"Consumers' Perception and Intention to Adopt Mobile Commerce in India"

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DOCTOR OF PHILOSOPHY

By

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CANDIDATE'S DECLARATION

I, hereby certify that the thesis titled "**Consumers' Perception and Intention to Adopt Mobile Commerce in India**", submitted in fulfillment of the requirements for the award of the degree of Doctor of Philosophy is an authentic record of my research work carried out under the guidance of Prof. (Dr.) Rajan Yadav. Any material borrowed or referred to is duly acknowledged.

The matter presented in this thesis has not been submitted elsewhere in part or entirely to any other University or Institute for the award of any degree.

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SUPERVISOR'S CERTIFICATE

This is to certify that the thesis titled "**Consumers' Perception and Intention to Adopt Mobile Commerce in India**", submitted in fulfillment of the requirements for the award of the degree of Doctor of Philosophy is an original research work carried out by M.s. Khushbu Madan, under my supervision. The matter presented in this thesis has not been submitted elsewhere in part or fully to any other University or Institute for the award of any degree, to the best of our knowledge.

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I dedicate this research work to all my friends and family members.

KHUSHBU MADAN

Executive Summary

A splurge in the information and communication technology during the recent years and rapid proliferation of internet enabled mobile phones has resulted in the electronic as well as mobile commerce opportunities to shoot up. Users are switching over to wireless network from wired one, i.e. to mobile commerce or m-commerce from the traditional electronic commerce (Bushell, 2002). The various value chain partners involved in mobile commerce are consumers, service providers, network operators, technology vendors, application developers and content providers. The prospect of mobile commerce industry relies on the efficiency and performance of all these partners. Consumer being the most important element of the mobile commerce eco-system plays a significant role in its success or failure. The study of factors influencing consumers' decision to adopt mobile commerce can provide useful insights to other partners in the value chain in creating and developing better suited technologies or applications. With this backdrop, the present study aims at identifying major areas of mobile commerce applications in India and the variables which influence consumers' intentions to adopt mobile commerce. It further analyses their relationship with consumers' behavioural intention and studies the impact of consumers' Age, Gender and Household Income on the proposed relationships. Finally it attempts to identify and analyse the strategies followed by Indian mobile commerce firms for consumer adoption.

The study utilised both primary as well as secondary data collection techniques to meet its objectives. A thorough literature review was conducted to identify major areas of mobile commerce applications in India, to study and compare various existing technology adoption frameworks and for identifying key factors influencing mobile commerce adoption. Further, a balanced approach was adopted where in, along with the primary data collected to develop and validate the research framework for mobile commerce adoption, cases of successful

mobile commerce companies were also analysed to understand the role of identified parameters in the adoption of services offered by mobile-commerce entities.

The research design of the study was descriptive in nature. The absence of a formal sampling frame in such kind of studies justified the use of non-random sampling techniques to collect data, which have been utilised for this research.

The data was collected through a self administered questionnaire. A Likert scale of five points, ranging from 1 representing high disagreement to the statement and 5 representing high agreement with the statement was utilised to measure the items which were further used to determine the identified independent and dependent variables.

A multi-staged analysis was conducted on the primary data collected including Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA) of the measurement model created in SPSS AMOS, testing of proposed relationships through Structural Equation Modelling (SEM), followed by Artificial Neural Networks (ANN) analysis to re-confirm complex linear relationships between the variables. For analysing the strategies implemented by different existing e-commerce companies as well as emerging mobile commerce companies for consumer adoption, cases from the industry were analysed.

Exploratory Factor Analysis (EFA) resulted in the establishment of 12 independent and 2 dependent factors explaining mobile commerce adoption. In the second phase of data analysis, the model's reliability and validity was established in SPSS and AMOS and further, measures of model fit were found to confirm the factor analysis. Also the relation of independent variables with the dependent variable were tested and variables such as Facilitating Conditions, Variety of Services, Perceived Usefulness, Personal Innovativeness, Perceived Critical Mass, Perceived ease of Use, Perceived Regulatory Support, Perceived Trust, Perceived Risk, and Promotional Benefits were observed affecting the Behavioural

Intention of consumers towards adoption of mobile commerce in a significant manner, Perceived Regulatory Support being the most significant factor. Behavioural Intention was also observed to significantly affect the mobile commerce Actual Usage by the consumers. The demographic factors namely the respondent's gender, annual household income and age were found to moderate the proposed relationships. Finally, the results of the third phase of analysis through ANN model, established Perceived Ease of Use to predict Behaviour Intention of consumers towards adoption of mobile commerce in a most significant way.

The findings of the research have important implications from the managerial, practical, and research point of view. It provides meaningful insights to various partners in the mobile commerce value-chain including marketers, app developers, service providers, and regulatory authorities enabling them to ensure a steady growth in the acceptance of mobile commerce by potential consumers. By integrating Artificial Neural Network Model with Structural Equation Modelling, the study provides a relatively new dimension to the analysis useful for the future researchers working in the domain of mobile commerce.

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List of Abbreviations

PDA   : Personal Digital Assistant

SMS   **:** Short Message Service

1G   : First Generation Cellular System

2G   : Second Generation Cellular System

3G   **:** Third Generation Cellular System

4G   : Fourth Generation Cellular System

TDMA   **:** Time-Division Multiple Access

CDMA   **:** Code Division Multiple Access

GSM   **:** Global System for Mobile Communication

WAP   **:** Wireless Application Protocol

WML   **:** Wireless Mark-up Language

Mp3   **:** Moving Pictures Expert Group- Audio Layer 3

VOD   **:** Video on Demand

TV   **:** Television

FIFA   **:** Federation Internationale de Football Association

MPG   **:** Multi-layer Games

UMTS   **:** The Universal Mobile Telecommunication Systems

CAGR   **:** Compound Annual Growth Rate

DAU   **:** Daily Active Users

CGAP   **:** Consultative Group to Assist the Poor

QR codes   **:** Quick Response Codes

IRCTC   **:** Indian Railways Catering and Tourism Corporation

i.e.   **:** That is

EFA   **:** Exploratory Factor Analysis

SEM   **:** Structural Equation Modelling

ANN : Artificial Neural Network

IBM : International Business Machine Corporation

SPSS : Statistical Package for the Social Sciences

Pvt. Ltd. : Private Limited

TRA : Theory of Reasoned Actions

TAM : Technology Acceptance Model

PEOU : Perceived Ease of Use

PU : Perceived Usefulness

TAM 2 : Technology Acceptance Model 2

CIP : Cognitive Instrumental Processes

SI : Social Influence

IT : Information Technology

IT/IS : Information Technology or System

TAM 3 : Technology Acceptance Model 3

TPB : Theory of Planned Behaviour

PBC : Perceived Behavioural Control

DOI : Diffusion of Innovation

UTAUT : Unified Theory of Acceptance and Use of Technology

MM : Motivational Model

SCT : Social Cognitive Theory

PC : Personal Computer

MPCU : Model of PC Utilisation

UTAUT 2 : Unified Theory of Acceptance and Use of Technology 2

FC : Facilitating Conditions

HM : Hedonic Motivation

PV : Perceived Value

EE : Effort Expectancy

H	**:** Habit
PE	**:** Perceived Enjoyment
AU	**:** Actual Usage
ISM	**:** Interpretive Structural Modelling
M-commerce	**:** Mobile Commerce
E-commerce	**:** Electronic Commerce
TR	**:** Technology Readiness
PQ	**:** Perceived Ubiquity
VOS	**:** Variety of Services
PCM	**:** Perceived Critical Mass
PR	**:** Perceived Risk
PT	**:** Perceived Trust
PRS	**:** Perceived Regulatory Support
PB	**:** Promotional Benefits
PI	**:** Personal Innovativeness
BI	**:** Behavioural Intention
CR	**:** Composite Reliability
ASV	**:** Average Squared Shared Variance
MSV	**:** Maximum Squared Shared Variance
AVE	**:** Average Variance Extracted
AI	**:** Artificial Intelligence
NN	**:** Neural Network
p.a.	**:** Per annum
Ph.D	**:** Doctor of Philosophy
CA	**:** Chartered Accountant
CS	**:** Company Secretary
KMO	**:** Kaiser-Meyer-Olkin

VIF   : Variance Inflation Factor

NFI   : Normalised Fit Index

RMSEA   : Root Mean Square Error of Approximation

GFI   : Goodness-of-fit Index

X2/d.f   : Chi-square to degree-of-freedom

Df   : Degree-of-freedom

CMB   : Common Method Biasness

SD   : Standard Deviation

IIT   : Indian Institute of Technology

COD   : Cash on delivery

PCI DSS   : Payment Card Industry Data Security Standards

UPI   : Unified Payments Interface

GMV   : Gross Merchandise Value

DTH   : Direct-to-home

ATM   : Automated Teller Machine

BCG   : Boston Consultancy Group

RBI   : Reserve Bank of India

CFO   : Chief Financial Officer

GPS   : Global Positioning System

SSL   : Secure Socket Layer

Chapter 1: Introduction and Overview

1.1. Overview

Recent splurge in the information and communication technology and rapid proliferation of internet enabled mobile phones has lead to a spurt in the opportunities with respect to electronic as well as mobile commerce. The industry is switching over to wireless networks i.e. to mobile commerce from the traditional wired electronic commerce (Bushell, 2002). With the ever rising popularity of high –end mobile devices and the rapidly evolving wireless network technology, mobile commerce has gained a strong position as an alternative business model. With this backdrop, the first chapter of the present study introduces the concept of mobile commerce along with the wide range of services included in it. It discusses the general industry trends with respect to mobile commerce in India. Further, it highlights the motivation of undertaking the present research, the research objectives, along with the research design to meet the objectives. Finally, it depicts the structure and flow of the thesis.

1.2. Mobile commerce

The very basic explanation of mobile commerce includes conducting business and providing services over wireless or portable devices like PDAs, tablets, smart phones, and the like (Senn, 2000).

From a narrow viewpoint, mobile commerce includes any monetary transaction initiated and completed over wireless devices via wireless telecommunication network (Müller and Veerse, 1999; Shuster, 2001; Jahanshahi et al., 2011; Chong, 2013a). Another definition explains mobile commerce to be *''Any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobiles*

access to computer-mediated networks with the help of mobile devices'' (Tiwari and Buse, 2007).

A broader viewpoint explains mobile commerce to include all the emerging services and applications that can be accessed by users from their internet–enabled hand held devices. (Sadeh, 2002). According to this view, mobile commerce involves a series of activities that goes before and after the actual sales transaction (Adam et.al, 1998; Turban et.al, 2000). Supporting this viewpoint, another research explains mobile commerce to include all the relating activities required for the completion of a potential commercial transaction using some mobile handheld device such as laptop, smart-phone, tablet or palmtop, over a wireless network. (Tarasewich et.al, 2002).

An additional viewpoint explains mobile commerce as an expansion of or the next-step after electronic commerce. According to this viewpoint mobile commerce is "*an e-commerce for users on the move*" (Vittet-Pillippe and Navarro, 2000). It is alternatively referred to as mobile electronic commerce or wireless electronic commerce. Mobile commerce is similar to electronic commerce; except in this case the medium of communication and transaction is wireless telecommunications network, which may or may not be internet-based, instead of fixed-wired internet-based network (Dholakia and Rask, 2002). Hence, it is believed to be a likely successor of electronic commerce (Au, 2007; Mahil, 2008). Since mobile commerce and electronic commerce function on similar business principles, mobile commerce can be viewed as the next step or as an alternative channel creating additional value for the existing electronic business processes and a driving force for next-generation electronic commerce (Coursaris and Hassanein, 2002; Ting, 2004). However, few researchers are of the opinion that m-commerce is distinct from e-commerce as it offers its own exclusive set of advantages (Scornavacca et al., 2006) such as intimacy, ubiquity, flexibility of time and location, differentiating it from the

traditional electronic commerce (Paavilainene, 2002). Another distinguishing factor in case of mobile commerce is the possibility of connecting information in a more direct way with the objects (Mobile Commerce, 2008)

1.3. Mobile Commerce Benefits

The increasing popularity of mobile commerce can be linked to the exclusive and unique set of advantages it offers that are distinct from electronic commerce (Scornavacca et al., 2006). These advantages may be summarised as

1.3.1. **Intimacy/ Personalisation:** Usually a mobile device is used or operated by a solo or a single user only. This gives it an opportunity to provide personalised services altered to the needs of an individual user (Paavilainene, 2002; Clarke III, 2008)

1.3.2. **Localisation:** The availability of high performing GPS Systems has made capturing the location of the user's mobile device on real time basis quite simple and effective. With this additional feature altered services according to the location of the consumer can be provided over their mobile devices (Paavilainene, 2002; Clarke III, 2008)

1.3.3. **Ubiquity:** The term Ubiquity refers to the omnipresence of information and continual access to commerce. This unique feature of mobile commerce enables information and mobile commerce services to be available everywhere at the same time (Paavilainene, 2002; Clarke III, 2008).

1.3.4. **Convenience:** Finally mobile commerce has an ability to offer great degree of flexibility in terms of time and location of usage. It does not require users to connect using their wired fixed location devices to avail mobile commerce services. This distinct advantage enables users to shop and avail services from

locations where they are not physically located (Paavilainene, 2002; Clarke III, 2008).

1.4.   Mobile commerce Background

The term "m-commerce" was mentioned by Kevin Duffey in 1997 for the first time. He explained it as *"the delivery of electronic commerce capabilities directly into the consumer's hand, anywhere, via wireless technology"*.

The first commercial transaction using mobile phone took place in 1997 in Helsinki (a city in Finland), where in, a vending machine for Coca Cola was operated using mobile phones (Sahota, 2011). Merita Bank in the year 1997 launched banking services that could be provided over phone, using text messages (Wiebke, 2012). Digital content was introduced in Finland for the first time in 1998, in the form of ringing tones that were downloadable on mobile phones via short message service (SMS) (Wiebke, 2012). Ever Since, SMS service has grown into a major platform for conducting varied commercial transactions over phones ranging from making payments for vending machines to time sensitive transactions such as last minute payment for gifts, transfer of funds, purchase and sale of shares, and so on. The role of SMS further gained significance in promoting brands, advertising, sales promotion, and for creating buzz in the market. For instance, in order to develop their brand as well as a sound database, Nokia used a branded game, played using the internet and text messages. (Rettie and Brum, 2001).

Later on, in partnership with Banco de Oro, Smart Communications introduced Smart Money in the year 2001. It enabled its customers to transmit and accept funds locally as well as globally using a mobile device. A few years later, in the year 2004, Globe Telecom

launched another SMS-based service, GCash, that offered similar functionalities over SMS (Leishman, 2009).

Mobile commerce transactions are difficult to conduct without the supporting wireless networks which form the backbone for mobile commerce. The launch of AMPS (Advanced Mobile Phone System) in 1983 in the United States, marked the first major milestone achieved in the area of wireless networks, representing the first generation of cellular systems (i.e. 1G). Following this, was the introduction of second generation systems (2G) such as TDMA (Time-division multiple access), CDMA (Code division multiple access), GSM (Global system for mobile communication) in 1990s and then an up-grade of 2G referred to as 2.5G. (Coursaris and Hassanein, 2002). Further with the launch of the recent third generation systems (3G) as well as fourth generation systems (4G), mobile commerce is expected to go places, creating all together an alternative model for conducting business.

With the rapidly evolving wireless networks, the evolution of two major communication protocols, i-Mode and WAP (Wireless Application Protocol) was also observed. WAP was introduced in 1997 by companies like Phone.com, Ericsson, Motorola and Nokia to enable basic functionality of wireless mark-up language (WML) and WML Script communications in the first place and later on with the release of WAP 2.0 in 2001 its scope extended to support graphics, videos and actions enabled by voice (i.e. wireless Web browsing) (Coursaris and Hassanein, 2002; HCL Blog, 2004). The purpose was to introduce a standardised interface protocols as well as a common communication technology for presenting and delivering wireless services via wireless networks (Senn, 2000). Nearly the same time, in the year 1999, i-Mode was launched by NTT DoCoMo of Japan as its very own exclusive wireless protocol (Sadeh, 2002).

Other than the supporting wireless networks and the communication protocols, another element important for a successful mobile commerce transaction is a mobile device via which a transaction can be directed and entered into. Wireless devices have also evolved a long way from a simple cell phone with limited communicational and transactional capabilities to now common hybrid smart-phones with increased capabilities. Before the introduction of smart-phones, wireless devices were supposedly categorised into three main heads, i.e. mobile phones, wireless laptops and personal digital assistants (PDA). However, in case of smart-phones, this categorisation has been blurred (Coursaris and Hassanein, 2002). Smart-phone being a combination of cell phone and a PDA, belong to a new category of wireless devices that combines features of two or all three categories providing better capabilities and wider options to the mobile users.

1.5. Overview of Mobile Commerce Industry

With the advent of smart-phones and recent developments in mobile internet technology, the Indian online as well as mobile retail industry is going through a phase of rapid evolution. The following section discusses the recent trends in the rate of internet penetration and number of users accessing internet over their smart-phones in India. Further, it attempts to capture the rise of mobile phone users in India and the proportion of it using a smart-phone. Finally, it analyses the effect of these trends on the revenue generated from the Indian online retail commerce market in general and from mobile retail commerce market in specific.

1.5.1. Internet Penetration in India

As far as Indian market is concerned, according to a recent report, the internet penetration in the country was over 566 million users in 2018 and is estimated to go up to 627 million users by this year, registering a growth rate of 11 % (Timesnownews.com 06 March 2019).

The growth rate is the result of increased internet penetration in the rural areas. According to a report, as of 2018 India's total population was 132.42 crores (1.3 Billion) out of which only 43 crores lived in urban areas and the rest 89.42 crores were in the villages or in the rural parts of the country (Kantar IMRB, 2018). However, the internet penetration is around 65% in urban areas as against only 21% in rural parts (eMarketEdu.com, 14 April 2019). With increasing access to internet in the rural India, the overall internet penetration is further expected to increase and reach around 829 million users by 2021 (CISCO report, Dec 2018). This rapid growth trend in the internet connectivity in the country offers a great scope of success for online and mobile commerce industry. Figure 1.1 presents the estimated growth of internet users in India from 2018 to 2021.
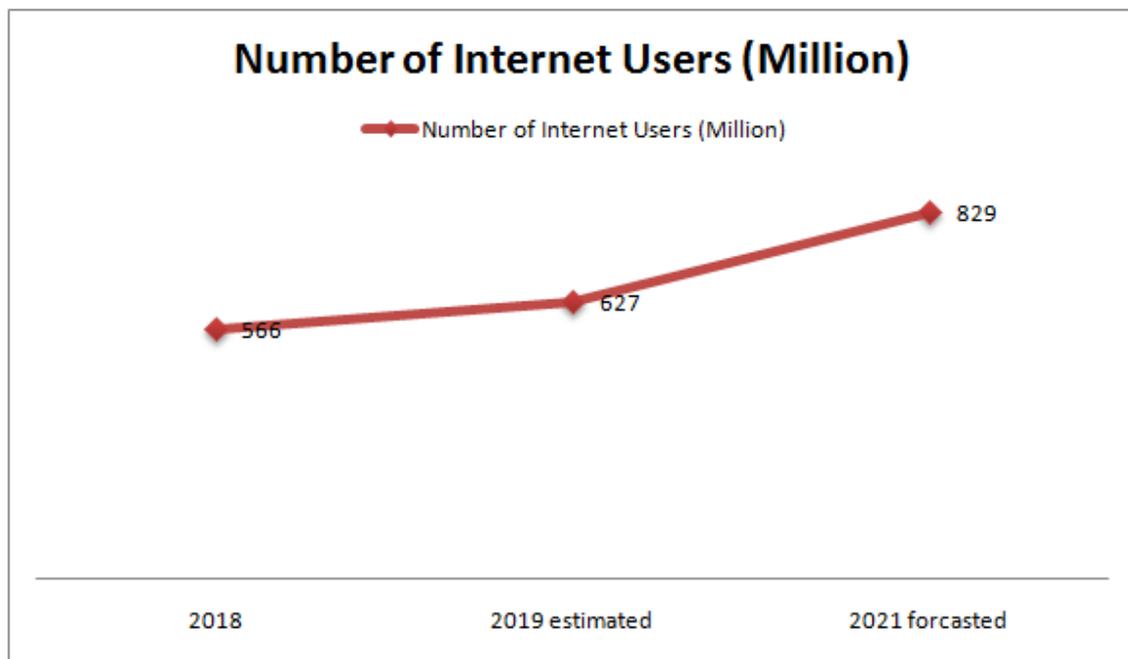
Figure 1.1: Number of Internet users in India (Million) from 2018 to 2021 (Source: CISCO report, Dec 2018; Timesnownews,com March 06, 2019)

A recent report predicted the internet penetration in India for the year 2018 to be 483 million users (Statista, 2019) which has been surpassed with over 566 million of total internet users reported as of 2018 (Timesnownews.com 06 March 2019) and is now predicted to reach 829 million internet users by 2021(CISCO report, Dec 2018).

1.5.2. Mobile Internet Users in India

The number of users accessing internet over mobiles stood at 456 million as of December 2017, with an increase of over 17 per cent from the figures reported for December 2016. By 2018, this figure supposedly touched 478 million (Indo-Asian News Service, 2018). The urban mobile internet users are estimated at 291 million against 187 million rural users as of 2018. The escalation in mobile internet usage can be accredited to the availability of cheaper smart-phones, faster connectivity, and affordable services. "Urban India witnessed an estimated 18.64 per cent year-on-year rise, while rural India witnessed an estimated growth of 15.03 per cent during the same period" (Smith, 2018; Times of India, May 29, 2018). The report made another revelation about mobile internet usage, pre-dominantly by the youngsters, 46 per cent urban users and 57 per cent rural users are below 25 years of age (Times of India, May 29, 2018)..
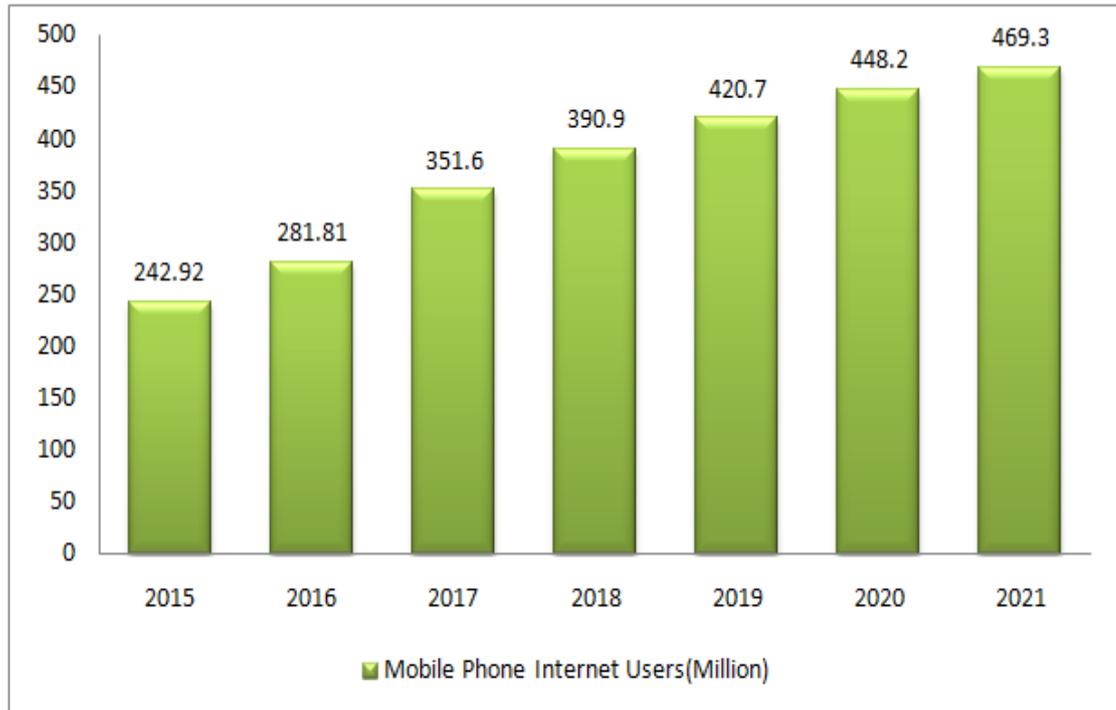
Figure 1.2: Predicted number of mobile phone internet users in India from 2015 to 2021 (in millions) (Statista 2019)

The statistics in the Figure 1.2 shows that by 2021, mobile phone internet users are predicted to reach 469.3 million in number (Statista, 2019). According to another recent market research, in terms of percentage of total population, mobile internet penetration in India is estimated to be 37.36% by 2021, making India a potential market for mobile-based services (Statista, 2018). The shift from computer-based internet usage to mobile-based internet usage can again give a tremendous boost to the mobile commerce market.

1.5.3. Smart-Phone Users in India

The projected growth of smart-phone users in India is over 60% between 2017 and 2022, which is the highest growth rate witnessed by any country in the world (Tripathi, 2018). More than a quarter of Indian population is estimated to be smart-phone users by this year. However, as of 2017, there were only 300 million users using smart-phones (Iyenger,

2017). The number is expected to hit almost 374 million in 2019 as against 813.2 million total mobile phones users, making the smart-phone users about 39 percent of all mobile users. It can be observed from the figure 1.3 that by 2022, smart-phone users are expected to touch a number of 442 million (Mello G.D'., Jan 15, 2019, Statista 2019). However, this also indicates that almost 1 billion of Indians, do not own a smart-phone yet.
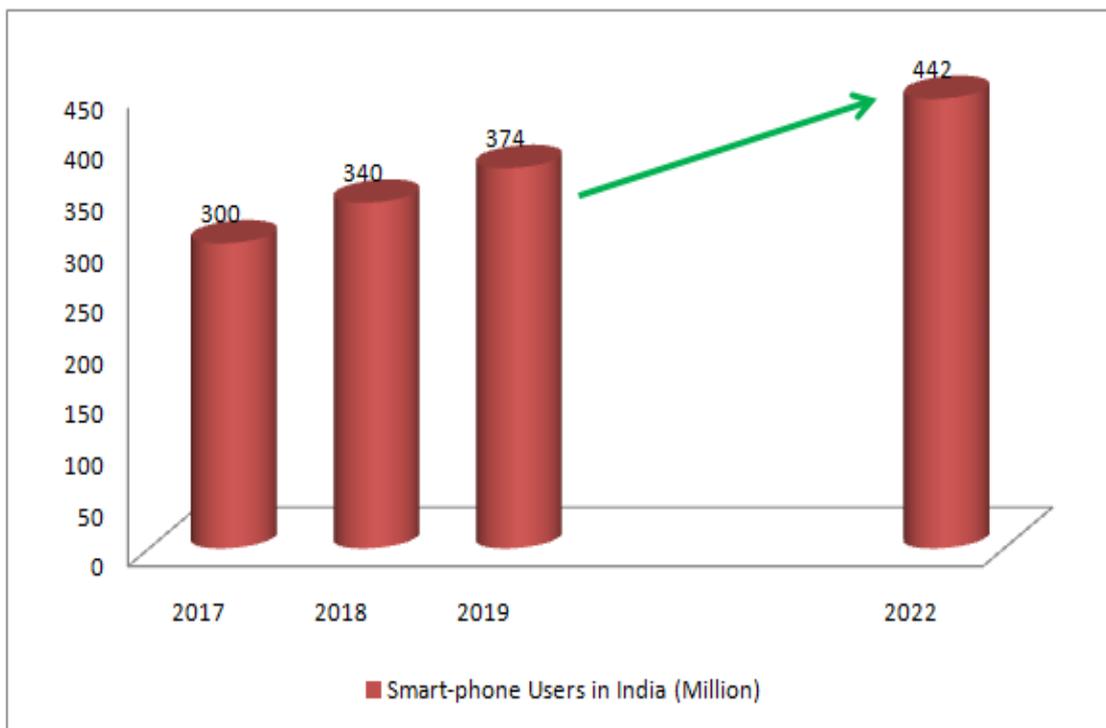
Figure 1.3: No. Of Smart-phone Users in India (Million) from 2017 to 2022 (Source: Iyenger, 2017, Mello, Jan 15, 2019)

In terms of percentage of total mobile phone users, smart-phone users in India are estimated to go up to 39% in 2019 as against 36% in 2018 (Statista, 2019).

1.5.4.   Online Retail and Mobile Retail Industry

The rapid growth in the internet penetration rate and mobile phone users in the country has given the e-commerce industry a tremendous boost in the last decade. In India, the active

e-commerce penetration in 2016 was only 28 percent, with a huge forecasted improvement. In terms of revenue generated, US$ 38.5 billion revenue was generated from e-commerce as of 2017 and is expected to shoot from almost US$ 39 billion in 2017 to US$ 120 billion in 2020, with the highest rate of annual growth in the world of 51 per cent (IBEF, Dec 2018). Further, it is expected to grow to US$ 200 billion by the year 2026.
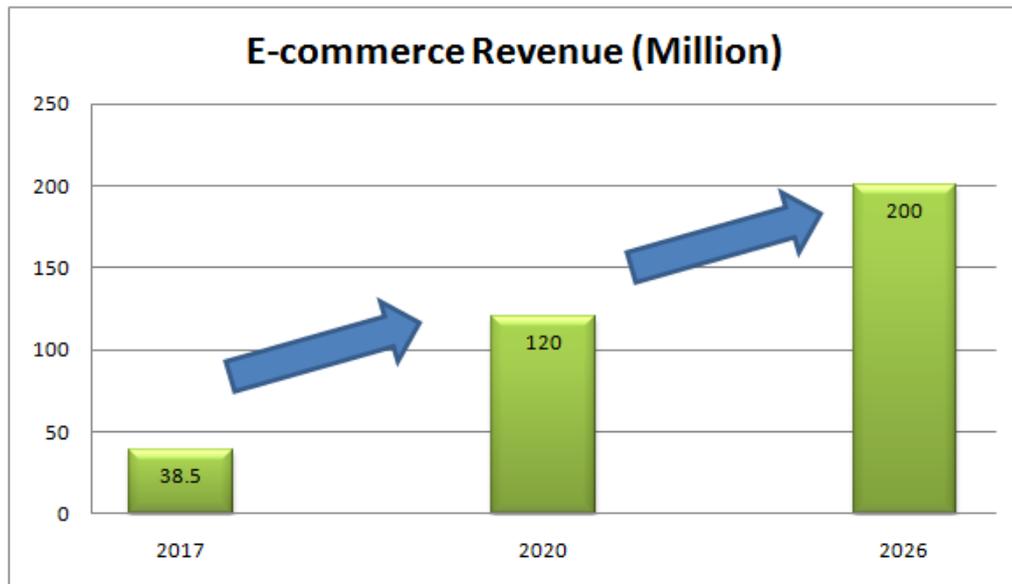
Figure 1.4: E-commerce Revenue Growth in India (Source: IBEF Dec 2018)

However, with the rapid advancement and widening reach of mobile infrastructure as well as with easy availability of mobile internet connectivity and smart phones at affordable rates, the Indian mobile commerce market is experiencing revolutionary evolution. A major portion of online commercial transactions are completed via a mobile device.
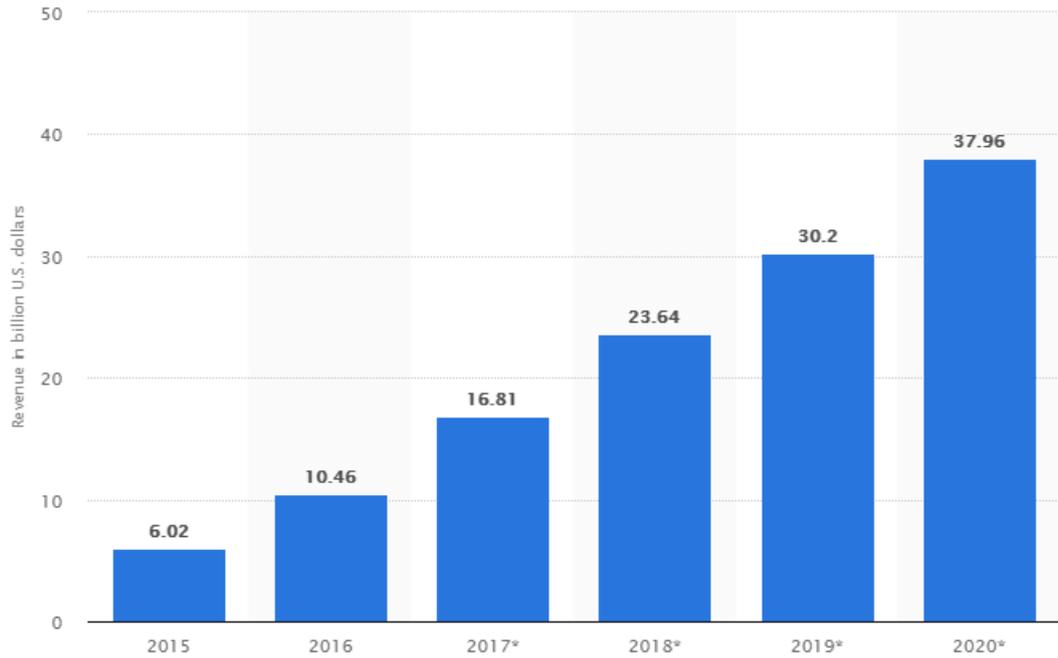
Figure 1.5: Retail m-commerce sales in India from 2015 to 2020 (in billion U.S. dollars) (Statista 2019)

In 2015, out of the total $12 billion annual online sales in India, nearly half took place through mobile phones. The retail mobile commerce revenue amounted to US$ 6.02 billion that year and was reported to reach US $ 37.96 billion by 2020 (Statista, 2019). Mobiles will be primarily responsible in driving this growth. In 2016, mobile commerce represented nearly 50% of online retail sales in India, compared with around 48% in China and 34% in the US, making India the most lucrative mobile commerce market (Srivastava, 2016).

Recent years have witnessed a remarkable growth in terms of internet penetration rate, number of mobile internet users, smart-phone users and mobile phone users in India, which has given a boost to the overall online retail and mobile retail market in the country. As of 2018, almost 566 million Indians from urban as well as rural parts had an access to internet, resulting in the internet penetration rate of almost 43% of the total population.

Among the total internet users that year, almost 450 million Indians accessed internet on their smart-phones. The number of mobile phone users were reported to be 775 million out of which 36% owned a smart-phone. The resulting revenue from retail m-commerce market that year was reported to be US\$ 23.64 billion. The smart-phone users and mobile internet users are estimated to grow further in number in the coming years, making India a potentially strong mobile commerce market globally. However, this is only a possibility if the service providers have a good knowledge of the consumers' needs and expectation from the mobile commerce industry.

1.6. Mobile commerce Applications

The term mobile commerce has a wide application and covers a spectrum of services which can be availed using mobile devices and wireless networks. Few of the most common applications of mobile commerce in India are mobile shopping, mobile payments, mobile entertainment, mobile banking, mobile ticketing and mobile gaming (Gordon and Gebauer, 2001; Sadeh, 2002; Hu, 2005, Jahanshahi et al., 2011). Figure1.6 shows the varied services included in mobile commerce.
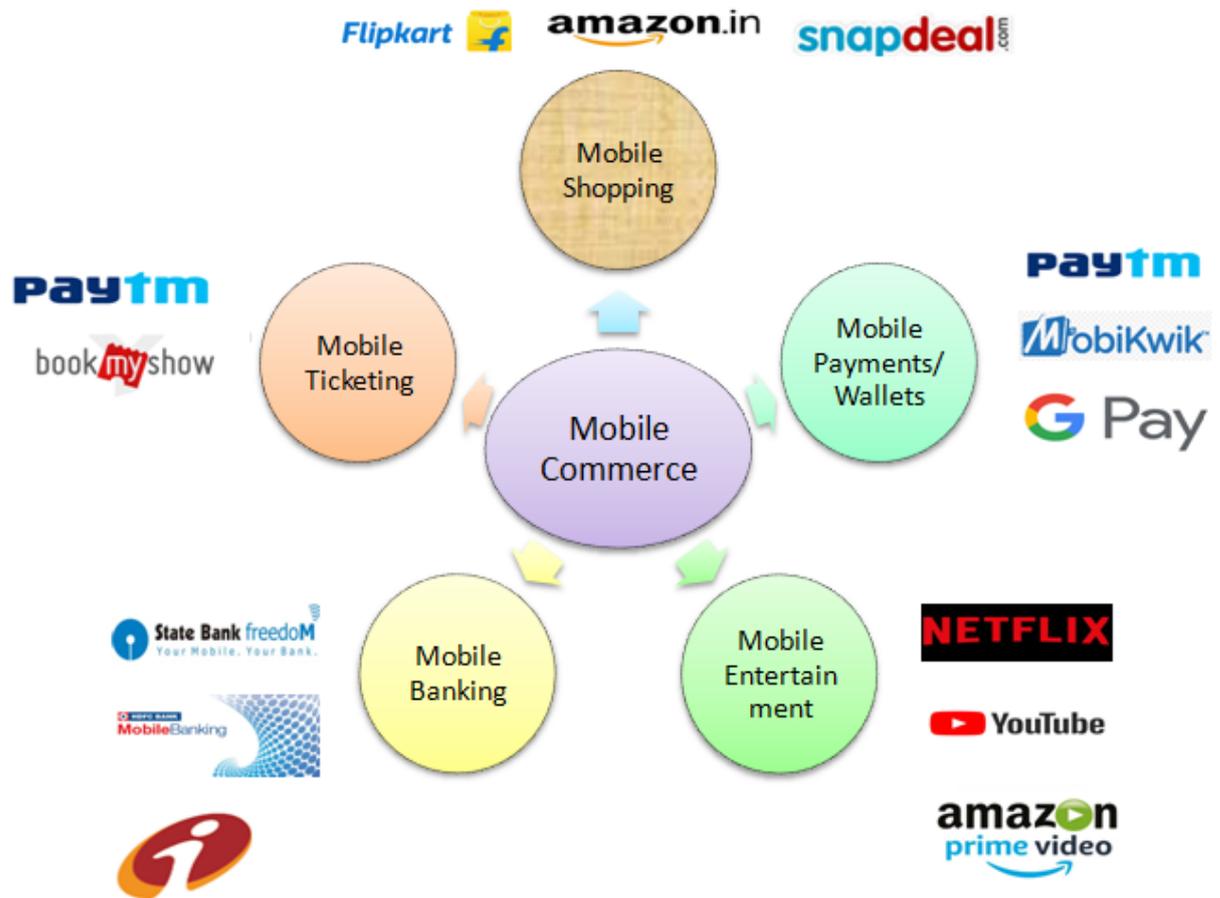
Figure 1.6: A Glimpse of Mobile Commerce Spectrum

1.6.1. Mobile Shopping

In the recent years, mobile shopping has become massively popular and is quickly penetrating into the fast-paced lives of the today's consumers. The utilisation of mobile devices has diversified to include a wide variety of activities ranging from initial search for the products, comparison among different vendors, placing of orders, and making online payments for services and products purchased (Hung et al., 2012). It is "*any monetary transactions related to purchase of goods or services through internet-enabled mobile phones or over the wireless telecommunication network*" (Wong et al., 2012, p.25). It is a division of mobile commerce, which can further be explained as "*any transaction with a monetary value- either direct or indirect- that is conducted over a wireless telecommunication network*" (Barnes, 2002, p.92).

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The rapid development and explosion in the mobile technology with the reducing rates of mobile network services and of high-end smart-phones, has made mobile shopping a popular trend amongst the consumers all over the world. Gaining from this mounting fame of mobile shopping amongst the consumers, marketers and retailers are investing significant funds and efforts towards this industry. Marketers worldwide are directing their energies towards promoting mobile devices for shopping among the consumers. Merchants are engaging with a variety of mobile applications to provide shoppers a safer and more convenient shopping experience. Also known as mobile retail commerce, mobile shopping was estimated to touch a global revenue of US\$ 669 billion by 2018 (Statista, 2016; Chopdar and Sivakumar, 2019). In India, with 478 million people using smart-phones to access internet (Indo-Asian News Service, 2018), the mobile retail commerce sales are estimated to reach US\$ 37.96 billion in 2020 (eMarketer, Dec 2016; Poddar, 2016; Pandey and Chawla, 2019).
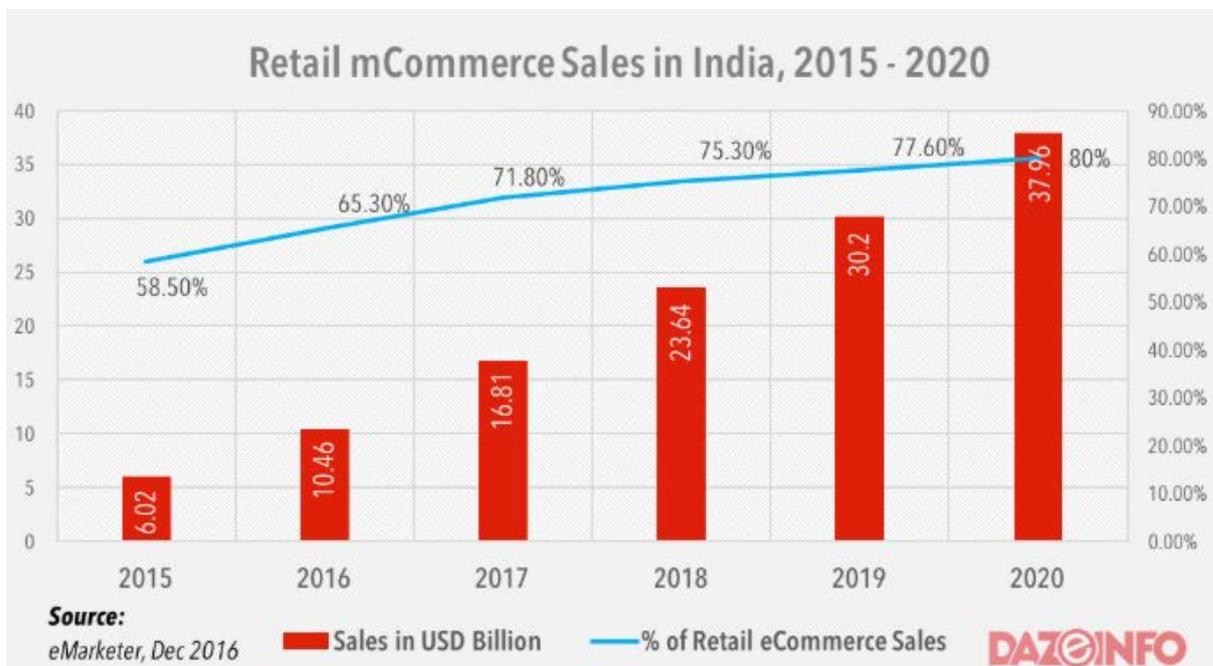
Figure 1.7: Retail mobile commerce sales in India from 2015-2020 (source: eMarketer, Dec 2016)

Few of the major market players offering mobile shopping services in India are Flipkart, Amazon India, Paytm, Snapdeal, Junglee, Groupon, Retailmenot (Chawdhary, 2015).

As of 2016, 44% of Indian smart-phone users preferred Flipkart over other sites for mobile shopping as against 32% users preferring Amazon (Poddar, 2016). As far as market share is concerned, as of 2017, Flipkart along with its subsidiaries Myntra and Jabong had a major market share of 39.5% in India followed by Amazon with 31.1% market share, Paytm with 5.6% share, Snapdeal with 2.5% share, Shopclues with 2.1% share and so on (Variyar, March 22, 2018). In the last festive season of October 2018, Flipkart had a leading market share of 51 percent, followed by Amazon with 32 percent and the rest of the companies shared the remaining 17 percent of the market (The Hindu Business Line, October 18, 2018). Figure 1.8 shows the market share of two major mobile shopping companies as of October 2018 in India.
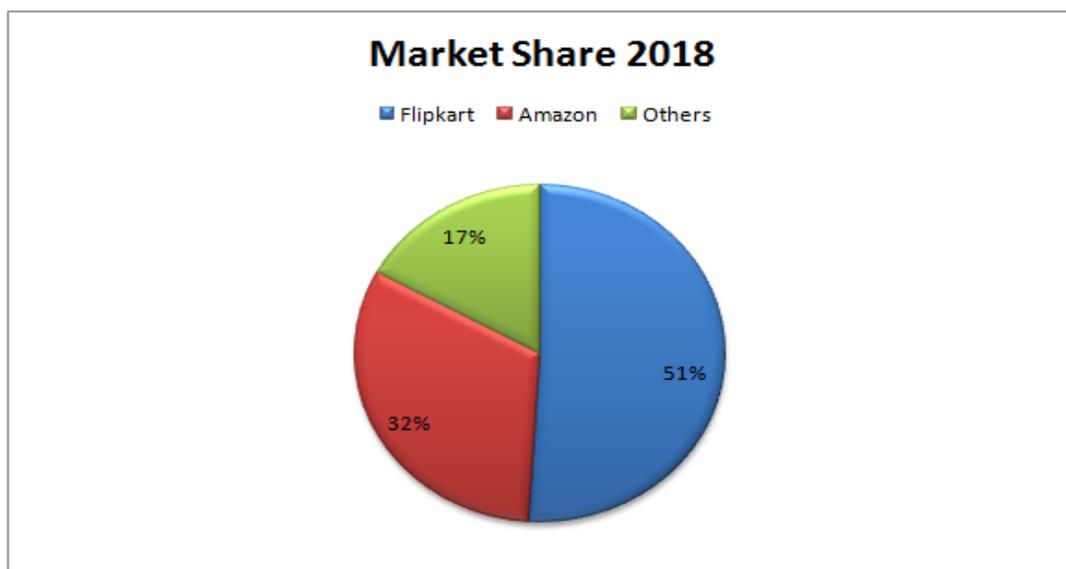
Figure 1.8: Market share of two major players in mobile shopping market as of October 2018 (Source: The Hindu Business Line, Oct 18, 2018)

Despite its strong potential, the consumers' response is still slow and unenthusiastic towards using wireless devices for shopping online (Wong et al., 2012). The reason behind

could be the issues faced by mobile shopping users with respect to limited screen size, poor connectivity, security and privacy concerns and the like (Chopdar and Sivalumar, 2019)

1.6.2. Mobile Payments

The conventional payment methods through traditional banking and financial institutions are facing major challenges in the developing nations as the utilisation of mobile devices and digital platforms for making payments is increasing rapidly (Duncombe and Boateng, 2009). This has resulted in a significant raise in terms of volume of mobile payment transactions across the globe. The global mobile payment volume in 2018 was 930 billion U.S. dollars i.e. close to 1 trillion U.S. dollars (Statista, 2019) and is estimated to go up to 14 trillion U.S. dollars by 2022 (Rolfe, 2018). In India, the number of users availing mobile payment services are estimated to grow to 93 million by the end of 2019 (Nayak, 2018). As of 2018, 26% of India's population were smart-phone users and by the year 2022 the smart-phone users are expected to reach almost 500 million in number.
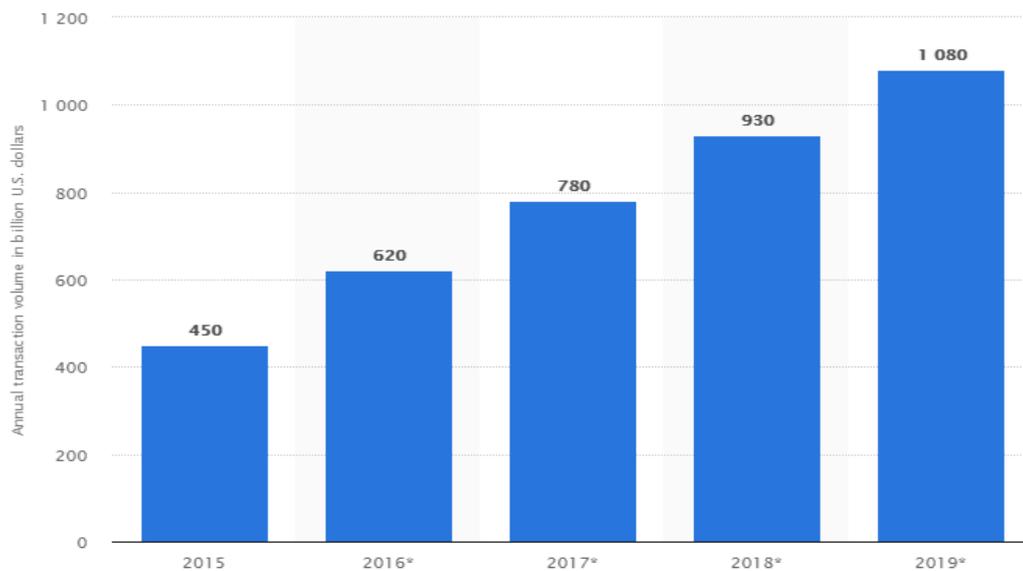
Figure 1.9: Worldwide Mobile Payment Revenue from 2015-2019 (Statista, 2019)

With the increasing internet and smart-phone users, a primary app that Indian smart-phone users are using is one or the other payment apps available (Kats, November 05, 2018).India has witnessed a recent erupt in the number of mobile payment solutions offered by various firms to its customers in different markets. About 93% of the Indian retailers are expected to accept digital wallet or mobile payments enabling their customers to shop without carrying cash (Chaturvedi, 2016).
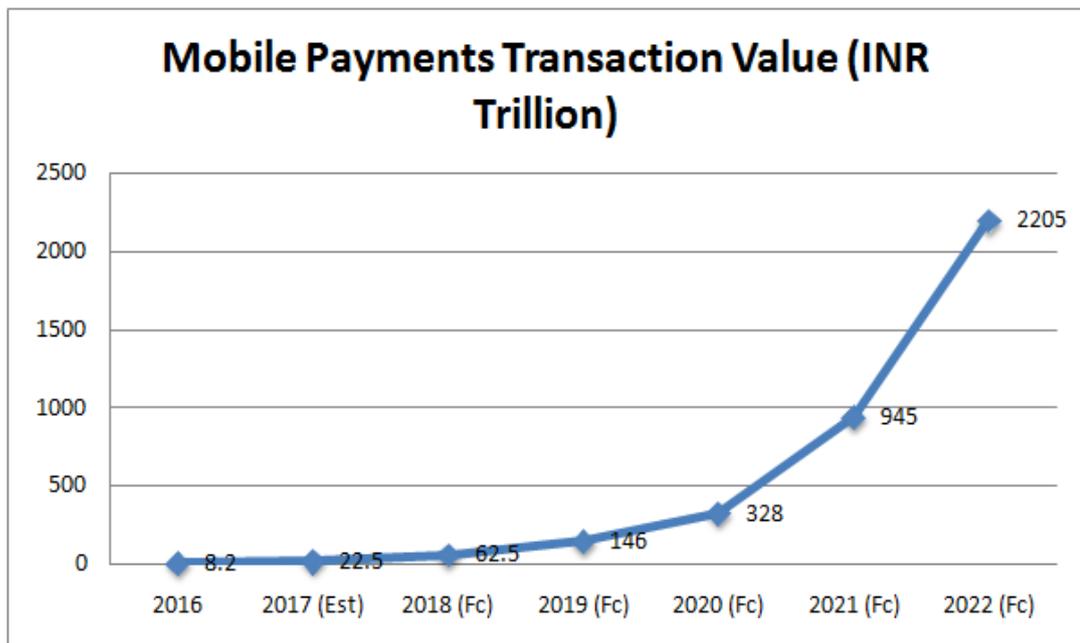
Figure1.10: Transaction Value of mobile payments in India (INR Trillion) 2016-2022

(Source: ASSOCHAM Dec, 2016) [Est- Estimated, Fc-Forecasted]

Some of the leading mobile platforms in India providing mobile payment solutions are Paytm, PayUmoney, Freecharge, Mobikwik, Google Pay, BHIM UPI, Google Tez. (Assocham, Dec 2016). Figure 1.11 depicts the distribution of m-wallet market share among major players in India as of 2017 (RedSeer Research, 2017).
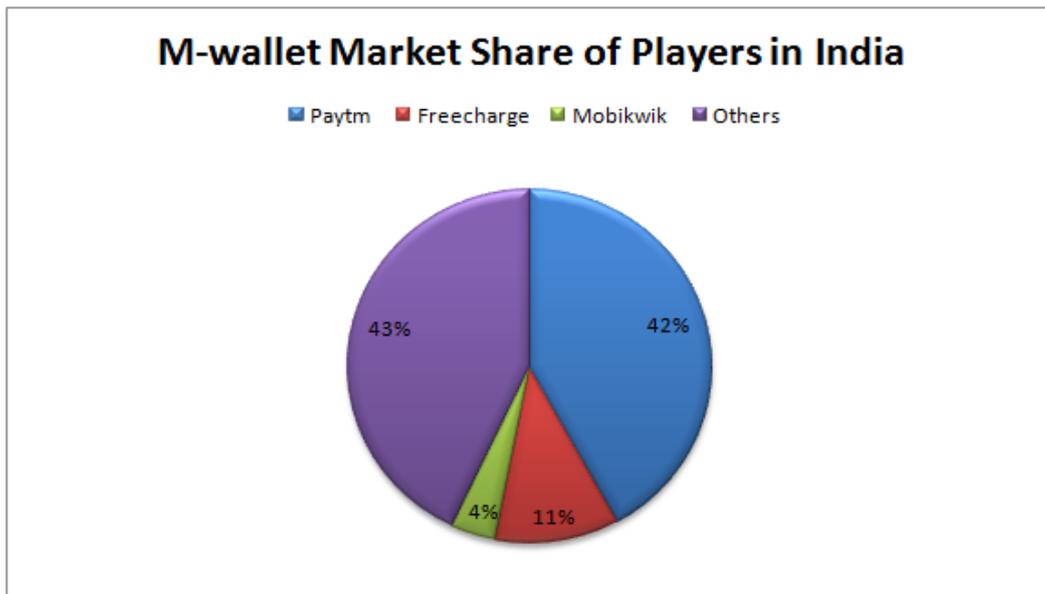
Figure1.11: Market share of Major Mobile wallet players in India (Source: RedSeer Research, 2017)

The positioning of such services rests on the benefits of ubiquity, the speed of delivery and the need of a green planet. The advancement in mobile wallet technology is providing convenience and has opened untapped channels of creating revenue for a number of firms. A rising number of business firms have now started to send billing information, news of a new product launch, confirmation of payment and other details directly on the customer's mobile phones. Given the embedded advantages of the mobile wallet technology, it is believed to have the capability as well as the potential of emerging as an alternative channel for making payments (Duncombe and Boateng, 2009; Leavitt, 2012; Dennehy and Sammon, 2015). As of 2017, around 38% Indian users used mobile payment solution for making money transfers, around 31% used it for recharges and bill payments and around 31% used it for other payments such as payment for mobile shopping, ticketing, gaming, etc. (ASSOCHAM, Dec, 2016; Statista, 2019).

Despite its innate benefits, the actual users of mobile wallet technology have remained abysmally low (Aggarwal, 2016). The central concern revolves around the attitude and

intention of the bottom of the pyramid customers who have the sole capacity to provide the required scale as well as profitability to a relatively new technology such as mobile wallet (Shen, 2015).

1.6.3. Mobile Entertainment

With the advancements in mobile and internet technology, another service which is gaining rapidly in terms of market value is the mobile entertainment service. It is another division of mobile commerce (Wong and Hiew, 2005), which includes any leisure activity undertaken over a wireless telecommunication network involving interaction with the service provider, and incurring of some cost. Example would be mobile gaming, mobile television, mobile internet, downloading of ring tones and music, mobile gambling and the like (Wong and Hiew, 2005). Mobile entertainment is defined by the Mobile Entertainment Forum as entertainment products including mobile games, ring tones and images functioning over a wireless network and individual mobile gadgets (Leong et al., 2013). It includes a variety of services ranging from ring tones, games, videos to even gambling over a mobile network (Shchiglik & Scornavacca, 2004). Broadly classifying, mobile entertainment services can be categorised into three parts: mobile music that includes ring tones, caller tunes and mp3 downloads; mobile television including mobile broadcasting and Video on Demand i.e. VOD and lastly mobile gaming (Kim et al., 2009).

Mobile television (mobile TV) is amongst the important upcoming application of mobile technology (Choi and Totten, 2012). It refers to traditional television content being transmitted to wireless- handheld mobile devices on a real-time basis (Loebbecke et al., 2008). It is an integration of mobile and television services which is changing the way people have been watching television for years (Wong et al., 2016). The additional advantages of flexibility and mobility offered by mobile devices, enables users to access

television services without any restriction of place and time (Lee et al., 2011; Wong et al., 2014; Hew, 2016).

Mobile television is a personalised mode of watching television on a most personalised device i.e. mobile phone (Kaasinen et al., 2009). It involves simultaneous delivery of various multimedia services such as television, radio and video channels to the receivers on their mobile handheld devices (Kwon and Chon, 2009; Pagani, 2011). It is different from the traditional ways of watching television as it enables users to watch television programs of their choice on demand on their personal portable devices. Simply defining, Mobile television implies watching television programmes on mobile devices (Wong et al., 2015).

Mobile phone usage over the period has evolved in three major spheres of life i.e. home, work and public, with increased usage in the public sphere such as while travelling or while waiting. Mobile television has perfect utility in such situation to keep the users entertained and up dated with information (news and sports updates) (Knoche and McCarthy , 2004; Maki, 2005; Kaasinen et al.,2009). Popularity of mobile TV, in the initial phase of its diffusion, can be attributed to its ability to provide on-demand sports and news updates. Initially the utility of mobile TV was driven by sporting events such as World Cup games, FIFA (Federation Internationale de Football Association) and Olympic Games where in sports lovers were in need of continuous updates of scores of their favourite games wherever and whenever they want (Bhebhe, 2008). Another important utility that made mobile TV popular was providing real time news updates to the users (Carlsson and Walden, 2007). However, in the present time, mobile TV services are being extensively availed by users to access a variety of content including news, music, movies, cartoons, soap operas as well as sports updates (Knoche and McCarthy, 2004). Globally, the revenue from mobile TV stood at US$ 7.69 billion in 2015 and is estimated to grow at

a CAGR of 9.5% to reach US$ 17.02 billion by 2024 (Transparency market research Report, Aug 2016). In India, it is estimated that 50% of the total video and Television viewing will take place using mobile devices by 2020 (The Economic Times, October 10, 2017). Some of the leading mobile video content providers are Youtube, Netflix, Hotstar, Amazon.

Online audio content is another service included in the broader concept of mobile entertainment. Audio content including ring-tones, caller-tunes and music downloadable or capable of online streaming on mobile devices via mobile network is another important aspect of mobile entertainment. In India, 273 million users are estimated to listen to music online by 2020 and the overall digital music industry is estimated to reach revenue of INR 31 billion by that year (Deloitte Analysis). Figure 1.12 depicts the trend in the number of mobile music listeners in India.
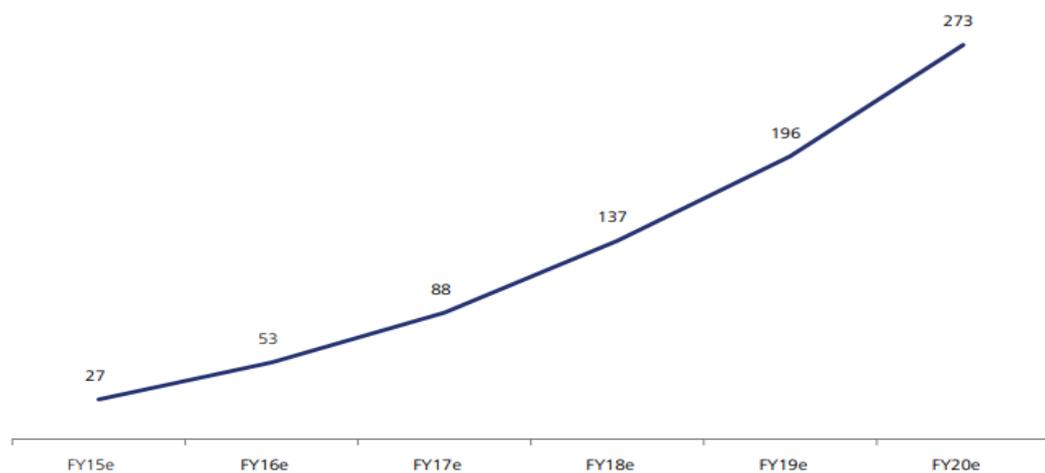
Figure 1.12: Online Music Users in India (Million) (Source: Deloitte Analysis) [e-estimated]
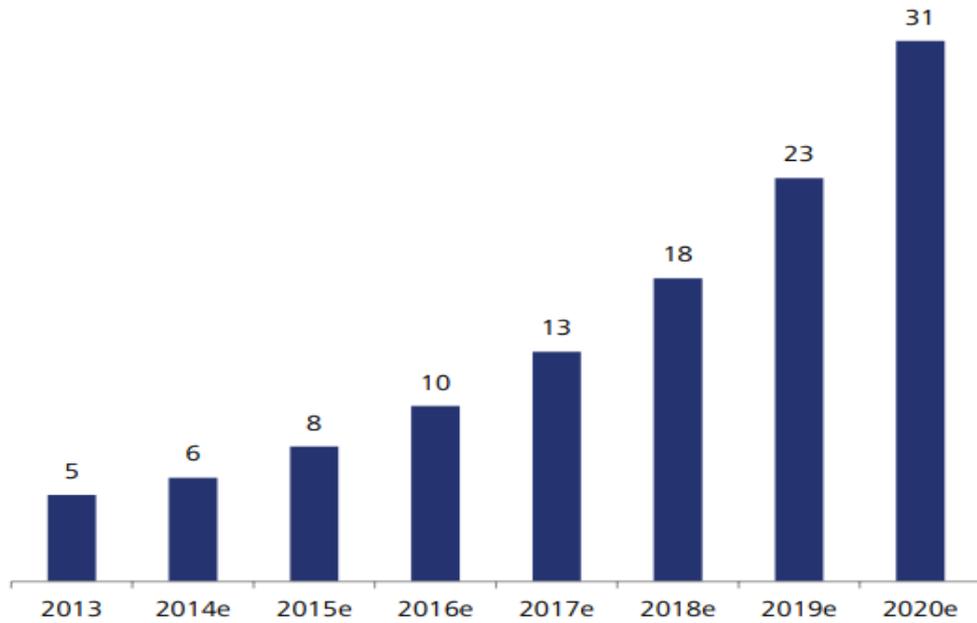
Figure 1.13: Digital Music Industry Revenue in India (Billion) [Source: Deloitte Analysis]

Figure 1.13 shows the current and predicted scenario of Digital music industry of India in terms of revenue generated. Major online music streaming application available in India includes Apple music, Amazon prime music, JioSaavn music, Google Play, Wink music, Gaana, Spotify, Hungama music, Coke Studio and the like (Sekhose, Feb 2018, Siddula, March 2019). It can be observed from the figure 1.14 that as of March 2018, Google play music had a leading market share of 63.7%, followed by Jio Saavn with 26.1%, Gaana with 4.5%, Wink music with 3% and Hungama with 1.3% share (Statista, 2019).
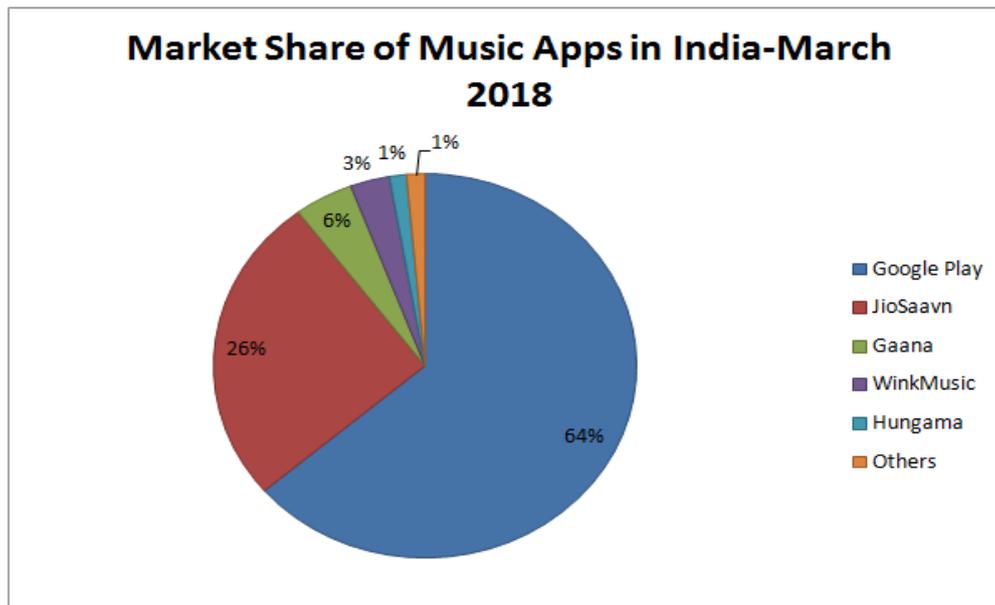
Figure 1.14: Market Share of Music Apps in India- March 2018 (Source: TheAtlas, 2018;

Statista, 2019)

Mobile Gaming is another segment under mobile entertainment services, which has gained

popularity with the advent and spread of smart-phones in the market (Kleijen et al., 2003).

By providing the services of gaming over a mobile device, utilising mobile network,

mobile technology has enabled users to play complex multi−player games (MPG) with and

against users playing remotely (UMTS Forum, 2000) without any constraint of location

and time. It serves as an effective time−killing and leisure-time entertaining activity for the

users (May, 2001). At the time when mobile phones were launched and their functionality

was restricted to a communication device only, users played games that came stored in

their mobile handsets. The mobile gaming market truly became global, when in early

2000s, mobile phones were commercialised on their capabilities of downloading games

from the operators' own portals. However, the nature of such games was simple and was

similar to the gaming consoles available in the market 10-15 years before (Durlacher,

2000). The reason was the limited processing power and graphical resolution of the mobile

phones of that time (Stone, 2001; Feijoo et al., 2012). With the launch of i-phone by

Apple in 2007, offering a set of advanced features such as touch screen, enhanced display, increased storage capacity, better location systems, and high-quality audio and video, there came a dramatic change in the mobile gaming market. Further, the introduction of ubiquitous mobile networks such as 2G, 3G and 4G services, many innovations were made possible. Innovations such as downloads from application stores, online gaming across different media using social networking sites such as Facebook, possibility of playing interactive multi-player and location-based games, are all possible now (Feijoo et al., 2012). Globally the mobile gaming market stood at revenue of US$ 137.9 billion in 2018, and is predicted to go up to a revenue of US$ 180 billion by 2021(MediaKix, Feb 06 2019). With about 250 million gamers, India is among the top five markets in terms of active user-base and is predicted to reach the mark of 628 million users by 2020 (dotcominfoway, 2018). In terms of market revenue, mobile gaming industry has a revenue amounting to US$ 1,015 million in 2019 and with a CAGR of 12 %, this amount is expected to be US$ 1,597 million by 2023 (Statista, 2019). As of 2017, some of the top games from India were, Ludo King with the highest number of daily active users (DAU) of 10 million, Subway Surfer with 5 million DAU and Temple Run with 2.5 million DAU (Laghate, Aug 14 2018).

However, the future of mobile entertainment services is still questionable. The worldwide adoption rate of mobile TV services is even lower than the expected, except for few countries such as Korea and Japan where the observation is otherwise (Pagani, 2009). As a result of this, the industry players are still doubtful about its success in the future. For mobile entertainment being a higher level value-added service targeted towards the existing television and mobile users, understanding the consumer-centric factors in its adoption and the challenges faced by the users in its usage is of utmost importance (Wong et al., 2016). The predictions about the future increase in revenue from mobile

entertainment services, ultimately depends on the end-users' satisfaction and their adoption rather than the technical development. Such revelations in the mobile entertainment market will help industry players to minimise the business risk involved and to direct efforts, resources and investments towards profitable innovations.

1.6.4. Mobile Banking

Innovation and rapid developments in information technology has affected every dimension of our modern lives including our means of banking and making payments for transactions. It has resulted in creation of new, flexible, and more user-friendly methods of payments (Akhturan, 2012; Dash 2014). In the pursuit of providing greater value to its customers in terms of convenience, reduced costs as well as to maintain profitability, financial companies are searching for alternative modes (Puschel et al., 2010). Mobile banking is one such alternative mode of banking which provides financial services through information technology to millions of people even in the low-income countries or emerging markets that have access to mobile phones (Ismail, 2009; Anderson, 2010; Hanafizadeh, 2014). It provides an opportunity to the financial institutions to reach new customers, improve their service quality as well as to reduce their operational costs (Ismail, 2009; Abbas et.al., 2018). Mobile banking is a potential channel with which people who are otherwise excluded from the mainstream financial system due to poor access or awareness can be reached (CGAP, 2006; Ismail, 2009). It is believed, "banking is essential to a modern economy, banks are not" (Tan and Teo, 2000, pp.3)

Mobile banking is a mobile commerce application that enables its users to enter into banking transactions virtually from any place and at any time convenient to them (Mehrad and Mohammadi, 2016). It may also be defined as, providing financial services through mobile devices using mobile communication technology (Pousttchi and Schurig, 2004;

Puschel et al., 2010; Chong, 2013; Dash, 2014, Sharma et.al., 2017). It is often considered as an extension of electronic banking which utilises mobile or wireless devices in delivering financial services electronically to the users (Riquelme and Rios 2010). However, due to increased access to mobile phones as compared to Personal Computers and enhanced quality of services provided through mobile banking, it has gained more popularity than electronic banking ever had (Laukkanen, 2007; Hanafizadeh, 2014; Deb and Agrawal, 2017). Banking over mobile devices offers greater value by providing customers an opportunity to access financial services whenever and wherever they want, provided they are connected to the internet (Laukkanen, 2007; Riquelme and Rios 2010; Dash 2014; Abbas et.al., 2018). Presently, banks are offering a wide variety of services through their mobile banking applications. These services includes financial transactions related to payment and banking such as bill payments, fund transfers, merchant payments and mobile recharges, as well as non-financial transactions related to real-time two-way transmission of data and financial information and services including access to account statements, enquiry about balance, cheque-book request and the like. (Jacob, 2007; Akhturan, 2012; Dash, 2014; Sharma et.al., 2017). Thus, mobile banking enables financial institutions to establish stronger relationship with their customers (Laukkanen, 2007; Hanafizadeh, 2014; Berraies, 2016).

Introduction of low-cost smart-phones along with affordable mobile internet plans in India has made it the fastest growing market in terms of smart-phone users in the Asia Pacific region (Chawla and Joshi, 2017). The ever increasing number of smart-phone companies in India including Samsung, Sony, Apple, HTC along with the new entrant such as Asus, Xiomi, Micromax, etc. has resulted in the development of new alternatives for bankers as well as consumers in the form of mobile banking. India being a developing country has more number of mobile users as compared to computer users giving mobile banking a fair

chance to be a potential success. The majority of India's mobile subscribers are expected to own a smart-phone within next five years (Forrester's Indian Mobile Banking Functionality Benchmark report, 2015). With the Government of India supporting projects such as "The Digital India", the popularity of smart-phones has grown enormously, making it a vital part of the daily life of the citizens (Deb and Agrawal, 2017). As a result major banks in India (both private and public sector) have developed mobile websites and mobile applications for providing easy access of financial services to their customers over their mobile hand-held devices. Mobile banking can provide cost-effective banking services to the Indian population which was earlier outside the coverage of the organised banking sector (Deb and Agrawal, 2017). As a result, in India there were 251 million registered mobile banking customers as of March 2018, as against 163 million registered customers in March 2017, witnessing a growth of 54%. Further, in terms of volume it showed an increase of 13% from 2017 to 2018 (The Economic Times, Aug 29, 2018). However, with a total population of 1.3 billion, there is a huge proportion of Indians who are yet out of the reach of mobile banking, offering a great scope of growth to this sector, but only if the marketers manage to build a positive consumers' attitude towards its adoption.

1.6.5. Mobile Ticketing

With the smart-phone users growing in number, along with continuous developments in mobile technologies, Mobile ticketing is trending as a new mobile commerce application among the users (Zhao et al., 2016). The greater flexibility, enhanced efficiency and easy accessibility provided by mobile ticketing makes it an attractive application for the users (Mallat et al., 2009; Alfawaer et al., 2011; Anandpadmanabhan; 2011; Zhou, 2011). Mobile ticketing basically refers to purchase of tickets over a mobile device using a mobile network (Anandpadmanabhan, 2011). It is a process, in which tickets can be ordered, paid

for, obtained, and validated by the customers at any time and place using some mobile device (Zhao et al., 2016). The digital format of ticketing offers a great deal of advantages by reducing the production and distribution costs of the physical form of tickets. Tickets and quick response (QR) codes are sent electronically to the mobile devices of the customers, where it can be stored for future reference, eliminating the need for carrying a ticket in physical form and making the entire ticketing process much more convenient and simple for the users (Zhao et al., 2016). The coverage of mobile ticketing extends to a varied range of services from public transport services to sports events, concerts and other live shows, movies, theatre and so on. The services availed through mobile ticketing can be broadly categorised into three sectors namely, travel and transport, sporting events, and entertainment (Anandpadmanabhan, 2011).

The increasing functionality of smart-phones has altered the way people buy their transit tickets globally. Throughout the world various transit agencies are implementing mobile technologies to modernise and ensure customer convenience in their point of sale operations. Using smart-phones in the ticketing process, not just allows users to buy their transit tickets online without any time and place constraint, but it also provides them accurate information regarding their trips on a timely basis. It reduces the chances of fare evasion and costs associated with cash management and automatic ticket vending machines. Moreover, with the enhanced data collection capabilities, service providers can bring in improvements in their transit operations and planning (Rainville et al., 2009; Tavilla, 2015). It offers travellers the advantages of cash-less travel, reduced waiting time compared to purchasing of paper-tickets and reduces the need to deal with out-of-order or poor performing automatic ticket vending machines (Master card website, 2016). The drivers or the conductors can inspect these tickets visually or by scanning the QR codes (Bartin et al., 2018). Mobile ticketing is gaining popularity in the public transport sector

due to the reduced time spent on the ticket counters as well as the convenience offered to the travellers, transit agencies as well as the operating staff involved such as drivers and conductors (Master card website 2016; Accenture website; Bartin et al., 2018)

Sporting events category is another sector which has been utilising mobile ticketing services, on a macro level. The reason for this is the large number of people waiting in the queues for the purchase of conventional paper-based tickets, making it a time-consuming and an inconvenient process. With the help of mobile ticketing platforms, spectators can purchase tickets online which can be validated by scanning QR codes, they can select the match timings and their seats by accessing internet over their mobile devices (Alfawaer et al., 2011).

In case of entertainment sector, which includes movies, theatre, live concerts and tickets for amusement parks, the users can enquire and select a movie or any entertainment event by accessing internet over their smart-phones without any constraint of time and place. As more and more users start using their mobile phones for booking the tickets, the number of people as well as the waiting time spent in the queue in front of the ticket counters will reduce (Anandpadmanabhan, 2011).

In India as well, mobile ticketing services are picking up as a popular mobile commerce application. Today, Indians are availing mobile ticketing services for booking their movie tickets (Anandpadmanabhan, 2011) through various mobile portals such as Bookmyshow.com, Paytm, Airtel Live as well as for booking their public transit tickets for Indian Railways Catering and Tourism Corporation (IRCTC) (Kapoor et al, 2015; Sahu and Singh, 2017), sub-urban railways (Siddiqui and Askari, 2016), Local train services such as Mumbai local (Kadge et al., 2017) and even bus services through redBus and AbhiBus. In the transit segment, the Indian railways recorded an increase of 300% in the

volume of tickets sold over mobile from April 2017 to June 2018 (The Indian Express, April, 2019). As of 2017, the overall online ticketing market witnessed a revenue of US$ 330 million and is estimated grow at a rate of 20% to reach US$ 580 million by 2020 (Biswas, Nov, 2018).
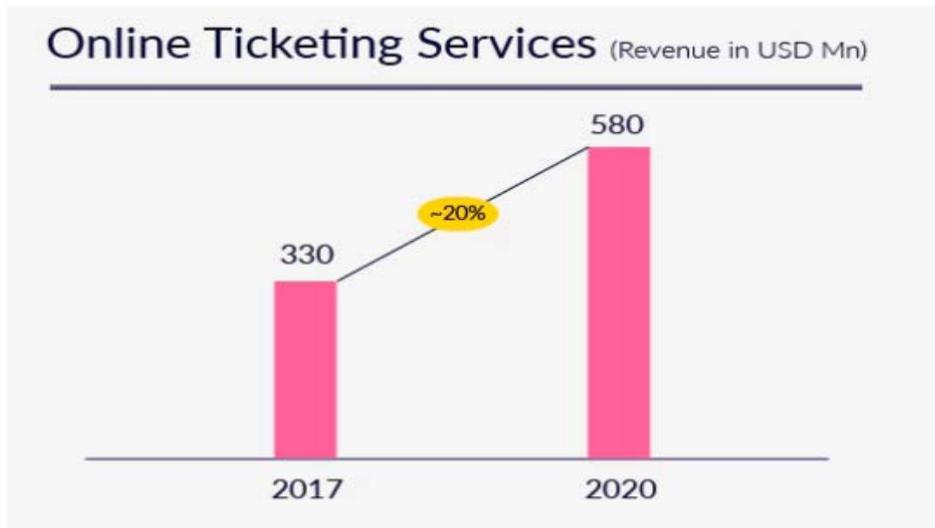
Figure 1.15: Revenue from Online Ticketing Services in India (Source: Biswas, Nov, 2018)

It can be observed from the figure 1.15 that in terms of revenue generated, mobile ticketing services are expected to grow from a market of 330 million US$ in 2017 to 580 million US$ market by 2020. From the almost US$ 330 million online ticketing market, around 55% of the revenue is generated from the selling of movie tickets, followed by sports contributing 25% to the total revenue and other events such as concerts, live shows and the like with a share of 20% in the total revenue (Biswas, Nov, 2018). Figure 1.16 shows the contribution by each service category to the overall mobile ticketing market revenue.

Figure 1.16: Share in Online Ticketing Revenue of Different Entertainment Segment

(Biswas, Nov, 2018)

Further, in the entertainment and sports events segment, major players in the mobile ticketing market in India are BookMyShow having 90% share in the total market (IBEF), followed by Paytm (Srinivasan March 2018).

1.7. Research Motivation

Ever since the arrival of smart-phones, there has been a rise of mobile influence on shopping behaviour of consumers. The consumers find finalizing their transaction over phone, more comfortable, i.e. they are more at ease with mobile commerce (Lacy, 2018). In the global scenario, more than half of the entire internet traffic is reported to come from mobile devices. The increase is not just in the number of users accessing internet through mobile devices but also in their e-commerce intent (Smith, 2018).

The mounting fame of wireless devices like smart phones, tablets, PDAs for undertaking commercial transactions is an outcome of the limitations experienced in using Personal Computers. The two main limitations encountered by personal computer are, firstly, it requires the presence of users in front of the fixed and wired system while operating it and secondly, it requires loading of software, dialling into it as well as connecting to a network

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service provider, prior to accessing of any internet application. However, mobile devices does not have any such requirement of downloading a software or boot time and enables users to simply access any app by downloading it once and re-access it in a nick of time as and when they turn on their devices (Senn, 2000).

By the year 2019, the Indian mobile commerce market is estimated to reach 19 billion US dollars (Singh and Islam, 2015). Although appearing to be a huge figure, given the size of Indian economy, it is still in its growing stage. To ensure faster adoption of mobile commerce as an alternative mode of conducting commercial transaction among the masses, understanding the needs of the consumers and their expectations from it is of utmost importance. Identifying the aspects of mobile commerce that poses difficulty in its usage and those which provides it an edge over other modes is also indispensible to ensure its rapid spread in the market.

The mobile commerce value-chain comprises of the network operators, application developers, technology vendors, service providers, content providers, and consumers. The future of mobile commerce industry and its sustainability will depend on the efficiency with which these value-chain partners perform their roles. As the most significant and indispensible element of this value-chain, consumers has an crucial part in the mobile commerce success or failure. Analysing factors that induces consumers' adoption of mobile commerce and factors that hampers its adoption will offer meaningful insights to other value-chain partners. Based on such insights, they can invest their resources and energy in developing and creating more suited and profitable technologies. The advantages offered by mobile commerce to the end users including ease of usage, better job performance, social acceptance, increased service variety, enjoyment and higher derived value, may influence consumers' decision regarding adoption of mobile commerce services in a positive way. Whereas issues related to security and trust issues, lack of

supporting technological and physical environment, which the consumers faces in any commercial transaction over mobile, may hamper its adoption.

1.8.   Research Questions

The study is primarily focussed on answering the following set of questions:

1.8.1. What is mobile commerce and what all different services are included in mobile commerce domain?

1.8.2. What are the factors inducing positive influence on consumers' Behavioural Intentions to adopt mobile commerce?

1.8.3. What are the key issues or factors that impede consumers' intentions to adopt mobile commerce?

1.8.4. What are the strategies employed by existing e-commerce and emerging mobile commerce companies to ensure consumer adoption of their services?

1.9.   Research objectives

For effective investigation of the research questions mentioned in the previous section, the study aims at achieving the following objectives:

1.9.1. To identify major areas of mobile commerce applications in India.

1.9.2. To identify the variables which influence consumers' intentions to adopt mobile commerce and their relationship with consumers' behavioural intention.

1.9.3. To analyse the impact of consumers' Age, Gender and Household Income on the proposed relationships.

1.9.4. To analyse the strategies followed by Indian mobile commerce firms for consumer adoption.

1.10. Scope of the study

The research is conducted in a context of one country i.e. India and focuses on the consumer-centric factors affecting behavioural intention of consumers towards mobile commerce adoption. Further, this study is conducted in a general sense covering the entire domain of mobile commerce irrespective of different sub-domains of it. It empirically analyses the effect of important independent variables identified from the literature on the mobile commerce behavioural intentions of the Indian consumers which further affects their actual usage. Moreover, the study is cross-sectional in nature i.e. the collection and analysis of the data is performed at a particular point of time.

1.11. Overview of Research Design and Method

For achieving the first three objectives of this study both primary as well as secondary data collection techniques were utilised. A thorough literature review was conducted to identify major areas of mobile commerce applications in India as well as to study and compare various existing technology adoption frameworks and for identifying key factors influencing mobile commerce adoption. Further, a balanced approach was adopted where in, along with the primary data collected to develop and validate the research framework for mobile commerce adoption, cases of successful mobile commerce companies were also analysed to understand the role of identified parameters in the adoption of services offered by mobile-commerce entities.

Primary research consisted of primary data collection to support the framework and subsequently the relationships between the identified variables were tested using a multi-staged analysis comprising of Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis and hypotheses testing through Structural Equation Modelling (SEM) and Artificial Neural Network (ANN) Model analysis in IBM SPSS and IBM SPSS AMOS.

The research design of the study was descriptive in nature. The absence of a formal sampling frame in such kind of studies justifies the use of non-random sampling techniques to collect data, which have been utilised for this research.

The data was collected through a self administered questionnaire consisting of two parts. The information on demographic variables was captured by the first part of the questionnaire. The second part was used to obtain data on the respondents' level of agreement or disagreement on the items measuring all the independent as well as dependent variables of the study. A Likert scale of five points, ranging from 1 representing high disagreement to the statement and 5 representing high agreement with the statement was utilised to measure these items.

A multi-staged analysis was conducted on the primary data collected starting from the first phase of Exploratory Factor Analysis (EFA) followed by the second phase of Confirmatory Factor Analysis (CFA) of the measurement model created in SPSS AMOS, testing of proposed relationships through Structural Equation Modelling (SEM), and the final phase of using Artificial Neural Networks (ANN) to confirm complex linear relationships between the variables. For analysing the strategies implemented by different existing e-commerce companies as well as emerging mobile commerce companies for consumer adoption, cases from the industry were analysed.

1.12. Contribution of Research

The findings of the research have important implications from the managerial, practical, and research point of view. The multi-staged analysis found few factor namely Perceived Regulatory Framework, Perceived Ease of Use and Personal Innovativeness as factors determining Behavioural Intention of consumers towards mobile commerce adoption in a most significant manner, further determining actual usage of mobile commerce. It provides

meaningful insights to various partners in the mobile commerce value-chain including marketers, app developers, service providers, and regulatory authorities enabling them to ensure a steady growth in the acceptance of mobile commerce by potential consumers. An effort has been done to establish a causal relation among the independent and dependent variables and to further confirm linear relationship of factors influencing adoption of mobile commerce with the Behavioural Intention of consumers towards it. By integrating Artificial Neural Network Model with Structural Equation Modelling, the study provides a relatively new dimension to the analysis useful for the future researchers working in the domain of mobile commerce.

1.13. Structure of the thesis

The study is structured in six chapters covering different aspects of the research.

Chapter 1: The first chapter introduces the term "mobile commerce", presents an overview of the industry, discuss various applications of mobile commerce in India along with the current trends in the Indian market. It also states the objectives of the research, a brief description of the research methods used to achieve these objectives, findings of the research and finally its implications.

Chapter Two: This chapter summarises the literature available on Technology Adoption Models and the researches done in the area of mobile technology adoption. It identifies the important factors that affects mobile commerce adoption and provides a theoretical base for the development of the research framework. Further, it proposes a research framework and discusses the research variables. It also includes development of the research hypotheses.

Chapter Three: The next chapter entails the research design and the methodology utilised for the purpose of effectively fulfilling the objectives of the present research. It focuses on the data analysis techniques utilised along with their suitability for the research.

Chapter Four: This chapter analyses the primary data collected through the sample survey and presents the findings of the analysis.

Chapter Five: The next chapter includes analysis of two successful business cases from the Indian mobile commerce market i.e. the case of Flipkart Pvt Ltd. and Paytm and discusses the practices utilised by them to ensure quick adoption of their services by consumers.

Chapter Six: In the sixth chapter of the study, the findings of the analysis are discussed in detail.

Chapter Seven: In the final chapter of the study the conclusions drawn from discussion, contribution of the study to the theory, implications to practice, limitations and the future scope of the research are discussed.
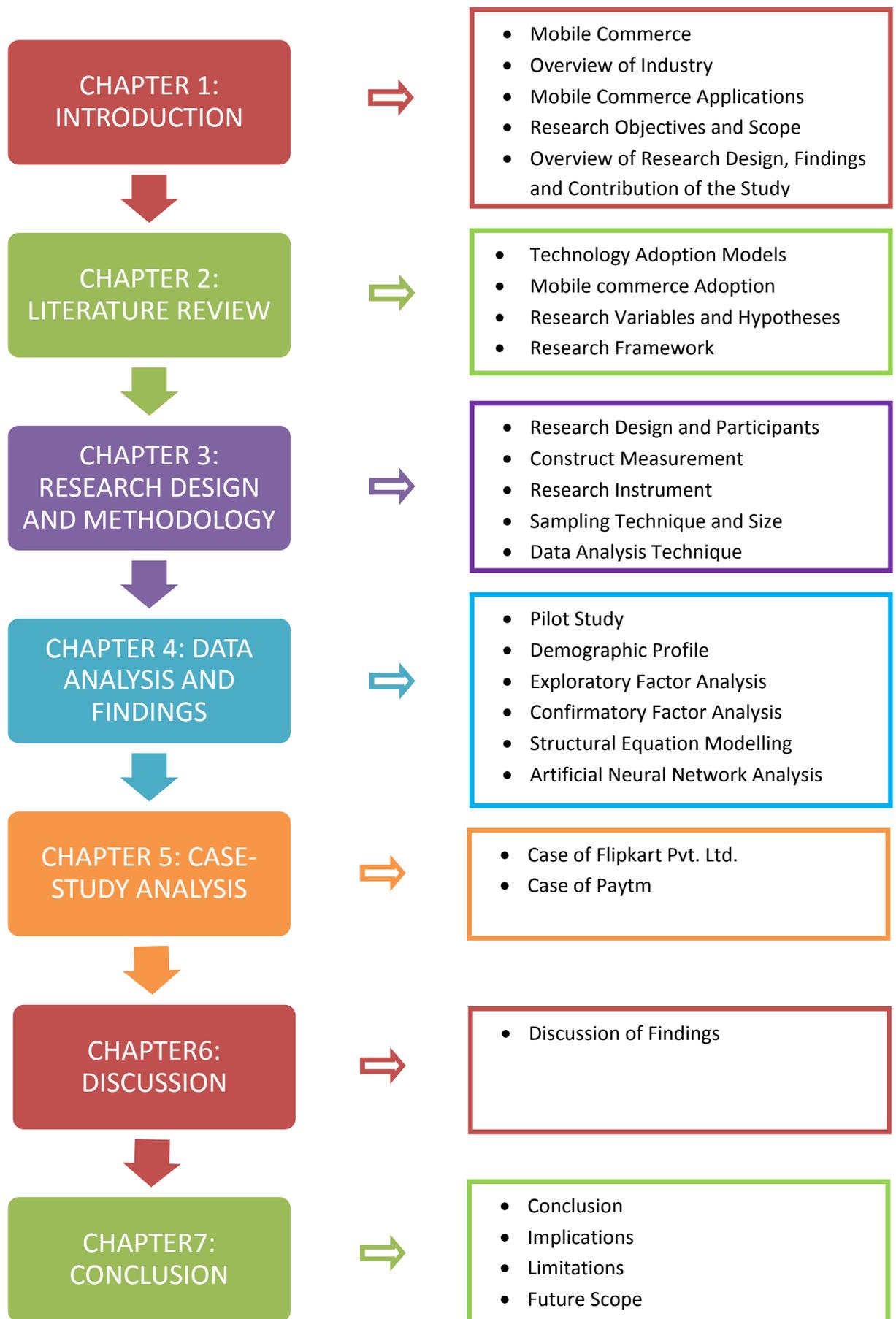
Figure 1.17: Flow of Thesis

Chapter 2: Literature Review and Hypotheses Development

2.1. Overview of Literature

With the continuous evolution and developments taking place in the field of technology, various frameworks and models, such as Diffusion of Innovation, Theory of Reasoned Action, Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, and the like, explaining users' behaviour to adopt new technology have been developed. Researchers have believed these adoption models to be relevant for mobile-based technologies and systems as well as they are considered to be in the nascent stages of adoption. Over the last two decades, taking these models as basis, researchers across the globe have identified many consumer-centric factors namely Social Influence, Cost, Perceived Enjoyment, Perceived Ease of Use, Facilitating Conditions, Risk, Perceived Usefulness and so on, to have a vital part in determining consumers' behavioural intentions towards adoption of services and technologies related to mobile. However, there is no composite and integrated study conducted with reference to Indian consumers that analyses these factors and their affect on mobile commerce adoption which is still an evolving phenomenon in India. This chapter reviews the important studies undertaken to analyse new technology adoption along with adoption of mobile related technologies and services globally. Further, it identifies prominent factors affecting users' behaviour intention towards a new technology and by including these factors, proposes a comprehensive framework to explain consumers' Behavioural Intention towards mobile commerce adoption as well as its actual usage among Indian consumers.

2.2. Technology Adoption Models

The past few years has witnessed researchers working sincerely to analyse consumers' adoption intention towards new technology and development of models or frameworks explaining it. The most prominent and widely accepted models found in the literature are:

2.2.1. Theory of Reasoned Actions (TRA) (Fishbein and Ajzen, 1975)

TRA is a widely accepted framework explaining behaviour of consumers and predicting their adoption intentions towards a new product, service or a technology. Originally developed as a social psychology theory, TRA states that it is the behavioural intentions to perform a specific task which determines a person's actual behaviour. It further explains the relationship of individuals' beliefs, attitudes, norms, and their intentions with their behaviour. According to this theory, attitude of a person towards a particular behaviour and the subjective norms he is expected to comply with determines his behavioural intention. The conceptual framework establishing relationships between Subjective Norms, Attitude, Behavioural Intentions and Actual behaviour is presented in the Figure 2.1.
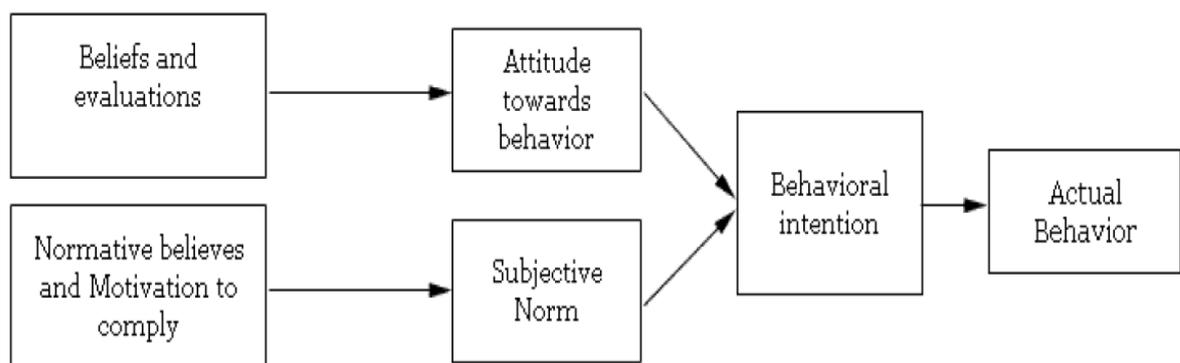
Figure 2.1: Theory of Reasoned Action (Source: Fishbein and Ajzen, 1975)

Subjective norms refer to "*the person's perception that most people who are important to him think he should or should not perform the behaviour in question*" (Fishbein and Ajzen, 1975). It further depends on a person's normative beliefs as well as on his motivation towards compliance of these norms. The belief of receiving specific results by exhibiting a particular behaviour multiplied by one's evaluation of these consequences will further determine his attitude towards that particular behaviour.

2.2.2. Technology Acceptance Model (TAM) (Davis, 1989)

Originally proposed for identification and analysis of the determinant of computer usage, TAM introduced Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) as two variables hypothesised as determinants of behavioural intention towards use of computer system and ultimately its actual use. The conceptual framework for TAM, establishing relationships between PU, PEOU, Attitude towards system use, Behavioural Intention to Use, and finally its Actual Use is presented in the figure 2.2.
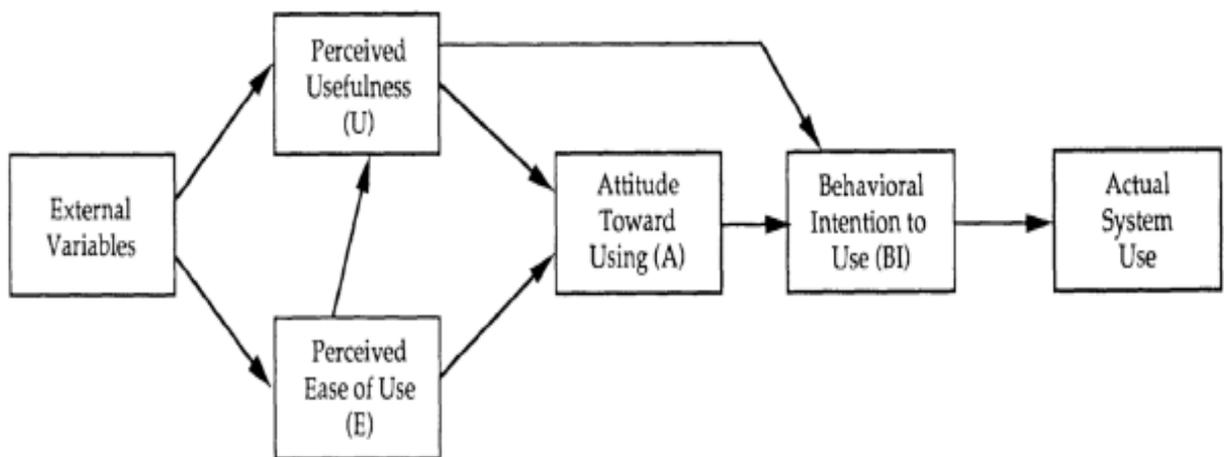
Figure 2.2: Technology Adoption Model (Source: Davis, 1989)

PU was explained as "*the degree to which a person believes that using a particular system would enhance his or her job performance*" and PEOU as "*the degree to which a person believes that using a particular system would be free of effort*". Further TAM established PU to impact the usage behaviour more significantly than PEOU. It also observed PEOU, being a causal antecedent to PU, to indirectly impact computer usage instead of having a direct impact on it.

2.2.3. Technology Acceptance Model 2 (TAM 2) (Venkatesh and Davis, 2000)

The TAM framework explaining acceptance of computer systems, originally proposed by Davis in 1989 was further extended and was known as TAM2. It suggested inclusion of Cognitive Instrumental Processes (CIP) along with Social Influence (SI) as additional variables, and exclusion of Attitude from the original framework, for better understanding of the users' intention to adopt a new information technology or system (IT/IS). Figure 2.3 represents the conceptual framework given by TAM2.
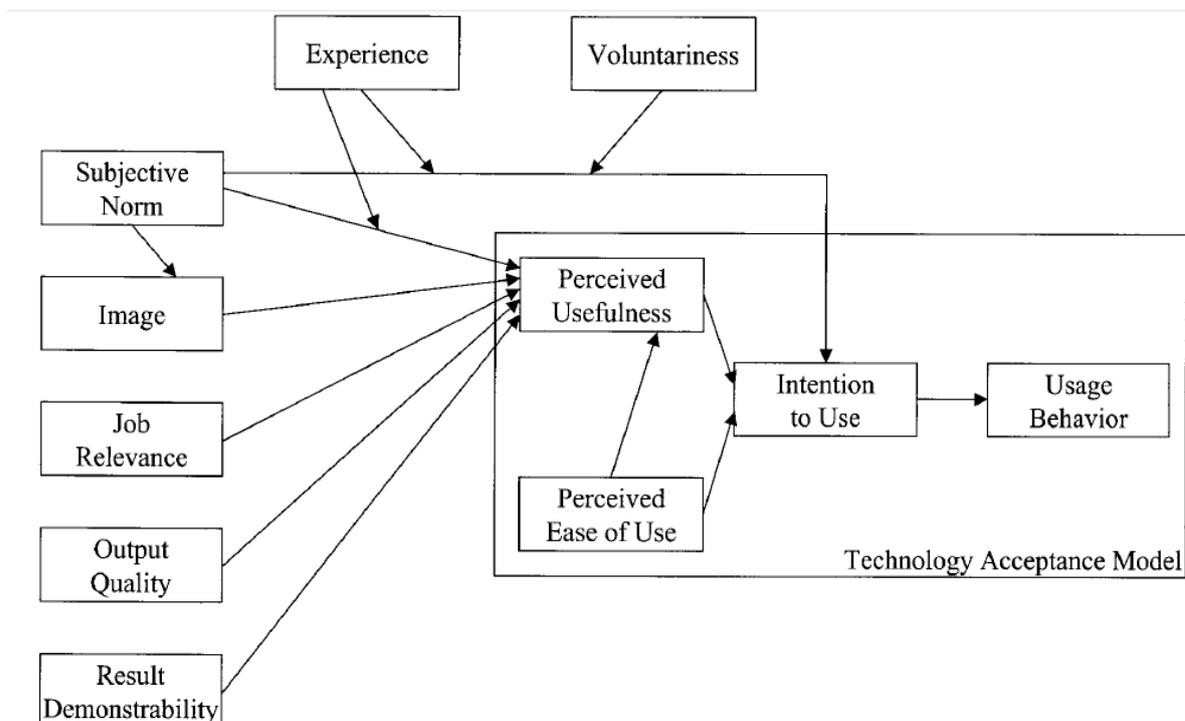
Figure 2.3: Technology Adoption Model 2 (Source: Venkatesh and Davis, 2000)

TAM2 further established a significant influence of both social influence (determined by voluntariness, subjective norm, and image) as well as cognitive instrumental processes (determined by job relevance, result demonstrability, output quality, and perceived ease of use) on the users' acceptance. By adding key variables determining usage intention and perceived usefulness to the original framework, the variance explained in the usage intention by the extended model went up to 60% from 40% in case of original model. It explains usage intentions and perceived usefulness in reference to social influence and cognitive instrumental processes.

2.2.4. Technology Acceptance Model 3 (TAM 3) (Venkatesh and Bala, 2008)

TAM was further extended to include factors determining PEOU along with the factors determining PU included in TAM 2 and the extended framework was termed as TAM3. Figure 2.4 represents the conceptual framework proposed by TAM3.
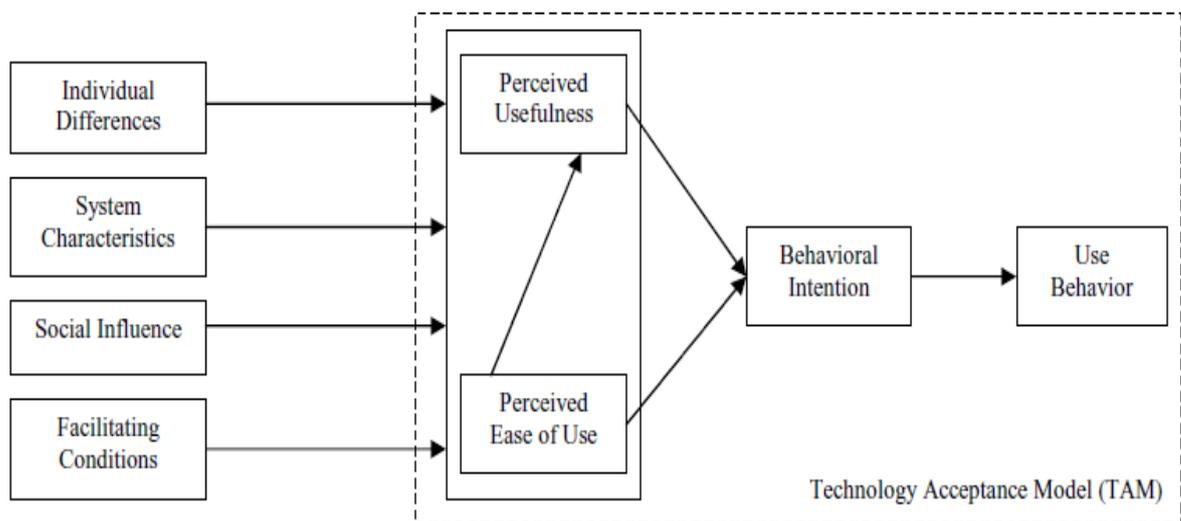
Figure 2.4: Technology Adoption Model 3 (Source: Venkatesh and Bala, 2008)

Venkatesh (2000) suggested certain drivers of PEOU namely computer anxiety, computer playfulness, and computer self-efficacy constituting the dimension of Individual Differences in the above framework and perceived external control constituting the dimension of facilitating conditions, along with two adjustments related to characteristics i.e. objective usability and perceived enjoyment to which individual's judgement of PEOU will be adjusted as he gains hands-on experience of the new IT/IS.

2.2.5. Theory of planned Behaviour (TPB) (Ajzen, 1991)

Ajzen in the year 1991 revised the original Theory of Reasoned Actions and proposed to include perceived behavioural control (PBC) as another important predictor to users' intention. The revised framework was termed as Theory of Planned Behaviour and is depicted in Figure 2.5.
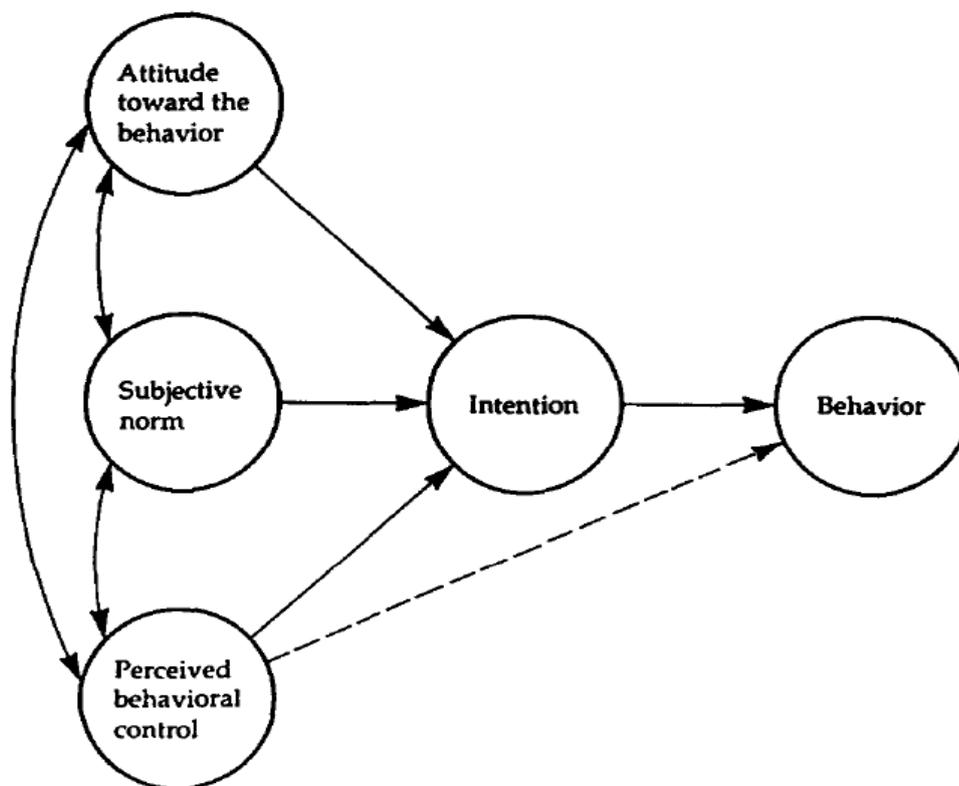
Figure 2.5: Theory of Planned Behaviour (Source: Ajzen, 1991)

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PBC was added to the framework with an objective of taking account of situations where a person has an intention of performing a behaviour however he is restricted or thwarted by the lack of control over it.

2.2.6. Diffusion of Innovation (DOI) (Rogers, 1962)

DOI is amongst the earliest theories in Social Sciences explaining how a population adopts or accepts innovations. Developed by E.M. Rogers in 1962, the theory states that it is not people who change but it is the qualities in an innovation that makes it spread or accepted by people. Figure 2.6 exhibits the detailed conceptual framework of DOI theory. The focus of the theory is on four major elements i.e. Knowledge, Persuasion, Decision and Confirmation. Knowledge refers to any idea, practice or object which the individuals perceive to be new or innovative.
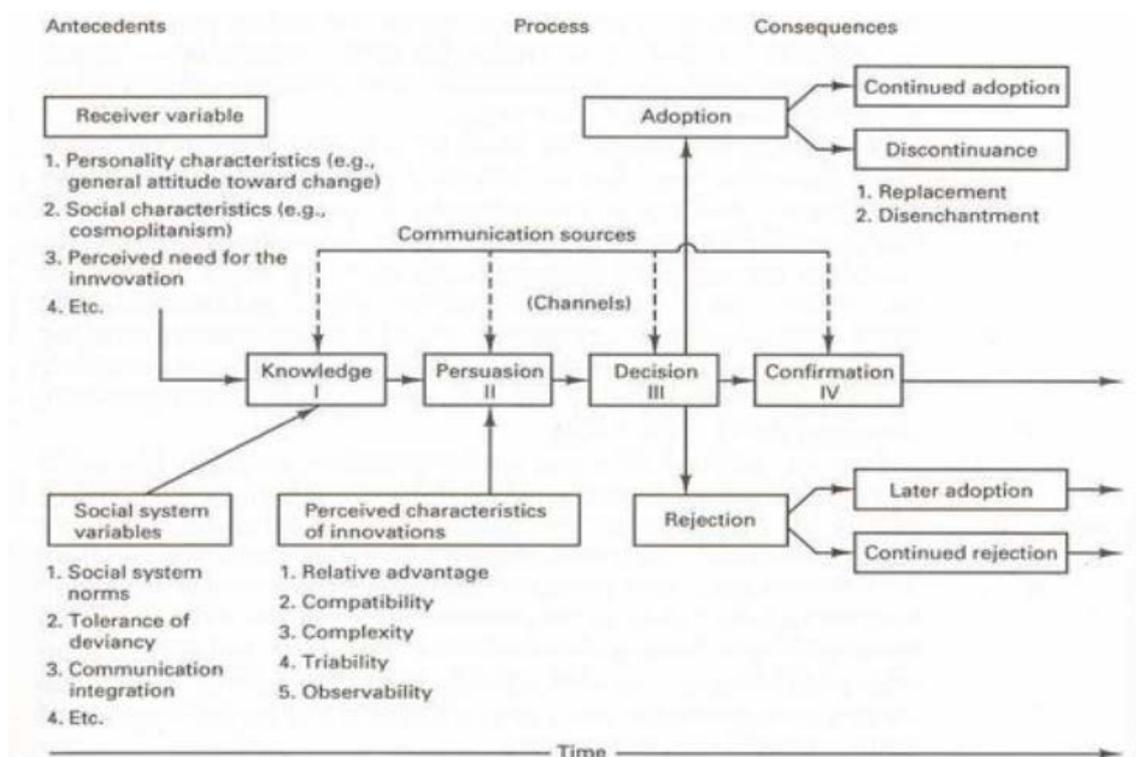
Figure 2.6: Diffusion of Innovation (Source: Rogers, 1962)

Qualities such as observability of results, trialability, ease of use and simplicity, compatibility with existing values as well as practices, and relative advantage are responsible for adoption of any technology by the masses. The second element of the theory highlights the vital role of peer to peer conversation and mass media in spreading adoption of any innovation. The third element refers to the process of decision making regarding adoption of an innovation and the time involved in it. Finally, the last element of the theory confirms the adoption of the innovation in the social system. The theory categorises the population in terms of five user groups, namely, innovators, early adopters, early majorities, late majorities and laggards, each having different needs. An innovation diffuses as it succeeds in fulfilling the needs of each successive user category.

2.2.7. Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003)

The UTAUT theory empirically compared eight technology adoption theories from the existing literature and formulated an integrated framework including important elements of these eight models. It compared prominent theories including Motivational Model (MM), Theory of Planned Behaviour (TPB), Theory of Reasoned Action (TRA), Social Cognitive Theory (SCT), Technology Acceptance Model (TAM), combined TAM and TPB, and Model of PC Utilisation (MPCU) with the objective of identifying and testing four crucial variables i.e. Social Influence, Effort Expectancy, Facilitating Conditions, and Performance Expectancy in determining behavioural intention of users towards adoption of IT/IS. Figure 2.7 depicts the relationships it proposes among the four variables and the Behaviour Intention towards new technology as well as Use Behaviour.
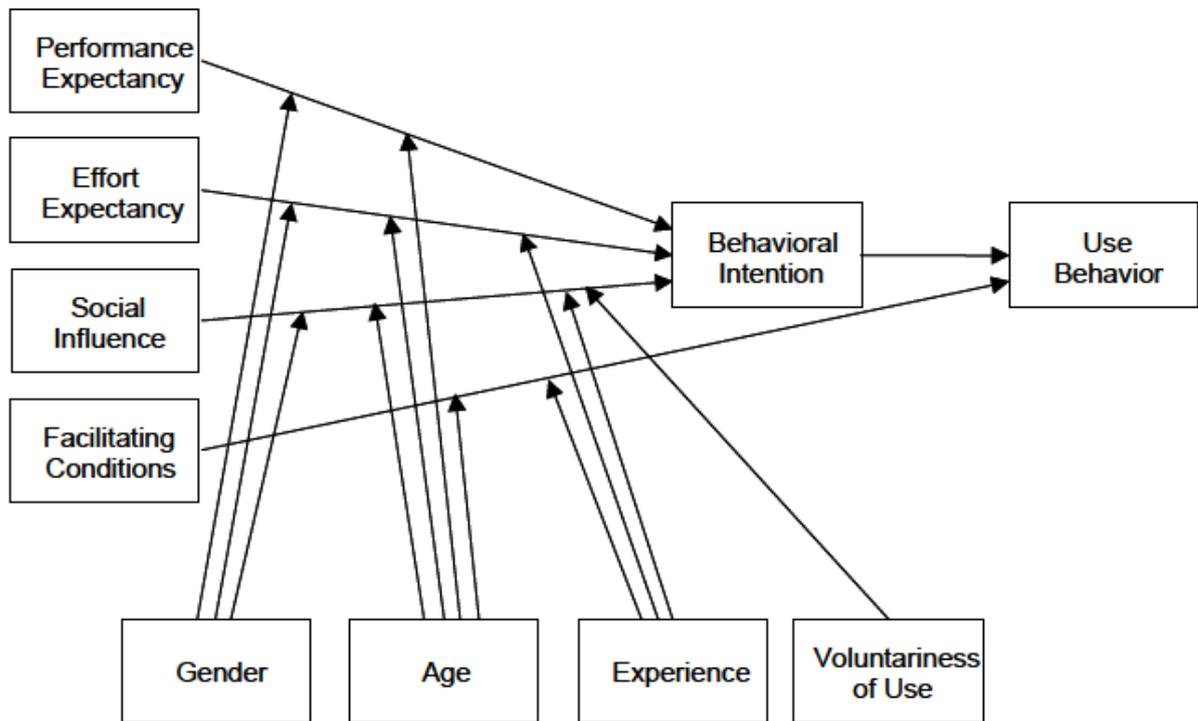
Figure 2.7: UTAUT (Source: Venkatesh et al., 2003)

2.2.8. UTAUT 2 (Venkatesh et.al, 2012)

With the object of improving variance explanatory power as well as the robustness of the original UTAUT, three additional constructs were incorporated in the original framework, i.e. Price Value, Habit, and Hedonic Motivation to propose an extended model (Venkatesh et.al, 2012). The conceptual framework under UTAUT 2 is presented in the figure 2.8.
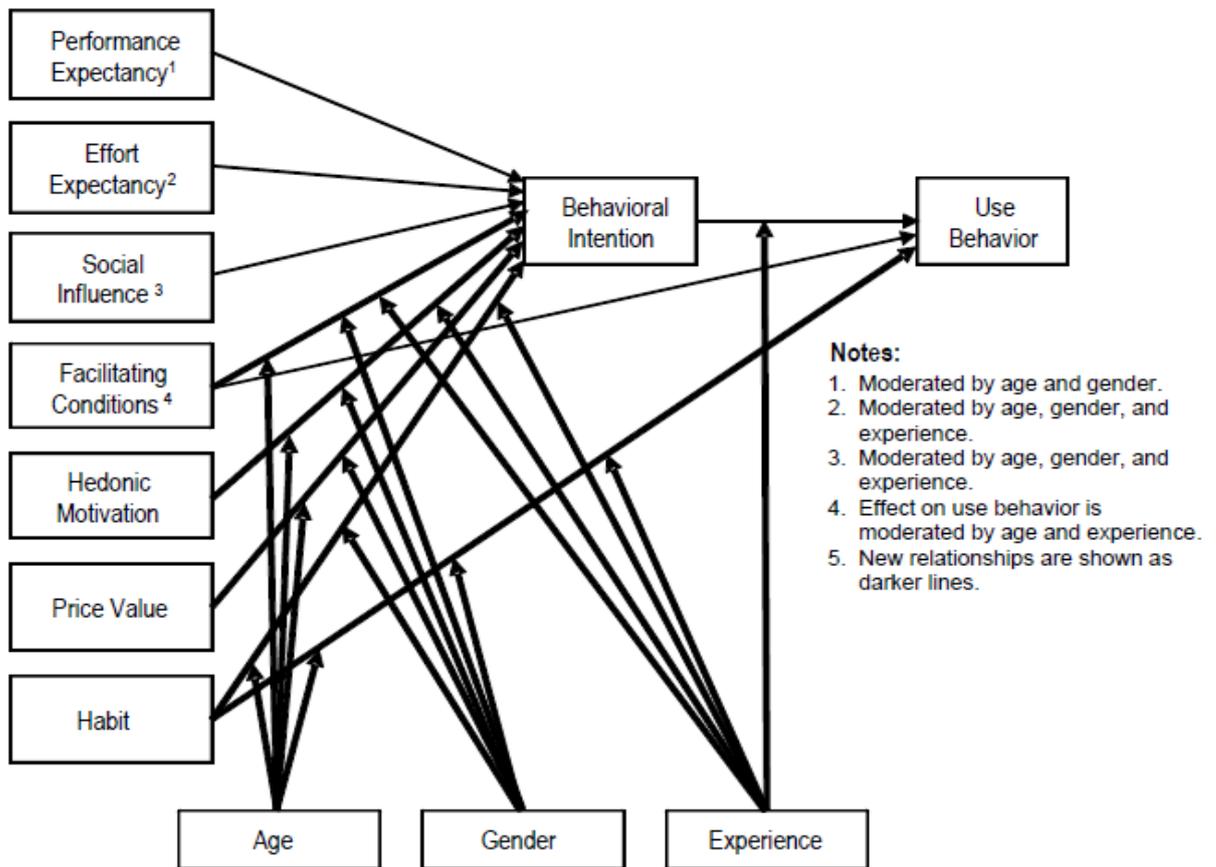
Figure 2.8: UTAUT 2 (Source: Venkatesh et al., 2012)

Seven constructs namely, Facilitating Conditions (FC), Hedonic Motivation (HM), Price Value (PV), Effort Expectancy (EE), Social Influence (SI), Habit (H), along with Performance Expectancy (PE), were included in the extended framework which explained variance up to 74%, in behavioural intention as against 54% in case of original framework.

Table 2.1 summarises the above discussed theories of new technology adoption, the variables proposed in each model along with the key findings of the study.

Table 2.1: Summary of Key Technology Adoption Models

Author(s)/ Year	Model/Technique applied	Variables Used	Purpose/Key findings
Fishbein and Ajzen (1975)	Theory of Reasoned Action (TRA)	**Independent Variable** Subjective Norms and Attitude towards behaviour **Dependent Variable** Behavioural Intention (BI)	*Context* Social psychological theory to determine Behavioural Intentions of a person which determines a person's actual behaviour. *Purpose* To determine a person' behavioural intentions. *Key Findings* • Attitude along with Subjective Norms were observed significant in determining Behavioural Intention.
Davis (1989)	Technology Acceptance Model (TAM), Regression Analysis	**Independent Factors** Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) **Dependent Variable** User Acceptance	*Context* User Acceptance of computers *Purpose* To develop and validate scale for PU & PEOU as important factors in User Acceptance. *Key Findings* • Both PU & PEOU impacts User Acceptance in a significant manner. • PU impact AU with greater magnitude than PEOU. • PEOU rather behaves as a causal antecedent to PU.
Venkatesh and Davis (2000)	Technology Adoption Model 2 (TAM 2),	**Independent Variables** Cognitive	*Context* Usage Intention for new IT/IS *Purpose*

		Instrumental Processes (CIP)**,** Perceived Ease of Use (PEOU), Social Influence (SI), Perceived Usefulness (PU) **Dependent Variable** Usage Intention	To improve variance explained in usage intention by including additional key variables determining usage intention and Perceived Usefulness. *Key Findings* • CIP along with SI were observed to impact usage intention in a significant way along with PEOU & PU. • It explained variance in usage intention up to 60%.
	Regression Analysis		
Venkatesh and Bala (2008)	Technology Adoption Model 3 (TAM 3), Structural Equation Modelling	**Independent Variables** Perceived Ease of Use (PEOU), Cognitive Instrumental Processes (CIP), Facilitating Conditions, Perceived Usefulness (PU), System Characteristics, Individual Differences, Social Influence (SI) **Dependent variable** Behavioural Intention (BI)	*Context* Usage Intention for new IT/IS *Purpose* To improve variance explained in usage intention by including additional key variables determining PEOU along with those of PU. *Key Findings* • All the variables determining PEOU were observed to be significant. • Upto 53% variance in BI was explained by TAM3.

Ajzen (1991)	Theory of Planned Behaviour (TPB), Regression Analysis	**Independent Variables** Attitude, Perceived Behavioural Control, and Subjective Norms **Dependent Variable** Behavioural Intention (BI)	*Context* Social psychological theory to determine Behavioural Intentions of a person *Purpose* To extend TRA by including Perceived Behavioural Control as additional variable. *Key Findings* • Perceived Behavioural Control was observed to directly impact both BI and actual performance of Behaviour.
Venkatesh et.al. (2003)	Unified Theory of Acceptance and Use of Technology (UTAUT), Structural Equation Modelling (SEM)	**Independent Variables** Facilitating Conditions, Effort Expectancy, Social Influence and Performance Expectancy **Dependent Variable** Behavioural Intention (BI)	*Context* Behavioural Intention towards acceptance of new technology *Purpose* To compare eight existing models and formulate a comprehensive model integrating elements from these models to explain users' Behavioural Intention. *Key Findings* • Effort Expectancy, Social Influence and Performance Expectancy were important factors in determining BI. • BI was not affected by Facilitating Condition but actual usage was affected by it in a significant way. • Around 70% variance in the usage intention was captured by

			UTAUT.
Venkatesh et.al. (2012)	Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2), Structural Equation Modelling (SEM)	**Independent Variables** Facilitating Conditions (FC), Habit (H), Social Influence (SI), Price Value(PV), Effort Expectancy (EE), Hedonic Motivation (HM), and Performance Expectancy (PE) **Dependent Variable** Behavioural Intention	*Context* Behavioural Intention towards acceptance of new technology *Purpose* To increase the variance explanatory power and robustness of original UTAUT and to extend it in consumer behaviour. *Key Findings* • FC, SI, H, EE, HM, PE, and PV influenced BI in a significant way. • Habit directly influenced the usage along with BI. • 74% variance in intention was captured.

In the past two decades mobile commerce and its adoption amongst the consumers has captured many researchers attention. As a result, researchers have attempted to theoretically and empirically analyse the effect of various consumer-centric factors on the consumers' behaviour and on their adoption intention towards mobile related technologies. Various technology adoption models such as the ones discussed in the previous section of this chapter have provided a strong base for mobile technology adoption studies as well. The Table 2.2 represents the review analysis of some of the prominent studies in this context.

Table 2.2: Literature Review of Prominent Mobile Technology Studies

Author(s)/ Year	Model/ Technique applied	Variables Used	Purpose/Key findings
Riquelme and Rios (2010)	Structural Equation modelling (SEM)	**Independent Variables** Risk, Relative Advantage Perceived Usefulness, Subjective Norms, and Perceived Ease of Use **Dependent Variable** Mobile Banking adoption	*Purpose* To test various factors influencing mobile banking adoption. *Key Findings* • 68.6% variance in the adoption was captured by the proposed model. • All the factors affected mobile banking adoption in a significant way.
Sreenivasan and Noor (2010)	UTAUT, Conceptual	**Independent Variables** Trust, Privacy, Performance Expectancy, Location, Social Influence, Effort Expectancy, Purchasing Power, and Facilitating Conditions **Dependent Variable** Acceptance & usage Intention of Mobile commerce	*Purpose* To examine as well as understand factors influencing m-commerce acceptance by Malaysian consumers.
Islam et.al. (2011)	Regression Analysis	**Independent Variables** Awareness and Knowledge, Pricing and Cost, Rich and Fast Information, Convenience, Security and Privacy, Perceived	*Purpose* To examine factors influencing adoption of m-commerce in Bangladesh. *Key Findings* • Security and Privacy, Pricing and Cost, along with Rich and Fast

		Usefulness. **Moderating Variable** Self-efficacy **Dependent Variable** Mobile Commerce Adoption	Information were found as major factors predicting Mobile Commerce Adoption. • Self-efficacy had a moderating role.
"Chris" Yang et.al. (2012)	TAM and TPB, Structural Equation modelling (SEM)	**Independent Variables** Attitude, Perceived Cost, Subjective Norms, Behaviour Control, Perceived Utility and Perceived Pleasure **Dependent Variable** Mobile Viral Intent	*Key Findings* • Subjective Norm, Pleasure along with Perceived Cost predicted users' Viral Attitudes in a significant manner. • Viral Attitudes, Subjective Norm, and Perceived Utility, predicted users' intention of passing entertaining electronic messages.
Thakur and Shrivastava (2013)	TAM and Innovation Resistance Theory, Structural Equation modelling (SEM)	**Independent Variables** Perceived Ease of Use, Perceived Credibility Risk, Perceived Usefulness, Social Influence, and Facilitating Conditions **Dependent Variable** Mobile commerce Adoption Intention	*Purpose* To investigate the impact of important factors on Adoption Intention of m-commerce. *Key Findings* • Perceived Ease of Use, Social Influence, and Perceived Usefulness were significant. • Perceived Credibility Risk influenced m-commerce adoption in a significant but negative way. • Facilitating Conditions were found to be insignificant.
Zhang et.al. (2012)	TAM, TPB & DOI, Structural Equation modelling	**Independent Variables** Perceived Ease of Use, Perceived Behavioural Control, Perceived Risk, Perceived Usefulness,	*Purpose* To identify general factors influencing m-commerce adoption and to analyse how moderating effect of culture on it.

	(SEM)	Innovativeness, Perceived Cost, Perceived Enjoyment, Compatibility, Subjective Norms, Attitude **Dependent Variable** Behavioural Intention (BI)	*Key Findings* • All the factors were significant determinants of BI other then Innovativeness. • Culture was found to have a moderating effect.
Chong et.al. (2012)	TAM and DOI, Hierarchical Regression Analysis	**Independent Variables** Variety of Services, Social Influence, Trust, Perceived Ease of Use, Cost, Perceived Usefulness, Trialability **Dependent Variable** Mobile commerce Adoption Intention	*Purpose* To examine factors that influences m-commerce adoption intention in China and Malaysia. *Key Findings* • Social Influence, Variety of Services, Cost, and Trust predicted m-commerce Adoption Intention in Malaysia in a significant way. • Cost, Social influence, and Trust, impacted adoption of m-commerce among Chinese consumers in a significant way.
Akturan and Tezcan (2012)	TAM, Structural Equation modelling (SEM)	**Independent Variable** Perceived Risk, Perceived Ease of Use, Perceived Benefits, and Perceived Usefulness **Dependent Variable** Attitude towards Adoption of mobile banking	*Purpose* To examine various factors that influences intention of future prospective consumers including students and youth to adopt mobile banking. *Key Findings* • Perceived Benefits, Perceived Risk, and Perceived Usefulness influences Attitude towards mobile banking in a direct

			manner.
			• Attitude is significant in determining intention to adopt mobile banking.
Amoroso and Watanabe (2012)	TAM, UTAUT Case study	**Independent Variable** Attitude, Perceived Risk, Perceived Value, Social Influence, Facilitating Conditions, Perceived Security, Attractiveness of Alternatives, Perceived Ease of Use, Trust, and Perceived Usefulness **Dependent Variables** Behavioural Intention to use mobile wallet	*Purpose* To study consumers' mobile wallet adoption in the Japanese market through investigating the case of Mobile Suica. *Key findings* • All the considered factors were important in successful adoption of Mobile Suica.
Chong (2013)	UTAUT, Regression Analysis and Neural Networking	**Independent Variables** Trust, Effort Expectancy, Personal Innovativeness, Facilitating Conditions Perceived Enjoyment, Social Influence, Performance Expectancy, and Perceived Value **Dependent Variable** Mobile commerce adoption	*Purpose* To examine factors predicting m-commerce adoption through extension of UTAUT. *Key Findings* *Multiple Regression Analysis* • PV was found to be most significant followed by PE, SI, EE, Perceived Enjoyment, and Personal Innovativeness. • FC along with Trust were insignificant. *NN analysis* • The most significant predictor of m-commerce adoption was Perceived Value followed by PE,

			SI, Trust, EE, Perceived Enjoyment, Personal innovativeness and FC.
Chong (2013)	TAM, Structural Equation modelling (SEM), Neural Networking (NN)	**Independent Variables** Perceived Usefulness, Variety of Services, Perceived Ease of Use, Network Influence, Trust, Perceived Enjoyment, and Cost. **Dependent Variable** Mobile commerce Adoption Intention	*Purpose* To examine various factors that influences m-commerce Adoption Intention. *Key findings* *SEM Analysis* • All factors predicted intention towards m-commerce adoption, except for Perceived Ease of Use in a significant way. *NN Analysis* • Perceived Ease of Use along with Cost was observed as insignificant factors.
Dash et.al. (2014)	DOI, Structural Equation modelling (SEM)	**Independent Variables** Compatibility, Relative Advantage, Attitude, Mimetic Force, Trialability, Observability. **Dependent Variable** Attitude towards Adoption of mobile banking	*Purpose* To examine major factors that influences attitude of Indians to adopt mobile banking. *Key Findings* • Compatibility, Mimetic Force and Trialability are important predictors of Attitude to adopt mobile banking.
Hanafizade h et. al. (2014)	TAM and TPB, Structural Equation modelling (SEM)	**Independent Variables** Trust, Perceived Cost, Compatibility with Life-style, Perceived Perceived Risk, Credibility, Perceived	*Purpose* To identify factors influencing mobile banking adoption in Iran. *Key Findings* • Trust along with Adaptation with Life-style affected mobile

		Ease of Use, Need for Interaction, Perceived Usefulness **Dependent Variable** Intention to Use Mobile Banking.	banking adoption of Iranian consumers in a most significant manner.
Pham and Ho (2014)	DOI and TAM, Conceptual	**Independent Variables** Compatibility, Privacy Risk and Perceived Security, Perceived Usefulness, Absorptive Capacity and attractiveness of alternatives, Trialability, Perceived cost and Additional Value, Perceived Ease of Use, Personal Innovativeness **Dependent Variable** Intention to Adopt NFC mobile payments	*Purpose* To understand the role of factors impeding or facilitating Taiwanese consumers in adoption of NFC-based mobile payments.
Khan et.al. (2015)	ISM approach	**Independent Variables** Operating Cost, Initial Cost, Performance of Mobile Services, Slow Connection and/or Data Transfer, Device Inefficiency, Coverage of Networks, Privacy Invasion, Security, Perceived Risks, Trust/Reliability,	*Purpose* To identify barriers to M-commerce adoption and their relationships with M-commerce Spread in Qatar. *Key findings* • Complexity of Technology, Computer and New Technology Skill, Unawareness of M-commerce and its benefits are the most important barriers in spread of M-commerce. • High initial cost along with High

		Computer and New Technology Skill, Incompatibility with Existing Business, Unawareness of M-commerce and its Benefits, Customer's Anxiety about Technology, Complexity of Technology **Dependent Variables** Spread of M-commerce	operating cost does not affect spread of M-commerce.
Song et.al.(2015)	TAM SEM, Multi-group Analysis	**Independent Variables** Hedonic expectation, Utilitarian expectation, External influence, Normative influence, Status gains, Status loss avoidance, Quality concern and Cost. **Dependent Variable** Adoption Intention	*Purpose* To identify key factors influencing Chinese in new mobile technology adoption and do they differ from western context. *Key findings* • Hedonic expectation, Utilitarian expectation, External influence, normative influence, Status gains, Status loss avoidance, Quality concern, and Cost, are significantly affecting intentions of users to adopt 3G mobile technology. • Effect of Status loss avoidance, Status gains, Normative influence, and Hedonic expectation on mobile technology adoption intention of Chinese were found to be different from the Western

			context.
Shaw and Sergueeva, K. (2016).	Focussed Group Discussion, SEM	**Independent Variable** Technology Readiness, Perceived Ease of Use and Perceived Usefulness **Dependent Variables** Perceived Ubiquity, M-commerce Adoption **Moderating Variable** Privacy Concern	*Purpose* To develop a framework explaining Affect of Technology Readiness (TR) on Perceived Ubiquity (PQ) (of smart phones) and of PQ on M-commerce Adoption (MA) while accounting for the moderating effect that Privacy Concerns (PC) posses on the relationship of PQ with MA along with the constructs Perceived Ease of Use (PEU) and Perceived Usefulness (PU). *Key Findings* - TR, PU & PEOU significantly affects PU and PU significantly affects MA. - PC significantly moderates the relationship of PU with MA.
Yadav et.al.(2016)	TAM, UTAUT SEM, NN	**Independent Variables** Variety of Services, Cost, Perceived Ease of Use, Perceived Trust, Perceived Usefulness, Social Influence **Dependent Variable** M-commerce Adoption Intention	*Purpose* To examine factors predicting m-commerce adoption. *Key Findings* - Social Influence, Variety of Services, Perceived Trust, Perceived Usefulness along with Cost influences m-commerce Adoption Intention in a significant way. - PEOU was found to be statistically insignificant. - Variety of Services, Perceived

			Trust along with Perceived Usefulness predicted m-commerce adoption in a most significant manner in NN analysis.
Omonedo and Bocij (2017).	Thematic Analysis, Relative frequency statistics	**Factors Affecting** Security, Social Influence, Cost and Trust **Dependent variable** M-commerce Adoption	*Purpose* To study the impact of Social Influence, Security, Trust and Cost on M-commerce Adoption in Nigeria as well as to recommend suggestions to address these issues. *Key Findings* • Issues of trust and security are significant factors affecting m-Commerce adoption. • In Nigeria it's a norm to follow local or global trends.
Ashraf et.al.(2017)	PLS-SEM	**Independent Variables** M-commerce Ubiquity (Continuity, Immediacy, Portability, Search ability) **Moderating Variable** M-commerce usage Habit **Control Variables** Culture, Age, gender, Internet plan **Dependent Variable:** M-commerce Usage Intention, Actual Usage	*Purpose* To understand how consumers' behaviours with respect to m-commerce differ across markets of different nations and across different user readiness stages. *Key Findings* • The purchase intention in case of Early users is more influenced by ubiquity than habit. • Users at an advanced stage give more weight to Habit than Ubiquity. • The influence of ubiquity on m-commerce usage intention is moderated by Habit.

Alalwan et.al. (2017)	UTAUT, SEM	**Independent Variables** Trust, Hedonic Motivation, Effort Expectancy, Habit, Performance Expectancy, Facilitating Conditions, Price Value, Social Influence **Dependent Variable** Behaviour Intention, Adoption Behaviour of Mobile Banking	*Purpose* To identify factors influencing bank customers of Jordan in their decision regarding Mobile Banking adoption. *Key Findings* - Hedonic Motivation, Performance Expectancy, Price Value and Effort expectancy significantly influenced Behaviour Intentions. - Trust and Effort Expectancy significantly influenced Performance Expectancy - Facilitating Conditions and Behaviour Intentions significantly influenced Adoption. - Variance explained in Behaviour Intention was 65%, in Performance Expectancy was 49% and in Adoption Behaviour was 31%.
Liébana-Cabanillas et.al.(2017)	TAM SEM and NN	**Independent Variables** Trust, Perceived ease of Use, Mobility, Customisation, Perceived Usefulness, and Customer Involvement **Dependent Variable** Behaviour Intention	*Purpose* To examine key factors determining mobile commerce adoption by consumers. *Key Findings* Customization and Customer Involvement were the strongest antecedents of consumers' intention towards mobile commerce use.
Marinkovic and Kalinic (2017)	CFA, Moderated Regression	**Independent Variables** Perceived Enjoyment, Mobility, Perceived	*Purpose* To determine drivers significant in determining customer's mobile

		Usefulness, Social Influence, and Trust **Moderating Variable:** Customisation **Dependent Variable:** Customer Satisfaction	commerce satisfaction and to examine how Customization moderates the relationship of Customer Satisfaction with its predictors. *Key findings* - Perceived Enjoyment, mobility, Perceived Usefulness, and Trust, were significant drivers of Customer Satisfaction. - Customization moderates the influence of Mobility and Trust on Customer Satisfaction.
Moorthy et.al. (2017)	Innovation Resistance Theory (IRT) and Valence Framework Multiple linear Regression	**Independent Variables** Image Barrier, Usage Barrier, Risk Barrier, Value Barrier, Perceived Cost barrier, Tradition Barrier **Dependent Variable** Adoption Intention.	*Purpose* To explore factors resisting generation X in Malaysia from adopting mobile commerce. *Key Findings* Except for the Cost Barrier, all other barriers significantly affect the mobile commerce Adoption Intention.
Natrajan et.al.(2017)	TAM, DOI SEM	**Independent variables** Personal Innovativeness, Perceived Ease of use, Perceived Risk, Perceived Enjoyment, and Perceived Usefulness. **Moderating Variables** Frequency of using mobile shopping applications, Experience,	*Purpose* To understand the consumers' intention towards shopping through mobile applications. *Key Findings* - Perceived Risk and Personal Innovativeness have a vital role in predicting usage intention of mobile shopping applications. - Users having higher usage intention towards mobile

		and Gender	shopping applications and who
		Dependent variable	are more innovative are less
		Satisfaction, Price	price-sensitive.
		Sensitivity, Intention to	
		Use	
Chau et.al. (2018)	UTAUT Chi-square, variance Analysis and Cluster technique	**Independent Variables** Hedonic Motivation, Performance Expectancy, Facilitating Conditions, Trust, Social Influence, and Effort Expectancy **Dependent Variable** Behaviour Intention towards adoption of mobile shopping	*Purpose* To examine factors influencing mobile shopping and information search behaviour of young adults in Thailand across 9 product categories and across different user segments. *Key Findings* - There is an increase in product search from light to heavy users - PE, EE, HM and FC were significantly different across segments on many items.
Cullen and Kabanda (2018)	Correlation and Regression Analysis	**Demographic Variables** Education Status, Gender and Age. **Motivational Variables** Perceived Ease of Use Perceived Enjoyment, and Perceived Usefulness **Dependent Variable** M-commerce Usage Activities	*Purpose* To evaluate the importance of motivational factors and demographics in determining usage activities related to mobile commerce in South Africa. *Key findings* - Age and mobile commerce transactions are significantly related to each other. - Education affects mobile commerce usage activities significantly. - How one uses mobile commerce is influenced by Gender. - All three motivational variables

			are significantly related to the Usage Activities of Mobile commerce
Ghazali et.al. (2018)	TAM, TPB PLS-SEM	**Independent variables** Perceived Behavioural Control, Perceived Usefulness, Personal Innovativeness, Perceived Ease of Use, Trust **Mediating Variable** Attitude **Dependent variable** Mobile shopping Adoption Intention	*Purpose* To study influence of important factors on mobile shopping adoption from with reference to a developing country like Malaysia. *Key findings* • All factors significantly affect mobile shopping Adoption Intention. • Perceived behaviour control is the most significant factor. • The effect of PEOU and PU on mobile shopping adoption intention is partially mediated by Attitude.
Baabdullah et.al. (2019)	TAM, Task-Technology Fit, SEM	**Independent Variables** Perceived Privacy, Perceived Ease of Use, Technology Characteristic, Task Characteristic, Task-Technology Fit, Perceived Security, Perceived Usefulness **Dependent Variable** Continued Intention towards M-banking	*Purpose* To examine factor important in predicting the continued intention of the Saudi's customers towards mobile banking adoption. *Key Findings* • Perceived Security, Task-Technology Fit, Perceived Privacy, and Perceived Usefulness significantly predicted Continued Intention. • Task Characteristic along with Technology Characteristic affected Task-Technology Fit significantly.

			• Task-Technology Fit positively influenced Perceived Usefulness.
			• Technology Characteristic significantly predicted Perceived Ease of Use.
			• Perceived Ease of use was not significant in predicting Continued Intention towards M-banking use.
			• Variance Explained in Continued Intention was 58%, in Task-Technology Fit was 48%, in Perceived Usefulness was 31% and in Perceived Ease of Use was 35%.
Shaw and Sergueeva (2019).	UTAUT 2 PLS-SEM	**Independent Variables** Hedonic Motivation, Habit, Social Influence, Perceived Value, Effort Expectancy, Privacy concerns, Performance Expectancy and Facilitating Conditions **Moderating variable** Personal Innovativeness **Dependent variable** Intention to use mobile commerce.	*Purpose* To examine factors influencing mobile commerce adoption in Canada by modifying UTAUT 2 and introducing Personal Innovativeness as a moderating variable. *Key Findings* • Perceived Value was influenced by Perceived Privacy Concerns. • Performance Expectancy, Hedonic motivation along with Perceived value influences mobile commerce usage intention in a significant way.

2.3. Research Gap

A detailed review of available literature has highlighted the following research gap areas:

- Most of the technology adoption frameworks existing in the literature attempts to explain adoption of technologies such as online banking, computers and internet usage, electronic commerce and the like. There is inadequate literature focussing on the unique nature of mobile commerce.

- There is a dearth of literature that goes beyond the UTAUT model to include new and relevant factors associated with mobile commerce adoption.

- Most of the researchers have utilised theoretical analysis or traditional linear regression analysis such as Simple and Multiple Regression for establishing relationship between the factors affecting mobile technology adoption and consumers' Adoption Intention. There is inadequate literature that uses Neural Network analysis to reconfirm the complex linear relationship between the factors and the behavioural intention towards adoption of mobile commerce.

- Research studies establishing and empirically testing a framework for mobile commerce adoption with reference to Indian consumers are inadequate.

2.4. Research Variables

A detailed review of theories available on new technology adoption and of researches undertaken to explain adoption of mobile-based technologies, lead to the identification of twelve important Independent variables influencing the consumers' behavioural intention towards mobile commerce adoption and its actual usage. The following section discusses the origin, meaning and relevance of each of these variables with reference to mobile

commerce adoption and proposes hypotheses for the relationship of mobile commerce behavioural intention with the identified independent variables.

2.4.1. Independent Variables

The literature review conducted in the preceding section, establishes a significant role played by factors namely Personal Innovativeness, Perceived Ease of Use, Facilitating Conditions, Perceived Value, Variety of Services, Perceived Risk, Perceived Enjoyment, Perceived Critical Mass, Perceived Usefulness, and Perceived Trust in influencing the Behavioural Intention (BI) of consumers towards adoption of mobile based technologies. Moreover, two relatively new variables namely, Promotional Benefits and Perceived Regulatory Support, which were considered as significant factors in determining consumers' adoption intentions towards similar services namely mobile wallet and mobile shopping in the previous researches, are also proposed to impact the BI towards mobile commerce adoption.

Perceived usefulness (PU)

PU is amongst the two variables considered in the original TAM framework. Since then, researchers have observed it to significantly influence new technology acceptance. The extent of consumer belief about increased efficiency in task performance by including mobile commerce services in their routine lives will further influence consumers to adopt it. TAM defined PU as "*the degree to which a person believes that using a particular system would enhance his or her job performance"* (Davis, 1989). PU was also reported as an important factor in the subsequent TAM2 and TAM3 (Venkatesh and Davis, 2000; Venkatesh and Bala, 2008). It was a vital element of the UTAUT framework as well along of the revised UTAUT 2 as Performance Expectancy (PE) (Venkatesh et.al, 2003; Venkatesh et.al, 2012).

PU may be explained with reference to mobile commerce as the extent of consumers' belief that utilising mobile commerce will lead to better performance of his or her daily jobs and tasks (Wei et al., 2009).Over the last three decades, mobile commerce adoption have been repeatedly found to be significantly affected by this factor (Bax and McGill, 2003; Chong et.al, 2012; Slade et al., 2015; Faqih, 2016; Liu and Guo, 2016; Roy and Moorthi, 2016; Hur et al., 2017; Liébana-Cabanillas et al., 2017; Munoz-Leiva et al., 2017; Natarajan et al., 2017; Chau et al., 2018; Cullen and Kabanda, 2018; Ghazali et al., 2018). Existing literature suggests that if mobile commerce will lead to improved job performance by allowing consumers' to complete transaction without being inhibited by location, time or physical boundations, consumers are more likely adopt it (Davis, 1993; Chong, 2013b). Hence, it was hypothesised that:

H1: Higher the Perceived Usefulness (PU), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived ease of use (PEOU)

Another important variable proposed by the original TAM framework was Perceived Ease of Use (Davis, 1989). Since then, researchers have considered PEOU as a factor that has significantly influenced users to adopt new technology across nations (Kleijnen et.al, 2004; Chong et.al, 2012; Faqih, 2016; Roy and Moorthi, 2016; Hubert et al., 2017; Hur et al., 2017; Munoz-Leiva et al., 2017; Natarajan et al., 2017; Cullen and Kabanda, 2018; Ghazali et al., 2018). It is the extent of users' perception about a new IT/IS that it is of use to them and is sufficiently easy to adopt. The classical TAM explained PEOU as *"the degree to which a person believes that using a particular system would be free of effort"* (Davis, 1989). It was included in the extended versions of TAM i.e. TAM2 and TAM3 as well (Venkatesh and Davis, 2000; Venkatesh and Bala, 2008). The framework proposed

under UTAUT and UTAUT 2 also includes a factor similar to PEOU i.e. Effort Expectancy (EE) to explain intention to adopt a technology (Venkatesh et.al, 2003; Venkatesh et.al, 2012). Researchers have used EE instead of PEOU which basically means the same (Shaw and Sergueeva, 2016; Chau et al., 2018). It is believed that the probability of consumers to adopt a new system is higher if it is perceived to be easy in terms of learning and using (Pikkarainen et al., 2004).

Despite increased penetration of mobile phones and smart-phones, mobile commerce applications are still a novel concept for consumers in both developing as well as developed countries. Its diffusion is yet to pick up, mainly among users who do not have any prior experience with mobile commerce (Schiertz et al., 2010; Chong, 2013b). Hence, mobile commerce services should essentially be easy for users to learn and use so that its adoption by inexperienced users can be ensured (Kim et al., 2010; Cabanillas et al., 2015). With this back drop, it was hypothesised that:

H2: Higher the Perceived Ease of Use (PEOU), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived Enjoyment (PE)

The extent of enjoyment experienced by using any new technology or service can be another motivation for consumers to start using it. PE was an important factor under TAM 3 framework determining PEOU in a significant way. TAM3 explained it as the degree to which "*the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use*" (Venkatesh, 2000). PE was an integral element of UTAUT 2 in determining BI mentioned as Hedonic Motivation (HM) in place of Perceived Enjoyment. HM was defined under UTAUT 2 "*as the fun or pleasure derived from using a technology*". Along with these technology

adoption theories, there have been researchers in the past who gave importance to HM while determining intention of consumers to adopt similar technologies. (Yang et.al, 2012; Chong, 2013; Slade et al., 2015; Shaw and Sergueeva, 2016; Hur et al., 2017; Natarajan et al., 2017; Chau et al., 2018; Cullen and Kabanda, 2018; Shaw and Sergueeva, 2019).

It is believed that consumers feel more engaged if the web-site or application in case of mobile commerce leads to enjoyment (Chong, 2013a). Mobile commerce has a great scope of fulfilling entertainment needs of its users as it can be used for mobile gaming, mobile videos, social networking and the like. Therefore, PE has a vital role in boosting mobile commerce adoption rate (Shang et al., 2005). Hence, it was hypothesised that:

H3: Higher the Perceived Enjoyment (PE), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Variety of services (VOS)

Variety of services refers to higher value-added services offered by any system other than its basic expected services. Mobile commerce has an edge over e-commerce as it offers benefits of flexibility and ubiquity. However, the services offered might be limited as compared to electronic commerce (Chong et al., 2012). In reference to mobile commerce, services such as transactional services, communication services, information services, entertainment services, and the like are the value-added services that can drive consumers to adopt it. The wide variety of services offered by mobile commerce service providers; acts as a strong factor influencing consumers' adoption decision regarding mobile commerce (Anckar 2002; Chong, 2013; Gupta and Arora, 2017). Moreover, the compatibility of mobile commerce services to the consumers' lifestyle and their ability to meet their daily expectation also plays a vital role in its adoption. Consumers would not be

willing to pay for mobile commerce services if it fails to provide better services than its alternative (Chong et al., 2012). Hence, it was hypothesised that:

H4: Higher the Variety of Services (VOS) offered, higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived critical mass (PCM)

PCM may be explained as the extent of belief of individuals that a mass of people will use a particular technology or system (Hsu and Lin, 2016). The intention of users towards using a particular system or a network was observed to increase as the existing users reached a good number (Lin and Lu, 2011). In the earlier studies, researchers have analysed factors similar to this construct to study intention of users towards using new technologies including mobile banking, electronic commerce, internet, and other mobile-related technologies (Hsu and Lu, 2004; Cheng et al., 2012; Hsu and Lin, 2016; Liu and Guo, 2017). In case of mobile commerce, as more users in one's referent group begin to utilise mobile commerce services, it positively influences his/her intention to use it. The extent of consumers' belief that using mobile commerce services will result in attaining better image and greater social acceptance within their group of friends, peers, social networking communities, and family will further induce them to adopt it. A similar factor namely Social Influence, was also observed to significantly influence adoption of a new technology, system or service including mobile commerce from the literature. (Venkatesh and Davis, 2000; Venkatesh et.al., 2003; Kleijnen et al., 2004; Harris et.al, 2005; Riquelme and Rios, 2010; Chong et.al, 2012; Venkatesh et al., 2012; Slade et al., 2015; Omonedo and Bocij, 2017; Chau et al., 2018). Social Influence is the extent to which the opinion of friends, family, and relatives influences the decision of a person to use a new product or service (Venkatesh and Davis, 2000). Hence, it was hypothesised that:

H5: Higher the Perceived Critical Mass (PCM), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived Value (PV)

PV is the extent of users' perception about the benefits or advantages that they gain by availing any service or a product in exchange of the cost incurred to avail it. It is a trade-off between what the users perceive to gain (in terms of benefits, utilities, and quality) and what they have to sacrifice for it (primarily in terms of price paid) (Zeithmal, 1988; Keeney, 1999). PV is a factor that influence adoption intention of consumers towards new technologies related to mobile and internet including mobile banking, mobile commerce, mobile wallet, and other similar technologies in a significant way (Pagani, 2004; Amoroso and Magnier-Watanabe, 2012; Shaw and Sergueeva, 2016; Zhu et al., 2017; Moorthy et al., 2017; Shaw and Sergueeva, 2019). It is an important element integrated in the UTAUT 2 framework (Venkatesh et.al, 2012).

Transacting over a mobile device has many advantages over conventional modes of transacting; however, it also requires consumers to put up with certain costs including access cost, equipment cost, transaction cost and conversion cost. Such additional costs of availing mobile commerce services are usually over and above the costs involved in transacting electronically over a wired network (Kuo and Yen, 2009). Hence, commercial transactions over mobile devices are relatively costlier than the electronic transactions over wired devices. The growth and development of mobile shopping industry can be slowed down with a higher perceived price or lower perceived value (Wei et al., 2009). Even though the consumers in general might believe the transactional cost involved in mobile commerce to be affordable, but the worth of it against its cost as perceived by the consumers will influence their decision of availing mobile commerce services (Chong et

al. 2012; Omonedo and Bocij, 2017). The price/cost of adopting an innovation is observed to be an important factor posing a constraint on its adoption (Khalifa and Shen, 2008; Kuo and Yen, 2009; Revels et al., 2010; "Chris" Yang et al., 2012; Wong et al., 2015). Hence, it was hypothesised that:

H6: Higher the Perceived Value (PV), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived risk (PR)

The key challenge for the providers of mobile services in encouraging consumers' adoption is to improve the extent of perceived security and to bring down the level of privacy risk associated with the mobile transactions. PR covers any kind of social, time related, product related, physical, psychological, and financial risks that consumers have to put up with while transacting over mobile (Wu and Wang, 2005). Mobile phone often stores information which is personal and important for the users, and therefore privacy and security risks associated with mobile commerce transactions are relatively higher (Chong, 2013). PR is the extent of consumers' perception of the risk of losing personal information while sharing it with the service providers over the mobile phone during an online transaction (Biswas & Biswas, 2004). Mobile commerce requires users to undertake financial transactions using wireless devices, which are perceived to involve higher risk. Using external networks over mobile phone or online environment to complete a purchase transaction increases the perceived risk of consumers (Shankar et al., 2002; Yang et al., 2011). Prior studies have concluded PR as a variable that significantly influences users' intention to adopt other mobile related technologies (Kleijnen et.al, 2004; Islam et.al., 2011; Zhang et.al., 2012; Thakur and Srivastava, 2012; Chong et.al.,2015; Natarajan et al., 2017; Patil et.al., 2018). Hence, it was hypothesised that:

H7: Higher the Perceived Risk (PR), lower is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived Trust (PT)

Another factor critical to mobile commerce success is the trust level of consumers on the providers of mobile commerce services as well as on the efficiency and quality of technology offered by them. The success of a dynamic relationship such as the one between a marketer and the consumer depends to a great deal on the mutual trust existing between them. In the recent years, introduction of any new IT/IS in the market has witnessed Trust to work as a catalyst in its success (Pham and Ho, 2014; Faqih, 2016; Liébana-Cabanillas et al., 2017; Chau et al., 2018). It is the degree of consumers' belief on the mobile commerce application providers that they are trustworthy in terms of their security and privacy policies. Having a low perceived trust might influence the consumers' decision regarding adoption of mobile commerce in a negative manner. Previous researchers have observed PT to determine intention to adopt technologies similar to mobile technology in a significant way (Chong et.al, 2012; Zhang et.al, 2012; Chong 2013; Pham and Ho, 2014; Faqih, 2016; Alalwan et.al., 2017; Liébana-Cabanillas et al., 2017; Munoz-Leiva et al., 2017; Omonedo and Bocij, 2017; Chau et al., 2018; Ghazali et al., 2018; Patil et.al., 2018). Hence, it was hypothesised that:

H8: Higher the Perceived Trust (PT), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Facilitating Conditions (FC)

FC includes all the physical, financial, environmental and technological resources essential for successful utilisation and adoption of any service, technology, or product. Absence of supporting conditions and resources can negatively influence the consumers' decision

regarding a new technology adoption. FC refers to a person's belief that a supportive technical infrastructure required for utilising a technology is in place (Venkatesh et.al, 2003). Popular frameworks namely UTAUT, UTAUT 2 and TAM3 explaining consumer acceptance of similar technologies, have observed FC as a significant determinant of adoption intention. Earlier researchers have also reported FC to impact the intention to adopt internet and other mobile related technologies namely mobile banking, mobile commerce, and so on in a significant manner (Yang, 2010; Amoroso and Magnier-Watanabe, 2012; Chong, 2013; Gatautis and Medziausiene, 2014; Chau et al., 2018). Hence, it was hypothesised that:

H9: Higher the level of Facilitating Conditions (FC), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Perceived Regulatory Support (PRS)

Strong and efficient legal regulations incidental with the technological innovations boosts the confidence of the users in utilising that technology. The normative rules existing in the society influences the behaviour and decision making of individuals as well as of organisations to a great extend. An organised regulatory framework comprising of government agencies, legislatures, trade unions, consumer courts and other legal bodies and its dominating presence has a momentous role in the shaping up of these societal norms (Zhu, 2009). Unlike conventional commercial transactions, a typical mobile commerce transaction is performed in anonymity. The negotiating parties involved in the transaction may or may not know each other personally. This anonymity increases the level of suspicion and doubt among the consumers. Any mobile commerce transactions have an active involvement of parties including consumers, vendors, internet service providers, payment gateways and shipment agencies. For successful mobile commerce

transaction it is important that all these parties fulfil their required role efficiently. To ensure smooth execution of the respective roles by these value-chain partners, an organised and well-structured regulatory framework is an indispensible ingredient. Clarity and transparency of regulatory safeguards available to the consumers will further boost their confidence in a relatively new technology such as mobile commerce.

Perceived Regulatory support is the extent of consumers' belief that the existing legal as well as regulatory framework in the country is effective and efficient in safeguarding their interests. At the time of a conflict at any step in the process of completing a mobile commerce transaction, consumers must believe that there exists some regulatory authority supporting their concerns. Over the time, consumer behaviour has been observed by many researchers to be affected by factors similar to PRS (Haque et al., 2009; Alqahtani et al., 2012; AlGhamdi et al., 2013). Despite that, literature incorporating and empirically testing this factor to understand consumers' behavioural intentions towards mobile commerce is still inadequate. Hence, this study attempted to incorporate this relatively new factor in analysing behavioural intentions of Indian consumers towards mobile commerce adoption and hypothesised that:

H10: Higher the Perceived Regulatory Support (PRS), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Promotional Benefits (PB)

Promotional Benefits may be defined as any add-on benefit or advantage offered by the service providers to initiate usage of a new technology or service by the users. With reference to mobile commerce, PB includes benefits such as cash discounts, cash backs, loyalty points, coupon codes, app download cash rewards, or any other freebies provided by service providers to encourage consumers to buy via mobile devices. Promotional

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benefits received by the consumers can prove to be an effective motivator for adoption of mobile commerce since it is a consumer-based technology. By improving the overall shopping experience, such coupon codes and promotional codes have proven to be effective for returning as well as new customers (Bigcommerce.com, 2015).

Consumers in the United Kingdom have been reported to alter their online purchase decision to the extent of 50%, on account of the promotions made and offers provided (Rapid Campaign Report, 2015; Brooks, 2015). A similar behavior was revealed amongst the American consumers towards offers and promotions in a 2014 survey (Brooks, 2015). In the times of an ever rising competition and new market players entering in the mobile commerce domain, promotional benefits offered can prove to be an important tool in ensuring growth and quick adoption of mobile commerce services. Consumers are expected to evaluate all these benefits and accordingly make their purchase decision. These promotional benefits can be communicated through mass media and are supposed to influence consumer buying behavior. Hence, it was hypothesized that:

H11: Higher the Promotional Benefits (PB) offered, higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

Personal Innovativeness (PI)

PI is the level of a person's eagerness to try an innovative product or service or a new concept, or a thing (Rogers, 1995). In case of a relatively new concept such as Mobile commerce, its adoption by the consumers might be altered by the level of individual's interest in trying a new technology, product or service. Consumers with higher inclination towards innovative ideas or technologies have an increased chance of seeking new ideas aggressively and perceiving a lesser degree of danger attached (Joseph and Vyas, 1984; Lee et al. 2012). Higher personal innovativeness demonstrates greater readiness of a

person to experiment with new product, technology or service. The risk of failure attached to a new product, technology, or service can be minimized with a deeper understanding of consumers' innovativeness and how it influences their behavior towards adoption of a new product (Chao et al., 2013). Personal innovativeness has been reported to influence the users' adoption of mobile as well as internet related technologies in a positive manner by previous researchers as well (Pagani,2004; Aldás-Manzano et al., 2009; Kuo and Yen, 2009; Lee et al. 2012; Thakur and Srivastava, 2014; Lu, 2014; Natarajan et al., 2017; Ghazali et al., 2018). Hence, it was hypothesized that:

H12: Higher the degree of Personal Innovativeness (PI), higher is the Behavioural Intention (BI) towards adoption of mobile commerce.

2.4.2. Dependent Variable

Behavioural Intention (BI)

BI measures the intensity level of a person with which he intends to exhibit a particular behaviour (Fishbein and Ajzen, 1975). Many important factors namely Perceived Risk, Performance Expectancy, Perceived Trust, Social Influence, Effort Expectancy, Perceived Value, Facilitating Conditions, Personal Innovativeness and so on were reported to impact BI towards new technology adoption which was further observed to determine its actual usage or adoption (Yang et.al., 2012; Chong et.al, 2012; Zhang et.al, 2012; Chong 2013; Hanafizadeh et. al, 2014; Hubert et al., 2017). Keeping the object of this study in mind, BI is proposed to be a dependent variable further determining consumers' actual usage of mobile commerce.

H13: Higher the Behavioural Intention towards adoption of mobile commerce (BI), higher is the Actual usage (AU) of mobile commerce

2.4.3. Moderating Variables

Moderating variables are the ones which have an effect on the strength and direction of relationships between independent and dependent variables (Serenko et al., 2006). They divide "*a focal independent variable into subgroups that establish its domains of maximal effectiveness in regard to a given dependent variable*" (Baron and Kenny, 1986, p. 1173). Moderating variables are often used for improving the predictive power of a model or for explaining some inconsistent results (Judge et al., 2001; Sun and Zhang, 2006). Previous researchers have reported demographic characteristics of users namely income, gender, and age to have a vital role in determining the acceptance rate of a new IT/IS (Morris and Venkatesh, 2000; Roslow and Nicholls, 2000; Venkatesh et al., 2003; Morris et al., 2005; Serenko et al., 2006; Beigne et al., 2007; Zhou et al., 2007; Gong et al., 2013). Demographic characteristics of the users, especially gender and age, are reported as important in analyzing IT adoption, (Zmud, 1979). UTAUT 2 has also observed gender, experience, and age moderating the impact of independent factors like Price value, HM, FC, etc. on the consumers' BI towards new technology adoption (Venkatesh et al., 2012). In case of mobile commerce, researchers have employed a variety of moderating variables to explain the relationship of independent factors with Behavioural intentions ranging from demographic factor such as gender, income, education level, age to psychographic factors such as experience with the technology, self-efficacy, personal innovativeness and the like. Keeping in line with the majority of researches from the literature, only demographic factors i.e. Age, Gender and Income have been included in the research framework as moderators moderating the relationship of the independent variables with the BI to adopt mobile commerce.

Age

Age was observed to play a vital part in determining new technology adoption in past researches (Brancheau and Wetherbe, 1990; Rogers, 1995; Morris and Venkatesh, 2000; Venkatesh et al., 2003). The generation younger in age is ussually more open to and have more exposure to new developments and innovations in internet technology and computer systems and thus, can supposedly learn computer-related skills fairly easily (Czara et al., 1989; Hubona and Kennick, 1996; Venkatesh and Morris, 2001). As a result younger individuals end up having greater experience with the internet and technology-related medium in the performance of their routine jobs in comparison to their older counterparts (McMillan and Morrison, 2006). Users of higher age groups are likely to demonstrate greater levels of computer anxiety and perceives greater risk, which results them in resisting to adopt new information technology (Morris and Venkatesh, 2000; Trocchia and Janda, 2000; Celik, 2016). Not having enough experience with the internet as medium of transaction, is often reported as a critical barrier in evaluating and understanding the benefits of using internet as a alternative channel for shopping in case of older users (Trocchia and Janda, 2000).On the contrary, users younger in age are supposedly more innovative and have greater readiness to accept innovations in a faster manner (Woods, 2013).

Many earlier researchers have also identified age to be a relevant factor determining online shopping behaviour (Zhang, 2009). Therefore, Age is considered to be an important demographic variable moderating the effect of independent variables on the BI towards adoption of mobile commerce. It further includes the aspect of personal innovativeness and user's experience with the technology. However, the role of personal Innovativeness has been discussed by most researchers independently affecting new technology adoption (Pagani, 2004; Aldás-Manzano et al., 2009; Kuo and Yen, 2009; Lee et al. 2012; Lu,

2014). Hence, maintaining consistency with the popular literature, Personal Innovativeness was included as an Independent variable in the research framework and not as a moderating factor. It was further hypothesised that:

H14a: Age moderates the effect of PU, PEOU, PE, VOS, PCM, PV, PR, PT, FC, PRS, PB, & PI on the BI towards adoption of mobile commerce.

H14b: Age moderates the effect of BI on mobile commerce AU.

Gender

The behaviour towards new technology adoption may also vary because of the expected gender roles in a society which expects higher task-orientation among the men (Lynott and McCanless, 2000; Serenko et al., 2006). Few researchers in the past have observed variation in the use of Information Technology across different gender groups (Gefen et al., 2003; Venkatesh et al., 2003; Serenko et al., 2006; Hew et al., 2016). New IT products are more preferred in general by men as compared to women (Areni and Kiecker, 1993; Venkatesh and Morris, 2001). Men in general are considered more pragmatic and women on the other hand, experience greater anxiety when it comes to using new product and are more strongly influenced by their immediate environment (Sun and Zhang, 2006). Thus, gender is another demographic factor considered to play a relevant role in moderating the impact of independent variables on the consumers' mobile commerce behavioural intention.

H15a: Gender moderates the effect of PU, PEOU, PE, VOS, PCM, PV, PR, PT, FC, PRS, PB, & PI on the BI towards adoption of mobile commerce.

H15b: Gender moderates the effect of BI on mobile commerce AU.

Income

Income is another important demographic variable which has attracted the previous researchers' attention while analysing new technology adoption (Serenko et al., 2006; Bigné et al., 2007; Jonker, 2007; Allard et al., 2009; Shin, 2009; Hernández et al., 2011; Du et al., 2012; See-To et al., 2014). Internet users belonging to higher income groups perceive lower level of risks associated with online purchases and thereby affects their demand for internet related products and services. On the other hand, lower income discourages users to enter into online transactions. With the increase in the level of income of the users, the ability to withstand possible financial losses increases and so does the degree of perceived ease of use and usefulness of a technology (Hernández et al., 2011). Previous researchers have reported that individuals belonging to higher income groups are more likely to initiate using a new IT product or service including mobile related services (Schiffman and Kanuk, 2004; Zhou and Du, 2008). It was demonstrated empirically by earlier researchers that income levels affects consumers buying behaviour (Roslow and Nicholls, 2000), consumption patterns (Wong and Yu, 2002) as well as usage of IT services and technologies (Spithoven, 2005).

The present study considers the level of household income to moderate the affect of independent variables on the behavioural intention towards adoption of mobile commerce and not individual income. The rationale behind this approach is that in a country like India, the expenses relating to mobile services are born by the entire household irrespective of who brings in the major part of income and not by individuals themselves.

H16a: Income moderates the effect of PU, PEOU, PE, VOS, PCM, PV, PR, PT, FC, PRS, PB, & PI on the BI towards adoption of mobile commerce.

H16b: Income moderates the effect of BI on mobile commerce AU.

2.5. Framework of the Study

The relationship of the twelve independent variables identified through review of literature with the consumers' mobile commerce Behavioral Intention, further determining its Actual usage by the consumers is depicted in the figure 3.1. The twelve independent variables proposed are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Vareity of Services (VOS), Perceived Enjoyment (PE), Facilitating Conditions (FC), Perceived Critical Mass (PCM), Perceived Value (PV); Perceived Risk (PR), Perceived Trust (PT), Facilitating Conditions (FC), Perceived Regulatory Support (PRS), Promotional Benefits (PB), and Personal Innovativeness (PI). Further, it is also proposed that the demographic factors such as the respondents' Age group, their Gender and their annual household Income moderates the relationship of independent variables with Behavioural Intention towards mobile commerce adoption as well as the impact of Behavioural Intention on its Actual Usage. The literature does not showcase any major inter-relationships of the twelve independent variables included in the framework with each other (Khalifa and Shen, 2008; Venkatesh et al., 2012; Hew et al., 2015; Ingham et al., 2015; Wong et al., 2015). Hence, for the purpose of this study no inter-relationship among the independent variables were proposed in the framework.
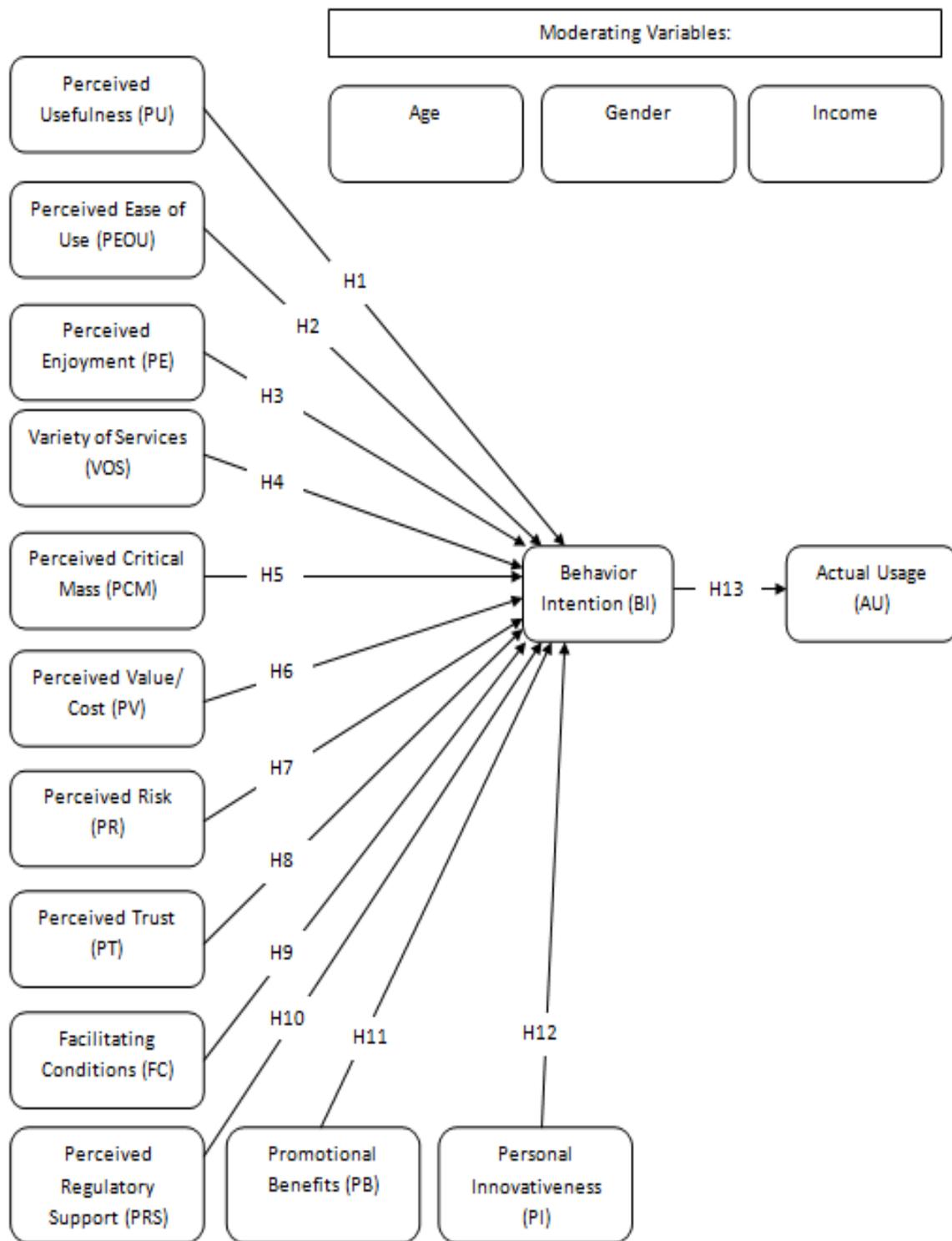
Figure 2.9: Research Framework

2.6.   Conclusion

Over the years one of the most researched areas in terms of new technology adoption is the study of consumers' behavioural intention towards adoption of a new technology or service and its actual adoption. With the strong back drop of popular technology acceptance theories and the previous researches conducted in the area of mobile technology adoption, the present study identifies twelve independent variables and two dependent variables to propose a framework explaining the consumers' mobile commerce adoption. The independent variables identified are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Enjoyment (PE), Vareity of Services (VOS), Facilitating Conditions (FC), Perceived Critical Mass (PCM), Perceived Value (PV); Perceived Risk (PR), Perceived Trust (PT), Facilitating Conditions (FC), Perceived Regulatory Support (PRS), Promotional Benefits (PB), and Personal Innovativeness (PI) and the two dependent variables are Behavioural Intention towrds adoption of mobile commerce and its Actual Usage. It also proposes the demographic factors such as gender, annual household income and age to influence the relationships illustrated in the research framework.

Chapter 3: Research Design and Methodology

3.1. Overview of Research Design and Methodology

A Research Design is a structure required prior to commencement of any data collection or analysis. Its purpose is "*to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible*" (De Vaus, 2001, pp. 9). The initial question refers to the research questions identified for the research. With this backdrop, the following chapter includes discussion regarding the type of the present research, the participants for the survey, measurement of the constructs, instrument utilised to collect the data, the sampling technique used to select the decided sample size, justification of the sample size and the statistical techniques utilised to analyse the data collected. Figure 3.1 represents the research design adopted for the present study.

Figure 3.1: Research Design for the Study

3.2. Research Design

There are two types of fundamental questions that the researchers can ask in case of social researches. One refers to the description of facts i.e. "what is going on" and the other refers to the explanation or the reason i.e. "why is it going on". The factual research answering to the question of "what" is known as Descriptive Research and the one answering the question "why" is known as Explanatory Research (De Vaus, 2001). The present research is descriptive in nature. It describes the present position of mobile commerce adoption among the Indian consumers and attempts to identify the reason behind the adoption behaviour exhibited by the consumers towards mobile commerce. For the purpose of identifying the reasons behind adoption of mobile commerce by consumers, the study empirically tests the relationship between important consumer-centric factors inducing or impeding its adoption and the behavioural intentions of consumers which further determine their actual use of mobile commerce.

3.3. Participants

Individuals belonging to varied consumer groups were surveyed for the purpose of collecting data for the study. An attempt was made to capture behaviour of consumers of different age groups, income levels, education level, profession, prior experience with mobile commerce and gender. Respondents surveyed were not just concentrated in Delhi NCR (National Capital Region), but were scattered across different cities of India, however in a non-proportionate manner.

3.4. Construct Measurements

Consistent with the existing literature, ten important consumer-centric variables were identified to predict behavioural intention of consumers to adopt mobile commerce. In addition to this, two variables namely Promotional Benefits and Perceived Regulatory

support which are relatively new and might impact new technology adoption were also introduced. The twelve independent variables were employed to develop a research framework explaining the two dependent variables i.e. Behavioural Intention (BI) to adopt mobile commerce and Actual Usage (AU) of mobile commerce. All the fourteen variables (dependent as well as independent) were measured on a multi-item scale. For measuring each variable, statements ranging in number from three to five were used. These statement or items were borrowed from already established scales used by previous researchers. Each of the statement was further rated by the respondents using a Likert scale of five-point where 1 denoted high disagreement with the statement and 5 denoted high agreement.

3.4. Research Instrument

For this study the primary data was collected using a survey questionnaire comprising of two sections. The first section of the questionnaire collected information regarding varied demographic profile of the respondents. Demographics such as gender, age, household income, education level, profession, prior experience of mobile commerce, daily time spent on internet and types of services availed via mobile commerce were captured. The second section of the questionnaire collected information on the identified items to further measure the proposed independent and dependent variables. Both offline and online mediums were utilised to collect the data. Survey questionnaire as a data collection instrument is suitable when the respondents are widely dispersed and when some aspect of respondents' behaviour or attitude has to be described (Mathers et al., 1998). Hence, for the current study Cross-sectional survey questionnaire was used to collect data. Moreover, prior to the finalisation of the questionnaire, a pilot study was administered to refine it further. A total of 60 responses were collected for the pilot study. Few members of faculty, professionals working with IT firms, researchers working in this area and some active

mobile commerce users participated as respondents in the pilot phase of the study. On analysing the results obtained from the pilot phase, few items from the questionnaire were dropped and few were altered to ensure that the finalised questionnaire is more appropriate and comprehensive in capturing the behaviour intention of consumers to adopt mobile commerce. The final version incorporated 49 items measuring twelve independent and two dependent variables.

3.5. Sampling Technique

In case of a research problem dealing with the study of consumer behaviour, a formal sampling frame is generally not available. As a result, researchers in the recent studies have utilised non-probabilistic sampling techniques for the selection of respondents to be surveyed (Amoroso and Watanabe, 2012; Chong, 2012; Pham and Ho, 2014; Alalwan et.al., 2018; Baabdullah et.al., 2019). Maintaining consistency with this approach, non-probabilistic sampling techniques were employed to collect primary data for this study.

3.6. Sample Size

600 responses were collected through a sample survey out of which, 509 completed and usable responses contributed to the sample data for the final analysis. Usually a ratio of five respondents for one variable is considered to provide a sample of sufficient size (Bentler and Chou 1987; Hair et al., 2010) and the final questionnaire used for this study included 49 items measuring twelve independent and two dependent variables. According to five for one item criteria, a total sample of 245 respondents would have been sufficient for the analysis. However, the analysis is done on a sample size of 509 responses which is more than sufficient.

Moreover, in case of SEM, which is the main analysis technique for this study, a sample size of 150-200 responses or more is considered to be adequate for testing a model (Muthén and Muthén, 2002, Kline, 2005; Weston and Gore, 2006). Therefore, a sample size of 509 responses is more than adequate for testing the research framework using SEM.

For conducting Exploratory Factor Analysis on the data, a common thumb rule is to have a sample size of at least 300 (Worthington & Whittaker, 2006). Another widely accepted rule suffices a ratio of ten subjects for one item for EFA to give reliable results (Kline, 2013). A sample size of 509 responses fulfils both these criteria.

3.7. Data Analysis Techniques

The primary data collected through the sample survey was used to test the research framework explaining consumers' behavioural intention towards mobile commerce adoption and its actual usage. For the purpose of testing the research framework and the relationships between the variables, a multi-staged analysis was conducted using IBM SPSS and IBM SPSS AMOS.

First Stage: Exploratory Factor Analysis (EFA)

In the initial stage of analysing primary data, an Exploratory Factor Analysis (EFA) was conducted through IBM SPSS to ensure that all the 49 items included in the questionnaire converge to form 12 independent and two dependent factors. Since the framework comprises of ten variables borrowed from the different scales already developed by researchers to explain various IT/IS and two relatively new variables, it was essential to conduct EFA and provide a strong theoretical base to the study.

Second Stage: Confirmatory Factor Analysis (CFA) and hypotheses testing through Structural Equation Modelling (SEM)

The second stage of analysis tested the research framework utilising Structural Equation Modelling (SEM) technique via IBM SPSS AMOS. With the objective of capturing linear relationship as well as establishing causal relation of the predictors with the mobile commerce behavioural intention and its actual usage, SEM techniques were utilised. Previous researchers have extensively utilised SEM for establishing and testing relationships between variables (Riquelme and Rios, 2010; "Chriss" Yang et.al, 2012; Hanafizadeh et. al, 2012; Chong, 2013). Keeping in line with the previous researches and to meet the objectives of the present study, SEM was utilised as one of the technique for analysing the primary data collected. The data collected was tested for reliability by computing values for Composite Reliability (CR) in AMOS and the two kinds of validities i.e. convergent and discriminant validity were ensured using the popular measures of Average Squared Shared Variance (ASV), Maximum Squared Shared Variance (MSV) and Average Variance Extracted (AVE). After testing for reliability and validity of the data, the measurement model created in AMOS was tested to confirm the Factor Analysis. For this purpose, five commonly accepted measures of goodness-of-fit were used for further ensuring an overall fit of the research framework. The proposed relationships were further tested for significance using *p*-values derived from the structural results in SEM. In the end, moderating effect of the respondent's Age, Gender and annual household Income was captured using technique of Multi-group analysis in SEM.

Third Stage: Hypotheses testing through Artificial Neural Networks

In the final phase of data analysis, the findings of SEM analysis were integrated with the outcome of Artificial Neural Network (ANN) analysis to provide more validation to the research framework. ANN is considered to be among the most important techniques of artificial intelligence (AI) and is explained as a ''*massively parallel distributed processor made up of simple processing units, which have a natural propensity for storing*

experimental knowledge and making it available for use'' (Haykin, 2001). Resembling to a brain of a human, ANN uses its environment to acquire knowledge through the process of learning (Haykin, 2001). It has an advantage over conventional statistical techniques including multiple regression analysis, logistic regression analysis, SEM, etc. and is considered more robust, providing higher prediction accuracy (Garson, 1998; Chiang et al., 2006; Chong, 2013a; Tan et al., 2014; Sim et al., 2014; Sharma et al., 2016; Yadav et al., 2016;). ANN is considered more accurate in capturing more complex linear relationships along with non-linear relationships that exists between the variables. The traditional linear statistical techniques like logistic, multiple and discriminant regression analysis as well as SEM fail to do so (Chan & Chong, 2012; Chong, 2013).

A classic ANN model has a hierarchy of layers comprising of one layer of input, one or more hidden layers along with one layer of output. The complexity of the model determines the number of hidden layers in an ANN (Negnevitsky, 2011). The input layer receives the data and the concluding information is generated in the output layer of the ANN (Morris et al., 2004). In the case of technology acceptance, usually one hidden layer is used in creating ANN (Huang, 2010; Chong, 2013a; Chong, 2013b; Leong et al., 2013; Sim et al., 2014; Tan et al., 2014; Chong et al., 2015; Sharma et al., 2016, Yadav et al., 2016). Using ANN to predict factors influencing behavioural intention of consumers towards mobile commerce adoption is consistent with the previous researches (Sexton et al.; 2002; Morris et al., 2004; Scott and Walczak; 2009). Thus, for the present study, the input variables to the ANN Model were the independent variables and the training of the model was performed using the most common and popular Multilayer Perceptron (MLP) training algorithm (Huang, 2010; Negnevitsky, 2011; Chong et al., 2015, Yadav et al., 2016).

Case Study Analysis

Finally, after analysing the primary data collected, the success of two mobile commerce companies in India was discussed to establish linkages between the findings of the analysis and the strategies implemented by mobile commerce companies to ensure consumer adoption of their services. The two mobile commerce companies which were discussed as case-studies for this research were Flipkart, one of the earliest mobile shopping portals offering a wide variety of products and services to its consumers and Paytm, a leading mobile payment portal with a licensed mobile payment bank, also operating on a market-place model. The rationale behind choosing Flipkart and Paytm for the case-study analysis was that both the companies enjoy a leading market share in their respective domains. Table 3.1 depicts the objectives of the study and the research methodology utilised to fulfil each of them.

Table 3.1: Research Methodology and Objectives of the Study

S. No.	Objective	Research Methodology
1.	To identify major areas of mobile commerce applications in India.	Review of Literature
2.	To identify the variables which influence consumers' intentions to adopt mobile commerce and their relationship with consumers' behavioural intention.	Literature Review, EFA, CFA, SEM Analysis, ANN Analysis
3.	To analyse the impact of consumers' Age, Gender and Household Income on the proposed relationships.	Moderating Effect in SEM
4.	To analyse the strategies followed by Indian mobile commerce firms for consumer adoption.	Case Study Analysis of Flipkart Pvt Ltd. and Paytm

3.8.   Conclusion

This chapter lays down the structure and the design of the research to be followed to effectively investigate research questions framed in the first chapter of the study. The research started with the analysis of present mobile commerce industry in the first chapter of the study and a thorough review of literature in the mobile technology adoption domain, discussed in the second chapter. It also studies the technology adoption theories existing in the literature, followed by identification of important factors affecting consumers' mobile technology adoption. Further, it provides a comprehensive framework integrating these factors to explain mobile commerce adoption among Indians. The next step involved measurement of the constructs, identification of the relevant participants for the survey, decision regarding sample size and sampling technique to be employed and selection of data collection tool which was questionnaire method in this case. Further, the data was collected from the participants and was analysed using a multi-stage analysis process including Exploratory Factor Analysis in IBM SPSS, followed by Confirmatory Factor Analysis in IBM SPSS AMOS, Hypotheses testing using Structural Equation Modelling and finally confirming the results of SEM analysis using Artificial Neural Networks constructed in IBM SPSS. At the end, in order to investigate the strategies employed by successful mobile commerce companies for faster adoption of their services by consumers, case study analysis was conducted, discussing the cases of Flipkart and Paytm.

Chapter 4: Data Analysis and Results

4.1. Overview of Data Analysis and Results

The data collected from the sample survey was analysed to test the research framework and the relationships it proposes among the independent and dependent variables. A multi-staged analysis comprising of Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), Multiple Regression Analysis using Structural Equation Modelling and Artificial Neural Networks (ANN) analysis was done in IBM SPSS and IBM SPSS AMOS. Before finalising the survey instrument for the final data collection, a pilot study was administered on 60 respondents. Based on the observations made in the pilot phase of analysis, alterations were done in the survey instrument before finalising and using it for final data collection. The refined questionnaire was then sent to more than 1000 prospective respondents belonging to different demographic profiles. Out of the 1000 questionnaires sent, 509 were completed and were used for further analysis. Figure 4.1 showcases the process of data analysis followed in this study.
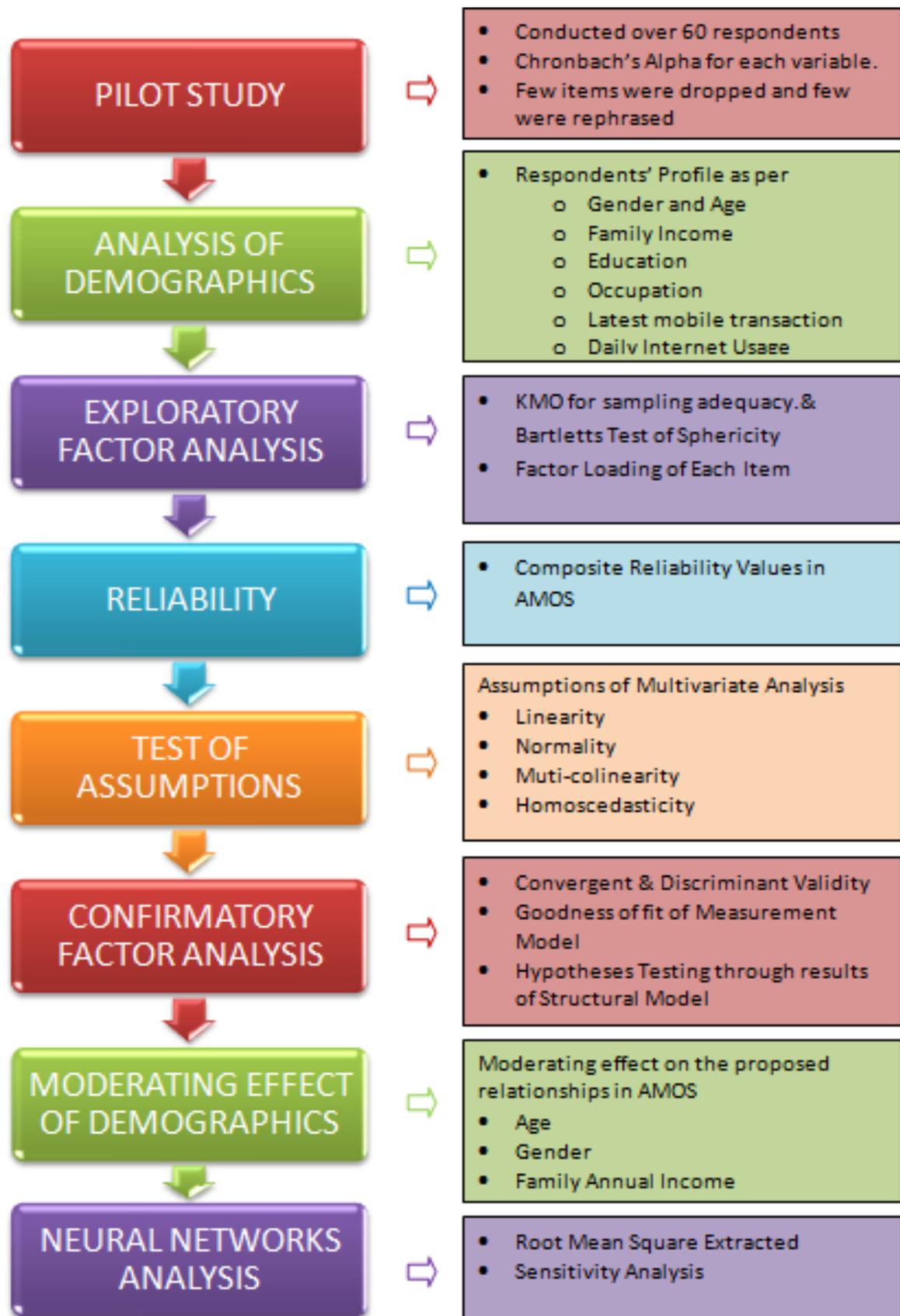
Figure 4.1: Flow of Data Analysis

4.2. Pilot Study

With the aim of refining the questionnaire a pilot survey analysis was undertaken over 130 prospective respondents selected to be a part of the pilot survey. The selection was made keeping in mind the expertise and area of interest of the respondents. Out of the 130 prospective respondents, 60 respondents completed the survey. These 60 respondents included IT professionals, banking professionals, marketing faculties, researchers with interest in new technology diffusion studies and active mobile commerce users. Along with completing the survey, they were also requested to provide feedback on the effectiveness and relevance of the questionnaire. From the data collected from these 60 respondents in the pilot survey, Chronbach's alpha values were calculated for each variable to ensure the questionnaire's initial reliability. Table 4.1 depicts the values of Chronbach's alpha calculated for variables using IBM SPSS in the pilot phase.

Table 4.1: Chronbach's alpha for dependent and independent variables

Variables	No. of Items	Chronbach's Alpha
Perceived Ease of Use	4	0.888
Perceived Usefulness	5	0.928
Perceived Enjoyment	5	0.83
Variety of Services	4	0.879
Perceived Critical Mass	4	0.718
Perceived Value	5	0.918
Perceived Risk	3	0.966
Perceived Trust	4	0.881
Facilitating Conditions	4	0.826
Perceived Regulatory Support	3	0.903
Promotional Benefits	3	0.887
Personal Innovativeness	4	0.922
Behavioural Intention	3	0.903
Actual Usage	3	0.862

The Alpha value for each variable shown in the Table 4.1 came out to be in the range of 0.718 to 0.966 exceeding the widely accepted minimum value of 0.07 (Hair et al., 2006). Hence, it was concluded that there were no reliability concerns with the questionnaire.

However, based on the suggestions and opinions of the respondents during the pilot survey, several changes were made to the questionnaire in order to increase its comprehensiveness and relevance. Items displaying semantic differentials and creating ambiguity in the minds of the respondents or those which were considered to be irrelevant in the context of mobile commerce adoption behaviour were either removed, rephrased or modified making them more comprehensive and relevant to the context. The final version of the questionnaire measured 12 independent variables and 2 dependent variables using 49 items. Table 4.2 shows the list of statements/items in the initial questionnaire used for the pilot survey and Table 4.15 presents the list of statements included in the final questionnaire.

Table 4.2: Questionnaire Items used in Pilot Survey

S.No.	Name of the Variable	Items
ID1	Perceived Ease of Use	I think it is easy to learn how to use m-commerce
		I think less time & mental effort is required in learning how to use m-commerce.
		I think m-commerce is easy to use.
		It is easy for me to become skillful in using mobile commerce.
ID2	Perceived Critical Mass	People who are important to me frequently use mobile commerce.
		My Family and friends frequently use mobile commerce.
		Most people in my community and peer group frequently use mobile commerce.
		Using mobile commerce is a common social trend.
ID3	Perceived Usefulness	M-commerce improves my current job performance.
		M-commerce increases my productivity.
		M-commerce increases my time effectiveness.
		M-commerce is useful for my work.

		M-commerce makes my daily job easier
ID4	Variety of Services	Variety of m-commerce services offered fits my current lifestyle.
		M-commerce services currently offered appeals to me & attracts me to avail them.
		M-commerce services offered are according to my requirements.
		Current m-commerce services offered meets my expectations.
ID5	Promotional Benefits	I get more discounts and incentives while shopping through mobile commerce.
		Promotional offers in mobile commerce are attractive enough to induce usage.
		Mobile commerce firms offer frequent discounts and incentives.
ID6	Perceived Trust	Mobile commerce service providers are trustworthy and reliable.
		I trust telecommunication operators to provide secured data connections for conducting mobile commerce transactions.
		I trust my mobile phone manufacturer to provide mobile phones appropriate for initiating mobile commerce transaction.
		I think m-commerce firms will fulfill their commitments.
ID7	Personal Innovativeness	I like to experiment with new technologies.
		I am curious about new technologies.
		I think it is very interesting to try out a new technology.
		Among my peers I am usually the first to try out a new technology.
ID8	Perceived Enjoyment	It is fun shopping over mobile phones.
		The overall mobile commerce experience would be enjoyable.
		Purchasing over mobile devices would be enjoyable.
		When using mobile commerce services, I am spontaneous.
		When using mobile commerce services, I am playful.
ID9	Perceived Value	I think the equipment cost is expensive for using mobile commerce.
		I think the access cost is expensive for using mobile commerce.
		I think the transaction fee is expensive for using mobile commerce.

		Using mobile commerce is expensive for me.
		The product/service of the m-commerce website is not a good value for money
ID10	Perceived Risk	I feel that use of mobile devices for transaction purposes is risky.
		I feel my personal information provided during mobile commerce transactions is not safe.
		I feel there is a risk involved while using my credit card or bank account details for making mobile commerce payments.
ID11	Perceived Regulatory Support	I believe that Legislation does not provides enough protection to mobile commerce users.
		I m hardly aware about the legislation and regulations developed to protect mobile commerce users.
		My Intention to use mobile commerce does not varies with development of rules and regulation.
ID12	Facilitating Conditions	I do not have necessary resources to initiate mobile commerce transaction
		I do not have the required knowledge necessary to undertake mobile commerce transaction.
		Online assistance is not available for issues/queries related to mobile commerce transactions.
		Availability of an internet enabled mobile phone required to enter into a mobile commerce transaction is an issue.
D1	Behavioural Intention	I will definitely avail mobile commerce services in future.
		I will continue availing mobile commerce services in future as well.
		I will refer mobile commerce services to my friends and family.
D2	Actual Usage	I often engage in online transactions via mobile commerce.
		I have availed many kinds of mobile commerce services.
		I use mobile commerce for my daily job performance.

4.3. Demographic Profile

In order to capture behaviour of consumers belonging to different age groups, income

levels, education level, profession, prior experience with mobile commerce and gender,

consumers from different demographic profiles were targeted. After the completion of pilot stage of analysis, valid responses of 509 consumers were obtained.

4.3.1. Respondents Profile as per Gender

The study was focussed on obtaining useful insights about the behaviour intentions towards mobile commerce of consumers belonging to all gender groups. Hence, the respondents' profile was a mix of males, females as well as transgender. Out of the total respondents, 57% were males, 41.8% were females and only 0.4% was transgender. Table 4.3 presents the profile of the respondents as per their Gender.

Table 4.3: Respondents' Profile as per Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	294	57.8	57.8	57.8
Female	213	41.8	41.8	99.6
Transgender	2	.4	.4	100.0
Total	509	100.0	100.0	

4.3.2. Respondents' Profile as per Age

The study attempted to gage the behaviour intentions of individual belonging to different age groups. Hence, among the final responses received, 12% were received from consumers having age of 20 years or below, 28% were in 21-25 years age group, 13% were of 31-35 years of age, 7% had an age between 36-40 years and 24 % were above the age of 40 years. The profile of respondents as per their age is represented by Table 4.4.

Table 4.4: Respondents' Profile as per Age

	Frequency	Percent	Valid Percent	Cumulative Percent
20 or Below 20 years	62	12.2	12.2	12.2
21-25 years	142	27.9	27.9	40.1
26-30 years	68	13.4	13.4	53.4
31-35 years	83	16.3	16.3	69.7
36-40 years	33	6.5	6.5	76.2
Above 40 years	121	23.8	23.8	100.0
Total	509	100.0	100.0	

Table 4.5 establishes the correlation between the respondents' age and their mobile commerce usage. The value for both Pearson's R and Spearsman Correlation is negative and less than 0.5 which shows a weak negative correlation between age and mobile commerce actual usage. It implies that respondents belonging to higher age groups are slightly lacking in terms of actual usage of mobile commerce.

Table 4.5: Correlation between Age and Mobile Commerce Actual Usage

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Interval by Interval	**Pearson's R**	-.190	.045	-4.348	.000[c]
Ordinal by Ordinal	**Spearman Correlation**	-.133	.046	-3.030	.003[c]
N of Valid Cases		509			

4.3.3. Respondents' Profile as per Annual Household Income

Mobile commerce has reached consumers of all classes and income groups. Hence, the study targeted consumers belonging to different income groups. Out of the total, respondents with household income of Rs. 300,000 p.a. or below were around 18%,

around 22% had Rs. 300,001 p.a. to Rs. 550,000 p.a. as household income, around 17%

had Rs. 550,001 p.a. to 750,000 p.a. as household income. Almost 13% were having a

household income of Rs. 750,001 p.a. to 10,00,000 p.a. and around 30% had a household

income of Rs. 10,00,000 p.a. or above. Table 4.6 represents the profile of respondents as

per their annual household income.

Table 4.6: Respondents' Profile as Annual Household Income (in Rupees)

	Frequency	Percent	Valid Percent	Cumulative Percent
3,00,000 or Below	90	17.7	17.7	17.7
3,00,001 to 5,50,000	112	22.0	22.0	39.7
5,50,001 to 7,50,000	86	16.9	16.9	56.6
7,50,001 to 10,00,000	69	13.6	13.6	70.1
Above 10,00,000	152	29.9	29.9	100.0
Total	509	100.0	100.0	

The Table 4.7 establishes correlation of annual household income of respondents with their

mobile commerce usage. The value of both Pearson's R and Spearsman Correlation is

positive and less than 0.5, establishing a positive but weak correlation between annual

household income and the actual mobile commerce usage of the respondents. It implies

that as the annual household income of the respondents' increases, there is a slight increase

in their mobile commerce usage.

Table4.7: Correlation between Annual Household Income and Mobile Commerce Actual Usage

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Interval by Interval	**Pearson's R**	.111	.046	2.512	.012[c]
Ordinal by Ordinal	**Spearman Correlation**	.130	.045	2.951	.003[c]
N of Valid Cases		509			

4.3.4. Respondents' Profile as per Education

Education may affect the level of awareness among the individuals regarding mobile commerce, as well as the level of skills required to handle a smart-phone. Hence, to get a holistic view of the diverse consumer behaviour towards mobile commerce, individuals with varied educational qualification were targeted. Almost 7% of the respondents had completed high school as the highest level of education, 40% had a graduation degree or equivalent, 35% had a post-graduation degree or equivalent, almost 18% had some professional degree such as, Chartered Accountant, Company Secretary and the like and 0.4% were having some qualification other than the given options such as PhD. Table 4.8 represents the respondents' profile as per their education.

Table 4.8: Respondents Profile as per their Education

	Frequency	Percent	Valid Percent	Cumulative Percent
High School	33	6.5	6.5	6.5
Graduation Degree or Equivalent	202	39.7	39.7	46.2
Post graduation Degree or Equivalent	179	35.2	35.2	81.3
Professional Degree	93	18.3	18.3	99.6
Others	2	.4	.4	100.0
Total	509	100.0	100.0	

The correlation between the respondents' education and their mobile commerce usage is established in the Table 4.9. The value for Pearson's R and Spearsman Correlation is quite low but positive implying a very weak positive correlation between a respondent's education level and his actual usage of mobile commerce.

Table 4.9: Correlation between Respondents' Education and Mobile Commerce Actual Usage

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Interval by Interval	**Pearson's R**	.075	.046	1.697	.090[c]
Ordinal by Ordinal	**Spearman Correlation**	.078	.045	1.757	.079[c]
N of Valid Cases		509			

4.3.5. Respondents' Profile as per their Occupation

The type of occupation or profession, an individual is into, may affect his need of using mobile commerce and eventually will affect his behaviour intention towards it. Therefore, the respondents of the study belong to different occupations or professions. Almost 33.6% were students, 38.9% were government or private sector employees, 13.9% were self-employed professionals such as CA, CS and the like, 7.9% were entrepreneurs or traders, 4.3% were home-makers and 1.4% respondents were retired. The respondents' profile as per occupation is represented in Table 4.10.

Table 4.10: Respondents' Profile as per their Occupation

	Frequency	Percent	Valid Percent	Cumulative Percent
Student	171	33.6	33.6	33.6
Govt./Pvt. Sector Employee	198	38.9	38.9	72.5
Self-employed Professional	71	13.9	13.9	86.4
Entrepreneur/ Trader	40	7.9	7.9	94.3
Home-maker	22	4.3	4.3	98.6
Retired	7	1.4	1.4	100.0
Total	509	100.0	100.0	

4.3.6. Time of Latest Mobile Commerce Transaction Undertaken by the Respondents

In order to know, how frequently the respondents enter into a mobile commerce transaction, the questionnaire included a question regarding the time of latest mobile commerce transaction entered into by the respondents. Almost 48% had a mobile commerce experience with-in last two days of filling the questionnaire for the study, 22% had transacted via mobile during the last week, 12% during the last month, 16% respondents had an experience with mobile commerce during the last one year, for 1% of the respondents, it has been more than an year and 1% never tried mobile commerce. Table 4.11 represents the respondents' profile according to the time of their latest mobile commerce transaction.

Table 4.11: Time of latest mobile commerce transaction undertaken

	Frequency	Percent	Valid Percent	Cumulative Percent
During Last Two Days	244	47.9	47.9	47.9
During Last Week	110	21.6	21.6	69.5
During last month	59	11.6	11.6	81.1
More than a month	82	16.1	16.1	97.2
More than an Year	7	1.4	1.4	98.6
Never	7	1.4	1.4	100.0
Total	509	100.0	100.0	

4.3.7. Time Duration of Respondents' Daily Internet Usage

There is a chance that higher the time spent over internet on daily basis; higher are the chances of entering into an actual mobile commerce transaction. To gage this behaviour of respondents, the study targeted respondents with varied internet-usage habit. Almost 60% of the respondents used internet for more than 2 hours a day, 22% had a daily internet

usage of 1hour to 2 hours, 13% used internet for half an hour to 1 hour daily, and only 5% used internet for half an hour or less per day.

Table 4.12: Time duration of daily Internet usage

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 1/2 hour	26	5.1	5.1	5.1
1/2 hour to 1 hour	68	13.4	13.4	18.5
1 hour to 2 hours	111	21.8	21.8	40.3
More than 2 hours	304	59.7	59.7	100.0
Total	509	100.0	100.0	

Table 4.13 establishes the correlation between respondents' daily internet usage and their mobile commerce usage. The Pearson's R and Spearsman Correlation values shown in Table 4.13, shows a weak but positive correlation between the time spent by respondents daily on browsing internet and their actual usage of mobile commerce.

Table 4.13: Correlation between Daily Internet Usage and Mobile Commerce Actual Usage

		Value	Asymp. Std. Error	Approx. T	Approx. Sig.
Interval by Interval	**Pearson's R**	.107	.049	2.434	.015[c]
Ordinal by Ordinal	**Spearman Correlation**	.110	.045	2.501	.013[c]
N of Valid Cases		509			

4.4. Exploratory Factor Analysis

After analysing the results of the pilot phase and altering the questionnaire accordingly, the refined questionnaire was then sent to more than 1000 prospective respondents belonging to different demographic profiles out of which 509 completed the survey. The data collected from these 509 respondents was further analysed to fulfil the objectives of the

study. The initial phase of analysis, conducted Exploratory Factor Analysis (EFA) on the finalised 49 items using the method of Maximum Likelihood Estimation with Varimax rotation. To ensure that the sample is adequate for conducting EFA as well as to ensure that conducting EFA on the data is appropriate, test of sampling adequacy i.e. Kaiser-Meyer-Olkin (KMO) along with Bartlett's test of sphericity were performed. The value obtained for KMO was higher than 0.60, depicting adequacy of the sample size (Tabachnick and Fidell, 2001). Bartlett's test of shericity, on the other hand hypothesise that no correlation exists between the individual items included in the questionnaire. The *p*-value for Bartlett's test below 0.05 results in the acceptance of alternate hypothesis and rejection of null hypothesis and further suggests that there exist correlation among the individual items in the questionnaire. Hence, it is appropriate to conduct EFA for reducing items into a limited number of factors consisting of correlated items.

Table 4.14 depicts the value obtained for KMO test of sampling adequacy as 0.893 which exceeds the minimum criteria of 0.60, hence ensuring that the sample considered is adequate in size. The value for Bartlett's test is 13841.040 with p-value < 0.05 ensuring appropriateness of conducting EFA (So et al., 2014).

Table 4.14: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.893
Bartlett's Test of Sphericity	Approx. Chi-Square	13841.040
	Df	903
	Sig.	.000

The factor loadings of each item on its respective factor are presented in the Table 4.15. All the 49 items were completely loaded on the intended 12 independent and 2 dependent factors with factor loading greater than 0.60 and with no cross-loading in excess of 0.40 (Suhr, 2006; So et al., 2014).

Table 4.15: Factor Loadings of Items

Factor No.	Name of Dimension	Variables	Factor loading
ID1	Perceived Usefulness (PU)	**PU1**- M-commerce improves my current job performance.	.780
		PU2- M-commerce increases my productivity.	.844
		PU3- M-commerce increases my time effectiveness.	.734
		PU4- M-commerce is useful for my work.	.772
		PU5- M-commerce makes my daily job easier	.703
ID2	Perceived Ease of Use (PEOU)	**PEOU1**- I think it is easy to learn how to use m-commerce	.820
		PEOU2- I think less time & mental effort is required in learning how to use m-commerce.	.837
		PEOU3- I think m-commerce is easy to use.	.843
ID3	Perceived Enjoyment (PE)	**PE1**- It is fun shopping over mobile phones.	.727
		PE2- The overall mobile commerce experience would be enjoyable.	.769
		PE3- Purchasing over mobile devices would be enjoyable.	.793
ID4	Variety of Services (VOS)	**VOS1**- Variety of m-commerce services offered fits my current lifestyle.	.648
		VOS2- M-commerce services currently offered appeals to me & attracts me to avail them.	.785
		VOS3- M-commerce services offered are according to my requirements.	.816
		VOS4- Current m-commerce services offered meets my expectations.	.717
ID5	Perceived Critical Mass (PCM)	**PCM1**- People who are important to me frequently use mobile commerce.	.783
		PCM2- My Family and friends frequently use mobile commerce.	.841
		PCM3- Most people in my community and peer group frequently use mobile commerce.	.806

ID6	Perceived Value (PV)	**PV1**- I think the equipment cost is expensive for using mobile commerce.	.807
		PV2- I think the access cost is expensive for using mobile commerce.	.853
		PV3- I think the transaction fee is expensive for using mobile commerce.	.810
		PV4- Using mobile commerce is expensive for me.	.773
		PV5- The product/service of the m-commerce website is not a good value for money	.663
ID7	Perceived Risk (PR)	**PR1**- I feel that use of mobile devices for transaction purposes is risky.	.830
		PR2- I feel my personal information provided during mobile commerce transactions is not safe.	.860
		PR3- I feel there is a risk involved while using my credit card or bank account details for making mobile commerce payments.	.844
ID8	Perceived Trust (PT)	**PT1**- Mobile commerce service providers are trustworthy and reliable.	.696
		PT2- I trust telecommunication operators to provide secured data connections for conducting mobile commerce transactions.	.809
		PT3- I trust my mobile phone manufacturer to provide mobile phones appropriate for initiating mobile commerce transaction.	.813
		PT4- I think m-commerce firms will fulfil their commitments.	.752
ID9	Facilitating Conditions (FC)	**FC1**- I do not have necessary resources to initiate mobile commerce transaction	.805
		FC2- I do not have the required knowledge necessary to undertake mobile commerce transaction.	.831
		FC3- Online assistance is not available for issues/queries related to mobile commerce transactions.	.721

ID10	Perceived Regulatory Support (PRS)	**PRS1**- I believe that Legislation does not provide enough protection to mobile commerce users.	.706
		PRS2- I m hardly aware about the legislation and regulations developed to protect mobile commerce users.	.859
		PRS3- My Intention to use mobile commerce does not vary with development of rules and regulation.	.761
ID11	Promotional Benefits (PB)	**PB1**- I get more discounts and incentives while shopping through mobile commerce.	.790
		PB2- Promotional offers in mobile commerce are attractive enough to induce usage.	.846
		PB3- Mobile commerce firms offer frequent discounts and incentives.	.806
ID12	Personal Innovativeness (PI)	**PI1**- I like to experiment with new technologies.	.808
		PI2- I am curious about new technologies.	.854
		PI3- I think it is very interesting to try out a new technology.	.841
		PI4- Among my peers I am usually the first to try out a new technology.	.708
DD1	Behavioral Intention (BI)	**BI1**- I will definitely avail mobile commerce services in future.	.881
		BI2- I will continue availing mobile commerce services in future as well.	.898
		BI3- I will refer mobile commerce services to my friends and family.	.847
DD2	Actual Usage (AU)	**AU1**- I often engage in online transactions via mobile commerce.	.638
		AU2- I have availed many kinds of mobile commerce services.	.616
		AU3- I use mobile commerce for my daily job performance.	.919

4.5. Questionnaire Reliability

For the purpose of confirming the reliability of the data collected, values of Composite Reliability were obtained in AMOS. The values of Composite Reliability computed for each factor is depicted in the Table 4.16. The values for all 14 factors shown in the table are ranging from 0.763 to 0.918, exceeding the widely accepted value of 0.70 (Hair et al., 1998). Consequently, it was concluded that the data demonstrated reasonable reliability.

Table 4.16: Composite Reliability of Variables

Factor No.	Variable Name	Composite Reliability (CR)
ID1	Perceived Ease of Use	0.911
ID2	Perceived Usefulness	0.881
ID3	Perceived Enjoyment	0.858
ID4	Variety of Services	0.859
ID5	Perceived Critical Mass	0.845
ID6	Perceived Value	0.882
ID7	Perceived Risk	0.902
ID8	Perceived Trust	0.859
ID9	Facilitating Conditions	0.874
ID10	Perceived Regulatory Support	0.763
ID11	Promotional Benefits	0.885
ID12	Personal Innovativeness	0.890
D1	Behavioural Intention	0.918
D2	Actual Usage	0.878

4.6. Testing the Assumptions of Multivariate Analysis

In the proceeding analysis phases, the study intends to use Multivariate Analysis such as Structural Equation Modelling (SEM) to test the hypotheses of the research and further

analyse the data. The technique of Multivariate Analysis can be utilised, only if the following assumptions are found to be true for the data collected.

4.6.1. Linearity

SEM assumes variables to be linearly correlated with each other and can capture only linear relationships between the variables within the framework. Hence, in order to use SEM, linearity of proposed relationships has to be ensured.

Table 4.17: Linearity of Relationships

Relationships	R Square	*p*-value
H1(PU-→BI)	.209	.000
H2 (PEOU-→BI)	.254	.000
H3 (PE-→BI)	.212	.000
H4 (VOS-→BI)	.244	.000
H5 (PCM-→BI)	.165	.000
H6 (PV-→BI)	.027	.000
H7 (PR-→BI)	.020	.000
H8 (PT-→BI)	.184	.000
H9 (FC-→BI)	.033	.000
H10 (PRS-→BI)	.003	.000
H11 (PB-→BI)	.265	.000
H12 (PI-→BI)	.343	.000
H13 (BI-→AU)	.542	.000

The assumption of linear relationship between the variables was tested in IBM SPSS. The proposed relationships were tested for all possible types of relationships such as linear, quadratic, cubic, logarithmic, exponential, compound, growth, inverse, logistics and more, using Curve-estimation. The Table 4.17 presents results obtained for linear relationships. The values of R-square along with the *p*-values represent the possibility of a linear

relationship among the variables. The *p*-values for all the proposed relationships came out to be less than 0.05. Hence, the relationships were concluded to be reasonably linear for SEM to be applied as an analysis technique.

4.6.2. Normality

For application of Multivariate Analysis, the data collected has to be normally distributed. To ensure normality of the data, values for kurtosis and skewness were obtained from the Structural model created in AMOS. For a normally distributed curve, the kurtosis and skewness values must lie close to zero i.e. from -1 to +1 (Hair et al., 2010).

Table 4.18: Normality

Name of Dimension	Items	Skewness	Kurtosis
Perceived Usefulness (PU)	PU1	-.308	-.244
	PU2	-.602	-.119
	PU3	-.867	.459
	PU4	-.762	.147
	PU5	-.755	.350
Perceived Ease of Use (PEOU)	PEOU1	-.945	.622
	PEOU2	-.734	.102
	PEOU3	-.952	.554
Perceived Enjoyment (PE)	PE1	-.462	-.007
	PE2	-.547	.342
	PE3	-.481	.007
Variety of Services (VOS)	VOS1	-.718	.626
	VOS2	-.496	-.070
	VOS3	-.482	.010
	VOS4	-.479	-.051
Perceived Critical Mass (PCM)	PCM1	-.405	-.008
	PCM2	-.561	-.032
	PCM3	-.773	.631
Perceived Value (PV)	PV1	-.021	-.726
	PV2	-.138	-.699
	PV3	-.065	-.865
	PV4	-.359	-.651
	PV5	-.273	-.646
Perceived Risk (PR)	PR1	.188	-.528

	PR2	.236	-.645
	PR3	.284	-.714
Perceived Trust (PT)	PT1	.085	-.327
	PT2	-.189	-.254
	PT3	-.300	.033
	PT4	-.280	.186
Facilitating Conditions (FC)	FC1	-.462	-.764
	FC2	-.549	-.681
	FC3	-.077	-.953
Perceived Regulatory Support (PRS)	PRS1	.231	-.368
	PRS2	.251	-.320
	PRS3	.391	-.021
Promotional Benefits (PB)	PB1	-.576	-.098
	PB2	-.495	-.148
	PB3	-.513	-.005
Personal Innovativeness (PI)	PI1	-.680	.032
	PI2	-.797	.429
	PI3	-.779	.305
	PI4	-.210	-.544
Behavioral Intention (BI)	BI1	-.829	.806
	BI2	-.809	.584
	BI3	-.794	.512
Actual Usage (AU)	AU1	-.558	-.011
	AU2	-.613	.138
	AU3	-.196	-.319

The values for skewness and kurtosis calculated for each of the 49 items included in the questionnaire are depicted in the Table 4.18. It can be observed that all the computed values lie between the range of -1 to +1, which means that the skewness and kurtosis is close to zero. Hence, normality of the data collected for each item was ensured.

4.6.3. Multi-colinearity

Multi-colinearity refers to high correlation between the items of one factor with the items of another. Multivariate Analysis assumes absence of any such multi-colinearity between the variables. Multi-colinearity is required to be checked for variables appearing at the

same level. Hence, in the proposed model, variables such PU, PEOU, VOS, PB, PT, PI, PE, PR, PRS, FC, and PV were checked to ensure that there is no problem of multi-colinearity between them. VIF values were generated in SPSS by putting one of the variables as dependent variable and rest as independent variables. The values for VIF were computed 3-4 times by putting a different variable as dependent variable each time to ensure that there are no major variations in the values.

Table 4.19: Multi-colinearity

Model with PEOU as DV	Co linearity Statistics	
	Tolerance	**VIF**
(Constant)		
PCM	.727	1.375
PU	.658	1.521
VOS	.537	1.861
PB	.658	1.519
PT	.595	1.681
PI	.693	1.443
PE	.558	1.791
PR	.614	1.627
PRS	.734	1.363
FC	.574	1.743
PV	.590	1.695

Table 4.19 depicts the computed values of VIF. All the values are less than 3 which is a widely accepted threshold for VIF. Hence, it can be said that there is no issue of multi-colinearity in this case.

4.6.4. Homoscedasticity

Homoscedasticity is another assumption required for multivariate analysis. Also known as Homogeneity of Variances, Homoscedasticity refers to a situation where in the random disturbances between the relationship of independent and dependent variables, known as the error terms, are equidistant from the regression line across all values of independent variable (Tabachnick and Fidell, 2001; Statistics Solutions, 2013). It can be tested by creating scatter plots for each independent variable (Nimon, 2012). Figure 4.2 to 4.13 depicts scatter plots generated for each independent variable in relation to the dependent variable i.e. Behavioural Intentions using IBM SPSS. The predicted values for dependent variable are shown on one axis and the other axis represents the residual values i.e. the difference between the values obtained for the dependent variable and its predicted values. The scatter plots so generated ensured that the assumption of Homoscedasticity was satisfied and thus regression can be used as a technique for further analysis.

Figure 4.2: Scatter Plot for Perceived Usefulness

It can be seen in the Figure 4.2 that the random disturbances between the relationships of independent variable PU and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PU. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

Figure 4.3: Scatter Plot for Perceived Ease of Use

The Figure 4.3 depicts the random disturbances between the relationships of independent variable PEOU and the dependent variable Behavioural Intention as equidistant from the regression line across all values of PEOU. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

Figure 4.4: Scatter Plot for Perceived Enjoyment

It can be observed from the Figure 4.4 that the random disturbances between the relationship of independent variable PE and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PE. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

Scatterplot
Dependent Variable: BI_avg
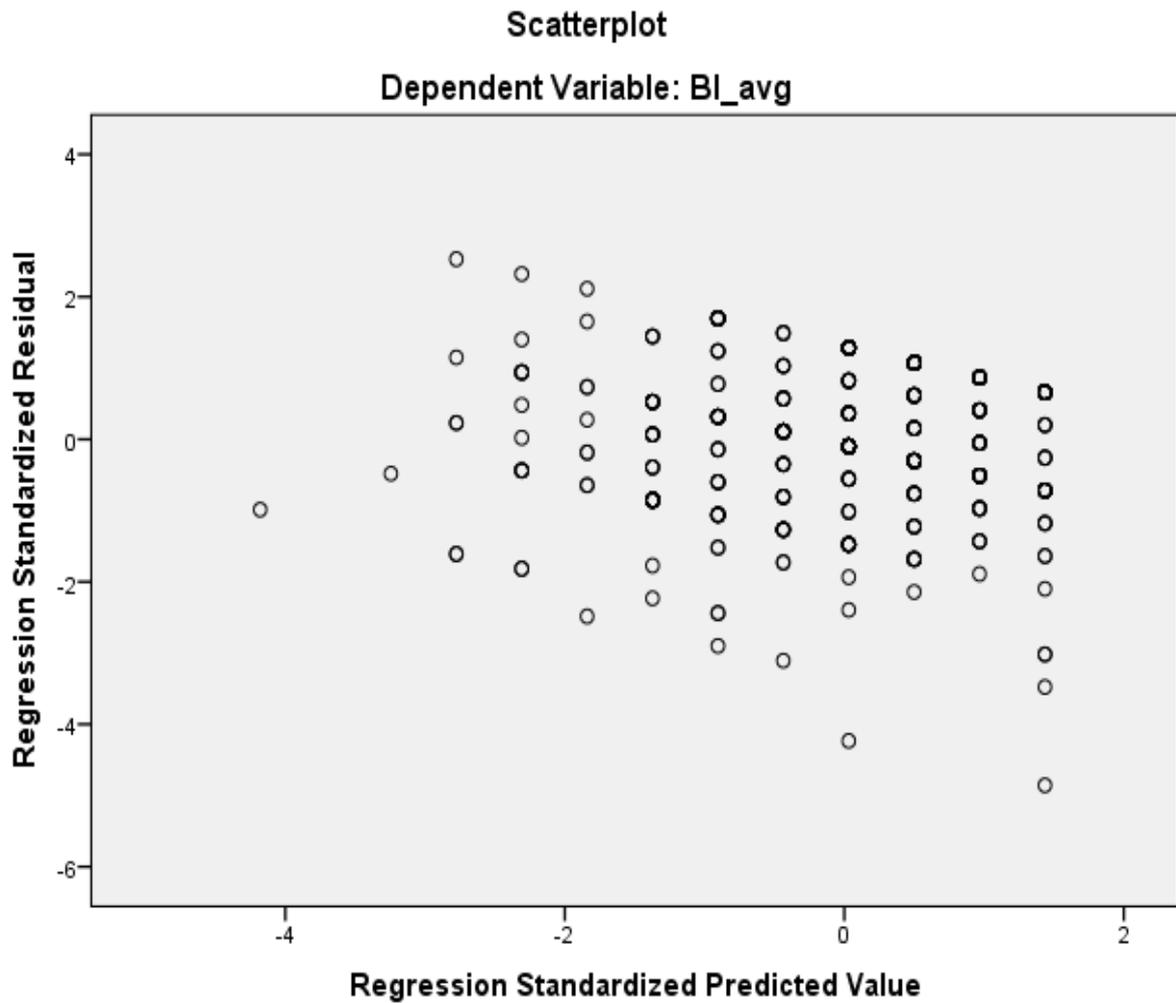
Figure 4.5: Scatter Plot for Perceived Critical Mass

It can be seen in the Figure 4.5 that the random disturbances between the relationships of independent variable PCM and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PCM. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

Scatterplot

Dependent Variable: BI_avg
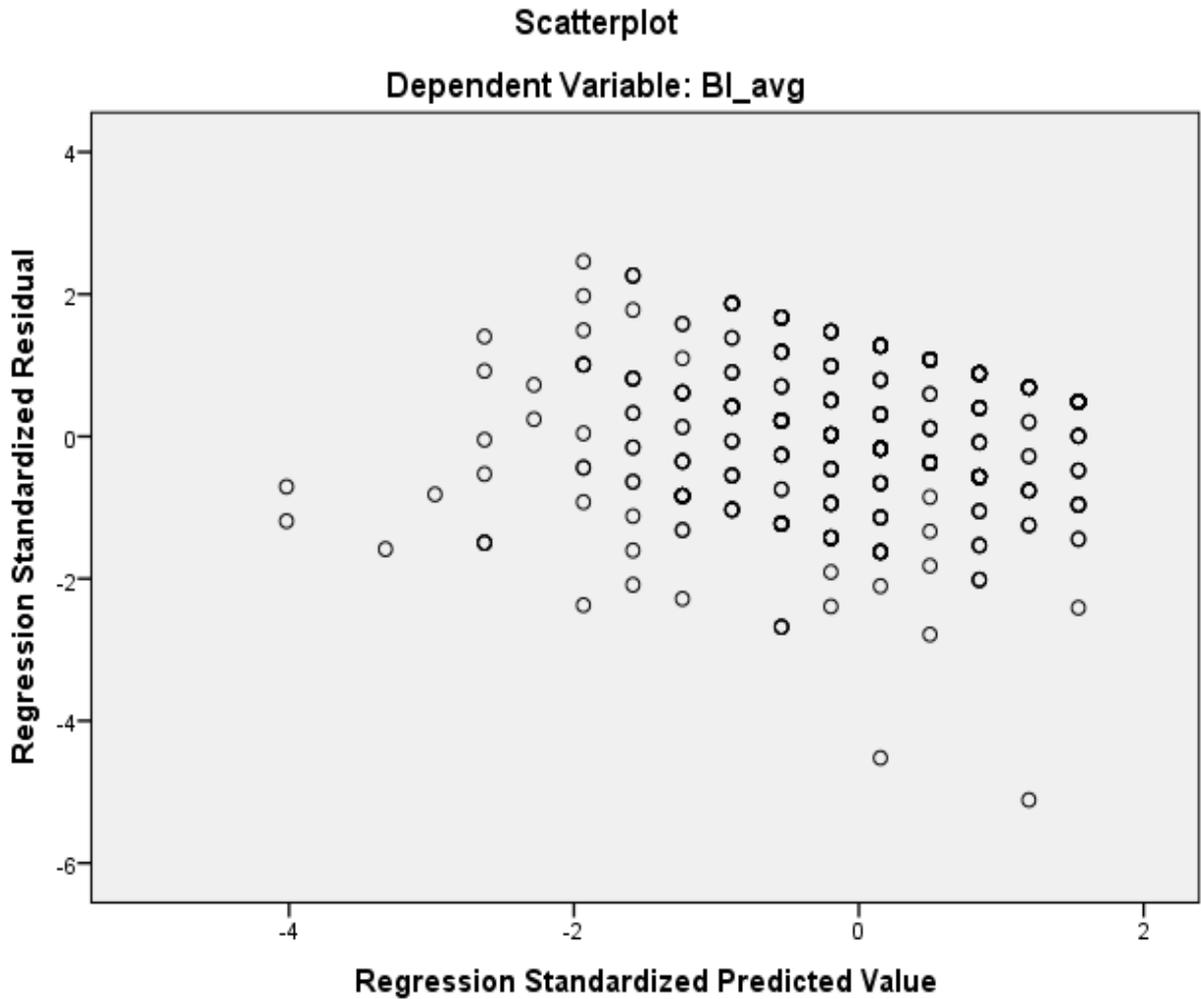
Figure 4.6: Scatter Plot for Variety of Services

It can be seen in the Figure 4.6 that the random disturbances between the relationships of independent variable VOS and the dependent variable Behavioural Intention are equidistant from the regression line across all values of VOS. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
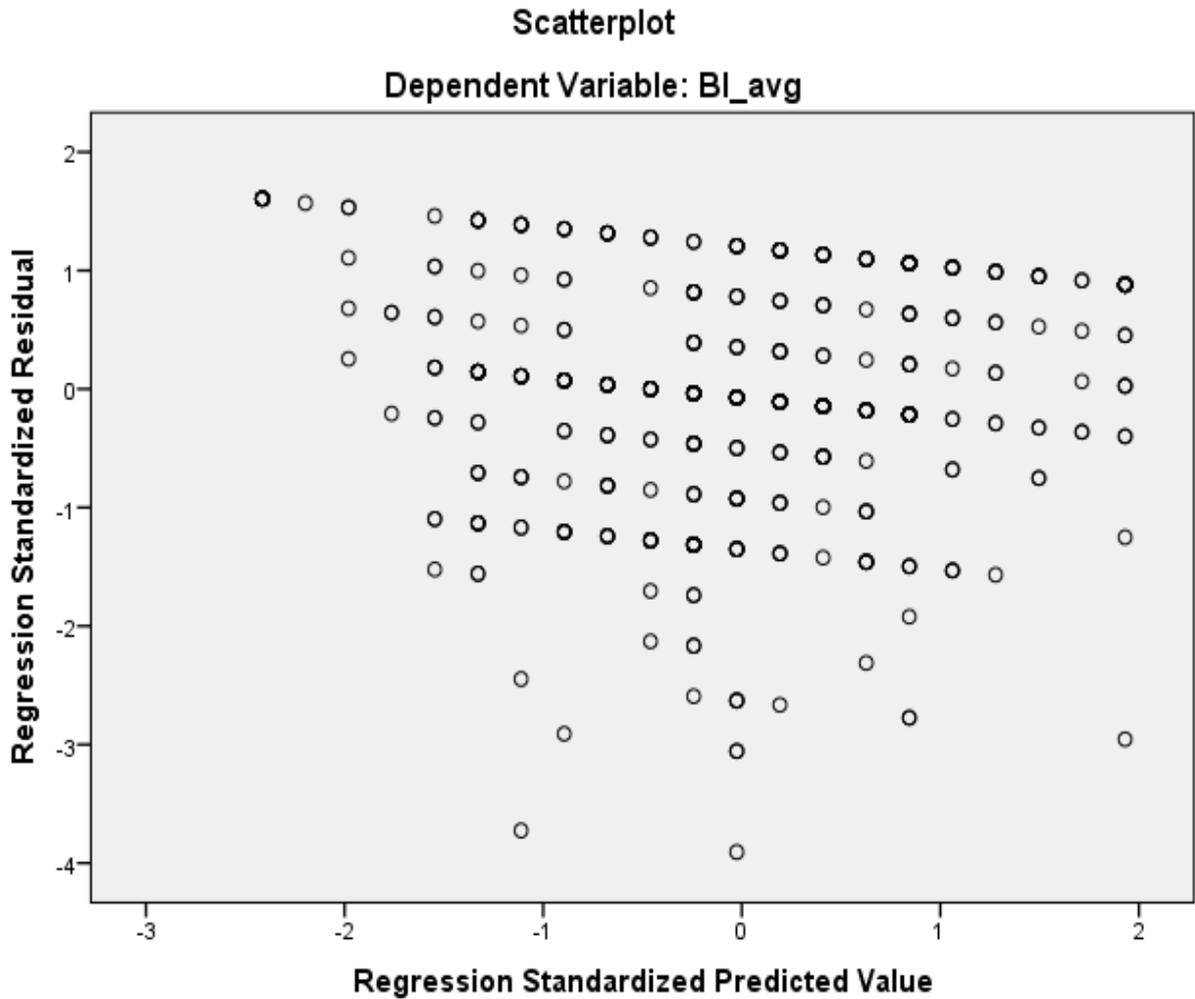
Figure 4.7: Scatter Plot for Perceived Value

It can be observed from the Figure 4.7 that the random disturbances between the relationships of independent variable PV and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PV. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
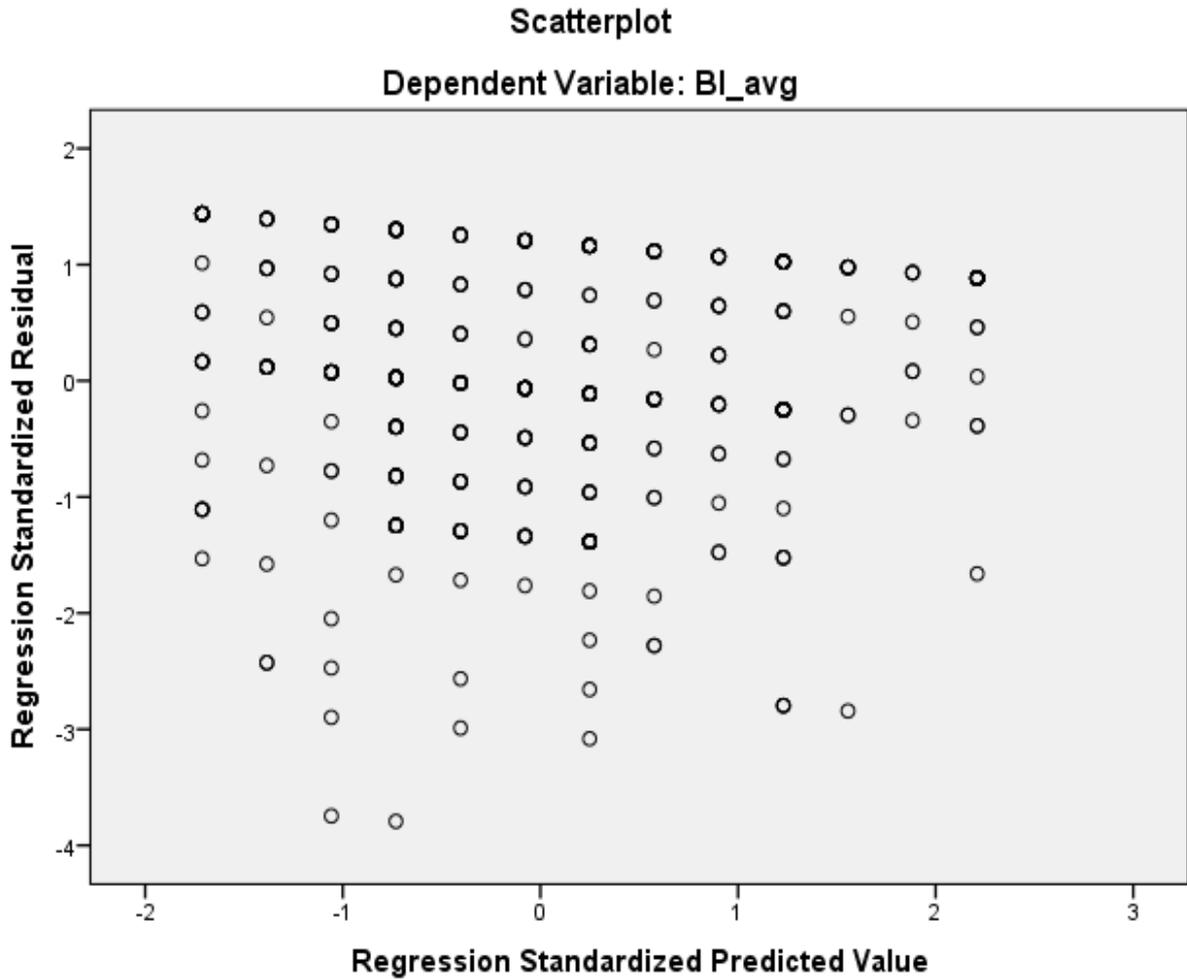
Figure 4.8: Scatter Plot for Perceived Risk

It can be seen in the Figure 4.8 that the random disturbances between the relationships of independent variable PR and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PR. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
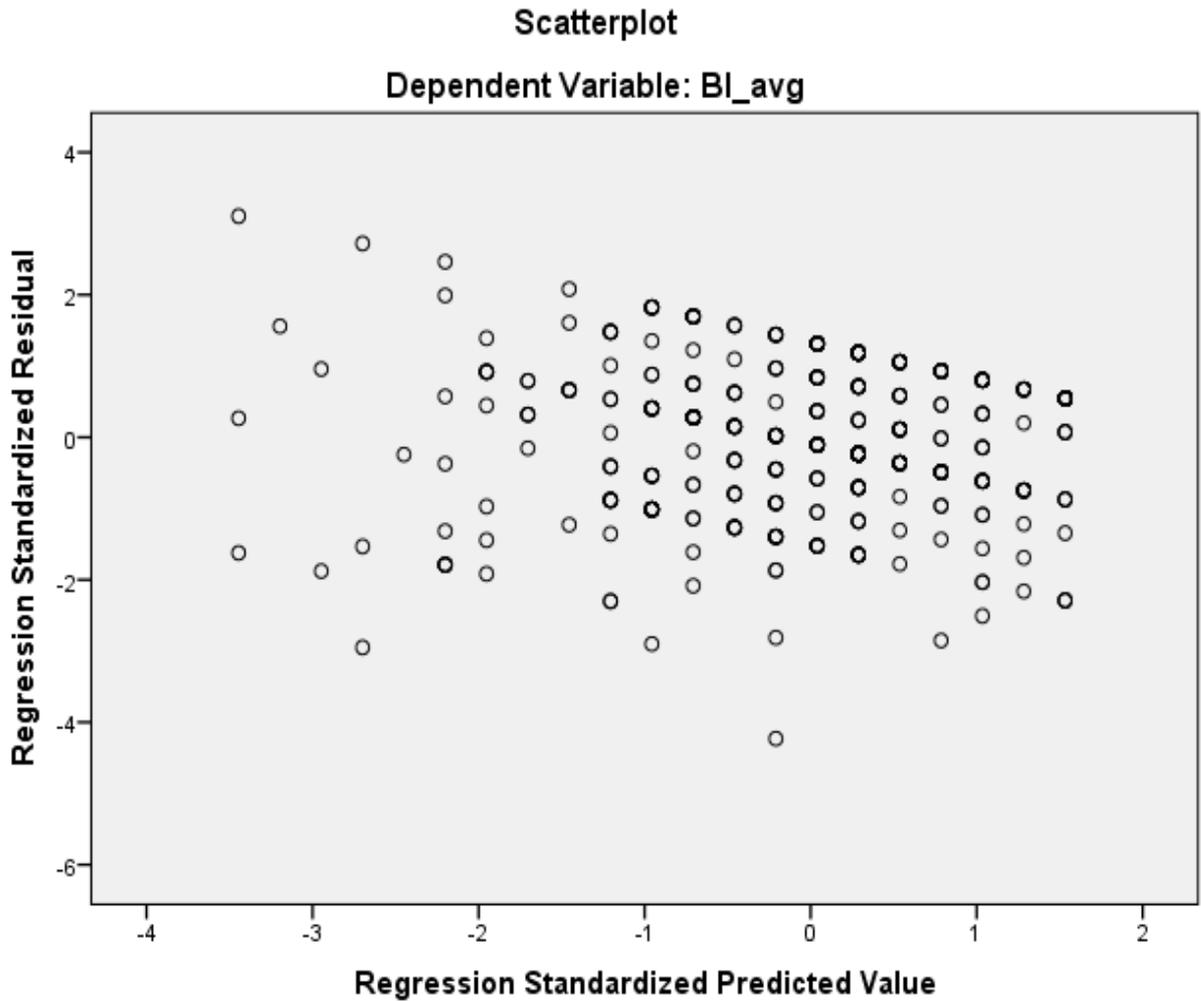
Scatterplot

Dependent Variable: BI_avg
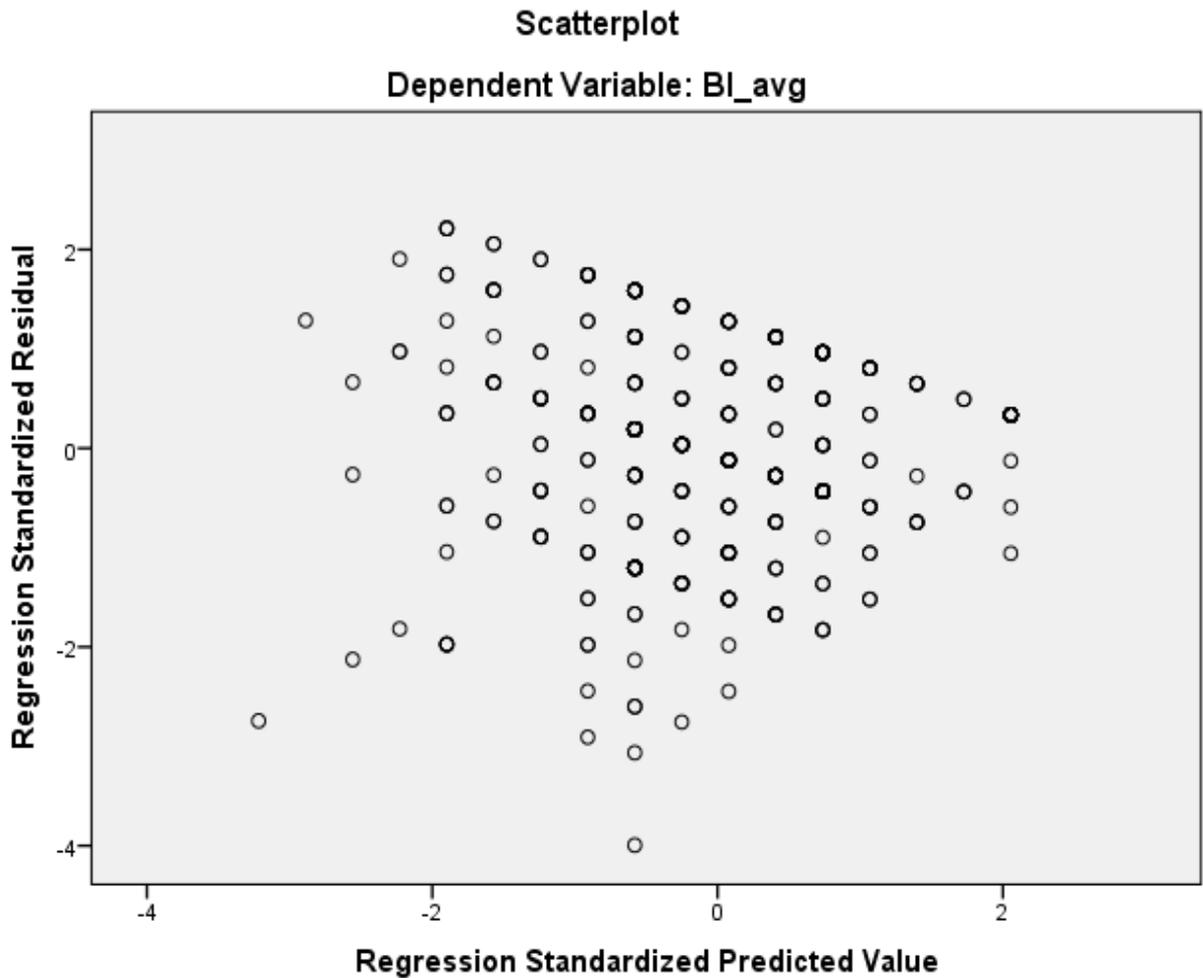
Figure 4.9: Scatter Plot for Perceived Trust

It can be seen in the Figure 4.9 that the random disturbances between the relationships of independent variable PT and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PT. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
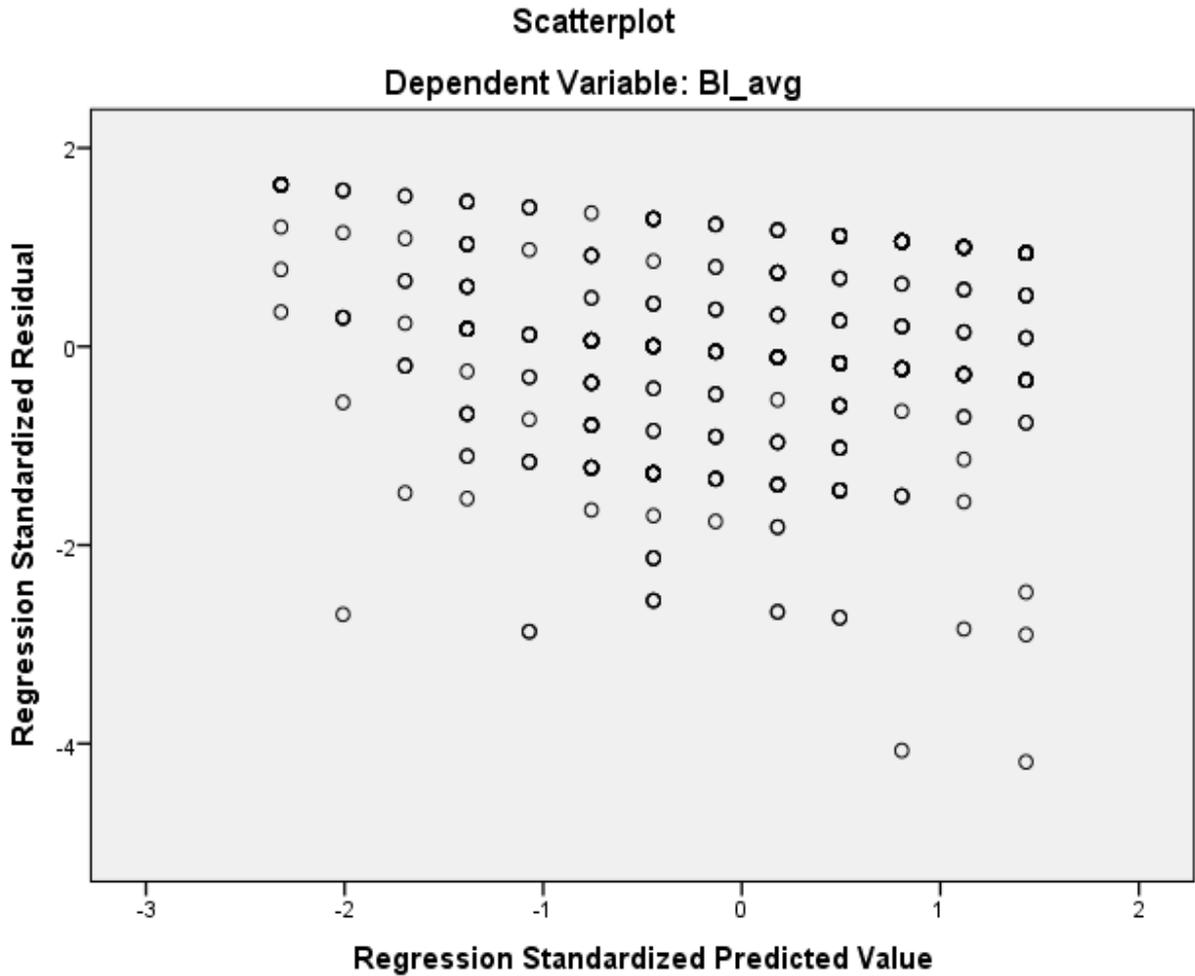
Figure 4.10: Scatter Plot for Facilitating Conditions

It can be seen in the Figure 4.10 that the random disturbances between the relationships of independent variable FC and the dependent variable Behavioural Intention are equidistant from the regression line across all values of FC. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

Scatterplot

Dependent Variable: BI_avg
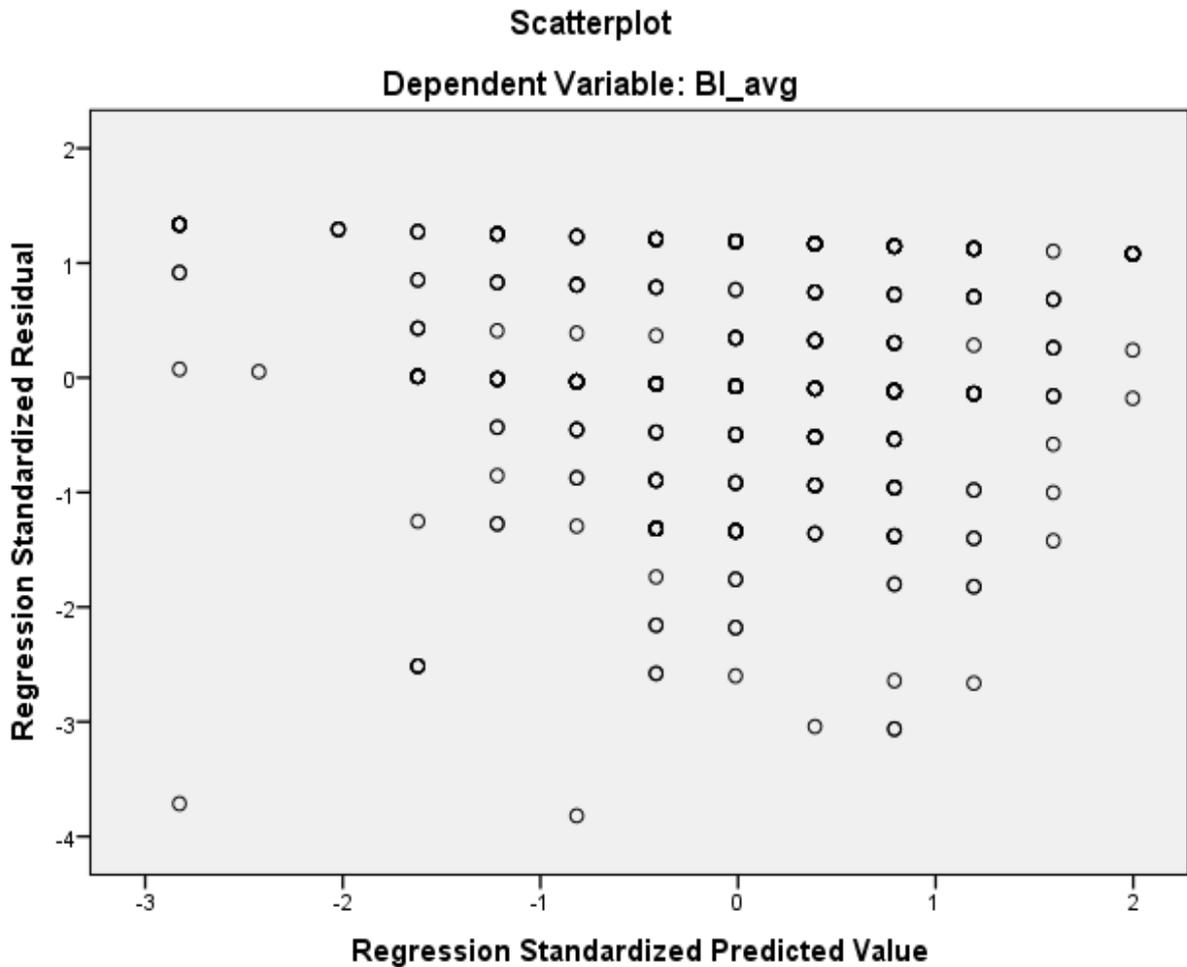
Figure 4.11: Scatter Plot for Perceived Regulatory Support

It can be seen in the Figure 4.11 that the random disturbances between the relationships of independent variable PRS and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PRS. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
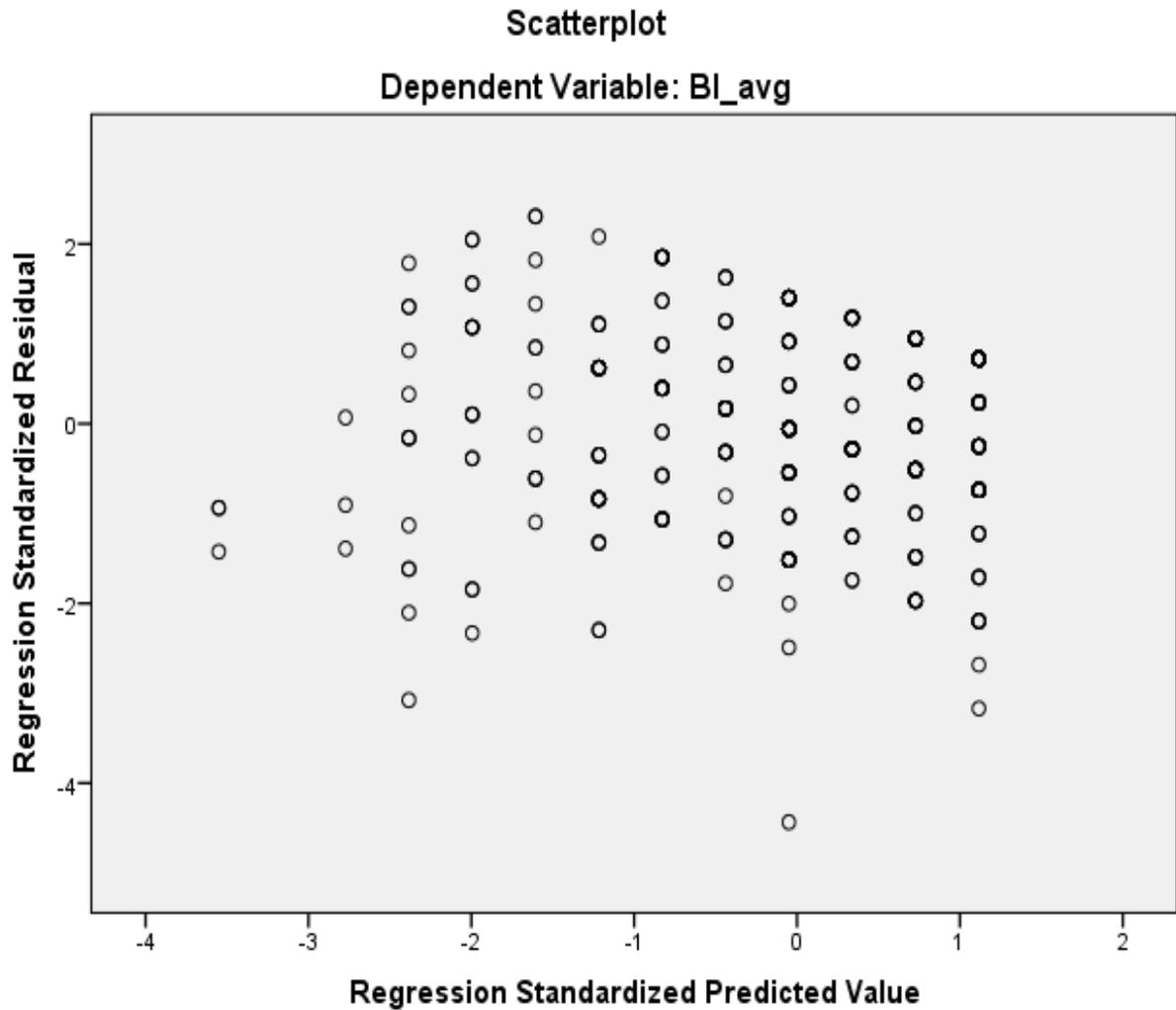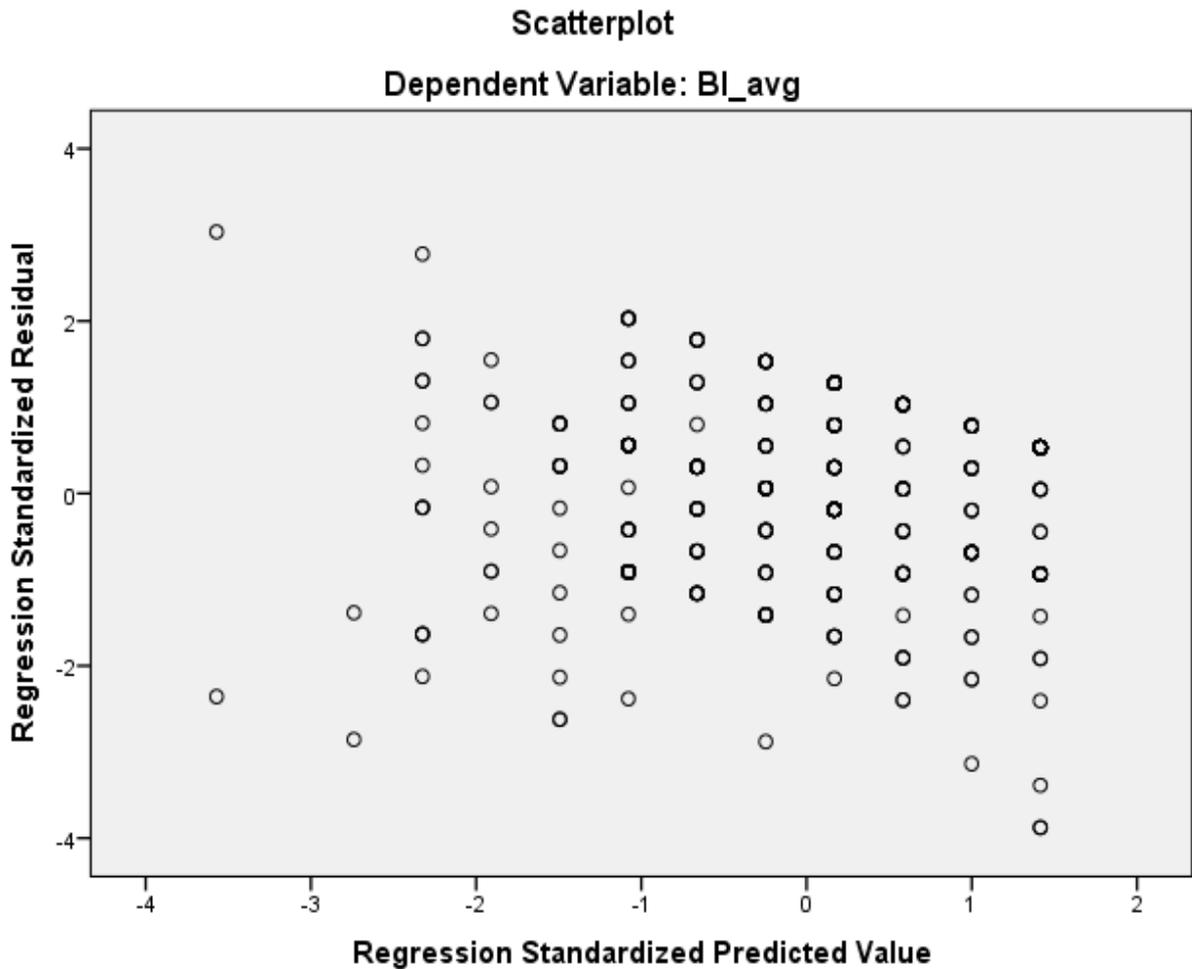
Figure 4.12: Scatter Plot for Promotional Benefits

It can be seen in the Figure 4.12 that the random disturbances between the relationships of independent variable PB and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PB. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.
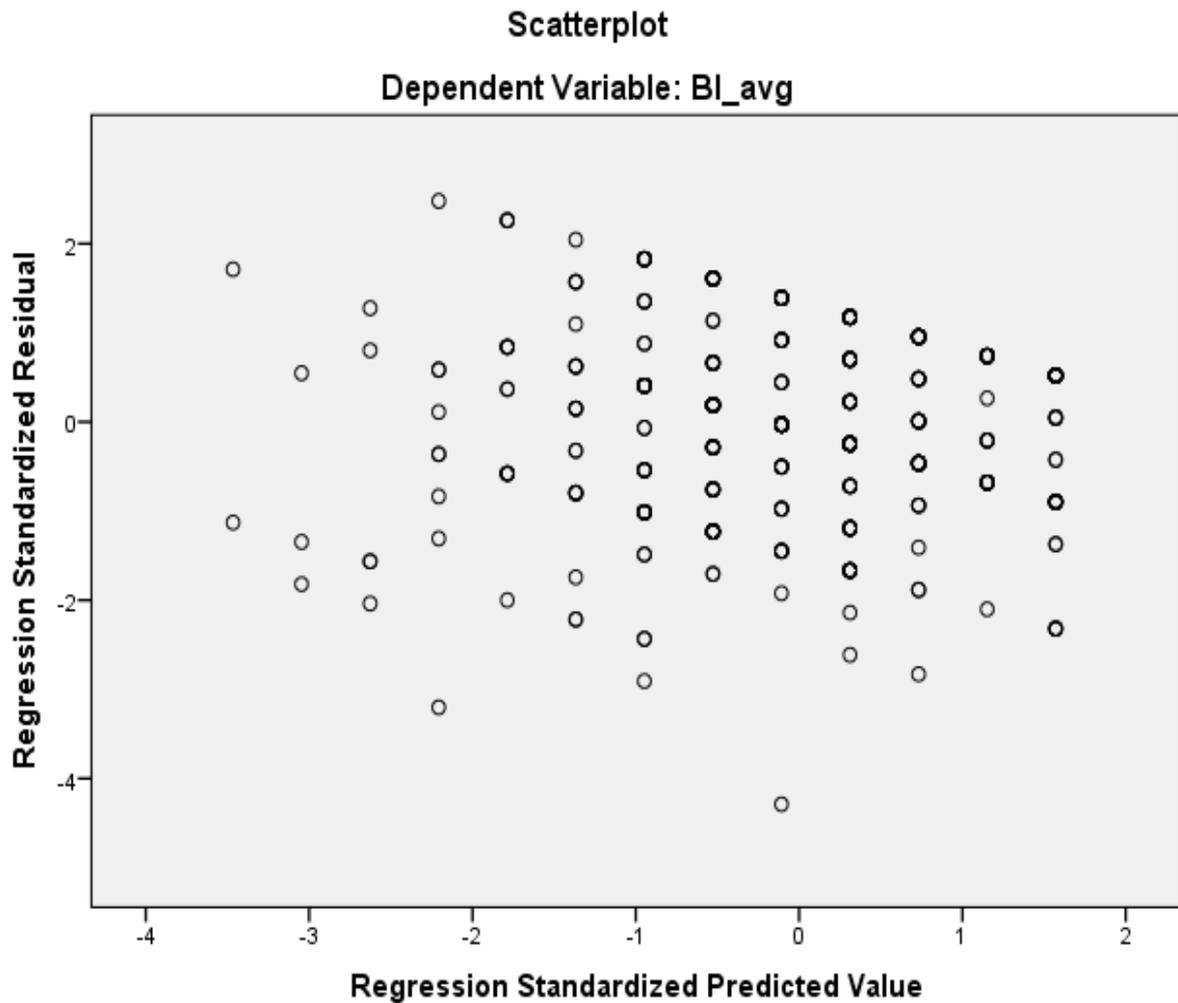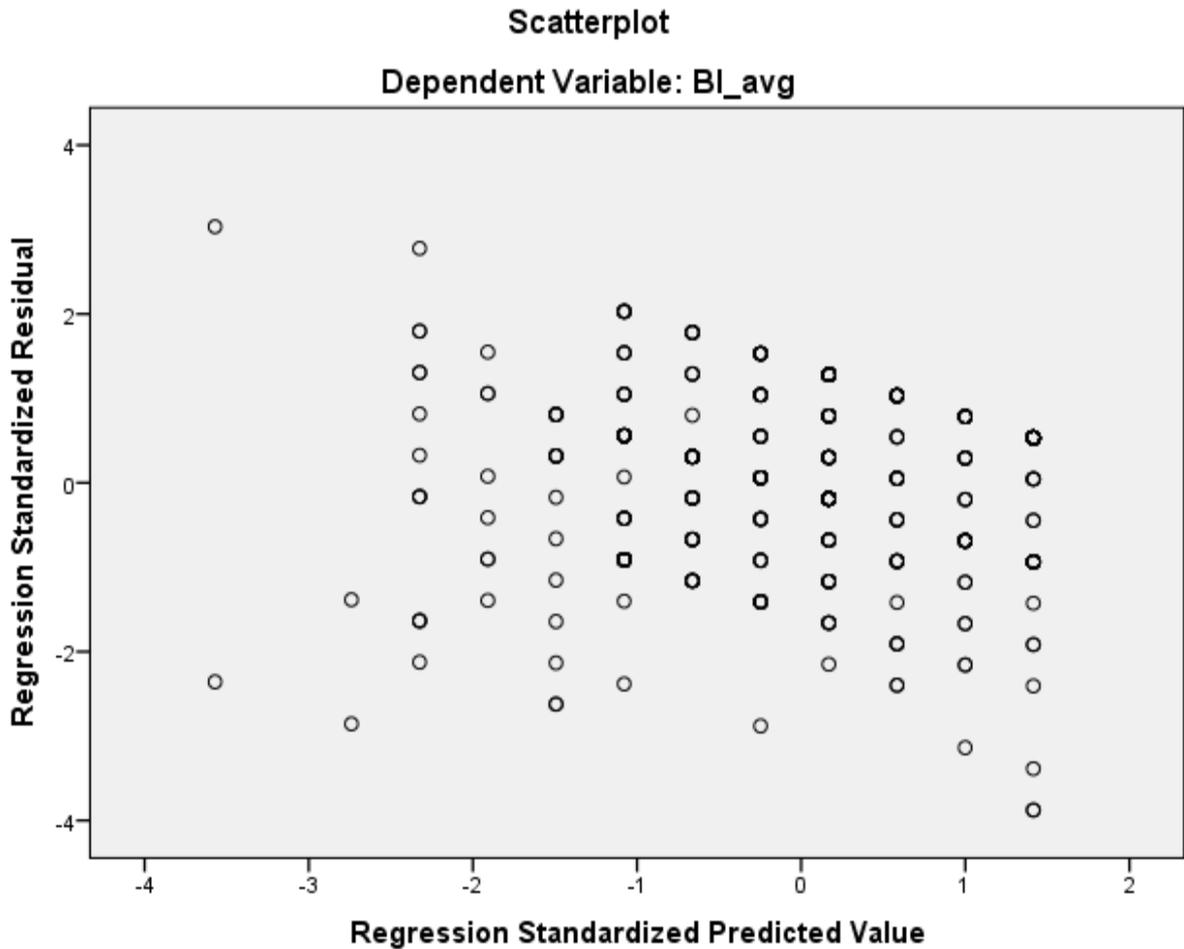
Figure 4.13: Scatter Plot for Personal Innovativeness

It can be seen in the Figure 4.13 that the random disturbances between the relationships of independent variable PI and the dependent variable Behavioural Intention are equidistant from the regression line across all values of PI. The scores obtained does not follow any systematic pattern rather are distributed in a rectangular shape. Hence, the assumption of Homoscedasticity is fulfilled.

4.7. Confirmatory Factor Analysis

In the second phase of analysis, Confirmatory Factor Analysis (CFA) was attempted using IBM SPSS AMOS, prior to which the proposed model was tested for validity concerns.

4.7.1. Convergent and Discriminant Validity

With the objective of ensuring absence of any kind of data validity concerns, the Convergent Validity along with the Discriminant Validity was tested by computing values for Average shared squared variance (ASV), Maximum shared squared variance (MSV) and Average Variance Extracted (AVE) in AMOS.

Table 4.20: Convergent and Discriminant Validity

Factors	Average Variance Extracted (AVE)	Maximum shared squared variance (MSV)	Average shared squared variance (ASV)
Perceived Usefulness	0.599	0.291	0.151
Perceived Ease of Use	0.774	0.325	0.159
Perceived Enjoyment	0.668	0.426	0.183
Variety of Services	0.604	0.426	0.194
Perceived Critical Mass	0.645	0.296	0.123
Perceived Value	0.600	0.434	0.067
Perceived Risk	0.754	0.309	0.062
Perceived Trust	0.604	0.287	0.148
Facilitating Conditions	0.700	0.434	0.066
Perceived Regulatory Support	0.518	0.309	0.049
Promotional Benefits	0.720	0.316	0.160
Personal Innovativeness	0.672	0.424	0.155
Behavioural Intention	0.788	0.684	0.235
Actual Usage	0.707	0.684	0.248

As can be observed in the Table 4.20, the AVE values, in the case of all variables, are exceeding the threshold value of 0.5 and lie in the range of 0.518 to 0.788, thereby, supporting the model's convergent validity (Fornell and Larcker, 1981; Hair et al., 2006). Further, the Discriminant Validity was tested by computing values of ASV, MSV and AVE. The observed value of AVE for each variable depicted in the Table 5.20 are higher compared to the respective values of MSV and ASV, thereby ensuring that there were no validity concerns (Hair et al., 2006).

4.7.2. Measurement Model

Once it was established that there were no validity and reliability concerns, the measurement model was used to conduct CFA in AMOS. The model fit was checked against the values of five commonly used goodness-of-fit measures, namely, normalized fit index (NFI), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), comparative fit index (CFI), and chi-square to degrees-of-freedom (X^2/d.f.). Figure 4.14 represents the Measurement Model derived from the data collected.
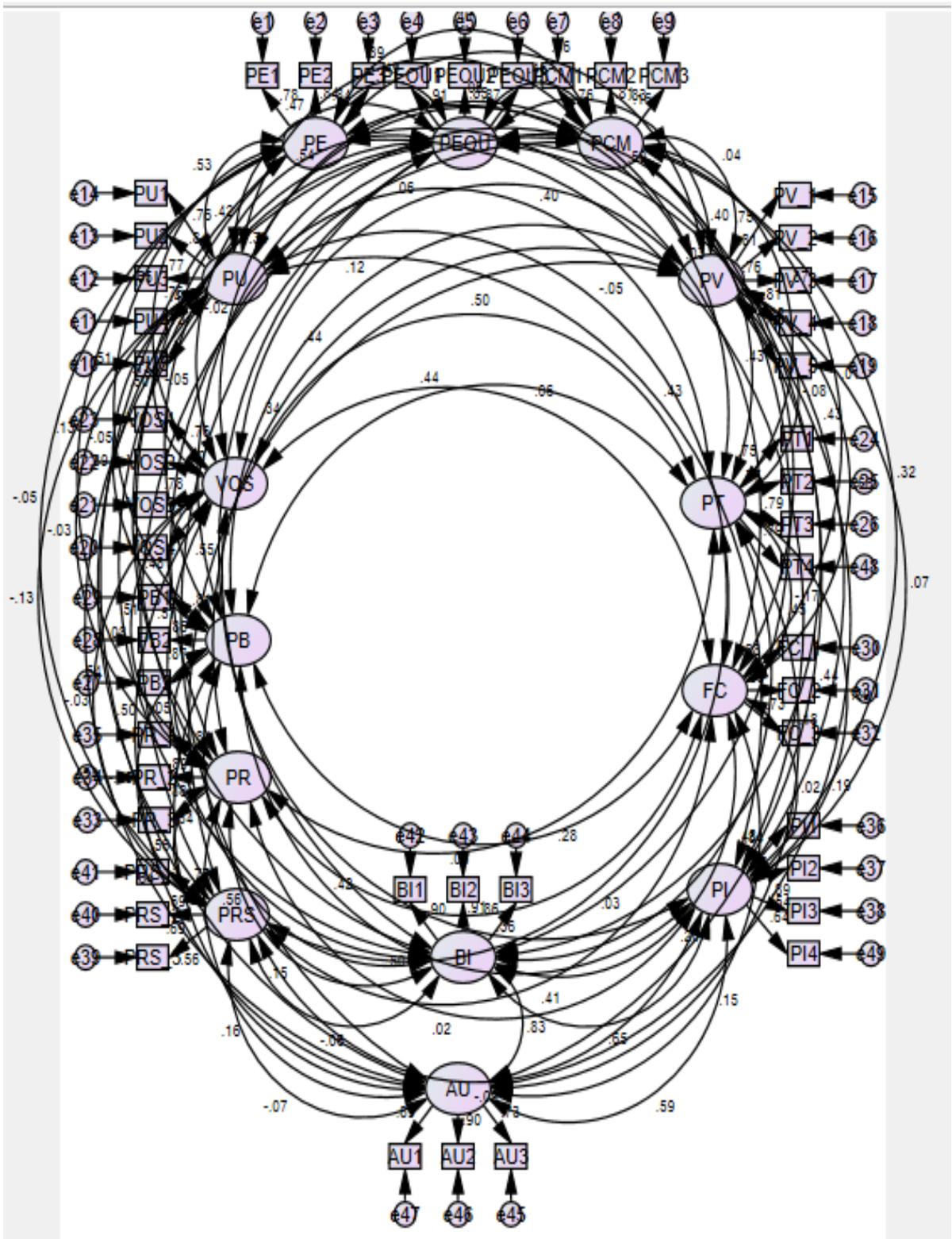
Figure 4.14: Measurement Model

The value close to 0.9 or more for GFI is commonly accepted to represent a good enough model fit (Baumgartner and Hombur, 1996). Similarly a value equal to 0.9 or more for the CFI and the NFI are accepted to display a good fit (Hu and Bentler, 1999).Further the value for X^2/d.f should not exceed the threshold value of three (Carmines and McIver, 1981; Ullman, 2001; Schumacker and Lomax, 2004) and RMSEA should not surpass 0.10 in value (Hu and Bentler, 1999; Hair et al., 2006), for a model having a good fit.

Table 4.21: Overall fit indices for Measurement Model

Model Elements	Values
C-Min	2017.527
Degrees of freedom (d.f.)	1036
C-Min / d.f.	1.947
Root Mean Square Error of Approximation (RMSEA)	.043
Comparative Fit Index (CFI)	.940
Normalised Fit Index (NFI)	.885
Goodness-of-fit Index (GFI)	.860

Table 4.21 depicts the values of five measures of goodness-of-fit generated to test the overall fit of the measurement model in AMOS. The value for GFI, NFI and CFI is 0.860, 0.885 and 0.940, respectively. All the three values are either exceeding or are nearing the threshold value of 0.90, representing a reasonably good model fit. Further the value for X^2/d.f, represented by C-Min/d.f. is shown to be 1.947 in the table, which is less than the commonly accepted maximum value of 3, again depicting a good model fit. Finally, the fifth measure of goodness-of-fit, RMSE is also less than the threshold value 0.10. Hence, the measurement model was concluded to have a good enough model fit confirming the factor analysis.

4.8. Structural Model

After the completion of second phase of analysing primary data with CFA, the research hypotheses were tested by generating a structural model using AMOS.

Table 4.22: Structural Results

Hypotheses	Standardized Regression Weights	*p*-value	Remarks
H1(PU→BI)	0.13	<.001	Supported
H2 (PEOU→BI)	0.15	<.001	Supported
H3 (PE→BI)	0.02	.467	Not Supported
H4 (VOS→BI)	0.18	<.001	Supported
H5 (PCM→BI)	0.12	<.001	Supported
H6 (PV→BI)	0.02	.518	Not Supported
H7 (PR→BI)	0.25	<.001	Supported
H8 (PT→BI)	0.20	<.001	Supported
H9 (FC→BI)	0.33	<.001	Supported
H10 (PRS→BI)	0.71	<.001	Supported
H11 (PB→BI)	0.17	<.001	Supported
H12 (PI→BI)	0.42	<.001	Supported
H13 (BI→AU)	0.82	<.001	Supported

The standardised regression weight and the p-value for each proposed relationship depicted in the Table 4.15 are less than 0.001 except for H3 (PE→BI) and H6 (PV→BI). A value less than the level of significance of 0.05 shows that alternate hypothesis is accepted for the population, hence supporting *H1, H2, H4, H5, H7, H8, H9, H10, H11, H12* and *H13*. Since the *p*-value for H3 (PE→BI) and H6 (PV→BI) is 0.467 and 0.518, respectively, which are more that the level of significance of 0.05, null hypotheses will be accepted in this case. Hence, alternate hypotheses *H3 and H6* will be rejected. It can be concluded from the structural results that there exists a significant relationship of variables

PU, PEOU, VOS, PCM, PR, PT, FC, PRS, PB and PI with BI as well as of BI with AU. However, the relationship of PE and PV with BI is not statistically significant.
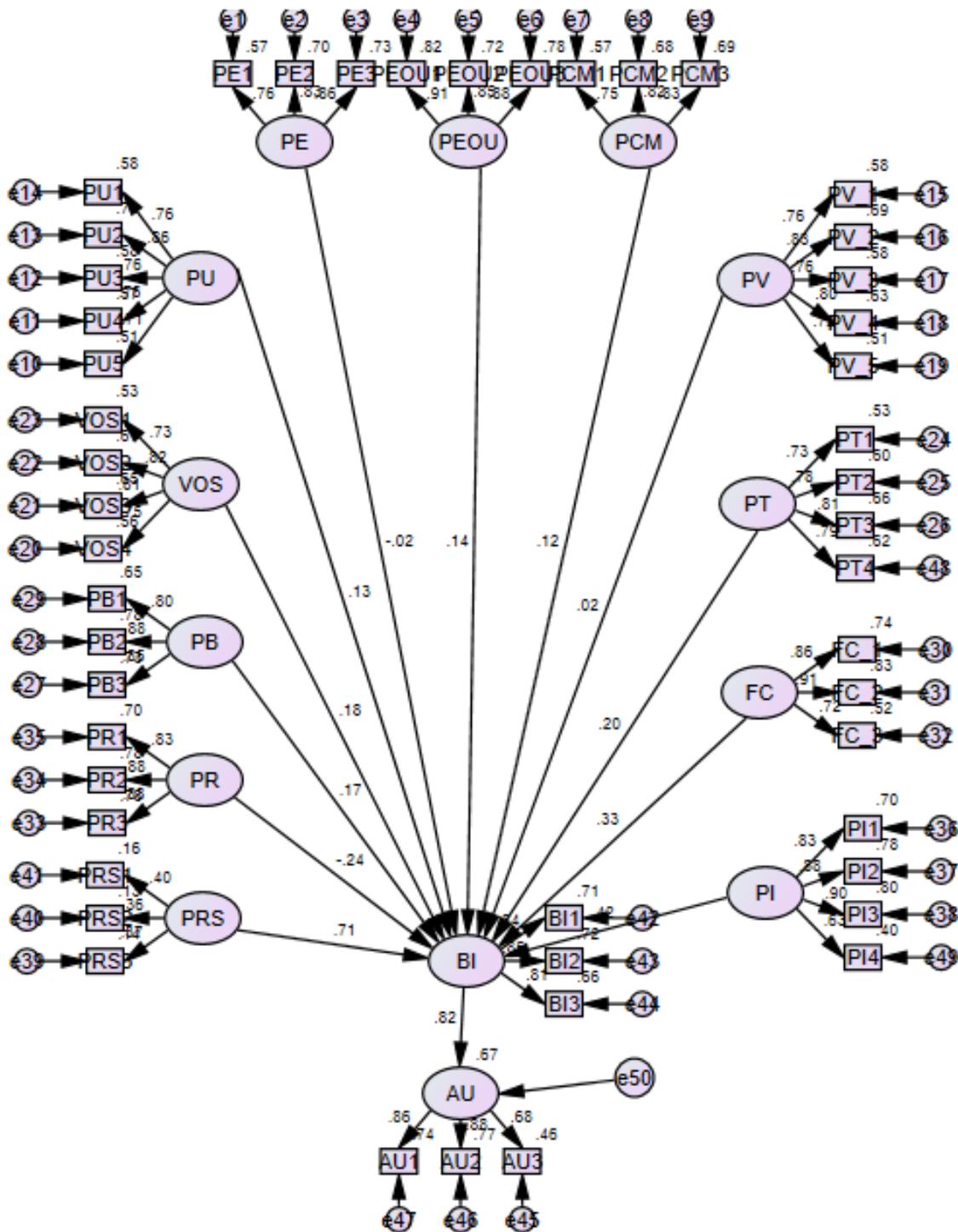
Figure 4.15: Structural Model

Moreover, the standardised regression weight for PRS is maximum (0.71), making it the strongest predictor of consumers' Behavioral Intention towards adoption of mobile commerce, followed by PI (0.41), FC (0.33), PR (0.25), PT (0.20), VOS (0.18), PB (0.17), PEOU (0.15), PU (0.13) and PCM (0.12). The structural model along with the standardised regression weights for each variable is represented in the Figure 4.15.

4.9. Common Method Biasness (CMB)

Since a common method was used to measure all the items of all the variables, Common Method Biasness (CMB) was checked using Common Latent Factor (CLF) method in AMOS and the squared variance came out to be 21.16%. CMB value less than 50% is accepted widely to ensure that there is no major issue of biasness in data collected due to usage of a common method (Eichhorn, 2014). Hence it can be concluded that there was no serious issue of CMB with the data collected for this study.

4.10. Moderating Effect

Since the survey was completed by respondents belonging to different demographic profiles in terms of their age, gender, and household income, it was considered necessary to analyse the extent to which these demographics moderates the influence of independent variables on the dependent variable. With this objective, the study utilised the technique of Multi-group analysis under SEM to investigate existence of any group differences in the results caused by the presence of the moderating effect of the above mentioned three factors. The responses were bifurcated into sub-groups on the basis of the respondents' age, their gender and their annual household income. The results of the analysis confirmed that there were group differences in the results for each subgroup.

4.10.1. Age

According to the age groups, two sub-groups of the respondents were created. The first sub-group represented the data collected from respondents having an age of 25 years or below. The second sub-group included responses of respondents who were having an age between 26 years to 40 years and the third sub-group represents the data collected from the respondents having age of 40 years or above.

Table 4.23: *p*-values for different Age groups

Proposed Hypotheses	25 years or Below		26-40 Years		40 Years and Above	
	Standardised Estimate	*p*-value	Standardised Estimate	*p*-value	Standardised Estimate	*p*-value
H1 (BI←PU)	.095	.065	.045	.825	.047	<.001
H2 (BI←PEOU)	.057	.686	.037	.001	.033	<.001
H3 (BI←PE)	.077	.901	.040	.058	.042	.238
H4 (BI←VOS)	.078	.546	.049	<.001	.053	<.001
H5(BI←PCM)	.069	.032	.072	<.001	.045	.882
H6 (BI←PV)	.047	.458	.037	.628	.044	.003
H7 (BI←PR)	.042	.012	.028	<.001	.035	<.001
H8 (BI←PT)	.071	.027	.045	<.001	.052	<.001
H9 (BI←FC)	.040	<.001	.030	<.001	.039	<.001
H10 (BI←PRS)	.413	<.001	.159	<.001	.077	<.001
H11 (BI←PB)	.072	<.001	.042	.012	.036	.751
H12 (BI←PI)	.066	<.001	.046	<.001	.034	<.001
H13 (AU←BI)	.077	<.001	.084	<.001	.132	<.001

The *p*-values observed across the three categories of age for each of the proposed relationships are shown in the Table 4.23 and establishes that Perceived Enjoyment is insignificant in determining Behaviour Intention across all the age groups. Hence, before proceeding with the analysis, PE can be trimmed off from the model. In the next step, chi-square differences were analysed and the model was reported to differ across agecategories, thereby, supporting hypothesis *H14a* and *H14b*. However, it was considered essential to conduct a path by path analysis to further analyse the effect of age on each path.

Table 4.24: Chi-square Thresholds to check path by path differences along different Age groups

<u>**Chi-square Thresholds**</u>		**Df**	***p*-value**
90% Confidence	7323.32	3349	
Difference	2.71	1	0.100
95% Confidence	7324.46	3349	
Difference	3.84	1	0.050
99% Confidence	7327.25	3349	
Difference	6.63	1	0.010

Table 4.24 shows the threshold values of chi-square to conduct path analysis and the result of path-by-path analysis conducted for difference in age groups is presented in the Table 4.25.

Table 4.25: Path by Path Analysis to check Moderating Effect of Age

Proposed Relationship	Chi-square	Result
H1 (BI←PU)	7336.166	99% confidence
H2 (BI←PEOU)	7327.627	99% confidence
H4 (BI←VOS)	7327.211	95% confidence
H5(BI←PCM)	7331.879	99% confidence
H6 (BI←PV)	7324.073	90% confidence
H7 (BI←PR)	7320.946	No Difference
H8 (BI←PT)	7322.032	No Difference
H9 (BI←FC)	7321.680	No Difference
H10 (BI←PRS)	7338.095	99% confidence
H11 (BI←PB)	7327.749	99% confidence
H12 (BI←PI)	7330.812	99% confidence
H13 (AU←BI)	7332.867	99% confidence

It is seen in Table 4.25, that age moderates the relationship of independent variables including Facilitating Conditions, Perceived Ease of Use, Promotional Benefits, Perceived Critical Mass, Perceived Value, Perceived Risk, Personal Innovativeness, Perceived Usefulness, Perceived Trust, and Perceived Regulatory Support with the Behaviour Intention towards mobile commerce adoption with a confidence interval of 99%. Age moderates the relationship of Variety of Services with Behaviour Intention with a confidence interval of 95%. Further, variables such as PR, PT, FC, PRS, and PI were significant in determining consumers' BI across all age groups. However for consumers having age of 25 years and below, PU, PEOU, PE, VOS, and PV were not found to be significantly influencing their BI. In case of consumers with age between 26-40 years, PU, PE and PV were found insignificant in determining their BI. In case of consumers having age of 40 years or above, PE, PCM and PB were insignificant factors in determining their BI.

4.10.2. Gender

To analyse group differences with respect to gender, the respondents were categorised into two sub-groups of Males and Females. Due to few responses received from the third gender, the category of Transgender was not considered for this phase of analysis. The *p*-values observed across different Gender groups against the proposed relationships are presented in the Table 4.26.

Table 4.26: *p*-values for different Gender groups

Proposed Hypotheses	Males		Females	
	Standardised Estimate	*p*-value	Standardised Estimate	*p*-value
H1 (BI←PU)	.069	.014	.055	<.001
H2 (BI←PEOU)	.023	<.001	.041	<.001
H3(BI←PE)	.028	<.001	.058	.090
H4 (BI←VOS)	.034	<.001	.056	.005
H5(BI←PCM)	.040	<.001	.059	.332
H6 (BI←PV)	.021	.336	.047	.705
H7 (BI←PR)	.018	.404	.039	<.001
H8 (BI←PT)	.037	<.001	.059	.098
H9 (BI←FC)	.023	<.001	.035	<.001
H10 (BI←PRS)	.037	<.001	.421	<.001
H11 (BI←PB)	.029	<.001	.048	.053
H12 (BI←PI)	.035	<.001	.048	<.001
H13 (AU←BI)	.103	<.001	.074	<.001

It can be observed in Table 4.26, Perceived Value is an insignificant factor in determining Behavioural Intention to adopt mobile commerce across Gender. Hence, for proceeding with the analysis, PV can be trimmed off from the model. Further, chi-square differences were analysed and the gender categories were not observed to differ at the model level, thereby supporting Hypotheses *H15a* and *H15b*. However, it was essential to conduct path-by-path analysis to identify differences at the path level.

Table 4.27: Chi-square Thresholds to check path by path differences along Gender groups

Chi-square Thresholds		df	*p*-value
90% Confidence	5586.64	2233	
Difference	2.71	1	0.100
95% Confidence	5587.78	2233	
Difference	3.84	1	0.050
99% Confidence	5590.57	2233	
Difference	6.63	1	0.010

Table 4.27 shows the threshold values of chi-square to conduct path analysis and the outcome of path-by-path analysis is presented in Table 4.28.

Table 4.28: Path by Path Analysis to check Moderating Effect of Gender

Proposed Relationship	Chi-square	Result
H1 (BI←PU)	5586.046	No Difference
H2 (BI←PEOU)	5584.014	No Difference
H3(BI←PE)	5589.708	95% confidence
H4 (BI←VOS)	5584.045	No Difference
H5(BI←PCM)	5594.352	99% confidence
H7 (BI←PR)	5650.897	99% confidence
H8 (BI←PT)	5588.253	95% confidence
H9 (BI←FC)	5583.968	No Difference
H10 (BI←PRS)	5604.938	99% confidence
H11 (BI←PB)	5584.935	No Difference
H12 (BI←PI)	5584.471	No Difference
H13 (AU←BI)	5591.601	99% confidence

The Table 4.28 shows that gender moderates the effect of independent variable including Perceived Enjoyment, and Perceived Trust on Behaviour Intention with 95% of confidence interval. Whereas, it moderates the effect of Perceived Critical Mass, Perceived Risk and Perceived Regulatory Support on Behaviour Intention as well as of BI with Actual Use

with 95% of confidence interval. However, the effect of Facilitating Conditions, Perceived Usefulness, Variety of Services, Perceived Ease of Use, Personal Innovativeness, and Promotional Benefits on Behavioural Intention was not moderated by gender. Further, factors such as PE, PEOU, VOS, FC, PRS and PI were significant in determining consumers' BI across gender groups. However for Male consumers, PV and PR were not found to be significantly influencing their BI and in case of Female consumers, PV, PCM, PT, and PB were found to be insignificant in determining their BI.

4.10.3. Income

Finally to analyse the group differences across different levels of household income, the respondents were categorised into four sub-groups as per their household income levels. The first sub-group included responses received from respondents having household income of Rs. 300,000 p.a. or less. The second sub-group included respondents with household income between Rs. 300,000 p.a. and Rs. 550,000 p.a. Respondents with household income within Rs.550, 000 p.a. to Rs. 10, 00,000 p.a. were included in the third sub-group. Finally the fourth sub-group represented the data collected from respondents with household income of Rs. 10, 00,000 p.a. or more. The *p*-values observed across different categories of annual household income against the proposed relationships are presented in the Table 4.29.

Table 4.29: *p*-values for different Income groups

Proposed Hypotheses	3,00,000 or less		3,00,000-5,50,000		5,50,000-10,00,000		10,00,000 or more	
	Standardised Estimate	*p*-value	Standardised Estimate	*p*-value	Standardised Estimate	*p*-value	Standardised Estimates	*p*-value
H1 (BI←PU)	.057	.005	.051	.003	.064	.605	.060	.309
H2 (BI←PEOU)	.042	.662	.046	<.001	.045	.036	.042	<.001
H3 (BI←PE)	.074	.003	.043	.022	.065	.031	.051	.961
H4 (BI←VOS)	.069	<.001	.062	<.001	.065	.827	.067	.013
H5 (BI←PCM)	.076	.321	.078	<.001	.062	.476	.063	<.001
H6 (BI←PV)	.051	.295	.056	.017	.037	.880	.046	.171
H7 (BI←PR)	.051	<.001	.043	<.001	.033	<.001	.037	<.001
H8 (BI←PT)	.095	<.001	.052	.439	.057	.312	.057	<.001
H9 (BI←FC)	.068	<.001	.038	<.001	.032	<.001	.040	<.001
H10 (BI←PRS)	.055	.141	.131	<.001	.173	<.001	.317	<.001
H11 (BI←PB)	.063	.366	.050	.008	.054	<.001	.051	.748
H12 (BI←PI)	.062	<.001	.048	<.001	.054	<.001	.049	<.001
H13 (AU←BI)	.113	<.001	.142	<.001	.082	<.001	.097	<.001

From Table 4.29, it can be observed that all the factors influence Behavioural Intention to adopt mobile commerce across all categories of annual household income in a significant way. Hence, there is no need for trimming off any relationship from the model prior to further analysis. The chi-square differences are analysed and the four sub-groups were

reported to differ at the model level, thereby supporting hypotheses **H16a** and **H16b**. However, further path-by-path analysis is required to identify differences for each path.

Table 4.30: Chi-square Thresholds to check path by path differences along Income groups

Chi-square Thresholds		df	*p*-value
90% Confidence	9145.77	4461	
Difference	2.71	1	0.100
95% Confidence	9146.91	4461	
Difference	3.84	1	0.050
99% Confidence	9149.70	4461	
Difference	6.63	1	0.010

Table 4.30 shows the chi-square threshold for conducting path analysis across different categories of annual household income and Table 4.31 presents the outcome of path-by-path analysis.

Table 4.31: Path by Path Analysis to check Moderating Effect of Annual Household Income

Proposed Relationship	Chi-square	Result
H1 (BI←PU)	9159.423	99% confidence
H2 (BI←PEOU)	9160.312	99% confidence
H3 (BI←PE)	9159.607	99% confidence
H4 (BI←VOS)	9168.123	99% confidence
H5 (BI←PCM)	9163.204	99% confidence
H6 (BI←PV)	9200.059	99% confidence
H7 (BI←PR)	9192.448	99% confidence
H8 (BI←PT)	9170.331	99% confidence
H9 (BI←FC)	9163.731	99% confidence
H10 (BI←PRS)	9193.479	99% confidence
H11 (BI←PB)	9192.253	99% confidence
H12 (BI←PI)	9163.145	99% confidence
H13 (AU←BI)	9201.142	99% confidence

It can be seen in the Table 4.31, respondents' household income per annum moderates the relationship of all the independent variable with Behaviour Intention towards mobile commerce adoption, as well as the relationship of BI with Actual Usage, with a confidence interval of 99%. Further, factors such as PR, FC, and PI were significant in determining consumers' BI across all income groups. However for consumers in the income group of Rs. 3,00,000 or less, PEOU, PCM, PV, PRS and PB were not found to be significantly influencing their BI. In case of consumers having Rs 3,00,000 to Rs. 5,50,000 of an annual household income, PT was found to be insignificant in determining their BI. In case of consumers with Rs. 5,50,000 to Rs. 10,00,000 of annual household income, PU, VOS, PCM, PV and PT were insignificant factors in determining their BI. Finally for consumers having Rs. 10,00,000 or more as their annual household income, PU, PE, PV and PB were insignificant factors.

4.11. Artificial Neural Network Analysis

In the third and the final phase of analysis an *Artificial Neural Network (ANN)* model is developed in *SPSS*. The training of the ANN was done using the multilayer perceptron (*MLP*) training algorithm and the trained network's accuracy was tested through Root mean square error (*RMSE*). From the total data collected, 70% was utilised for the training of ANN, and remaining 30% for testing the predictive accuracy of the trained model.

4.11.1. Root Mean Square Extracted (RMSE) for ANN

The average cross-validated RMSE for the testing as well as training model was obtained through a10-fold cross validation algorithm (Chong, 2013; Wang and Elhag, 2007). Independent variables such as PU, PEOU, PE, VOS, PCM, PV, PR, PT, FC, PRS, PB and PI were used as input variables predicting the output variable Behavioural Intention

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towards mobile commerce adoption (Chong, 2013). The RMSE values for the testing and training model are shown in the Table 4.32.

Table 4.32: RMSE for 10 Neural Networks

Networks	Training	Testing
ANN1	.499	.641
ANN2	.488	.646
ANN3	.390	.639
ANN4	.505	.626
ANN5	.618	.772
ANN6	.417	.671
ANN7	.424	.646
ANN8	.444	.575
ANN9	.494	.756
ANN10	.357	.615
Mean	**0.4636**	**0.6587**
SD	**0.739**	**0.610**

The value of average RMSE observed from the table for the Training and Testing Model is 0.4636, and 0.6587 respectively and the value of Standard Deviation is 7.39% and 6.1% respectively.

Figure 4.16 represents an Artificial Neural Network Model with PU, PEOU, PE, PV, PT, PR, FC, PRS, PB, PCM, PI and VOS as input variables, BI as output variable and one hidden layer.
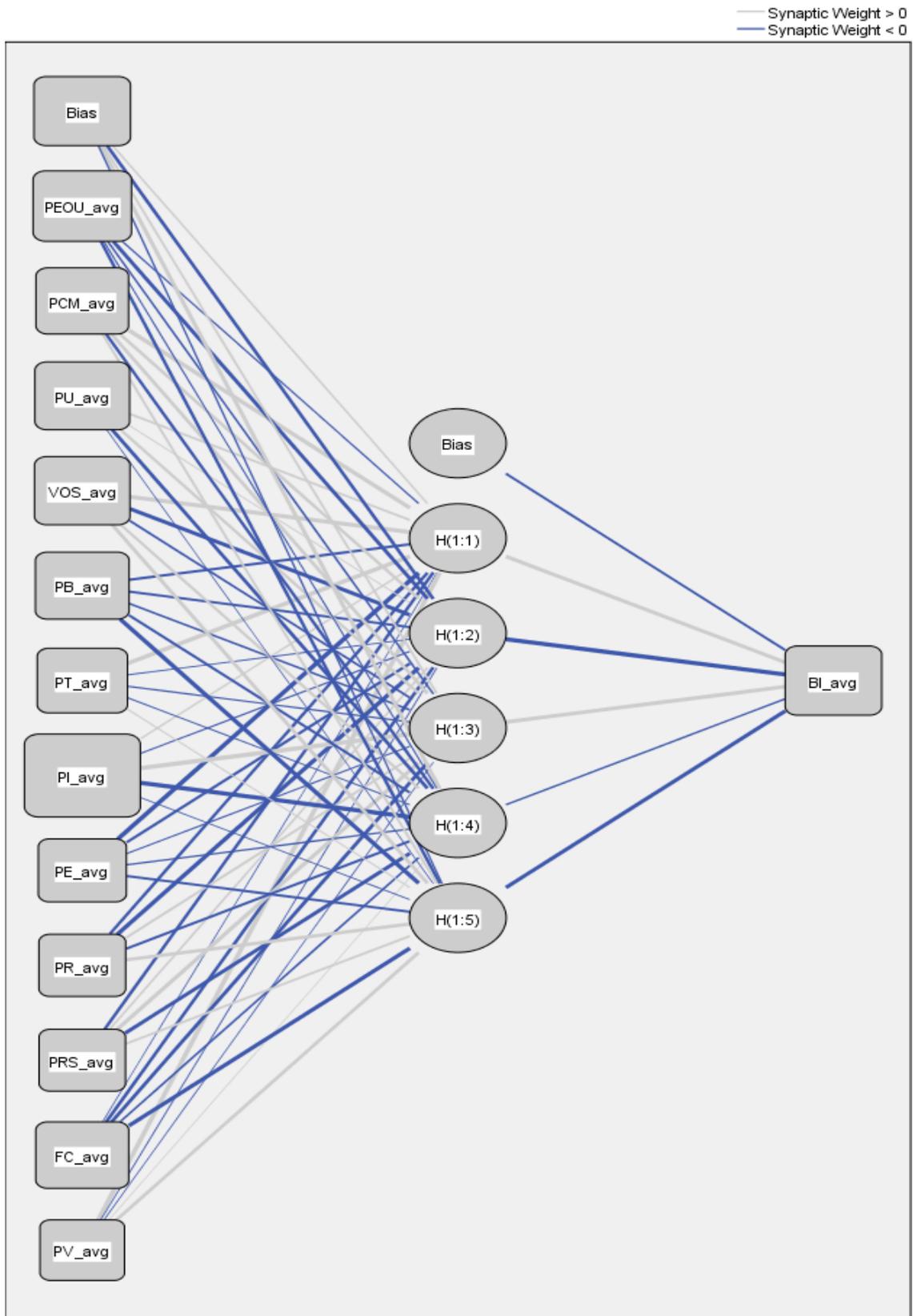
Hidden layer activation function: Hyperbolic tangent

Output layer activation function: Identity

Figure 4.16: Neural Network Diagram

4.11.2. Sensitivity Analysis

Further, the extent of variation in model predicted values in response to any movement in the values of input variables, in other words, each variable's average importance in predicting Behavioural Intention towards mobile commerce adoption is shown in the Table 4.33.

Table 4.33: Independent Variable Importance

Constructs	Importance	Normalised Importance
Perceived Usefulness (PU)	.085	73.1%
Perceived Ease of Use (PEOU)	.116	100.0%
Perceived Enjoyment (PE)	.064	54.8%
Variety of Services (VOS)	.074	63.9%
Perceived Critical Mass (PCM)	.085	72.8%
Perceived Value (PV)	.079	67.7%
Perceived Risk (PR)	.047	40.0%
Perceived Trust (PT)	.071	61.3%
Facilitating Conditions (FC)	.100	85.9%
Perceived Regulatory Support (PRS)	.064	54.6%
Promotional Benefits (PB)	.105	90.0%
Personal Innovativeness (PI)	.110	94.7%

The Table 4.33, establish PEOU as the most significant input variable predicting the output variable i.e. Behavioural Intention towards mobile commerce adoption, followed by Personal Innovativeness, Promotional Benefits, Facilitating Conditions, Perceived Usefulness, Perceived Critical Mass, Perceived Value, Variety of Services, Perceived Trust, Perceived Enjoyment, Perceived Regulatory Support and lastly Perceived Risk.

4.12. Conclusion

The research framework developed in the third chapter was further tested through a multi-staged analysis. The first stage of analysis i.e. Exploratory Factor Analysis (EFA), helped in concluding that the items included in the questionnaire to measure 12 independent and 2 dependent factors, loaded on their intended factors with a factor loading of more than 0.6. This provided a strong theoretical base for the proceeding analysis.

The second stage of Confirmatory Factor Analysis (CFA) under SEM, confirmed the research framework to have a decent model fit on the basis of some popular Goodness-of-fit measures namely, C-min/d.f., GFI, NFI, CFI and RMSEA. The structural results obtained in CFA indicated that factors such as PU (p-value-<0.001), PEOU (p-value-<0.001), VOS (p-value-<0.001), PCM (p-value-<0.001), PR (p-value-<0.001), PT (p-value-<0.001), FC (p-value-<0.001), PRS (p-value-<0.001), PB (p-value-<0.001), and PI (p-value-<0.001) impacted the consumers' BI towards mobile commerce adoption in a significant way. On the other hand, factors such as PE (p-value- 0.467) and PV (p-value-0.518) were found to as statistically insignificant in influencing mobile commerce BI. The consumers' BI was also observed significant in influencing actual usage of mobile commerce by the consumers (p-value-<0.001). Moreover, Perceived Regulatory Support (PRS) was observed most significant in determining BI towards mobile commerce adoption.

The third stage of analysis included construction of an Artificial Neural Network (ANN) in SPSS to identify more complex linear relationships among independent and dependent variables. The results indicated the RMSEA of the Training model as 0.4636 and that of Testing model as 0.6587. Further from the results of Sensitivity Analysis of input

variables, PEOU came out as the most significant factor in determining the output variable i.e. BI towards mobile commerce adoption.

For the purpose of understanding the impact of difference in respondents' demographics on the results of the study, moderating effect of factors including Age, Gender and annual household Income of the respondents on the proposed relationships was analysed. The results confirmed that age moderated all the proposed relationships except for the relationship of PR, PT and FC with BI. Further, PE was insignificant for all age groups, while PV was significant in case of respondents having an age of 40 years or above. Further suggesting that consumers, who are older in age gives more importance to the value they perceive to receive while using mobile commerce. Gender was found to moderate the relationship of PE, PCM, PR, PT and PRS with BI as well the relationship between BI and AU. PE was found to be significant in case of males only and PV was found to be in significant across gender. This indicates that enjoyment is an important criterion for males in deciding whether to adopt mobile commerce or not. The results further indicated that annual household income is one important demographic variable which moderated all the proposed relationship in the framework. PE was found to be significant for all the income groups except for the respondent with household income of Rs.10,00,000 p.a. or above, indicating enjoyment to be a less important deciding factor for individuals belonging to high income groups. PV was found to be insignificant across all income groups except for respondents in the income group of Rs. 3,00,000 p.a. to Rs. 5,50,000 p.a., indicating the importance of price value to the middle income groups of our society.

Chapter 5: Case-studies

5.1. Overview of Case Analysis of Mobile Commerce Companies

Over the last two decades, India has witnessed the emergence of many electronic and mobile commerce companies. Few of the prominent ones are Flipkart Pvt. Ltd, SnapDeal, Amazon India, Paytm, BigBasket and the like. The present chapter discusses the cases of two prominent mobile commerce companies operating in India i.e. Flipkart Pvt Ltd. and Paytm. The purpose is to identify the strategies utilised by them to ensure quick adoption of their services by the consumers and further connect it to the results of this study, providing a practical support to the findings. The rationale behind the selection of Flipkart Pvt Ltd and Paytm as the cases to be discussed is the fact that both the companies are of Indian origin capturing majority market share in their respective domain. Flipkart along with its subsidiaries Myntra and Jabong held a major market share of 39.5% in India as of March, 2018 (Variyar, March 22, 2018), making it a market leader in the Indian mobile shopping market. Paytm, on the other hand, is a market leader in the mobile payments market in India, having a user base of 120 million as of 2015 (Assocham, Dec 2016).

5.2. Flipkart Pvt. Ltd.

Flipkart Pvt. Ltd. Was launched as an online book retailing e-commerce company in October 2007, in India. The idea to sell books online was commenced by two Indian Institute of Technology (IIT), Delhi alumni, Binny Bansal and Sachin Bansal, who had worked with American e-commerce giant Amazon prior to that.

In a country of varied tastes and preferences such as India, where people have always preferred the idea of buying goods from physical shops where they can see, touch and feel

the product, starting an online store for books was definitely a risky venture. Fortunately, for Flipkart the risk of entering an unknown territory of online retailing paid off well. Starting with a simple idea of selling books online and delivering them to the doorsteps of consumers, to striking a whooping $16 billion deal with in just 11 years of commencement with the world's largest retail giant Wallmart, Flipkart has given India one of its biggest start-up success stories. An example to be quoted by aspiring entrepreneurs for many years to come.

In the initial years of its existence, like any other start-up, Flipkart resorted to venture capital funding for raising funds. In the following years, with the growth of the company, more funding came in and Flipkart did not disappoint its investors' faith and ensured outstanding performances in each passing year. Flipkart had already earned sales revenue amounting to Rupees 40 million by the financial year 2008-09, and by the next year, this figure had reached 200 million Indian rupees. It was one of the pioneering companies in the domain of online retail and thanks to it; online retail is among the top growing sectors of India today. However, the road to the success of this magnitude wasn't easy for Flipkart. Being an online start-up company in a country like India with abysmally low internet penetration and population not familiar with the concept of buying online, Flipkart had to face many challenges.

5.2.1. Flipkart: An overview

Founded in October 2007 by two IIT Delhi alumni and ex-employees of Amazon-US, Flipkart has altered the entire consumer retail industry. The co-founders of Flipkart, Binny Bansal and Sachin Bansal encountered each other at IIT Delhi in 2005. With the idea of selling books online, they launched an online book selling company Flipkart in 2007 with a capital of five lack Indian rupees brought in by them. Starting an online bookstore in

Bangaluru, India, from a two-bedroom apartment, Flipkart has grown to be among the largest online retail stores of India with the maximum market share in online and mobile shopping. Sachin Bansal and Binny Bansal have become household names gaining celebrity status within a time frame of just 11 years. They have become inspiration for the aspiring entrepreneurs of the country setting example of their great success in online retailing. As an online sales portal for books, the promise was to deliver anywhere in India on time, to the doorsteps of the buyers. With this vision, and facing all the difficulties in the path, Flipkart managed around 20 successful shipments in its very first year in the business. Slowly but firmly, Flipkart gained momentum and started receiving 100 orders per day by the next year. What played an important role in exploding flipkart business was the word-of-mouth publicity it received from its satisfied customers. To cater to the interest of its growing customer base, it launched a 24X7 customer service and by the end of 2008, it managed to deliver over 3,400 shipments successfully.

In 2009, with the experience of two years in the business and growing popularity, Flipkart attracted the attention of Accel Partners who went on to become the first Venture capitalist firm investing $1 million in Flipkart. With this huge funding at its disposal, Flipkart went on to expand its presence in India by setting up its Delhi and Mumbai offices. The same year, Flipkart hired Ambur Iyyappa as its first employee on full-time basis, who later became a millionaire himself, thanks to the enormous growth of the company and its ESOP. Within no time the company's employee head count grew to 150. Recognising the need of Indian consumers and in order to increase their trust on the Flipkart promise to deliver quality goods anywhere in India on timely basis, it pioneered its Cash-on-Delivery option for payments in 2010. In the same year, to handle the logistics requirement with the increasing demand and introduction of COD, Flipkart launched its logistics arm Ekart to ensure delivery on timely basis. It further came up with a return policy of 30-days and

added a variety of services and products to its portfolio which included games, movies, music, electronics, and mobile phones. The year 2010, also saw a phase of acquisition wherein, Flipkart acquired Bangaluru-based weRead, a social book discovery service, from Lulu.com.

Few more acquisitions were made by Flipkart in late 2011, relating to digital distribution, including a music streaming digital content platform Mime360.com along with Chakpak, a Bollywood's digital content library. With the growing portfolio of products and services offered, Flipkart became one of the first online shopping sites to introduce its own digital wallet in 2011.

In the following years, Flipkart continued to expand its digital presence through acquisitions. It acquired an online electronic retailer Letsbuy, a private label for electronics DigiFlip, and an online music service Flyte MP3, in 2012 and in the year 2014, it acquired one of the leading online fashion retailers, Myntra, which continues to operate as stand-alone fashion brand alongside Flipkart. Along with this, it also acquired a major stake in Jeeves, an after-sales service provider and Ngpay, a payment platform. With the aim of gaining on the social transition of e-commerce to m-commerce, it also went on to become one of the first online shopping sites to have its own mobile shopping app. Today, Flipkart has a major market share in the revenue generated through mobile shopping in India. To reduce the level of risk perceived by its consumers while making the payment online as well as to ease up the process of online payments, it received a PCI DSS Certification which allowed it to save card details in a secure manner. Further to ensure expansion of the service offerings, Flipkart decided to operate on a Market-place model, bringing in third parties to sell their products and services on the platform. With the market-place model and a newly launched payment solution PayZippy, Flipkart went on to record a single day

sales of 100,000 books and at the end of 2014, its valuation stood at $11 billion with the registered GMV (Gross Merchandise Value) of $1.9 billion. Keeping up with its promise to deliver variety of services to its customers, Flipkart partnered with many smart-phone companies such as Motorola, Xiomi, Redmi and Micromax, to host exclusive online sales for their handsets.

During 2015, Flipkart continued to expand its digital presence and portfolio through several new launches and acquisitions. It launched home and maternity product categories along with Flipkart Lite, a data-light mobile website. It acquired related companies like AdIquity (mobile marketing firm), FX Mart (payment service start-up) and Qikpod (delivery locker service start-up). By the end of 2015, to further improve its delivery logistics, it acquired a majority stake in MapmyIndia, a digital mapping provider. The year 2015, also witnessed the celebration of Flipkart becoming the first mobile application in India to cross a user base of 50 million and a registered customer base of 100 million.

In 2016, Flipkart went on to acquire Phonepe, first Unified Payments Interface (UPI) based mobile application of India, and Jabong.com, another online fashion retailer for US$70 million, from Rocket Internet . In the same year, due to Demonetisation, Phonepe crossed 10 million downloads from Play Store on Google.

In the beginning of year 2017, US$2 million were invested by Flipkart in Tinysteps, a parenting information start-up. Later in the same year, SoftBank's Vision Fund became the largest shareholder of Flipkart after investing $ 1.5 billion in the company. By 2017, Flipkart had a majority share of 51% surpassing Amazon India (33%) in the all India smart-phone shipments. It was able to sell 1.3 million phones alone for its Big Billion Days promotions on 21st September 2017. In 2018, Flipkart had over 130,000 third-party sellers on board selling over 80 million products from its ever expanding product

catalogue. Finally, it cracked the jaw-dropping deal of $16 billion with the US-based retail giant Walmart in exchange of a 77% stake of Walmart in Flipkart. It can be said that the risky bet of e-commerce, has finally paid off well for Sachin Bansal and Binny Bansal.

5.2.2. Mobile Shopping in India

With the launch of Flipkart, a new concept of e-tailing (retailing via electronic medium) was introduced to the Indian consumers. Bricks and mortar retailers however, were not threatened and many were of the opinion that e-tailing is a foreign concept which cannot be a success with the Indian buyers who still wants to touch and feel the product they are buying. Today, Indian e-commerce is already a $30 billion industry in size and is estimated to touch $200 billion by 2026. The growth of the e-commerce sector was in perfect sync with the rise of Flipkart contributing to its meteoric growth.

Gradual development and rapid spread of mobile infrastructure along with the reduction in the prices of smartphones and mobile Internet services has resulted in mobile shopping becoming a popular phenomenon amongst the consumers' globally. In the recent past mobile shopping has succeeded in penetrating deeply into the lives of modern consumers. The usage of mobile devices has extended to include a wide range of activities starting from the search for products and services, comparing their prices and features across different vendors, placing of orders and finally making online payments for various goods and services. Taking advantage of this popular trend, Flipkart which started as an e-commerce portal for selling books launched its own mobile shopping app in 2012. Other retailers such as Myntra, Snapdeal, Amazon India have also invested huge amount in this industry. Marketers across the globe are encouraging consumers to switch to mobile shopping. An increasing number of mobile applications are being developed to provide a safer shopping experience to the shoppers.

5.2.3. Evaluation of success factors

Flipkart's success story is an inspiration to a whole generation of aspiring entrepreneurs of the country. What started as an online bookstore, today offers a product catalogue of over 80 million products and services. Currently Flipkart, with its subsidiaries Myntra and Jabong, holds the major share of online sales with $7.5 billion annual GMV and a total market share of 31.9% in 2018. With the recent $16 billion investment from Walmart, these figures are only expected to grow in the coming year. The success of this magnitude can be attributed to many factors. Few of the important factors identified from the case are as follows.

Usefulness and Convenience

Flipkart from its very beginning offered customers the convenience of buying books without actually going out to a physical shop. Through online retailing and its well established supply-chain, Flipkart managed to deliver its products and services anywhere across India to the doorsteps of the consumers without any delays. Flipkart started with a delivery service of their own, something that no other e-commerce player in India had done before. This provided their customers who were mainly corporate employees working and staying in large metropolitan cities, the comfort of shopping without losing on their leisure time on weekends and without having to face the traffic hassle on the way to the physical shops or market, making their daily tasks much easier. Customers from the remote and smaller towns got the convenience of shopping a variety of products and services through a single portal.

Ease of using

Flipkart was able to identify the aspects of online shopping that dissuades users in India and allowed them to make purchases through Facebook and Twitter sign-in without even

registering. In order to make the online purchase and payment experience hassle free, Flipkart was one of the first online shopping sites to launch its own digital wallet. It received a PCI DSS Certification which allowed it to save card details in a secure manner, making the process of online payments even simpler. It went on to launch its own payment solution PayZippy and consequently by the end of 2014, its total valuation stood at $11 billion.

Variety of products and services offered

Started as an e-commerce portal dealing only in online sale of books, Flipkart continued to expand its product and services portfolio. By the year 2010, it already had added a variety of services and products to its portfolio including music, movies, games, electronics and mobiles. Further to ensure expansion of the service offerings, Flipkart decided to operate on a Market-place model, bringing in third parties to offer their products and services on the platform for sale. It also provided the service of digital wallet and launched PayZippy to provide improved payment solutions to its customers.

Customers' Trust

To cater to the interest of its growing customer base, it launched a 24X7 customer service. Flipkart was a pioneer in introducing an option for Cash-on-Delivery payment that enabled its consumers to pay in cash on the receipt of their ordered goods at their doorstep. Further, to handle the logistics requirement, it launched its logistics arm Ekart to ensure delivery on timely basis. A 30-day return-policy was introduced in 2010. All these measures taken to improve the level of trust amongst its buyers with regards to the quality of product and services delivered by Flipkart proved to be an important factor in gaining momentum for Flipkart. The end of 2011 witnessed expansion of Flipkart's network to deliver across 600 cities of India.

Reduced risk of financial loss

By receiving a PCI DSS Certification which allowed it to save card details in a secure manner, Flipkart managed to reduce the level of risk perceived by its consumers while making the payment online as well as to ease up the process of online payments.

Social Influence

One of the most effective factors that worked in the favour of Flipkart helping it gain popularity was the word-of-mouth publicity and the social media mentions it received from its satisfied customers. Customers started telling their friends about the timely delivery of the books they loved to their doorsteps. As a result, in its second year of operations itself, it started receiving 100 orders per day.

Promotional Benefits offered

In the initial years of its operations, Flipkart offered 20-25% discounts on every book purchased. With high volumes of aggregated sales from across the nation and books being a product with high profit margin, Flipkart was able to offer discounts without losing on its profit volumes much. Moreover, it offered free-shipment for every order. Such added benefits offered by Flipkart proved to be effective in drawing the attention of buyers and in increasing its sales revenue. It made more sense to buy a book from Flipkart at a discount delivered at doorstep instead of buying it from a local vendor who might not be able to offer the same discounts due to lower volumes.

5.2.4. Challenges faced

At the time when Flipkart started its operations, e-commerce companies had a 20% to 25% failure rate. The success of Flipkart was not free from challenges either. Few of

the major challenges which Flipkart overcame to become India's first successful online retail company were:

Financial Risk

Customers were fearful of losing financial details while completing payments online. Flipkart dealt with this issue by coming up with Cash-on-Delivery option for payment and accepting Debit/Credit cards at the delivery time. It also received PCI DSS Certification, to store customers' card details in a secure manner.

Difficulty in using online payment gateways

The issue with the gateways used for online payment was that people did not prefer making payment online because of the risk associated with sharing their card detail with the third party providing payment gateway. Moreover, setting-up of a payment gateway was not an easy task. Flipkart addressed this issue by offering cash on delivery option and by accepting payment by cards on delivery.

Trust issue regarding on-time delivery

One of the major challenges faced by any e-commerce company is the on-time delivery of goods. Customers often worry about the timely delivery of goods while making a purchase online. Flipkart understood that delivering the goods on time is a factor most critical to the success of any ecommerce company. To ensure on time delivery of orders, Flipkart came up with its own supply chain management system.

5.2.5. Findings of the Case and Results of The Study

The purpose of analysing the case of Flipkart Pvt. Ltd. was to provide practical support to the findings of the primary data analysis and to stress the implications of

the results in the actual market. Table 5.1 compares the findings observed frpm the analysis of primary data with the findings of the case discussed above.

Table 5.1: Results of Data Analysis & Findings of Case Analysis

Hypotheses	Results of the Study	Findings of the Case
H1: PU → BI	Supported	Flipkart has gained customer base due to the convenience and usefulness of its services to its customers (Reddy, May 6, 2013)
H2: PEOU → BI	Supported	Easy access through facebook without registering has improved the ease of using Flipkart which has further improved its customer base (What Makes Flipkart a Success?, May 14, 2012).
H3: PE → BI	Not Supported	There was no literature support found to prove that Flipkart has undertaken any major steps to improve the entertainment factor of its web-site or mobile app.
H4: VOS → BI	Supported	By increasing its portfolio of services and products, Flipkart has gained on this factor and succeeded in increasing its customer base (Chaudhary, Apr 07, 2012; Sharma, May 9, 2018)
H5: PCM → BI	Supported	With the increasing number of users and their positive "word-of-mouth", Flipkart became even more popular and desirable among the users (Chaudhary, Apr 07, 2012).
H6: PV → BI	Not Supported	Providing discounts and competitive pricing for its products and services has increased Flipkart's user base (Chaudhary, Apr 07, 2012; Reddy, May 6, 2013; Sharma, May 9, 2018).
H7: PR → BI	Supported	Flipkart has managed this factor effectively by receiving a PCI DSS Certification which allowed it to save card details in a secure manner (Sharma,

		May 9, 2018).
H8: PT → BI	Supported	By ensuring on time delivery and introducing cash on delivery and prompt customer service, Flipkart has tackled this issue effectively (Chaudhary, Apr 07, 2012; What Makes Flipkart a Success?, May 14, 2012).
H9: FC → BI	Supported	By developing web app that is lightweight and quick to load, Flipkart has managed this hindrance and gained on its user base (The Flipkart Stories, Dec 14, 2017).
H10: PRS → BI	Supported	By receiving a PCI DSS Certification for saving card details in a secure manner has given a perception of some level of regulatory support to its users (Sharma, May 9, 2018).
H11: PB → BI	Supported	By offering discounts and free shipping in its initial years, Flipkart was able to attract good amount of customers (Reddy, May 6, 2013; Sharma, May 9, 2018).
H12: PI → BI	Supported	Flipkart started with targeting youngsters who want everything on internet (Soni, Aug 05, 2014). By making the interface more user-friendly and less technical, flipkart has succeeded in attracting users having lower degrees of Personal Innovativeness as well.

5.3. Paytm

5.3.1. Paytm: An overview

In August 2010, Mr. Vijay Shekhar Sharma launched a platform for making payments using mobiles i.e. Paytm which literally stood for "Pay through mobile" under the parent company One97 communications. Simply stating, Paytm provided a mobile platform which enabled any user to pay for their bills and recharge their mobile and DTH services online from anywhere and at any time with a click of a button. Its fresh approach brought in a revolution and altered the entire billing system of the country. By providing a digital wallet service i.e. Paytm Wallet it enabled its users to pay for their shopping or services not just at Paytm, but for products and services bought outside the Paytm as well. Within a span of two years Paytm went on to become a full fledged mobile commerce platform. What started as a mobile platform for online recharges and bill payments soon diversified itself into a marketplace. Paytm offered an opportunity to the small merchants to list their products and services with it and provided its users a wide portfolio of products and services on its mobile app, to be bought by a few clicks. Today, Paytm is India's largest platform on mobile commerce with registered users of over 250 million and a total valuation of $10 billion as of 2018. Paytm is at the top in terms of UPI-based payments in India with a market share of over 33% and all this was achieved within a span of just 8 years.

5.3.2. Mobile Payment Industry and Paytm in India

The medium of payment has evolved throughout the human history from sheep, shells, silver and gold to paper currency, plastic money and today's mobile money. Wharton professor of marketing Z. John Zhang suggests that as the smart-phone will become more and more versatile and ubiquitous in terms of its functionality and usage, mobile currency

will gain popularity. In India, though mobile payments services were introduced much before, they got momentum when our Prime Minister Narendra Modi announced Demonetisation policy in November 2016. The event of Demonetisation was considered a game changer for mobile based payment services.

Pre-Demonetization Times

Even before the announcement of Demonetization, mobile wallet industry was strengthening its grip in the country. In a country like India, where a big portion of the population still remains unbanked and the credit card penetration is still low, mobile wallet provided an opportunity in matching up to the global development game. A study conducted before Demonetization by Ecosystem in India noted, "The global payments landscape has seen some dramatic changes. Digital payments in India are not limited to being an urban and affluent phenomenon…. India is becoming a digital country."

On the other hand, even after being there for some years now, mobile wallets were not easily categorised as a prominent mode of payment because of the lack of clear rules and regulations. In the year 2014, a set of guidelines was released by the Reserve Bank of India pertaining to a new type of financial institution which was called as a payments bank. In February 2015, applications were invited for setting up of payment banks. Accordingly, a payment bank can accept deposits not exceeding one lakh rupees per customer and could run savings and current accounts, operate net and mobile banking, issue ATM and debit cards but could not issue any loans or credit cards. Paytm along with Forty-one institutions applied for the licence to operate as a payment bank and was one of 11 entities to receive the same. Paytm with its growing consumer base started attracting attention of investors worldwide. In the year 2015, Alibaba of China, through its Ant subsidiary, made an investment of $575 million in Paytm's parent company, One97 Communications. Mobile

money market of India, in general was also growing. A survey report by MediaNama and Akamai, stated that India's mobile banking transactions stood at 49.5 million in number and the total amount transacted was $8.9 billion for March 2016. In September 2016, there were 140 million wallet users registered with Paytm with number of monthly transactions ranging from 75 to 90 million. On the other hand, registered users with ItzCash stood at110 million, followed by MobiKwik and Vodafone M-pesa with 35 million and 1.3 million wallet users respectively.

Demonetization of November 2016

Since November 8, 2016, with the Prime Minister Narendra Modi announcing Demonetization drive in India, digital and mobile payments witnessed a significant growth. The Finance Minister of India, Arun Jaitley was particularly up-beat about the mobile money, since he believed that a major part of infrastructure needed for it already existed in India with almost 90% of Indians using mobile phones. Alpesh Shah, senior partner and managing director at BCG opine that "The demonetization event has further accelerated the need for digital payments and, for smaller transactions, mobile payments. In fact, some research post demonetization has shown a significantly larger acceptance of digital/mobile payments by end-consumers as well as merchants." Even though, Paytm has already established itself in the mobile commerce market, the event of Demonetization provided it an opportunity to expand its user base exponentially, which Paytm did not fail to gain from. It was able to register new users at an unexpected rate and grow its trade volume by leaps and bounds. The total transactions through Paytm grew by 435% with a 200% increase in app downloads and with 250% rise in the overall transaction value. Paytm was able to sign up 70,000 merchants daily in November, the month of demonetization.

Post- Demonetization Times

After demonetization of November 2016, the access to currency notes declined as a result people started looking for alternatives to cash. Paytm was one such alternative which provided an easy digital payment option. Although demonetization gave rise to all modes of digital payments in general, Paytm was one of the major gainers. Paytm witnessed around 1000% growth in the amount added to its wallets along with gaining 20 million new users within 2 months of demonetization. Within 3 months, the number of wallet users registered with it increased from 125 million to 185 million and hit 280 million users within a year of demonetization. Demonetization presented an opportunity and Sharma with his team ceased it with full vigour. Sharma had said that work worth of 600 days was done in 60 days by him and his staff.

2017 was the year of exponential growth for the mobile wallet industry. The mobile wallet transactions increased by 475% with a 207% increase in the amount transacted; according to a MediaNama report. Paytm mobile wallet users touched 218 million in number with 700,000 users being added every day in March 2017. By the end of May 2017, after receiving the last clearance from RBI, Paytm launched Paytm Payments Bank. By this time, Paytm was already the largest mobile money company in India. Paytm Payments Bank was launched with an ambitious vision of acquiring new customers to the extent of 500 million and offering a variety of financial services and products ranging from accepting deposits, financial lending to insurance, wealth management and others. As Sharma said, the business of mobile wallet had been a curtain raiser for the main show which is the payments bank. In the same year, Japan's SoftBank invested $1.4 billion in Paytm, taking its total valuation to $8 billion. With the launch of Paytm Payments Bank, Paytm became a single platform with the largest network of merchants, the largest online or offline spending network which is also capable of saving, borrowing and depositing

salary of its customers now. According to the analysis of Venture Intelligence (tracking financials, transactions and valuations of Indian private companies), Paytm's parent company, One97 Communications has received a funding of $360 million between 2013 and 2017.

Conclusion

Paytm, as a mobile payment company, was already on its path, when the Prime Minister made an unexpected move of demonetization. Madhur Deora, who joined Paytm as CFO just a month before demonetization, had pointed out that Paytm has already been providing payment solutions since 2015 to the offline merchants, making it the only company in India doing so other than the card networks. Even before demonetization, Paytm already had the product and the sales infrastructure in place. Scaling up the infrastructure and product to match the new increased demand was a task that took a lot of effort, but it already had the foundations it needed. Demonetization clearly made its adoption a lot faster by a lot of users, as it became a necessity of the hour from being an option for the users. Paytm became a much bigger brand with the announcement of demonetization in the country.

The founder of Venture Intelligence, Arun Natrajan has said "Mobile payment was a key area of interest to PE-VC investors in India even before demonetization. By making adoption of digital payments much more widely accepted, demonetization has only made the sector more attractive".

5.3.3. Evaluation of success factors

Clearly, demonetization played a crucial role in pacing up the adoption of Paytm as a payment solution; its success has been a result of several factors that worked in its favour.

Customer Trust

When Paytm was launched as a mobile portal for making payment of bills and recharging for mobile and DTH services, it succeeded in establishing a trust factor among its users. As it diversified itself into a mobile commerce platform, this trust factor worked in its favour. Further, Paytm has always focussed on developing a robust as well as secured payment system. To ensure this, it doubled its server capacity to handle at least 5000 transactions per second. With this move, Paytm succeeded in keeping the trust of its users intact.

Variety of services

Soon after its launch, Paytm was providing a variety of services to its users other than just recharging and bill payment. Within two years, it started operating in the marketplace model becoming one of the major mobile commerce platforms. A GPS tracking system was added and a mobile wallet was introduced where money could be stored online. Other than this, services which were offered included bus ticket booking, NH-8 toll-card recharge, income tax returns filing and many more. This became an encouraging factor for new customers for signing up as Paytm Wallet users as well as for existing customers for using it again. With the launch of Paytm Payments Bank in 2017, it is now providing banking services to its customers as well. Further, it is planning to introduce stock-broking in a next few months.

Usefulness

Since its very beginning, Paytm has proved itself to be very useful in making the daily life tasks a lot easier. Earlier, people used to stand in a long queue to pay electricity bills and landline bills. Even for getting their mobile phone recharge, one has to visit a recharge shop and share their mobile numbers with the unknown shop keepers. But with the

emergence of paytm, the scenario has completely changed. It enabled making such recharges and bill payments online through a mobile wallet. With launching of its Payments Bank in 2017, its utility has only increased for its customers by providing a single platform for shopping, making payment, saving their salary and even for borrowing funds.

Ease of On-boarding Merchants

Paytm allowed merchants to sign up even without a bank account as against other competing e-wallets which insisted on linking their bank accounts with the wallet at the time of installation itself. It enabled financially excluded merchants to receive money into their Paytm wallets and even spend it while shopping with other merchants accepting Paytm payments. A bank account was only needed at the time when they want to cash out their Paytm wallet amount. This helped, Paytm in signing up hundreds of thousands of merchants not having a bank account. The ease with which these merchants could sign up for Paytm, and the growing need to accept mobile money after the announcement of demonetization, encouraged many small merchants to start accepting payments through Paytm and open their bank accounts later when their Paytm balances started growing.

Social Influence

Paytm allowed its users to send money even to those who did not have a Paytm account. When a Paytm user sends money to his friends and family who are not using paytm at that time, a message was sent to the receiver that you have a transfer of this much rupees which can be claimed by signing up for a Paytm account. This gave a compelling reason to the non-users to sign-up with Paytm and generated a positive network effect for Paytm. The more popular Paytm became among the users' side, the more necessary it became for the

merchants to accept it as a payment mode, further creating a positive cross-side merchant network effect.

Ease of using

Paytm understood that convenience and ease of using an application is the most important factor in its adoption. To cash upon this aspect of consumer behaviour Paytm hid its log-out option deep into the application, as a result users' seldom log-out from their Paytm app allowing a much faster access and frictionless payment transaction. Though it created a security concern, but Paytm understood that security is only a hygiene factor where as convenience is more essential for the consumers to adopt a new technology or system. Further, the added point-of-sale capabilities in the app allowing users to rely on the smart-phones of the merchant to make a payment by entering their card details, made using Paytm even simpler and a more convenient option.

Promotional Benefits

Paytm adopted aggressive promotion to encourage its adoption among both the sides i.e. users as well as merchants. It was Paytm who pioneered the system of cash-backs in India. For every transaction made through Paytm, a cash-back was given to the users in their Paytm wallets which could be used in further transactions, motivating them to use Paytm wallet again. Discounts, loyalty rewards, coupons were other promotional benefits that Paytm offered to its users and registered merchants

5.3.4. Challenges faced by Paytm

Like for any other success story, the success path of Paytm was also not free of challenges. On the road of becoming India's largest mobile payment company, Paytm too had to face many hurdles and overcame them.

Facilitating Conditions

For entering into a mobile payment transaction, a basic requirement is to have an internet enabled mobile phone and an internet connection. At the time, when Paytm was launched, the proportion of Indian population having access to internet was just 33%. With a majority of population not connected through internet, it was not possible for mobile wallet firms such as Paytm to reach-out that section. However, with the government's initiative of Digital India and the emergence of Reliance Jio, the internet penetration has increased in India. It was expected that the total internet users will reach 500 million by June 2018 and by 2020, the number of smart-phone users are expected to hit 702 million. With the increased access to internet and availability of smart-phones at affordable prices, mobile wallet companies such as Paytm can expect to grow further.

Security vulnerability

There is a certain degree of security vulnerability attached to almost every online payment option. Paytm is no exception to this. In order to address this security concern, Paytm wallet has RBI approval for opening an Escrow account to ensure protection of the users' money, with a reputed nationalised bank. Further, it utilises SSL (Secure Sockets Layer) with Verisign-certification and with encryption technology of 128-bit, providing users greater protection with respect to the safety of their financial details and passwords entered during a payment transaction.

5.3.5. Findings of the Case

Table 5.2 compares the findings of the primary data analysis with the results obtained from the basic understanding and analysis of the case of Paytm.

Table 5.2: Results of Data Analysis & Findings of Case Analysis

Hypotheses	Results of the Study	Findings of the Case
H1: PU → BI	Supported	Paytm gained customer base due to its usefulness as an effortless platform for bills payment and mobile recharges (Prateek, Jun 01, 2015).
H2: PEOU→BI	Supported	Faster access and frictionless payment transaction because of hidden log out option, improved the simplicity and ease of using Paytm which has further improved its customer base (Prateek, Jun 01, 2015; Five reasons why Paytm is miles ahead of its rivals, Jan 20, 2017; Kishore, Mar 23, 2018)
H3: PE → BI	Not Supported	There was no literature support found to prove that Paytm has undertaken any major steps to improve the entertainment factor of its web-site or mobile app.
H4: VOS → BI	Supported	By increasing its portfolio of services and products and diversifying into a mobile commerce platform, Paytm has succeeded in increasing its customer base (Paytm- Mobile: The Closest You Can Get to Your Consumers, 2015; Forer, Feb 12, 2018)
H5: PCM → BI	Supported	Paytm succeeded in generating positive network effect among the consumers by allowing transfer of money to even non-users of Paytm (Five reasons why Paytm is miles ahead of its rivals, Jan 20, 2017; Kishore, Mar 23, 2018)
H6: PV → BI	Not Supported	Providing variety of services at competitive prices has definitely improved the value perceived by its users to some degree (Prateek, Jun 01, 2015).
H7: PR → BI	Supported	Paytm has managed this factor effectively by receiving SSL (Secure Sockets Layer) with Verisign-certification and with encryption technology of 128-bit as well as by attaining RBI approval for escrow accounts (Forer, Feb 12, 2018; Tomar and Giri, Jan 20, 2017)

H8: PT → BI	Supported	By developing a robust as well as secured payment system, Paytm has succeeded in becoming the most favoured mobile payment platform of the consumers (Forer, Feb 12, 2018; Tomar and Giri, Jan 20, 2017)
H9: FC → BI	Supported	With increase in internet connectivity and introduction of Reliance Gio, Paytm has gained on its user base (Kamal, Apr 30, 2018).
*H10:*PRS→ BI	Supported	Having RBI approval for opening an Escrow account to ensure protection of the users' money, with a reputed nationalised bank has given a perception of some level of regulatory support to its users (Forer, Feb 12, 2018; Tomar and Giri, Jan 20, 2017)
H11: PB → BI	Supported	By pioneering the concept of cash backs for every transaction, Paytm was able to attract good number of customers (Karmakar, Apr 09, 2017).
H12: PI → BI	Supported	Due to high personal innovtiveness, Paytm is able to attract users from early adopters category and few from early majority category as well (Karmakar, Apr 09, 2017).

5.4. Conclusion of Case analyses

After having a basic understanding of the two cases discussed in this chapter, it can be concluded that the findings of this study has some important implications in the actual market scenario. Important consumer-centric factors such as Perceived Usefulness, Facilitating conditions, Perceived Ease of Use, Perceived Critical Mass, Personal Innovativeness, Perceived Benefits and Perceived Regulatory Support, which were found as significant factors affecting consumers' Behavioural Intention towards mobile commerce adoption in the primary data analysis, have been observed to play an important role in the success of Flipkart and Paytm as well.

Chapter 6: Discussion and Conclusion

6.1. Overview

The following chapter discuss the findings of the multi-stage analysis process undertaken in the fourth Chapter of Data Analysis along with the findings of the cases analysed in the previous chapter and the conclusions drawn from it.

6.2. Discussion

The relationships of twelve independent variables with the two dependent variables were empirically tested in this study using a multi-staged analysis. The linear relationships between the variables were analyzed through SEM and factors such as PE, PEOU, PCM, VOS, PR, PT, FC, PI, PB, and PRS were observed to be significantly influencing the consumers' BI to adopt mobile commerce. Surprisingly, results observed PE and PV as insignificant in influencing BI, contradicting to the findings of many previous researchers (Childers et al., 2001; Kuo and Yen, 2009; Lu and Su, 2009; Hanafizadeh et al., 2014; Song et al., 2015; Slade et al., 2015).

6.2.1. Perceived Usefulness (PU) as a significant factor determining mobile commerce Behavioural Intention (BI)

The findings of the primary study observed Perceived Usefulness as a significant factor impacting the consumers' Behavioural Intention towards adoption of mobile commerce. Such an observation is in consistency with the findings of the previous researchers in the mobile technology adoption domain (Shin, 2009; Kim et.al, 2010; Requelme and Rio, 2010; Schierz et.al, 2010; Hanafizadeh, 2012; Wang and Yi, 2012; Chong, 2013; Thakur and Shrivastava, 2014; Yan and Yang, 2015). The significant impact can be attributed to

the unique benefits offered by and the inherent features of mobile commerce. The degree of ubiquity, flexibility in terms of place and time, convenience of retrieving information and the degree of personalisation offered are some of the feature of mobile commerce which makes it useful for the consumers (Ghazali et al., 2018), improving their daily job performance. Another advantage of mobile commerce is that it offers a more personal and interactive, and direct communication with the retailers, making it of more use. As a result, the degree to which customers perceive mobile commerce to be useful for them is an effective driver for them to adopt it. Further, by analysing success cases of mobile commerce portals of India, such as Flipkart and Paytm, it is clearly visible that these have gained exponentially due to the inherent benefits of ubiquity, flexibility and personalization offered by mobile devices.

6.2.2. Perceived Ease of Use (PEOU) as a significant factor determining mobile commerce Behavioural Intention (BI)

Consistent with the observations of previous researchers, the structural results of the second phase of analysis, observed PEOU determining mobile commerce Behavioural Intention in a significant manner (Chong, 2013; Slade et.al, 2014; Hanafizadeh et al., 2014). The sensitivity analysis under the third phase of analysis through Artificial Neural Network model, found PEOU as an input variable most important in determining the output variable i.e. mobile commerce BI. Other than the inherent advantages of ubiquity and flexibility offered by mobile commerce, the customers have to face issues of limited screen size and resolution, low bandwidth, difficulty in interface due to inconvenient keyboards and so on. The issues faced while transacting over a mobile device, creates problems for consumers in easy browsing through mobile devices, making it less user-friendly. Researchers in the past have proven that when a mobile technology is user friendly and does not require any major mental effort in learning or using it, consumers

develop a positive perception towards its usefulness further encouraging them to have stronger intentions of adopting it (Ghazali et al., 2018). By believing in a system to be easy to use, consumers tend to reach their goals more easily and it further improves their intentions to adopt it (Carlos Roca et al., 2009; Wong et al., 2014). The convenience and the effort-less usability of mobile commerce portals, have played a vital part in the success of many leading mobile commerce companies such as Flipkart and Paytm.

6.2.3. Perceived Enjoyment (PE) as an insignificant factor determining mobile commerce Behavioural Intention (BI)

The second phase of analysis found Perceived Enjoyment as statistically insignificant factor in influencing mobile commerce BI. Such an observation is inconsistent with many of the previous studies, which observed PE as a significant factor influencing intentions of consumers towards adoption of a new mobile technology (Venkatesh et al., 2003; Wen et al., 2011; Venkatesh et al., 2012; Yang and Kim, 2012; Zhang et.al, 2012; Chong, 2013). Even though this factor has been reported as an important motivational driver in mobile technology adoption accross many studies, there are still few researches which have observed a contradictory results and hence support the findings of this study. PE was observed to bear no significant effect on one aspect of mobile commerce i.e. mobile entertainment, in a previous research (Cullen and Kabanda, 2018). This suggests that users will engage in mobile entertainment activities regardless of the enjoyment value perceived by them. Further implying that there are some other influences such as advantage of interacting and communicating over mobile entertainment portals like gaming platforms, which motivates its adoption. PE was also found to have no significant relationships with mobile application continuance intention (Lu et al., 2016) and with the intentions of adopting 3G mobile value added services in China (Du et al., 2012). However, the analysis of moderating effect of demographic variables on the results found PE to significantly

affect mobile commerce BI in case of males, implying that male consumers are more driven by the enjoyment value they perceive to achieve by using mobile commerce. Further, it was observed that as the income level of the consumers increases, enjoyment becomes a lesser important factor in mobile commerce adoption.

6.2.4. Variety of Services (VOS) as a significant factor determining mobile commerce Behavioural Intention (BI)

The results observed Variety of services offered by mobile commerce as another important motivating factor in driving consumers' BI to adopt mobile commerce. Marketers these days are increasingly trying to integrate mobile technology into their existing business models. Mobile phone has grown from simply being a device utilised for communication purposes to a medium of delivering wide variety of services to the consumers. Further, the unique benefiting features of mobile devices including free and easy download, installation and usage of the mobile apps, makes it even more comfortable for the users to avail varied services offered through mobile commerce. It has provided mobile commerce firms an opportunity to create a competitive edge over traditional electronic commerce websites by developing technologies and processes which are capable of delivering a wider range of services in comparison. The results of the analysis are consistent with previous researches undertaken to analyse mobile technology adoption or adoption of related technologies (Chong et al., 2012). Mobile commerce giants of India such as Flipkart and Paytm, understood the importance of variety of services for the Indian consumers and quickly diversified into a wide portfolio of products and services offered through a single portal. They left no stone un-turned in offering world class services to their customers ranging from 24 hours customer care services to the recent banking services, ensuring their long-lasting success in the market.

6.2.5. Perceived Critical mass (PCM) as a significant factor determining mobile commerce Behavioural Intention (BI)

The multi-staged analysis found *Perceived Critical Mass* as an important variable influencing *consumers' Behavioural Intention* towards adoption of mobile commerce. PCM refers to the mass of people or the number of users in the referent group of an individual who are expected to avail mobile commerce services. Family, friends, peer groups and virtual social communities of an individual are important change agents in his behaviour. It makes a person's intention to adopt a new technology stronger, if more of these people are already using it. The results observed are consistent with the observations of the previous researchers, supporting a significant relationship of PCM with adoption of a new system or technology (Hsu and Lu, 2004; Lin and Lu, 2007). Contrary to this, in case of respondents having an age of 40 years and above, the influence of PCM on BI was observed insignificant while analysing the moderating effect of age on the results. It is believed that as an individual crosses a certain age his decision making is less affected by the opinions of people in his referent group. This might be the reason for PCM being insignificant in determining BI for respondents who are senior in age. Mobile commerce companies, such as Paytm, took advantage of this networking effect by allowing money transfers to even non-users of the app, to ensure wider acceptance among the users.

6.2.6. Perceived Value (PV) as an insignificant factor determining mobile commerce Behavioural Intention (BI)

The value which the consumers perceive to obtain in form of additional benefits (ubiquity, flexibility, personalisation, direct communication of information and so on) offered by mobile commerce in comparison to traditional retail channels, as against the price paid or the cost incurred to avail such services, has been reported by previous researchers to

influence the consumers' intention to adopt it in a significant manner (Pagani, 2004; Khalifa and Shen, 2008; Kuo and Yen, 2009; Revels et al., 2010; Amoroso and Magnier-Watanabe, 2012; Venkatesh et.al, 2012; Wong et al., 2015). Mobile commerce requires users to accept some additional costs in the form of access cost, equipment cost, Transaction cost, and conversion cost. How much worth is mobile commerce services with respect to its cost will affect the consumers' decision about its adoption (Chong et al. 2012). Contradicting the findings of previous researches, the structural results from the second phase of analysis observed PV having insignificant relationship with the consumers' BI towards adoption of mobile commerce. Although in a limited manner, there exist few supportive researches which validate the insignificant relationship between PV and mobile technology adoption. In case of adoption of mobile computing devices among the male users, perceived cost was observed to bear no significant influence on the adoption intention (Liu, 2016). Over the time, the cost of transacting over a mobile has reduced significant manner, hence it is not expected to be a primary consideration of consumers while deciding whether to adopt mobile commerce or not (Yang et al., 2012; Moorthy et al., 2017). However, the results of analysis of moderating effect of demographic variables on the results, PV was reported as a significant factor determining BI for consumers having age of 40 years or more as well as for consumers having an annual household income between Rs. 3,00,000 to Rs. 5,50,000. The findings imply that consumers with more age puts greater value on the price of mobile commerce as well as those belonging to middle income groups have more price concerns. In India, generation belonging to this age group is the one which has struggled more as compared to the younger generation to achieve the lifestyle they have today in terms of income. Moreover, the middle-class section of the country still remains one of the most price-sensitive segments of the market.

6.2.7. Perceived Risk (PR) as a significant factor determining mobile commerce Behavioural Intention (BI)

Validating the results of the previous researches, the structural results of the analysis observed Perceived Risk as another factor influencing consumers' behavioural intention towards adoption of mobile commerce in a significant manner (Kleijnen et.al., 2004; Shin, 2009 ; Islam et.al., 2011; Chong et.al., 2012; Chong, 2013). Mobile commerce industry involves a number of value-chain partners such as merchants or retailers, service providers, app developers, financial institutions, payment gateways and so on. In a usual mobile commerce transaction, customer's personal and important information is shared online with the payment gateway, merchant and the service provider. This increases the risk of breach of trust at any level by any stake-holder. If not effectively managed, the security concerns or the risk which is mostly a product of consumer's perception than of reality, can negatively impact the adoption of mobile commerce (Islam, 2014). Hence, the results are in line with previous researches supporting the significant role of PR in negatively affecting new technology adoption (Dahlberg et.al. 2003; Wu and Wang, 2005; Shin, 2009; Islam et al., 2011; Wen et al., 2011; Chong et.al., 2012; Zhang et.al., 2012; Gong et al., 2013; Xin, 2013; Pham and Ho, 2014). Learning form the findings of such studies, mobile commerce portals such as Flipkart and Paytm, took special care in handling the issue of security and risk by introducing cash-on delivery options to its customers and safe and reliable payment gateways.

6.2.8. Perceived Trust (PT) as a significant factor determining mobile commerce Behavioural Intention (BI)

Closely related to the issues of security involved in mobile commerce is the issue of Perceived trust, which was reported to influence consumers' BI towards adoption of

mobile commerce in a significant way. The results are consistent with previous researches where in, trust was reported to affect consumers' intentions towards mobile related technologies (Chong et al., 2012; Hanafizadeh et al., 2014, Slade et al., 2015; Ghazali et al., 2018). It increases the consumers' perceived level of control over the mobile transaction and helps in developing a positive perception towards mobile shopping and indirectly boosts the consumers' confidence in mobile shopping (Ghazali et al., 2018). Therefore, increasing the level of trust among the consumers by ensuring that the service providers as well as the retailers will meet the consumers' expectations regarding quality and reliability of services, and by keeping commitments and promises, will increase the chances of mobile commerce adoption by them. Maintaining a good reputation and transparency on data usage, offering reliable encryption security, guaranteeing prompt and effective dispute resolution, and the like are some of the determinants of Perceived Trust (Vasileiadis, 2014). However, while analysing the moderating effect of demographic variables on the results of the study, PT was found to have no significant importance for the female respondents in determining their BI towards mobile commerce. Also, there was no significant influence of FC on BI for the respondents belonging to middle income groups i.e. having household income in the range of Rs. 3,00,000 p.a. to Rs. 7,50,000 p.a. This implies, that for females and people belonging to middle income categories, the other advantages of mobile commerce such usefulness, convenience or promotional discounts offered, are more critical in driving its adoption then PT.

6.2.9. Facilitating Conditions (FC) as a significant factor determining mobile commerce Behavioural Intention (BI)

Facilitating conditions refers to the availability of physical as well as technical infrastructure and resources essential for easy adoption of any new technology. The accessibility of resources required for a mobile commerce transaction to be completed

successfully, such as the necessary knowledge of handling a mobile device, an uninterrupted internet connection with a decent speed, an internet enabled smart phone, and the like, was also found as a factor influencing BI towards mobile commerce in a significant way. The observation is consistent with the results of previous researches confirming the influence of FC on new technology adoption (Yang, 2010; Amoroso and Magnier-Watanabe, 2012; Chong, 2013; Thakur and Shrivastava, 2014; Hew et al., 2015). FC was further reported to be influencing mobile commerce BI across all age groups, gender and income categories significantly. In India, with the increasing penetration of smart-phones and advancements in mobile internet technologies, conditions have become more supportive for mobile commerce companies, such as Flipkart and Paytm.

6.2.10. Perceived Regulatory Support (PRS) as a significant factor determining mobile commerce Behavioural Intention (BI)

In addition, consumers and mobile phone users have limited awareness about the regulatory and legal support available for safeguarding their interest, in case any conflict arises at any step in the process of completing a commercial transaction over phone. The results observed a strong influence of Perceived Regulatory Support on consumer's BI towards mobile commerce adoption. PRS was observed in a prior analysis to influence Behavioral Intention towards mobile wallet adoption in a significant way. Moreover, the structural results obtained in the second phase of analysis observed PRS as a factor most significantly influencing consumers' BI towards mobile commerce adoption. Having a strong and reliable regulatory and legal support to back a mobile commerce transaction improves the confidence of the consumers in it and creates a positive perception towards it, further leading to a stronger intention towards its adoption. Moreover, PRS was found to be critical across all age group, gender and income categories except for the lower income group having household income of Rs. 3,00,000 p.a. or below. The reason could the lack

of awareness among this section of the society. India as a country is still home to a huge proportion of population with no literacy. Most of this population belongs to the lower income groups. Without literacy, it is unreasonable to expect them to be aware about the regulatory framework available with respect to mobile commerce. Therefore, the regulatory authorites as well as other stake holders should direct their effeorts towards establishing effective laws and regulations to protect the interest of the consumers as well as to create awareness about the existing regulatory framework among them.

6.2.11. Promotional Benefits (PB) as a significant factor determining mobile commerce Behavioural Intention (BI)

It has been witnessed time and again that consumers go for mobile commerce as an alternative channel for transacting, not just because of the above widely discussed factors but also because of the incentives and additional promotional benefits it offers to its users. The cash-backs offered by mobile commerce companies to its users, along with other additional benefits such as first-time discounts, coupon codes, loyalty points, free deliveries and the like have proven to be successful to a great extent in motivating consumers to shift from traditional channels of commerce to mobile commerce. Consistent with the market trend, Promotional Benefits (PB) was observed as another significant factor determining BI towards mobile commerce adoption in the current analysis. Mobile commerce companies operating in the market such as Flipkart and Paytm have widely utilised this factor in motivating and attracting consumers towards their services. Paytm was the first to introduce the concept of cash back to paytm wallets in the country. Flipkart, used to deliver every order without any shipment fee charged from the consumers. However, PB was found to have not much importance in determining BI towards mobile commerce in case of older respondents having an age of 40 yrs or above and in case of respondents belonging to very low and very high income categories. This

imply, that PB is a successful motivator for middle income groups and for younger consumers only and fails to appeal to the older consumers and consumers having low or high household income who are looking for benefits beyond the short term promotional benefits offered by the mobile commerce companies.

6.2.12. Personal Innovativeness (PI) as a significant factor determining mobile commerce Behavioural Intention (BI)

Lastly, the degree of Personal Innovativeness among the users was also found to influence BI towards mobile commerce adoption in a significant manner. The observations from the analysis are consistent with the results of the previous researches that established PI as a factor positively influencing BI towards adoption of new technology (Citrin et al., 2000; Goldsmith, 2000; Limayen et al., 2000; Pagani,2004; Aldás-Manzano et al., 2009; Kuo and Yen, 2009; Lu, 2014). A person's inclination and his willingness to adopt a new innovative technology or a concept supposedly have a strong impact on his intentions towards mobile commerce adoption as it is still relatively a new concept. PI was found to drive mobile shopping acceptance among the spanish consumers (Aldas-Manzano et al., 2009). However, the age group to which respondents belonged was observed to moderate the influence of PI on BI. Consumers having high degree of PI are reported to be found more willing in adopting mobile shopping and mobile payments as an aternative channel for making purchases and paying for them (Natrajan et al., 2011; Slade et al., 2013; Tan et al., 2014). Moreover, it was reported as a significant factor affecting consumers' BI to adopt mobile commerce across all age groups, gender and income category, making it one of the most critical factors to be considered while directing efforts towards improving mobile commerce adoption among the consumers.

Keeping in view the vast potential of mobile commerce, its diffusion is still low. The findings obtained from the multi-staged analysis, can help all the stake holders including marketers, merchants along with the providers of services and technology to understand key factors relevant in promoting mobile commerce adoption in India and developing suitable marketing interventions to ensure maximum gain from the emerging market of mobile commerce.

Chapter 7: Conclusion

7.1. Overview

The following Chapter draws conclusions from the Data analysis done in Chapter 4 and Discussions made in Chapter 6. Further, it emphasises on the contribution of the study to theory, its significant practical, managerial and research implications and also mentions few areas where the study suffers from some limiting factors. Finally, it provides some pointers to the researchers regarding the future scope and direction of this study.

7.2. Conclusion

This study was aimed at analysing the consumers' Behavioural Intention towards mobile commerce adoption and its actual usage as well as at identifying important factors motivating or impeding mobile commerce adoption among the consumers. On the basis of the extant literature available on new technology and mobile technology adoption, the study proposed a comprehensive framework to predict behaviour intention towards mobile commerce and its actual use. The research framework integrated twelve independent variables namely, Perceived Value (PV), Perceived Usefulness (PU), Facilitating Conditions (FC), Promotional Benefits (PB), Personal Innovativeness (PI), Perceived Ease of Use (PEOU), Variety of Services (VOS), Perceived Enjoyment (PE), Perceived Risk (PR), Perceived Critical Mass (PCM), Perceived Trust (PT), and Perceived Regulatory Support (PRS). Further it was tested through a multi-staged analysis. The first stage of analysis i.e. Exploratory Factor Analysis (EFA), helped in concluding that the items included in the questionnaire to measure 12 independent and 2 dependent factors, loaded on their intended factors with a factor loading of more than 0.6. This provided a strong theoretical base for the proceeding analysis.

The second stage of Confirmatory Factor Analysis (CFA) under Structural Equation Modelling (SEM), confirmed the proposed model to have a decent fit, based on the popular Goodness-of-fit measures namely, C-min/d.f., GFI, NFI, CFI and RMSEA. The structural results obtained in CFA indicated that factors such as PU (p-value-<0.001), PEOU (p-value-<0.001), VOS (p-value-<0.001), PCM (p-value-<0.001), PR (p-value-<0.001), PT (p-value-<0.001), FC (p-value-<0.001), PRS (p-value-<0.001), PB (p-value-<0.001), and PI (p-value-<0.001) affected the consumers' BI towards mobile commerce adoption in a significant way. On the other hand, factors such as PE (p-value- 0.467) and PV (p-value-0.518) were found as statistically insignificant factors in determining mobile commerce BI. The consumers' BI towards mobile commerce adoption was also observed as significant in determining their actual usage of mobile commerce (p-value-<0.001). Moreover, Perceived Regulatory Support (PRS) came out to be the most significant factor affecting BI towards adoption of mobile commerce.

The third stage of analysis included construction of an Artificial Neural Network (ANN) in SPSS to reconfirm complex linear relationships between the variables. The results indicated the RMSEA of the Training model as 0.4636 and that of Testing model as 0.6587. Further from the results of Sensitivity Analysis of input variables, PEOU came out as the most significant factor in determining the output variable i.e. BI towards mobile commerce.

With an objective to better understand the impact of difference in respondents' demographic profile on the relationships proposed in the study, moderating effect of demographics such as respondents' Age, their Gender and their annual household Income on the proposed relationships was analysed. The results confirmed that age moderated all the proposed relationships except for the relationship of PR, PT and FC with BI. Further, PE was insignificant for all age groups, while PV was significant in case of respondents

having an age of 40 years or above. Further suggesting that consumers, who are older in age gives more importance to the value they perceive to receive while using mobile commerce. Gender moderated the relationship of PE, PCM, PR, PT and PRS with BI as well the relationship of BI with AU. PE was found to be significant in case of males only and PV was found to be in significant across gender. This indicates that enjoyment is an important criterion for males in deciding whether to adopt mobile commerce or not. The results further indicated that annual household income is one important demographic variable which moderated all the proposed relationship in the framework. PE was found to be significant for all the income groups except for the respondent with household income of Rs.10,00,000 p.a. or above, indicating enjoyment to be a less important deciding factor for individuals belonging to high income groups. PV was found to be insignificant across all income groups except for respondents having income between Rs. 3,00,000 p.a. to Rs. 5,50,000 p.a., indicating the importance of price value to the middle income groups of the Indian society.

7.3. Contribution to Theory

The present study contributes to the theoretical knowledge in the domain of mobile commerce adoption in many ways.

Firstly, the study identifies important consumer-centric factors such as Facilitating Conditions (FC), Percieved Risk (PR), Percieved Trust (PT), Promotional Benefits (PB), Percieved Regulatory Support (PRS), Percieved Usefulness (PU), Variety of Services (VOS), Percieved Critical Mass (PCM), Percieved Enjoyment (PE), and Personal Innovativeness (PI) that influences consumers' Behavioural Intention towards mobile commerce adoption in the context of India.

Secondly, the study reports Perceived Regulatory Support and Perceived Ease of Use as most significant factors influencing Behavioural Intentions of consumers to adopt mobile commerce.

Lastly, apart from establishing a causal relation among the independent and dependent variables through Multiple-Regression Analysis (MRA), the study also contributed towards developing a comprehensive framework confirming complex linear relationship of the factors influencing consumers' intention to adopt mobile commerce with their behavioural intentions through a multi-staged analysis that included EFA, CFA , ANN and Case analysis.

7.4.   Implications for Practice

Over the years, both public and private sector has made significant investments in creation of advanced telecommunication network for the users worldwide. Consequently, mobile phones succeeded in creating a new history in technology adoption by becoming the fastest growing technology during the last couple of decades. The widespread mobile and internet penetration has provided a huge business opportunity to the marketers in the form of making additional sales or increase their existing consumer base by facilitating mobile technology and mobile devices in the process of converting their sales. In order to gain from this potential and emerging market, sincere efforts are being taken to persuade more and more consumers to adopt it. The findings of the present study can provide valuable insights on consumer behaviour regarding mobile commerce in India. The results observed that consumer-centric factors namely Facilitating Conditions, Perceived Risk, Promotional Benefits, Perceived Usefulness, Perceived Ease of Use, Variety of Services, Perceived Critical Mass, Perceived Regulatory Support, Perceived Trust, and Personal Innovativeness are important factors predicting consumers' Behavioural Intention towards

mobile commerce adoption in India. By shifting the marketing focus and efforts towards these identified factors, increased acceptance of mobile commerce and enhanced revenue generation through it can be ensured. It also helps in understanding the relationship between various consumer-centric factors and mobile commerce adoption amidst varied consumer demographics in a better way. The results obtained have significant implications from the managerial, research and practical point of view.

Firstly, the multi-staged analysis reported Perceived Regulatory Support and Perceived Ease of Use to influence consumers' BI towards adoption of mobile commerce in a most significant way. Thus, it is recommended to the various partners in mobile commerce value-chain such as marketers, merchants, service providers, app developers, and regulatory authorities to emphasize on establishing more effective and reliable leagal and regulatory support to safegaurd the intersets of consumers transacting on mobile platforms. Also efforts shoud be taken to increase the level of awareness among the users regarding the leagal safegaurds available to them incase of any mis conduct or breach of trust taking place during the process of mobile commerce transaction. The mobile commerce companies should direct their efforts in making the consumer interface as convenient and free of effort as possible. Businesses should emphasise on providing user-friendly features which are easy to access and navigate on their mobile apps and ensure that they are sufficiently easy to use from the customers perspective through regular usability pretesting.

The telecom service providers, financial institutions as well as payment processing companies are required to come up with security solutions with multiple layers to minimize any sort of risk perceived by the consumers and to maximise the level of perceived trust among the consumers while transacting over a mobile device. It is recommended to look beyond the factors related to technology and shift the focus on the

cultural aspects such as trust, price sensitivity and the impact of social influence on the Indian consumers. For creating awareness and educating prospective consumers, effective marketing campaigns or social networking sites can be utilised (Chong, et al., 2012). Further, consumers can be educated regarding secure and effective use of mobile commerce and the benefits it offers, provided with more user-friendly interface, and with systems with greater enjoyment value, in order to ensure its faster acceptance among the consumers (Shen et al., 2010).

Within the Indian context, mobile commerce companies such as Flipkart and Paytm have already taken various initiatives to incorporate some of the above discussed recommendations in their businesses and have succeeded in developing a good reputation for themselves. The steps include cash on delivery option given to the customers, promotional benefits offered in terms of cash-backs, free deliveries, loyalty points, ensuring a secure payment gateway, quick redressing of complaints through an effective customer care service, and effective return policies.

Therefore, marketers and businesses can adopt the recommended strategies or other similar strategies as they may result in a positive consumer perception towards security, and trust which is further expected to influence mobile commerce adoption in a positive way (Omonedo and Bocij, 2017)

Secondly, on the basis of a deeper understanding of mobile commerce through a multi-staged analysis supported by cases from the market, it is shown that the mobile technology since its introduction has revolutionarised the entire retail market. Mobile phones have enabled consumers to check for prices offered by other retailers, interact with their friends for advice, read online reviews about the product and service, comparing products and services with different brands, accessing images and videos showcasing the functionality

of the product, all of it on a click of a button. Connecting the consumers with the vast virtual retail-scape on any-time and any-place basis, mobile commerce has altered the entire experience of entering into a business transaction. As a result businesses of fixed location based shopping stores have been affected. The understanding of changing retail scenario provided in the study, may provide useful information to these fixed location-based shopping stores in coming up with their own mobile apps to adapt effectively with the changing times. Some of the big-scale retailers such as Lifestyle, HnM, ShopperStop have already introduced their mobile apps along with their fixed location shopping stores.

Thirdly, the study focuses on the consumers and their behaviour in the context of developing country like India. In India, where mobile commerce is still in its introductory stage, marketers are investing in mobile commerce activities with the expectation that it will experience a faster and higher diffusion among the masses in the future. At present the Indian mobile commerce market is still evolving. A thorough analysis of factors promoting or restricting its adoption among consumers, will provide a logical base for the industry players to develop strategic framework focussed towards faster adoption of mobile commerce and steady growth of sales revenue generated from it.

Finally, Integrating the findings of ANN model with the results obtained from SEM analysis is comparatively a new approach of analysing data in mobile commerce researches, having a potential of being a meaningful tool in the hands of researchers in future.

In sum, observations from the study suggests various mobile commerce value-chain partners to redesign their web-pages and mobile applications keeping in view the factors identified to be important for consumers while using mobile commerce services. Many retailers including online and offline retailers have already started integrating these aspects

to their businesses and are gaining from the increasing popularity of mobile commerce in India. It provides further understanding of complex consumer-centric factors providing useful insights to the retailers in further developing their business through mobile technology. It also provides the future researchers with a direction in conducting researches of higher level in this area.

7.5. Limitations

Although the research was conducted ensuring due diligence with respect to the robustness and rigour of an appropriate level employed in researching the problem at hand. However the fact that a single study is incapable of covering all the aspect of a particular research area; makes this research to have a few limitations as well. Amidst these limitations, the results of the research continue to have meaningful implications for the marketers and future researchers. The limitations discussed in the following section reflect that different patterns or result are possible if the context and environment of the research is altered. As made clear by the practice theory, "social practices do not present uniform planes upon which agents participate in identical ways but are instead internally differentiated on many dimensions" (Warde, 2005: 138).

For instance, *firstly* the focus of the research is on consumer centric factors and on behaviour of Indian consumers. If the focus is shifted to technology related factors or on to the factors affecting service providers, some of the outcomes might become irrelevant while few may continue to make sense.

Secondly, the research was administered within the territorial boundaries of India. If a similar research is conducted in the contexts of other countries the results obtained might differ from the observations of the present study. Therefore, while generalising the results to other cultural context, different from India, due care would be needed.

Thirdly, the unavailability of a proper sampling frame in social sciences prompted for the use of non-probablilistic sampling techniques for collecting data which are not considered scientific enough by many statisticians.

Fourthly, only twelve most important independent variables were included in the research framework explaining the Behavioural Intention towards adoption of mobile commerce. Whereas, other variable influencing new technology adoption existing in the literature, could be integrated in the research framework in future to achieve more comprehensive results.

Lastly, the study was conducted at a single point in time and the Indian mobile commerce industry is still in its evolutionary phase where in users' adoption behaviour is also changing along the process. Therefore, the generalisation of the findings of the study cannot be done for a longer time period.

Despite these limitations, the present research provides more complex and detailed understanding of mobile commerce. Understanding different aspects of consumer behaviour including motivating factors as well as demographic variables, makes this research a sound basis for future researches as well as for developments in mobile commerce domain.

7.6. Future Scope

The constructs and the research framework suggested by the study offer a basis for academicians, service providers and future researchers for undertaking empirical studies of advanced level in the domain of mobile commerce adoption. It also points out to some empirical questions of potential interest to be explored by academic researchers in the future.

Firstly, it is suggested to include additional variables such as compatibility and other technology-related factors as well as experience flow perspectives in future models to analyse mobile commerce adoption behaviour in a more comprehensive manner.

Secondly, a comparison of results obtained from the responses coming from rural as well as urban parts of India may be analysed simultaneously, for the purpose of identifying potential differences between their mobile commerce adoption behaviour.

Thirdly, it would be logical to administer a cross-cultural study across different countries to evaluate the contrasting preferences and consumer behaviour of different nations analysing the impact of different cultural factors such as different family values, demographics, societal norms, technological environment and the like on the results of the study.

Fourthly, it is suggested that research focussed on consumers' intentions regarding continuous purchasing over mobile commerce should be conducted in the future.

Lastly, it will be worthwhile to undertake future researches in successive intervals of time, in order to observe changes in consumer attitudes over the evolving times. This is particularly effective in the case of mobile commerce systems being a new technology, which is still evolving in India.

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Appendix A

Mobile Commerce in India (PhD work)

With the emergence of mobile and internet technology, businesses as well as consumers are interested in taking advantage of mobile commerce. Mobile commerce includes mobile technology based services such as m-shopping, m-ticketing, m-banking, m-wallet, mobile television and the like. The purpose of this survey is to identify factors which influences consumers' adoption behavior of such mobile based services. The data collected will be used in academics only and for the purpose of this research exclusively.

* Required

1. Gender *

Mark only one oval.

◯ Male

◯ Female

◯ Transgender

2. Age *

Mark only one oval.

◯ 20 or Below 20 years

◯ 21-25 years

◯ 26-30 years

◯ 31-35 years

◯ 36-40 years

◯ Above 40 years

3. Annual Family Income (in Rupees) *

Mark only one oval.

◯ 3,00,000 or Below

◯ 3,00,001 to 5,50,000

◯ 5,50,001 to 7,50,000

◯ 7,50,001 to 10,00,000

◯ Above 10,00,000

4. Education *

Mark only one oval.

◯ High School

◯ Graduation Degree or Equivalent

◯ Post graduation Degree or Equivalent

◯ Professional Degree

◯ Other: _____

5. Occupation *

Mark only one oval.

◯ Student

◯ Govt./Pvt. Sector Employee

◯ Self-employed Professional

◯ Entrepreneur/ Trader

◯ Home-maker

◯ Other: _____

6. Time of latest mobile commerce transaction undertaken *

Mark only one oval.

◯ During Last Two Days

◯ During Last Week

◯ During last month

◯ More than a month

◯ More than a year

◯ Never

7. Time duration of daily Internet usage *

Mark only one oval.

◯ Less than 1/2 hour

◯ 1/2 hour to 1 hour

◯ 1 hour to 2 hours

◯ More than 2 hours

8. Frequently purchased goods/services over mobile *

Check all that apply.

☐ Clothing and Accessories

☐ Food items (such as fruits, vegetables, confectionery items, restaurant orders)

☐ Ticketing (movies, theater, sports event, travel)

☐ TV or Gaming on mobile (Netflix, Amazon Prime, Voot, Paid games)

☐ Banking and Financial services (PayPal, Paytm, MobiKwik, Mobile banking services)

☐ Medicines

☐ Cosmetics

☐ Consumer Durable goods (such as furniture, cars, electronics)

☐ Other: _____

Following Question are to be answered on a scale of 1 to 5 with
1 - Strongly Disagree
2 - Disagree
3 - Neutral
4 - Agree
5 - Strongly Agree

Perceived Enjoyment

9. It is fun shopping over mobile phones. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

10. The overall mobile commerce experience would be enjoyable. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

11. Purchasing over mobile devices would be enjoyable. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Usefulness

12. M-commerce improves my current job performance. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

13. M-commerce increases my productivity. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

14. M-commerce increases my time effectiveness. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

15. M-commerce is useful for my work. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

16. M-commerce makes my daily job easier *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Ease of Use

17. I think it is easy to learn how to use m-commerce *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

18. I think less time & mental effort is required in learning how to use m-commerce. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

19. I think m-commerce is easy to use. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Variety of Services

20. Variety of m-commerce services offered fits my current lifestyle. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

21. M-commerce services currently offered appeals to me & attracts me to avail them. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

22. M-commerce services offered are according to my requirements. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

23. Current m-commerce services offered meets my expectations. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Critical Mass

24. People who are important to me frequently use mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

25. My Family and friends frequently use mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

26. Most people in my community and peer group frequently use mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Value

27. I think the equipment cost is expensive for using mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

28. I think the access cost is expensive for using mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

29. I think the transaction fee is expensive for using mobile commerce. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

30. Using mobile commerce is expensive for me. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

31. The product/service of the m-commerce website is not a good value for money *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Risk

32. I feel that use of mobile devices for transaction purposes is risky. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

33. I feel my personal information provided during mobile commerce transactions is not safe. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

34. I feel there is a risk involved while using my credit card or bank account details for making mobile commerce payments. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Trust

35. Mobile commerce service providers are trustworthy and reliable. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

36. I trust telecommunication operators to provide secured data connections for conducting mobile commerce transactions. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

37. I trust my mobile phone manufacturer to provide mobile phones appropriate for initiating mobile commerce transaction. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

38. I think m-commerce firms will fulfill their commitments. *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Facilitating Conditions

39. I do not have necessary resources to initiate mobile commerce transaction *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

40. I do not have the required knowledge necessary to undertake mobile commerce transaction. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

41. Online assistance is not available for issues/queries related to mobile commerce transactions. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Perceived Regulatory Support

42. I believe that Legislation does not provides enough protection to mobile commerce users. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

43. I m hardly aware about the legislation and regulations developed to protect mobile commerce users. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

44. My Intention to use mobile commerce does not varies with development of rules and regulation. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Promotional Benefits

45. I get more discounts and incentives while shopping through mobile commerce. *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

46. **Promotional offers in mobile commerce are attractive enough to induce usage.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

47. **Mobile commerce firms offer frequent discounts and incentives.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Personal Innovativeness

48. **I like to experiment with new technologies.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

49. **I am curious about new technologies.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

50. **I think it is very interesting to try out a new technology.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

51. **Among my peers I am usually the first to try out a new technology.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Behavior Intention

52. **I will definitely avail mobile commerce services in future.** *
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

53. **I will continue availing mobile commerce services in future as well.** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

54. **I will refer mobile commerce services to my friends and family.** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Actual Usage

55. **I often engage in online transactions via mobile commerce.** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

56. **I have availed many kinds of mobile commerce services.** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

57. **I use mobile commerce for my daily job performance.** *

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Appendix B

Publications and Participation

Journal Papers

- Madan, K., & Yadav, R. (2018), "Understanding and predicting antecedents of mobile shopping adoption: a developing country perspective", *Asia Pacific Journal of Marketing and Logistics*, Vol. *30*, No. 1, pp. 139-162.
- Madan, K., & Yadav, R. (2016), "Behavioural intention to adopt mobile wallet: a developing country perspective", *Journal of Indian Business Research*, Vol. *8*, No. 3, pp. 227-244.
- Madan, K., & Yadav, R. (2019), "A two-stage SEM-neural network analysis to predict drivers of m-commerce in India", *International Journal of Electronic Marketing and Retailing*, Vol. *10*, No. 2, pp. 130-149.
- Madan, K., & Yadav, R. (2016), "An exploration of factors affecting m-commerce adoption in India", *Advances in Economics and Business Management (AEBM)*, Vol. *3*, No. 1, pp. 1-6.

Conference Papers

- Madan, K., & Yadav, R. (2017), "Behaviour Intention to Adopt Mobile Shopping in India", *International Conference on Paradigm Shift in World Economies: Opportunities and Challenges*, Rukmini Devi Institute if Advanced Studies, pp. 245-260.
- Madan, K., & Yadav, R. (2016), "Mobile Commerce Adoption: Literature Review of Factors affecting it", *Digital India: Recent Paradigm shift in IT, Media and Management,* pp. 9-13.

Papers Presented

- Presented a paper on mobile commerce adoption at *International Conference on Telecommunication Technology & Management* held at Bharti School of Telecommunication Technology and Management, IIT Delhi, India.
- Presented a paper titled "Predictors of Online Shopping Intentions: An Indian Perspective" at *6th Annual International Commerce Convention* held at Department of Commerce, Delhi School of Economics, India.
- Presented a paper titled "Determining Factors in Adoption of Mobile Payment Services by Indian Consumers" at *International Conference on Business and Management, 2019* held at Delhi School of Management, Delhi Technological University, India.

Workshops and FDPs Attended

- 7-day FDP on "*Exploring and Analysing Data Using SPSS & AMOS*" at Bharati Vidyapeeth Institute of Management & Research, Paschim Vihar, New Delhi.
- 5-day workshop on "*Data Analytics*" held at University School of Management (USMS), GGSIPU, Dwarka, New Delhi.
- 2-day workshop on "*Digital Marketing*" organised by MAME-Technology Development Centre, Agra, at Rukmini Devi Institute of Advance Studies, New Delhi.
- 5-day workshop on research methodology at DSM, DTU.
- 7-day Faculty Development program titled "*Advanced Research Tools & Techniques*" at BCIPS, Dwarka Institute.
- One day Management Conclave on the Topic "*Big Data Analytics: Relevance in Modern Business Scenario*" organized by BCIPS, Dwarka on 23rd Feb, 2019.