi, table() function was used in R to analyse the frequencies of the data. The results of these tests were formatted into table structure and pie charts were also formed using Excel that are depicted below.

Table 4: Showing the Percentage of Responses gathered from Businesses		
Business	Frequency	Percentage
Grocery Stores	23	11.5
Restaurants	24	12
Self Employed Service Providers	53	26.5
Others	100	50
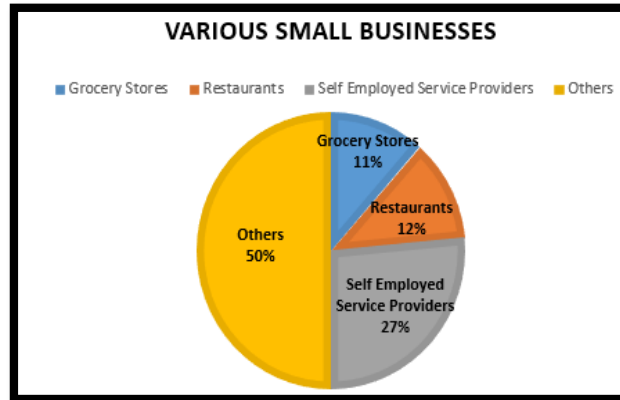
Figure 3

Table 5: Do you provide Mobile wallet services to your customers

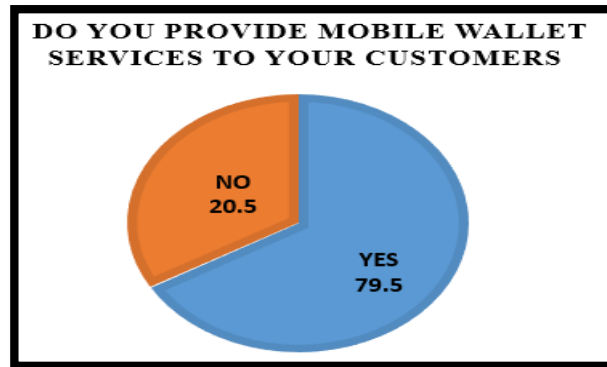|	Frequency	Percentage
Yes	159	79.5
No	41	20.5
Total	200	

Figure 4

Table 6: Reasons for not adopting mobile wallets into the business	Frequency
Do not trust E-wallet Payment system	11
Fear of Security	16
Lack of Customer's Demand	14
There are a lot of legal problems	4
The extra cost incurred is not worth it	4

Table 7: From when your business had started accepting payments through E-wallets	Frequency	Percentage
After Demonetisation	111	70.3
Before Demonetisation	47	29.7
	158	

Figure 5

8
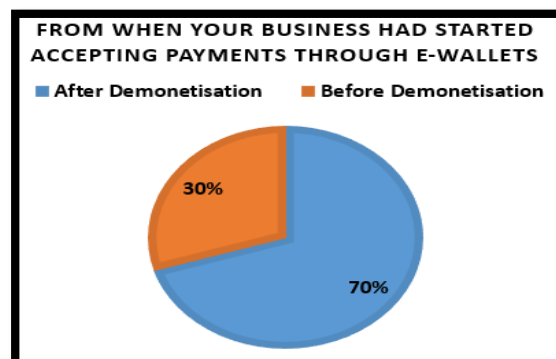
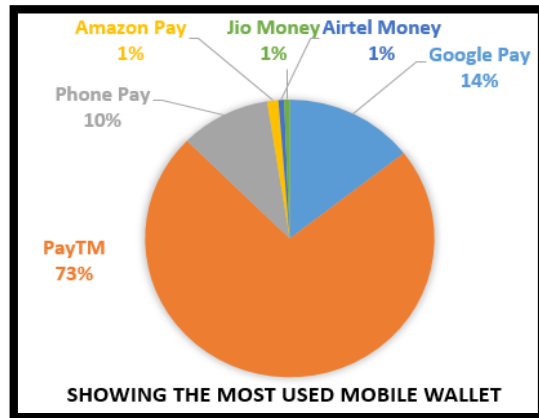| Table 8: Showing the most used Mobile Wallet		
Mobile Wallets	Frequency	Percentage
Google Pay	23	14.5
PayTM	116	73.0
Phone Pay	16	10.1
Amazon Pay	2	1.3
Airtel Money	1	0.6
Jio Money	1	0.6
	159	

Figure 6

Table 9: How Likely will you lose your customers and Business Revenue if you do not provide the service		
	Frequency	Percentage
Likely	43	27.4
Neutral	61	38.9
Unlikely	27	17.2
Very Likely	9	5.7
Very Unlikely	17	10.8
	157	
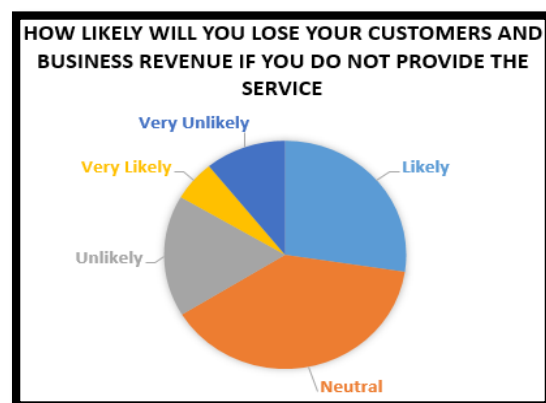
Figure 7

Table 10		
What Percent of business income comes from mobile wallets	Frequency	Percentage
0%	1	0.6
Less than 10%	56	35.2
10%-25%	65	40.9
25%-50%	30	18.9
More than 50%	7	4.4
	159	
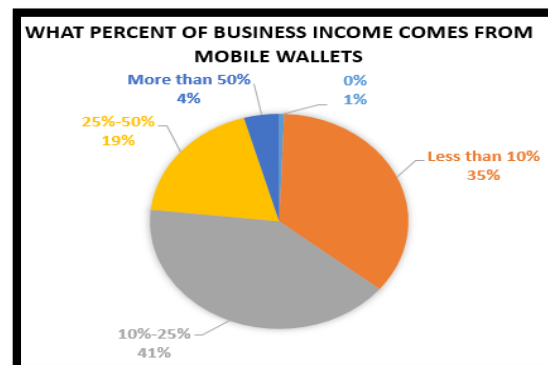
Figure 8

Table 11: Is electronic wallet a viable alternative to traditional cash-based system?		
	Frequency	Percentage
YES	125	62.5
NO	75	37.5
	200	
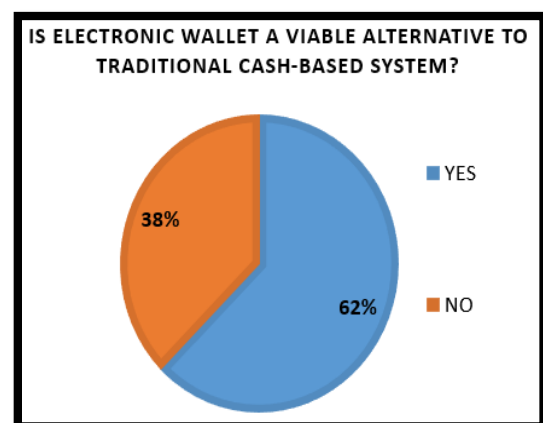
Figure 9

Table 12: Accepting payments through the E-wallet system is secure.		
	Frequency	Percentage
Strongly Agree	60	30.2
Agree	58	29.1
Neutral	49	24.6
Disagree	17	8.5
Strongly Disagree	15	7.5
	199	
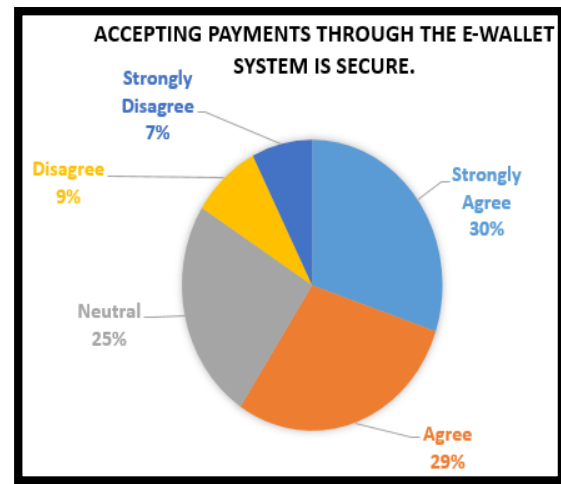
Figure 10

Table 13: Accepting payments through the E-wallet system makes it convenient for doing business.		
	Frequency	Percentage
Strongly Agree	60	30.2
Agree	54	27.1
Neutral	52	26.1
Disagree	23	11.6
Strongly Disagree	10	5.0
	199	
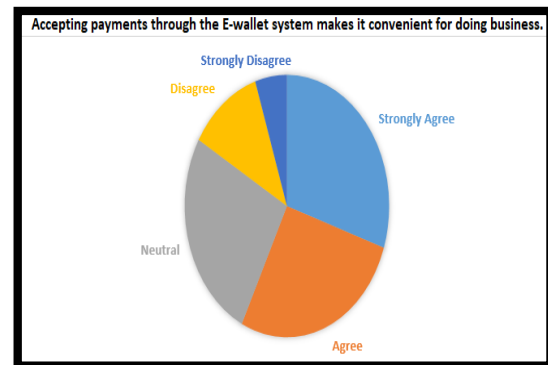
Figure 11

Table 14: Businesses which Provide Mobile Wallet Services

Business	Providing Mobile wallet services	
	NO	YES
Grocery Store	3	20
Others	23	77
Restaurants	0	24
Self Employed Service Providers	15	38

Conclusion

This manual discusses about the key technologies that have been used during this research project and has also mentioned the packages and functions that were used in R for getting the results. The knowledge contained in this manual will help to replicate the findings described in this research. The data for this study was obtained from the respondents by online surveys, telephonic interviews and face-to-face interactions.