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Mobile Business Services with special reference to Financial Sector

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CHAPTER ONE

Introduction to Mobile Business and Mobile Banking

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1.1. Introduction

The convergence of wireless devices and the Internet is creating an important new channel to business and the next wave of change across industries. Mobile business (or M-business) will enable organizations in every industry to expand their markets, improve their services and reduce their costs. M-business can best be described as the transaction of data between mobile devices. The most significant factor driving M-business is undoubtedly the proliferation of mobile telephones, wireless-enabled personal digital assistants (PDAs) and other devices that enable users to conduct transactions anywhere at any time.

Much of the discussion surrounding M-business has been narrowly focused on m-commerce, a subset of M-business that involves the use of mobile devices for marketing, selling and buying products and services over the Internet, "third generation" (3G) networks, or other supporting technologies. But it is believed that M-business is a far greater one that will build on organizations' e-business transformations and capabilities and provide the backdrop for a further qualitative shift in business operations. M-business will comprise a broad spectrum of applications, from communication and entertainment to consumer transactions and corporate services. These services will not be limited to one particular type of relationship, like business-to-consumer (B2C), but also will include business-to-business (B2B), business-to-employee (B2E), consumer-to-consumer and device-to-device relationships. For this reason, M-business has been dubbed A-A business : anytime, anywhere.

M-business is not just e-business without fixed connections, but it is an entirely new way of designing and deploying a wide range of systems and solutions that are :

- Personal.
- Convenient.
- Easy to use.
- Always available.
- Accessible in real time.

- Location sensitive.

The biggest risk for organizations is believing that M-business opportunities are far years away. The pace with which businesses accept emerging technologies is accelerating. M-business is here today, and growing at a tremendous rate (Singh, 2002).

Analysts predict that in the next five years the penetration of mobile devices will outpace that of televisions — and the more users have such devices, the more services they will demand. But behind the scenes, there are other drivers moving this revolution forward, which include :

- **Advancements in network technologies -** Mobile-network operators around the world are investing large sums of money in licenses and in building a new generation of networks. Network technologies that can support always-on connectivity will allow users to immediately send and receive voice and data services. At the same time, business investment is continuing apace in innovation at other levels of the network. Device manufacturers are creating prototypes of the products that might exist in the near future, and the race is on to create new standards for operating platforms.
- **Falling costs for airtime and wireless devices -** The cost of mobile devices and basic services such as voice and short messaging service (SMS) has plummeted. No longer is the mobile device a status symbol. It is becoming an intrinsic part of everyday life for millions of people.
- **The ability to link elements in different value chains, in real time, to provide a dynamic, personalized service -** Businesses those link services, many of which already exist independently, will streamline their customers' transactions. For example, linking aeroplane ticket purchases, car rental bookings and hotel reservations, then communicating all the information via messaging to mobile devices, would make travel planning easier. In order to offer these new services, businesses are beginning to enter into new alliances and partnerships, both within and outside their industries. This process in itself creates new possibilities and new business opportunities. M-business raises critical questions about strategic adaptation for every organization. It will herald the emergence of entirely new value

chains and business models, not to mention new levels of personalized service. It will lead to new business alliances and a wave of convergence between industries. At a fundamental level, it will enable organizations to dynamically reconfigure their value chains and develop new relationships with employees, suppliers, customers and competitors.

- **The ability to tailor services for end-users' various needs —** Taking one-to-one marketing to a higher level — will become a new source of competitive advantage. By changing the nature of communication and interaction, customer relationship management will take on a new dimension. M-business will also facilitate efficiency gains through workforce management. Mobile technologies offer the potential for tasks to be scheduled for the right worker, with the right set of tools, at the right location and at the right time. They also increase the likelihood that customer enquiries can be resolved on the first port of call.

Organizations that succeed at M-business will have to do more than simply place supply chain management systems onto mobile devices, or mobile-enable enterprise resource planning (ERP) solutions. They will have to capture business "events" and translate them in real time into whatever format is required. Transaction volumes will be high, and the required service levels will far exceed those delivered by today's technology solutions. M-business is set to make a major difference in all aspects of operations and management, and it opens up a whole avenue of major top-line revenue growth opportunities and bottom-line productivity gains for organizations in all industries. Organizations need to examine where their prospects for efficiency gains and improvements to customer service. This means anticipating changes in all areas of their value chains, which include : Administration, Human resources, Research and development, Production, Purchasing and sourcing, Sales and marketing, Distribution and logistics.

In this introductory Chapter, an overview of opportunities and challenges for mobile business is given. This includes various value propositions, implications of mobile devices, implications of mobile networks, mobile business value chain, advantages of mobile business over e-business, mobile business activity including value added

applications, legal concerns and implications to applications and service providers. This chapter also emphasizes the Indian scenario on mobile business and various business sectors which can benefit under M-business transformation. Various research agendas including application level issues, mobile service providers, and Indian traditional and cultural issues are discussed. An overview of Cellular service penetration and usage of mobile phone in India as well as in Karnataka State during 1997 to 2007 are discussed. The chapter also contains information about various easy banking service channels like internet banking and mobile banking. A qualitative survey of adoption of mobile banking facility as new distribution channel in public, private and foreign sector banks in India is made and various facilities under mobile banking services are identified.

1. 2. Features of Mobile Business

1.2.1. Value Propositions for M-business

Value propositions define the relationship between supplier offerings and consumer purchases by identifying how the supplier fulfills the customer's needs across different consumer roles (Porter, 1998). Specifically, it defines the interdependence between the performance attributes of a product or service and the fulfillment of needs. The value proposition furthermore solidifies the relationship between the customer and various dimensions of product value. Thus, customer satisfaction is merely a response to the value proposition offered by a specific product/service bundle. For e-business, the establishment of a value proposition is rudimentary to any consumer-oriented strategy creation.

The mobility afforded wireless devices shapes M-business into a disparate entity from conventional e-business. Consequently, value propositions are likely to be new, different and novel for mobile e-business. The primary advantage of mobile devices is to provide a superior offering of value-for-time to users. That is, by accessing the Internet/SMS through mobile devices, users will be able to realize additional value allowances for any specified period of time, which fixed-line users will not be able to achieve. Information may now truly become available anytime, anyplace and on any wireless device. As such, value propositions of e-business will be forced to change to

reflect the underlying dimensions of value-for-time for users. Specifically, M-business differs from e-business on the following value proposition attributes:

1. Ubiquity : Mobile devices offer users the ability to receive information and perform transactions from virtually any location on a real-time basis. M-business users will have a presence everywhere, or in many places simultaneously, with a similar level of access available through fixed-line technology. Communication can take place independent of the user's location. The advantages presented from the omnipresence of information and continual access to commerce will be exceptionally important to time-critical applications.

Mobile businesses, for example, can leverage this value proposition by providing alert notifications, such as for auctions, betting, and stock price changes, which are specified by the user as an important part of relevant personal content. As such, the real-time, everywhere presence of M-business will offer capabilities uniquely beneficial to users. Industries that are time and location sensitive, such as financial services and travel, are likely to benefit from businesses exploiting this value-added feature of mobile business.

2. Convenience : The ability and accessibility provided from wireless devices will further allow M-business to differentiate its abilities from e-business. People will no longer be constrained by time or place in accessing e-business activities. Rather, M-business could be accessed in a manner which may eliminate some of the labor of life's activities. For example, consumers waiting in line or stuck in traffic will be able to pursue favorite Internet/SMS based activities or handle daily transactions through M-business applications. Consumers may recognize a special comfort which could translate into an improved quality of life. One opportunity to increase value lies in M-business capabilities that allow consumers to shop at where they are not located. This ability to obtain information and conduct transactions from any location is inherently valuable to consumers. As such, M-business offers tremendous opportunities to expand a client-base by providing value-added services to customers. By making services more convenient, the customer may actually become more loyal. Consequently, communication facilities within M-business are key applications for the delivery of convenience. Consumers will be looking for M-business applications which can deliver functions like : sending and receiving e-

mail, voice mail forwarding, conference calling, faxing, document sharing, instant messaging; as well as transactional based activities.

3. Localization : Knowing the location of the Internet/mobile user creates a significant advantage for M-business over wired e-business. Location-based marketing, via global positioning technology, will soon be available in all mobile devices. Through GPS technology, service providers can accurately identify the location of the user. Utilizing this technology, M-business providers will be better able to receive and send information relative to a specific location. Since mobile devices like cell phones are almost always on, vendors will know the location of their customers and can deliver promotions based upon the likely consumer demands for that location. Location-specific information leverages the key value proposition of M-business over traditional e-business by supplying information relevant to the current geographic position of the user. M-business providers will be able to both push and access information relevant to the user's specific location. Mobile web-sites may serve as points of consolidation of consumer information and disseminate the relevant information for a particular location based on profile data built on the user's past behavior, situation, profile and location. As such, real time discounting may become the "killer application" for M-business.

4. Personalization : Mobile devices are typically used by a sole individual, making them ideal for individual-based target marketing. Mobile offers the opportunity to personalize messages to various segments, based upon time and location, by altering both sight and sound. New developments in information technology and data-mining make tailoring messages to individual consumers practical and cost-effective. For example, upon employing mobile Internet device, advertising messages tailored to ones individual preferences can be provided. Relevance of material and the "de-massing" of marketing becomes possible through the personal ownership of mobile devices.

5. Conditions of Usage : The mobile user may be engaged into another activity, like traveling, meeting people, etc., rather than sitting in front of his/her desk top terminal.

6. Adaptability : Mobile business applications should be adapted to the environment of their clients. Adaptability is possible along various dimensions including the type

of the device in use, the currently available communication bandwidth as well as location and time.

7. Broadcasting : Some wireless infrastructures, such as cellular architectures and satellite networks, support broadcasting (i.e., simultaneous delivery) of data to all mobile users inside a specific geographical region. Broadcasting offers an efficient means to disseminate information to a large consumer population. This mode of operation can be used to deliver information of common interest to many users such as stock prices, weather information or for advertising.

A value proposition is developed as superior consumer value is created through an increasingly targeted Internet experience for mobile users. For M-business, the technological limitations magnify these value-for-time propositions. It has been estimated that every additional click-through, which a user needs to make in navigating through a commercial online environment with a mobile device, reduces the possibility of a transaction by 50 per cent (Durlacher Research, 2000). Providing the user with the desired, most relevant information without forcing a complex click-through sequence will significantly improve the effectiveness of any mobile e-business strategy. Value-for time propositions become maximized for those business strategies best able to implement M-business's distinguishing capabilities. M-businesses will become differentiated from traditional e-business based upon their abilities to integrate and actuate the advantages to the mobile devices. Various applications may provide differing value for mobile Internet users.

1.2.2. Implications of the Mobile Devices

Mobile devices that are of interest to mobile communication can be divided into four categories based on their processor, memory and battery capacity, application capabilities (SMS, WAP, Web, I-mode), as well as physical size and weight. These categories are (from weakest to strongest) : usual voice handsets with SMS capability, WAP phones, communicators/PDA with wireless communication capability, and laptops with wireless communication facilities. To be easily carried around, mobile devices must be physically light and small. The smaller and lighter the devices are, the *more portable* they are. In addition, a mobile device should be a

multipurpose device (voice phone, data transmitter, PDA, etc.) so that the user does not need to carry too many gadgets. Portability considerations, in conjunction with a given cost and level of technology, will keep mobile elements having less resources than static elements.

The devices have small screens and small multifunction keypads; the former fact necessitates the development of appropriate visual user interfaces, different from the PC or laptop. They have comparably less memory, disk capacity and computational power than traditional computing devices. Portable devices rely for their operation on the finite energy provided by batteries. Even with advances in battery technology, this energy concern will not cease to exist. This is because the conserved energy depends primarily on the weight, volume of the battery. There are higher risks to data stored and transactions performed in mobile devices, since it is easier for mobile devices to be accidentally damaged, stolen, or lost than fixed devices.

1.2.3. Implications of the Wireless Networks

The necessary networking infrastructure for wireless mobile computing in general combines various wireless networks including cellular, wireless LAN, private and public radio, satellite services, and paging (Wesel, 1998). As compared with wire-line networks, wireless communications add new challenges:

C-autonomy : The handsets in the wireless radio networks are normally not always communicating with the network infrastructure, i.e., they are unreachable. There are numerous reasons for this behavior that can be described under C(ommunication)-autonomy (Veijalainen, 1990). First, disconnections may be voluntary, e.g., when the user deliberately avoids network access during nighttime, or while in a meeting, or in other places where the user does not want to be disturbed. In cases that the handset does not have voice capabilities, and thus disturbing is not a big issue, it is still often reasonable to cut the wireless communications with the network to reduce cost, power consumption, or bandwidth use. The break in on-going communication or incapability to set up any communication can also happen against the will of the user, e.g., when a user enters a physical area where there is not any or not enough field strength for a successful communication battery becomes suddenly empty, or

hand-over between base stations does not succeed and the connection is therefore lost.

Bandwidth restrictions and Network topology : In the case of many wireless networks, such as in cellular or satellite networks, communication channels have much less transfer capacity than wire-line networks. This is caused by the fact that the used modulation and channel allocation schemes designed for voice traffic have rather modest upper bounds. Further, wireless communications are much more error prone than wire-line communications and require much redundancy in the channel coding of the payload.

Asymmetric communications : Some wireless networks offer asymmetric transfer capacity for up- and downlink. The asymmetric transfer capacity on uplink and downlink can be applied in a reasonable way if the network offers broadcast facility. This is unfortunately not a strong side of the telecom networks, because they were designed for connection-oriented point-to-point communications. Wireless LANs are better in this respect, because they apply packet broadcast protocols. GSM networks have broadcast facility on the control channels, but the amount of application data that can be transferred on them is small. The currently very popular short messages (max 160 characters) are an example of such data that is transferred over control channels. If used, e.g., to broadcast multimedia contents over the network, the network would collapse, because controlling the traffic would not be possible any more. Still, the asymmetric transfer capacity is an important asset in cases where the wireless client usually sends a short request and gets a large data set as a response.

Variant bandwidth and bursty traffic **:** Currently, multi-network terminals are emerging that can use several networks to communicate. Typical forerunners are the dual-band devices that are able to use 900 MHz and 1.8 GHz GSM networks. New products are emerging to the market that are able to also use WLANs and possibly Bluetooth, together with GSM, GPRS, and soon also UMTS network infrastructure. Wireless technologies vary on the degree of bandwidth and reliability they provide. In this respect one can speak of variable bandwidth. Another phenomenon also observable in the wireless world is bursty traffic which is the case with Internet-type networks and this holds in different time scales.

Variant tariffs : For some networks (e.g., in cellular telephones), network access is charged per connection-time, while for others (e.g., in packet radio), it is charged per message (packet). In the WAP environment there is a larger variety of tariffs, e.g., session-based, transaction-based, connection time-based, while in mobile e-commerce the range of tariffs is even wider.

Mobility : GSM infrastructure allows roaming all over the world, i.e., the user can get access to voice and data services basically in any other GSM network. Mobility causes diverse phenomena. The available bandwidth might vary, for instance, a mobile terminal may rely on low-bandwidth networks outdoor, while inside a building it may be offered reliable high-bandwidth connectivity or even operate connected via wire-line connections. Moreover, there may be areas with no adequate coverage resulting in disconnections while on the move. There may be also variability in the provision of specific services, such as in the type of available printers or local weather reports. Furthermore, the services offered by the telecom network used might differ from those at home. This might have drastic consequences for mobile business, if the e-commerce infrastructure used needs them. Finally, the resources available to a mobile element vary, for example, a docked computer or PDA has more memory or is equipped with a larger screen. Mobility also raises very important security and authentication issues.

1.3. Mobile business Value Chain

As described by Barnett et al., (2000), transport, basic enabling service, transaction support, presentation service, personalization support, user application, and content aggregators are the seven links in the mobile business value chain (illustrated in Table 1.1).

Table 1.1 : Mobile Business Value Chain

	Link Name	Function
1	Transport	To maintain and operate the infrastructure and equipment to guarantee data communication between mobile users and application providers.

2	Basic enabling service	To provide services such as server hosting, data backup, and system integration.
3	Transaction support	To provide the mechanism for assisting transactions, for security, and for billing users.
4	Presentation service	To convert the content of Internet-based applications to a wireless standard suitable for the screens of mobile devices.
5	Personalization support	To gather users' personal information, which enables personalized applications for individual users.
6	Content aggregators	To provide information in a category or search facilities to help users find their way around the Internet.
7	User applications	To carry out mobile commerce transactions for Mobile consumers.

From the perspective of a transaction, the following entities are the main participants in mobile business:

1. Customer. He or she can initiate a transaction in one place, receive the service in another place, and complete the transaction in a third place. The places can be in different cities, states, and countries.

2. Content provider. It provides customers specific content, which can be transmitted through a WAP Gateway or through a portal.

3. Mobile portal. Different from an Internet portal, it offers customers services with a greater degree of personalization and localization.

4. Mobile network provider. It plays different roles in mobile business varying from a simple mobile network provider to an intermediary, portal or trusted third party, depending on where it stands in the mobile business chain.

1.4. Advantages of M-business over E-Business

E-business has conquered the world. Despite the bursting of the dotcom bubble, it is hard to believe today how one managed to transact any business in the early 1990s without the Internet. Whether employed for information, support or advertising, nearly every business in the world of any size has a website. E-business has revolutionized how many companies do business, allowing for new business models and spawning completely new types of businesses. So with e-business less than 10 years old, is the world ready for something new, something with a potential of revolutionizing business practices the way e-business did? The answer is "Yes."

Like e-business that preceded it, M-business as a transformational force is here to stay. In the next few years, mobile business or M-business will emerge as a powerful new approach for conducting business. It will become as pervasive by 2008 as e-business had become by the late 1990s. While the transformation induced by M-business would be dramatic, it would not necessarily replace e-business. M-business would enhance existing e-business functions and applications and launch new ones, totally mobile instead of being tied to desktop terminals. In many ways, M-business would establish new patterns of doing electronic transactions, over and beyond what fixed-line e-business is capable of.

E-business happened because of the combined efforts of the personal computer, telecommunications, software, and office technology industries. M-business, similarly, is happening because of the combined efforts of the world's mobile handset manufacturing, telecommunications, computers, software, and office technology industries. In this massive global business, M-business is appearing as a new platform for creating product and service differentiation. Internet and e-business helped drive the supply and demand for multimedia computers. The underlying chip and display technology are upgrading at tremendous speed and as the mobile business matures, it would transform the handset – rendering it as different from its predecessors as today's desktop PC screen is from the green-tinted, non-graphic PC screen of the early 1980s.

The variables that are likely to set M-business apart from e-business are as follows :

User Experience

The biggest differentiator between e-business and M-business is the sensory experience of the user. In e-business, the user is in a stationary position in front of a PC terminal, and interfaces the content using a keyboard and point-and-click devices. In M-business, this is replaced by total mobility and the terminal can be voice or touch activated.

Different Terminals

A disposable terminal is probably the most radical way of describing how different terminals could be. Today's manufacturing technology aided by the unrelenting progress of Moore's law will allow an ever-increasing differentiation of terminal offerings. Terminals that are bendable, so that they can be rolled up, have been demonstrated at trade shows. Miniature sized terminals allow for packaging into ever-changing shapes and forms. Pre-paid phone service is just the introduction to other pre-paid services, complete with 'free' terminals. Multimedia is here to stay and will continue to evolve.

Multi-Transaction Services

M-business services could be scheduled and delivered in multiple ways. Users can choose to have a variety of services delivered at the times and places that they specify. In some cases, the services can be pre-scheduled (for peak hours, late night, birthdays, etc.). In still other cases, the network and the device can make intelligent assessments of what services are needed and proffer such services.

Integration with Enterprise Applications

With M-business, a business enterprise could move most of its capabilities out into the field. Services and applications that required office visits and meetings could now be delivered while moving with full access to all enterprise applications residing on business IT and information systems.

Field Third Party Applications

Terminals that are M-business ready can receive services not just from the primary wireless service providers but also from a variety of third-party providers. Most of these third-party providers would work through the wireless service operators. In some cases, the terminal may be able to communicate directly to third-party wireless service providers, through ad-hoc information exchange set ups or direct connectivity. The source of applications and information therefore becomes transparent to the user.

Geographic Positioning

From a continent to the corner of a street, M-business networks would be able to locate the user and tailor the service mix to the geographical location, keeping in view the constraints and opportunities of the geographical setting as well as the preferences of the user. A service would therefore work differently in India than in Honk Kong, London or New York based on profiles or regional preferences.

Mobile Flexible Configurations

Today's user profiles – whether in e-business or M-business settings – show the way to flexible configurations. But rather than requiring manual setups and changes, the m-services of the future will be automatically configured. So the minute a user leaves the home area, the service will be automatically configured with ring-tones, forwarding information and even downloaded information as the user travels. If the user wants to configure it in a new way, a simple code will download a new configuration.

Integration with Mobile Services

New M-business services would be easy to integrate with preexisting mobile services. For example, M-business offerings could easily incorporate a variety of existing messaging services, SMS and e-mail. They could also use conference bridges, network based calling, voice mail as well as many emerging services like downloadable hand-set applications, Multi-Media Messaging and information services.

Mobile Flexible Services

With easier integration of services, users would be able to avail of pre-packaged as well as programmable service-mixes. Some M-business systems would offer a service bundle from which the users would be able to choose and blend a variety of services.

Flexible Location

With M-business, the user can work, do daily chores, and/or play at work, home, recreational, shopping, and vehicular locations. The coming blurring of roles in the era of M-business will spawn multiple opportunities as well as trigger major social changes.

Network-enabled M-business Services

Extrapolating existing business approaches and paradigms into new areas is the most obvious way of looking into the future. For M-business, the problem with this approach – treating M-business as a simple extrapolation of e-business – is that it fails to take into account the dramatic differences (as well as different capabilities) between the two. Some of the most dramatic differences are screen size and the mobile user experience. But equally important are the fact that M-business services will be built (assembled) from different 'piece-parts' than e-Business. Wireless service operators will deliver some of these 'new' piece-parts and many of these are being discussed and implemented today. Examples include location information Application Programming Interfaces (APIs) and services. Certainly in future, there will be other, as-yet-unknown service piece-parts.

Basic Data Transport Services

At the most basic level, adding data transport capabilities to simple mobile voice telephony opens up some opportunities for M-business. The evolution of Web-browsing from today's slow WAP speeds to higher data rates will revitalize some of this market. Pure data transport to support custom terminal based network applications, like those used by today's package delivery services, will continue to

grow as enterprises start to capitalize on higher speed data transport to develop new business productivity and enhancement applications.

Additional Network Services

Enhancing basic mobile data access and web-browsing capabilities with additional network services and specialized terminals add more value to the M-business concept. Examples of this include the handheld device, which provided mobile email and messaging capabilities. Present day technology provides GPS capabilities in the mobile phone, making it a useful device for navigating in cities as well as in wilderness. Multi-media messaging is certainly positioning itself as a major value added service, replacing today's SMS as a key data service. Some network data services will utilize location information, for example delivering messages only in certain areas.

APIs for Network Services

APIs for network services allow for tighter service integration of Messaging, Location Based Services, Usage monitoring, and Billing. These API's are intended to be used by third parties or business enterprise applications to offer services that are more closely integrated with network services, utilize network billing or deliver services that are based on where the user is located.

Additional Services

As an additional value-adding step, the wireless operator can offer additional M-business oriented services providing complete value added information, tracking, billing or messaging services. These complete service packages can be utilized by business customers in order to develop more complete applications for their users.

Complete Integrated Service Packages

As an ultimate value-adding step, the M-business service provider can design and offer fully integrated service packages that solve complete problems.

1. 5. Mobile Business Activities

The essence of mobile business revolves around the idea of reaching customers, suppliers, and employees regardless of where they are located. It is about delivering the right information to the right place at the right time. This flexibility of mobile business is made possible by the convergence of the Internet, enterprise applications, and wireless technology (Clarke, 2001). Mobile business, enabling information exchange and purchases using mobile devices, provide different things to different people: to customers, it represents convenience; merchants associate it with a huge earning potential; and service providers view it as a large unexplored market. Japan and Europe are already witnessing early successes in mobile business. In Japan, NTT DoCoMo's iMode phone has emerged as a great success highlighting the application of wireless technology to a business environment. Introduced in February 1999, NTT DoCoMo iMode provides a continuous Internet connection via mobile phones, and connects users to a wide range of online services, many of which are interactive. All services link directly to the iMode portal Web site, and users can access any service virtually instantly by pressing the mobile phone's dedicated iMode button, iMode has already attracted more than 13 million Japanese consumers, particularly youth. Connected continuously to the Internet, these 13 million users can send e-mail, get stock quotes, and play online games. Soon they will be able to use on-line map guides and even conduct commercial activities by phone. Europe has also embraced a simple mobile data service whole-heartedly. Short Message Service (SMS) technology makes wireless e-mail a reality, and the new Wireless Application Protocol (WAP) facilitates Web browsing and other Web-based transactions on mobile phones. Bluetooth, another European data initiative, further establishes a common standard for a wide range of appliances and industrial devices to communicate wirelessly. With new developments in technology, it is estimated that more than half of the European mobile business market in the next few years will include financial, advertising, and shopping services (Muller-Veerse, 2000).

1.5.1. Value-Added Applications

As mobile business extends the current Internet sales channel into the more immediate and personalized mobile environment, it also revolutionizes the business

world by presenting it tremendous opportunities to provide additional value to hard-to-reach end customers (Keng Siau, 2001). These value-added services include:

1. Easy, timely access to information (e.g., the latest availability of flights) : Delivering a service that not only reaches more people but also is available all of the time, mobile business enables consumers to make purchases from wherever they are, whenever they are ready. This will result in an increase in revenue to the company providing the mobile services.
2. Immediate purchase opportunity (e.g., last minute purchases of tickets or gifts) : Provided with a personalized, immediate opportunity to purchase, the customer will make the purchasing decision on the spot and not go to an alternate source.
3. Wireless coupon based on user profiles : Since a mobile device's location can be determined precisely, the stores around the mobile device user can transmit user-specific information, such as current sales or specials, and alert the user about similar upcoming events. Wireless coupons, which enable an advertiser to deliver a geographically targeted and time-sensitive message to a willing consumer directly with a promotional offer virtually anytime and anywhere, will increase acquisition efficiency and allow direct offers suited to user profiles or stated user's preferences.
4. Beaming money : Some bank transactions such as withdrawals and deposits will be conducted via mobile terminals in the near future. Electronic money can even be transferred to mobile devices allowing the latter to be used for electronic payments.
5. Buddy finding : This location technology will quickly alert a user when his or her friend or colleague is nearby. It will also help the user to locate the nearest restaurant or ATM.

The only limit on the number and types of mobile business applications is our imagination. Varshney et al., (2001) identified a few important classes of applications such as mobile finance applications, mobile advertising, mobile inventory management, and product location shopping. As wireless technology further evolves, its application in business will only be broadened by more and more innovative mobile business possibilities.

1.5.2. Legal Concerns

Apart from its technical and business obstacles, the implementation of mobile business has its legal concerns too. The application of traditional law to the mobile Internet is not always a straightforward process. Legal issues plaguing mobile business are similar to those facing e-business. Some of them are how to maintain privacy, how to deal with defamation, how to protect intellectual property, and how to treat Internet taxation (Deitel et al., 2001). Like the wired Internet, the wireless Internet also poses significant challenges to our legal structure.

1.6. Implications to Application and Service Providers

The prospect and advantages of mobile business may appear obvious to many of us, but the path to success using mobile business is not necessarily so plain. Technical restrictions of mobile devices and wireless communication, business concerns, and legal constraints complicate the practical use of mobile business. The obstacles confronted by mobile business applications and service providers, and the solutions available to some of the problems are given below :

1. Changes in business strategies : To stay competitive and realize genuine productivity benefits from mobile business, many organizations actually need to be redesigned. They will have to make fundamental changes in organizational behavior, develop new business models, and eliminate the inefficiencies of the old organizational structures. The process of rethinking and redesigning is a demanding task.

2. Investment risk : A major problem faced by mobile business is the huge investment required to implement and operate it. Engineering massive organizational and system changes to reposition the organization strategically is complicated as well as expensive. How can organizations obtain a payoff from their investment in wireless technology? Understanding the costs and benefits of mobile business is difficult.

3. Customer confidence : Customers need to be assured that their financial information is secure, and that wireless transactions are safe. The mobile business service should improve its reliability and stability by providing comprehensive technical and operational support to give users positive experiences and increase

their satisfaction, and thus enhance the service provider's reputation and build customers' loyalty.

4. Simplicity in use : Many who try mobile business are frustrated and stop using it after a few attempts. Users need a simple experience, directly relevant to their mobile needs, and to enjoy the benefits of immediacy. Simplicity in use is critical to a successful mobile service.

1.7. Mobile Business - Indian Scenario

India is at a stage where all trends suggest an imminent surge in M-business. The IT Act, convergence, e-governance initiatives, mobile technology and infrastructure, the globalization of the economy, the distinct drive within public and private sector firms for efficiency and the use of technology to achieve this are all good signs. M-business has already started changing the rules of the game on the Indian business front. An integration of mobile technology with e-business offers significant business advantages and opportunities beyond e-business. Global projections are astonishing with Strategy Analytic predicting the total revenue from M-business transactions to reach US$ 500 billion by 2008 (Ozair et al., 2003). Statistical predictions in the Indian context too seem to be optimistic. Remarkable cellular phone penetration, and the increasing Internet subscriber base in India has definitely set a conductive ground for M-business revolution.

Today the Indian consumers have a host of options available and thus can choose a mobile device that suits her/his budget and lifestyle. Further more, cell phone manufacturers, service providers, and software/network providers have started coming together to let the Indian consumer to get a feel of M-business phenomena. Indian cellular players are continuously striving to delight customers by increasing their coverage and introducing value added services. Cellular infrastructure rollout is faster than fixed line and in 2002, it is estimated that the cellular subscriber base will surpass that of the fixed line by 2008. But, due unpredicted growth, cellular subscriber base surpassed that of the fixed line by 2006. In fact the growth of cellular infrastructure in India is fast becoming an index of development of states. States like Maharastra, Gujarat, Andra Pradesh and Karnataka are getting expensive coverage

in every district and town. Although early winning M-business applications like mobile messaging, ticketing, stock trading, banking have become widespread in developed countries, it seems to be gaining grounds in Indian market as well. Banks are tying up with cellular service providers to provide a full range of m-banking facilities to its customers. HDFC bank is the first Indian bank to offer mobile banking services followed by others like ICICI and Global Trust.

In India, the people are not worried about online payment. But they are worried about the security aspects. M-business sites have to be certified by an authority, like Verisign, which helps to build confidence about a site. Instead of online payment, cash on delivery is a very good model for India. Companies forcing their customers to make online payments are not good. Instead, they should look at educating their customers and then asking them to make use of the online payment mode. It was believed that the major hurdle would be posed by an absence of reliable bandwidth backbone and affordable Net access device. But presently the availability of optimum bandwidth as a result of adapting new mobile technology (3G) and the availability of handheld wireless Internet devices in the range of Rs. 1,000 to 3,000 certainly boost the M-business market in India.

The following sectors in India will get benefit under M-business transformation (Computers Today, 2002) :

1. Banking industry : Possible facilities that could be offered include Account Balance Enquiries, Last 'n' transactions, Utility Bills Payment, Cheque clearing notifications, Inter account Transfers, Statement and Cheque book requests, Access to Portfolio management and other share dealing services.
2. Share market industry : Mobile phone-based stock trading allows users to receive instant updates on market information. The system allows users to identify which stock they are interested in and what levels of alert they want. The warnings are then sent to the user's handset, and then they can buy or sell immediately without going to a computer.
3. Shopping : Many mobile service providers have planned to launch services that promote shopping using mobile. Fabmart, Zee marketing are few examples.

Customers can pay for their purchases through their mobile phone bills. Text message shopping is already in use to buy books, CD etc., at bargain rate.

4. Building and construction materials industry : The fragmented nature, geographical spread and multiplicity of levels in the distribution structure for most products in this industry offers unique challenges and opportunities for e-business and M-business initiatives. M-business adaptation in this sector would be driven by factors such as improving brand building and customer services, penetrating markets in the semi-urban and rural pockets, improved dealer management, and ensuring timely supplies and services.

5. Metal industry : M-business adaptation in the metal sector would be primarily driven by working with lower inventories and adapting IT techniques and catering the customers through remote devices. This will increase market coverage and widen distribution reach, improved dealer management and controlling cost at every stage of the value chain. Metals, as commodity, also provide considerable scope for on-line tendering and auction applications.

6. Office automation industry : The Indian office automation industry is another potential candidate to adopt M-business strategies to its sales and service. The major benefits would be improved customer service, wider market coverage, and marketing and procurement costs reductions.

7. Packaging industry : The Indian packing industry is another potential sector for adopting M-business. Handling order taking and order placement through mobile, the package industries can improve supply efficiency, customer service and market coverage.

8. Indian engineering industry : Indian engineering industry is another potential candidate for M-business implementation. Front-end activities like enhanced customer service and receiving new order, and back-end activities like enhanced vendor communication and booking purchases can emerge key priority areas in this industry.

9. Electrical and electronics industry : Implementing e-business and M-business in these industries is expected to result in improved sales and customer service through better information dissemination.

10. Chemical industry : Indian chemical and Petro-chemical industries have considered on-line business as a cost reduction tool. By adopting these strategies they would improve supply chain efficiency and reduce marketing / procurement costs.

11. Hotels and tourism industries : Booking hotel rooms and resorts at any time, at any place can be done through M-business options.

12. Pharmaceutical industry : Indian pharmaceutical industry views M-business as a tool that would aid community building, and to smaller extent, reduce costs through better supply chain management. They also expect to use this medium to provide people with more information on diseases and the products used to cure them.

13. Logistics industries : Both transportation and warehousing parts of logistics are potential candidates for M-business implementation due to the fact of increase in products sold on-line. The need to move a large volume of small parcels and the increase in customer expectations.

14. Auto – components industry : The Indian auto-component industry is another prominent candidate for M-business implementation. Due to the increasing competition in the domestic market and threat of imports, necessitating widening of market reach, and exploring export markets.

15. Lottery and Betting : All on-line lotteries and betting can accept the bets through the message delivered by SMS. The M-business technology allows not only mobile betting but also, using a mobile video-phone, be able to watch the actual race while moving on the road or while traveling in an aeroplane.

16. Mobile positioning services : With mobile positioning services the mobile phone could become a personal tracking device, allowing your family friends and employer to know where you are at all times. Mobile positioning integrates with satellite positioning systems and let people tell others where they are.

1.8. M-business Research Agendas

Research plays a vital role in solving problems in current mobile business applications and directing its future development. The possible research activity to be carried out in mobile business in order to correct or address the challenges are :

Application Level Issues

At the application level, one can find a non-exhaustive list of mobile business applications. Some of them such as mobile news subscriptions, mobile file exchanges, and mobile e-mail services have already been developed and used. Others such as mobile multimedia on demand, mobile distance learning, mobile financial transactions and mobile telemetry are in the development phase. While it is still early to predict how successful the emerging mobile business applications are, one would expect several important research issues to be addressed at the application level to derive useful principles for designing such applications and developing businesses around them. The important application level research issues include:

1. Usability research : The usability of an application generally refers to how well it is designed to enable users to perform their tasks easily and effectively. In mobile business, usability issues are particularly important as primary constraints of the mobile environment. Usability concerns will impel users to demand far better application designs, compared to wired applications. To evaluate the usability of mobile business applications, a comprehensive methodological and comparative framework will have to be developed. Application case studies should be conducted using the methodology and framework so that new design principles for mobile business applications can be tested.

2. User interface design : Unlike the wired computing environment where large screens are available, mobile business applications have to operate on small and often wearable mobile devices that can only include small screens. In some cases, the mobile business applications may have to exploit the use of voice channels to enhance the efficiency of the user interface. Some studies on the user interface for mobile devices have been reported in the Workshop series on Human Computer Interaction with Mobile Devices (Rock, 2000). The possibility of using Wireless Storage Area Network (WSAN) and Organic Light Emitting Display (OLED) technologies along with voice recognition techniques will certainly change the M-business scenario dramatically.

3. Mobile business models : While electronic commerce within the wired environment has introduced new business models such as e-auction, e-shopping, e-

banking etc., the mobile environment in which the mobile business applications reside will require further adaptation of these business models. One reason for this is that mobile business provides opportunities for telecommunication services, e.g., SMS messaging, phone, billing, etc., to be integrated more tightly with the mobile services. In addition to the usual B2B and B2C business applications, one would expect the individually owned mobile devices to make it easier to design and implement C2C (customer-to-customer) or P2P (peer-to-peer) applications such as trading music or video files and financial transactions. In order for mobile business to succeed, it is also vital to ensure that all the related applications and services can be accessed with ease and little cost.

Indian Traditional and Cultural Issues :

Indian organizations can benefit from world wide implementation experiences and apply them after local conditioning. The adaptations will have to be made in the areas of localized business practices, telecom infrastructure, security requirements and local language interfaces. M-business implementation in India has been affected by both external and internal factors. External factors include a low number of customers accessing the Internet/mobile devices for their purchasing needs, poor communications infrastructure, gaps in legal and regulatory frameworks and issues concerning payment gateways. The Indian IT Act is not clear on issues regarding taxation of electronic transactions, and is silent on protection of intellectual property rights in net space. Internal barriers include perceived uncertainties with regard to benefits, territory protection issues and a lukewarm response from business partners. In most business companies IT systems and processes are not geared to maximize the benefits of M-business. The mobile network penetration is very low and less than 10 per cent of internet users presently buy products / services online. Apart from B2B market, B2C market is expected to get more benefit due to the advantage of convenient, speedy and personalized services of M-business. A day will surely come for Indian former to sell his products in C2C market and carryout his financial transactions and payments using mobile business devices in near future.

1.9. Mobile Service Providers - Indian Scenario

Growth of Cellular Market in India :

Since the mid-1990s, the penetration of mobile phones in developed and developing economies has been explosive. Whereas in 1997 only 215 million people were using mobile communicating devices worldwide, by 2001 this had grown to a massive 961 million, further growing to 1.16 billion by 2003. During 2005, Western Europe exhibited highest penetration of mobile phones (79per cent), followed by North America (48per cent), and Asia (12per cent). In 2002, China was reported to have become the largest internet and the biggest mobile phone market in the world, with 59.1 millions internet users and 200 millions mobile phone users (Wong et al., 2004).

The mobile phone made its debut in India in 1995 and struggled for the first three years to touch the 1 million mark in 1998. Growth started perking up thereafter to reach 3 million in 2000, 5 million in 2001, and 10 million in 2002. As of September 2005, there were nearly 64 million cellular subscribers, out of which GSM were around 51 million and CDMA were around 13 million. The nation's mobile-phone subscriber base in 2005 grew at an astounding rate of 47per cent to reach approximately 75.3 million at the end of 2005, up from 48 million at the end of 2004. India, in 2005 emerged as the world's sixth-largest market in terms of mobile-phone subscribers, and will become the second largest in 2010, second only to China. Indian market for mobile phones will rise to approximately US$ 5.8 billion in 2010, double the US$ 2.4 billion in 2005.

There are 125 state-of-the art Networks, out of which 83 are of GSM. But finally due to a variety of reasons like a new telecom policy that removed the problems of mobile operators and the crashing of handset prices, mobile telecom subscription exploded in the country to reach 100 million in June 2006. India represents one of the most exciting opportunities for mobile services in the coming decade and these opportunities can be tapped by adding value to telecom services. The subscriber base for telephony services continued to maintain its growth during the month of August 2006 also. During August 2006, 5.90 million mobile subscribers and 0.04 million-fixed line subscribers were added to project net 5.94 million subscribers as

compared to 4.94 million net additions during July 2006. It may be noted that the WLL (F) subscribers of all the operators are now being considered as mobile subscribers in view of clarification issued by Department of Telecom (licensor) and accordingly the mobile and fixed line subscriber figures from April 2006 onwards have been changed. At the end of August 2006, total Fixed lines were, 40.87 millions and mobiles were 123.44 million. The gross telephony subscribers in country reached 164.31 million as compared to 158.37 million in July 2006. The overall tele-density reached around 14.80 in August 2006 as compared to 14.40 at the end of July 2006. The net addition of mobile and fixed line subscribers in the first five months of FY 2006-07 is 23.99 million as compared to 10.51 million in the corresponding period of FY 2005-06 (Annual Report of TRAI, 2005).

Cellular phone subscribers rose in India by a record 6.6 million in October 2006, keeping the country's place as the world's fastest-growing mobile phone market, according to data released. Subscribers for the GSM network grew by 4.7 million in September, while the number of mobile phone subscribers using CDMA technology increased by 1.9 million. The Cellular Operators Association of India, which includes mobile phone companies offering services on the GSM network, said the country now has about 96 million GSM-based phone connections. CDMA phone service providers say they now have about 40 million subscribers. The total number of mobile phones in the country stands at about **136 million** at the end of October 2006. The gross telephony subscribers in country reached 176.78 million at the end of October 2006 as compared to 170.26 million in Sept. 2006. The overall tele-density reached 16 in October 2006 as compared to 15.44 at the end of Sept. 2006. However, India still lags far behind China, which has more than 420 million mobile phones — the most in the world. It is estimated that the mobile-phone subscriber base in India will rise to 500 million by 2010, resulting in a cellular penetration rate of 40per cent of the nation's population. The saga of Indian cellular subscriber growth after its beginning in the year 1997 to the year 2007 is given along with the growth of Fixed line telephone for comparison, in Table 1.2. The detailed growth rate of GSM Cellular Phone usage in India and Karnataka state for the period 2001 to 2007 is shown in Table 1.3.

Table 1.2 : Subscriber growth of Basic and Cellular Service in India :

Year	Fixed Line Telephone (Mn)	Cellular Line (Mn)
1997	14.54	0.34
1998	17.80	0.88
1999	21.59	1.20
2000	26.51	1.88
2001	32.44	3.58
2002	37.94	6.43
2003	40.62	12.69
2004	42.58	33.60
2005	45.91	52.21
2006	48.63	65.37
2006 (March)	46.78	93.04
2006 (October)	40.00	136.00
2006 (December)	40.50	160.00
2007 (September)	40.92	209.08
2008 (January)		231.00
2010 (estimated)	40.00	500.00

Table 1.3 : Cellular Statistics (GSM only) in India and Karnataka State from 2001 to 2007 :

	Year	**Jan**	**Feb**	**March**	**April**	**May**	**June**
In India	2001	3273839	3417540	3577095	3702834	38715414	4077962
	2002	5737907	6048225	6430814	6714753	6990146	7339228
	2003	11163141	11756047	12687637	13335153	14175910	15148796
	2004	23362322	24621612	26154405	27174418	28175452	29203746
	2005	38871624	39774278	41002843	42121496	43346706	44920004
	2006	62019144	65188550	69193321	71461799	75290092	78484849
	2007	110419603					

In Karnataka	2001	200628	209657	218649	224281	236019	250820
	2002	356945	382084	400134	412376	424344	447197
	2003	696650	720602	821413	889199	937572	993868
	2004	1583895	1680672	1761415	1829391	1907914	1977985
	2005	2689143	2734761	2810176	2888110	2982116	3102100
	2006	4444250	4610747	4937921	5139327	5421190	5619488
	2007	7826878	8699216				

	Year	**July**	**August**	**Sept**	**Oct**	**Nov**	**December**
In India	2001	4288987	4542187	4798508	5011341	5224913	5478932
	2002	7690268	8171392	8531991	9025935	9730543	10480430
	2003	16298598	1739966	18300557	19346303	20725950	21991743
	2004	30593166	32026878	33559526	34794031	35937490	37378807
	2005	46874789	48914029	50873902	52987335	55315260	58503224
	2006	81562891	84418397	87001631	100521757	103690251	107268314
	2007		**201,286,738** (GSM + CDMA)	**209,083,613** (GSM + CDMA			
In Karnataka	2001	260915	275118	295263	307043	311224	329346
	2002	466258	478762	497978	548732	588407	649584
	2003	1062416	1153133	1232800	1332694	1405979	1493119
	2004	2119177	2287814	2384271	2463751	2535364	2616424
	2005	3252198	3360497	3463709	3623276	3774881	3992025
	2006	5946821	6281287	6573690	6893443	7224599	7475837
	2007		**13,581,509**	**14,082,923**			

India continues to be one of the fastest growing major telecom markets in the world. Sweeping reforms introduced by successive Indian governments over the last decade have dramatically changed the nature of telecommunications in the country.

The mobile sector has grown from around 10 million subscribers in 2002 to 80 million (including both GSM and CDMA services) by early 2006, aided by a mix of higher subscriber volumes, lower tariffs and falling handset prices. Whilst GSM technology remains the dominant technology platform in the market, CDMA has quickly grabbed a 23per cent market share. Despite the huge mobile subscriber base, this represented only around 8per cent of India's one billion plus population. Clearly, the mobile industry should continue its strong growth. The country's telecom regulator, the TRAI, says that the rate of market expansion would increase with further regulatory and structural reform. The adoption of Unified Licensing, a change in the Access Deficit Charge regime, increased sharing of infrastructure and coverage of new areas by operators will contribute to ongoing growth.

India's wireless service rates are now among the lowest in the world. From their peak rate of around 50 cents per minute in 2003, mobile tariffs have decreased significantly and now are in the range of about 2 cents per minute. This decline in rates is expected to continue in the future. Meanwhile, wireless carriers over the last two years have spread their networks in India's rural and semi-urban areas to tap the next wave of growth.

With about 70per cent of India's population living in small towns and villages, carriers now are planning to deploy cellular networks that will cover all 5,200 towns and half of the 600,000 villages by the end of 2006, thereby providing coverage to 75per cent of the Indian population. As carriers expand coverage into rural India, they will be confronted with the daunting tasks of developing a countrywide infrastructure and improving and maintaining quality of service (QoS) while simultaneously dealing with the potential of dramatic decreases in average revenue per user (ARPU), especially for new subscribers.

While tele-density in urban areas is close to 40 per cent, it is only about 10 per cent in rural areas (average tele-density is 23per cent as on September 2007). Operators including Airtel, Reliance Communications and Idea Cellular have earmarked a significant part of their investments this year for roll out in rural areas. Based on

Government of India's recent decision to set up infrastructure for mobile telephone networks in the rural areas with supporting subsidy, two or more service providers can now share the passive infrastructure such as transmission towers and power equipment. Given that the number of users per square km in the rural setting is likely to be much lower than in towns, and the average revenue from them is also expected to be considerably less, sharing passive infrastructure makes eminent sense for even competing cellular phone companies. Indeed, it has taken out so much of the business risk that four cellular companies have not sought even a rupee of government subsidy to run the service for 2.5 lakh villages. From all indications the cellular route is about to provide the most cost-effective solution yet to connecting rural India.

It is believed that the subscriber growth and phone demand in India will continue to be extremely price elastic and as handset prices in India continue to fall, the number of handset unit shipments will increase. As this happens, the Indian market for mobile handsets will more than double between 2005 and 2010, making India a difficult market to ignore for global phone makers.

In India by 2008, technology will evolve to digital switching and transmission, VoIP and advanced Broadband. To ensure rapid evolution of technology, there is a need to light-up India's extensive optical fibre network. Already 6,70,000 km of optical fibre has been laid out in the interior areas by service providers including BSNL. Optical fibre network together with wireless technologies such as 3G can be effectively used to provide high quality telecom coverage to rural areas and thus bridge the digital divide. The telecom world may still be marveling at India's mobile telephony growth, which at 230 million connections has emerged as the fastest growing in the world.

1.10. Evolution of Internet Banking In India

Indian banking industry, today, is in the midst of an IT revolution. The technology changes have put forth the competition among the banks. This has led to increasing total banking automation in the Indian banking industry. New private sector banks

and foreign banks have an edge over public sector banks as far as implementation of technological solutions is concerned. However, the later are in the process of making huge investment in technology.

The financial reforms that were initiated in the early 90s and the globalization and liberalization measures brought in a completely new operating environment to the banks. Services and products like Anywhere Banking, Tele-Banking, Internet Banking, Web Banking, M-Banking etc. have become the buzzwords of the day and the banks are trying to cope with the competition by offering innovative and attractively packaged technology based services to their customers.

The Government of India enacted the Information Technology Act, 2000, generally known as IT Act, 2000, with effect from the 17th October 2000 to provide legal recognition to electronic transactions and other means of Electronic Commerce. Reserve bank of India had set up a ˜Working Group on Internet Banking" to examine different aspects of Internet banking (I-banking). The Group had focused on three major areas of I-banking i.e., (i) technology and security issues, (ii) legal issues and (iii) regulatory and supervisory issues. RBI had accepted the recommendations of the Working Group and accordingly issued guidelines on *Internet banking in India* for implementation by banks. The Working Group has also issued a report on Internet banking covering different aspects of I-banking. Considerable progress has been made in consolidating the existing payment systems and in upgrading technology with a view to establishing an efficient, integrated and secure system functioning in a real-time environment. Major projects under implementation are electronic clearing, centralized funds management, structured financial messaging solutions and the Indian Financial Network (INFINET). Facilities under Electronic Funds Transfer (EFT) have been upgraded and their spatial reach expanded with multiple settlements in a day. Foreign exchange clearing has been initiated through the Clearing Corporation of India Limited (CCIL). Adequate security features are being incorporated into the EFT. Preparatory work for the real time gross settlement (RTGS) is complete (RBI, 2001).

A cost comparison study done by IBM global services consulting group clearly shows the advantage of using Internet as medium for banking services over other traditional mediums (Fig 1.1). As per the recent survey, traditional banks spend 60per cent of the revenue generated to run a branch. Whereas, the cost of providing same services via Internet comes out to be only 15per cent. This is a huge savings for banks and consumer. Definitely the consumer is the principal beneficiary of the Internet Banking. He will be access the same services with more efficiency at low cost. E- banking will have two-fold effect, first, it will reach the remote consumer and second it will create the awareness among consumer about benefits of investment in different financial products.

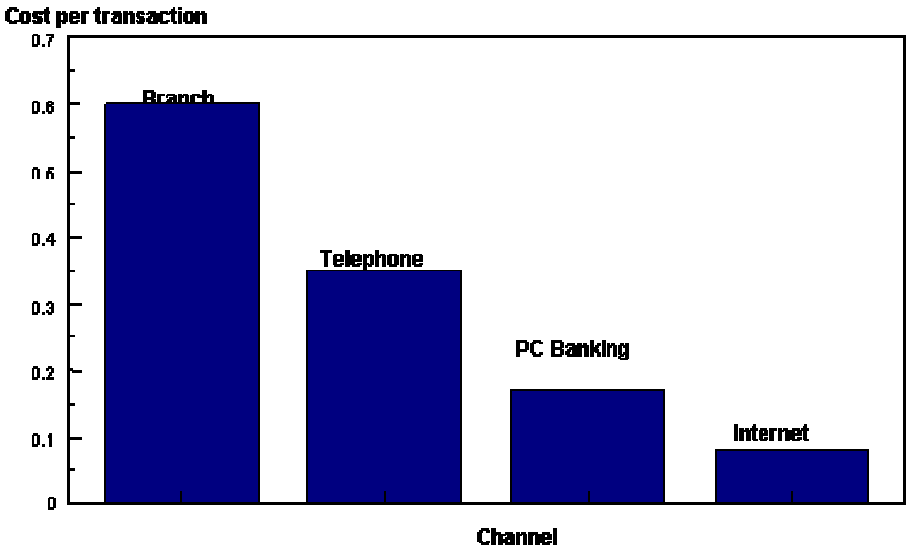


Fig. 1.1 : Cost of Internet Banking over other mode of Banking (Source: IBM global services consulting group)

As per an Internet survey conducted by NASSCOM the Indian Internet market grew steadily in terms of subscribers. There is a growth of 30per cent in March 2002 compared to the 1.1 million active subscriber base in March 2001. The number of Internet subscribers in the year 2004-05 is reached to 7.7 million, with the user base to grow over 50 million. India's Internet user base is growing at a rapid pace. India's Internet population grows to 29 million by March 2003 from 10.7 million in 2002. Banking and finance market has got the largest share i.e. 21 percent among the other

sectors of economy in using information technology. Thus there is a lot of scope for banking institutions to expand their Internet banking services to have a more sophisticated customer base.

Private and Foreign banks have been the early adopters of e-banking while the Public sector banks are also beginning to hold on to the competition. ICICI Bank and HDFC Bank have taken a lead in introducing e-banking in India. ICICI Bank is the first one to have introduced Internet banking for a limited range of services such as access to account information; correspondence for the first time in 1996 and recently, funds transfer between its branches (Rajneesh and Padmanabhan, 2002). ICICI is also getting into e-trading, thus offering a broader range of integrated services to the customer. Other banks also followed the suit. However, 1996-98 was the period of Internet banking adoption while the Internet banking usage gained importance only in 1999 after ICICI, Citibank, IndusInd Bank and HDFC Bank were the early ones to adopt the technology in 1999.

Internet Banking is conducting ones banking or bank account online through a computer and a internet connection. The system is updated immediately after every transaction automatically. In other words it is said that it is updated 'on-line, real time'. Through internet banking one can check the status of his/her account, place queries and also can be facilitated with a wide range of transactions simultaneously.
In India, the regulatory body has not yet sanctioned virtual bank, in abroad there are banks like EGG Bank or NET Bank, which only have a virtual presence without any physical branches. Internet Banking has three basic features. They are as follows:

- The banks offer only relevant information about their products and services to the mass.
- Few banks provide interaction facility between the banks and its customers.
- Banks are coming up with arrangements of utility payments, like telephone bills, electricity bills, etc.

The current statistics show that hardly 10 per cent of Indian customers uses the internet for banking. Among all the facilities provided, the maximum of them uses

only for checking balance or requesting for a cheque book. Very few customers uses the advance interactive services provided by the banks. According to ICICI and HDFC Bank, 17 per cent of ICICI customers use the Internet for banking and 10 per cent of HDFC customers prefer it.

Cost of installation of services

For basic features, the cost for providing such services to the banks come around Rs. 40 lakh to Rs. 50 lakh. For the third level service or sophisticated services, the investments mount to the tune of Rs. 4 crore to Rs 5. crore. These investments is just a fraction if compared to the operations of the bank using physical infrastructure.

Advantages of Internet Banking

- It removes the traditional geographical barriers as it could reach out to customers of different countries/legal jurisdiction. This has raised the question of jurisdiction of law/supervisory system to which such transactions should be subjected.
- It has added a new dimension to different kinds of risks traditionally associated with banking, heightening some of them and throwing new risk control challenges.
- Security of banking transactions, validity of electronic contract, customers' privacy, etc., which have all along been concerns of both bankers and supervisors have assumed different dimensions given that Internet is a public domain, not subject to control by any single authority or group of users.
- It poses a strategic risk of loss of business to those banks who do not respond in time to this new technology, being the efficient and cost effective delivery.

Customer confidence on online banking would also largely depend on how the banks would deal with any erroneous transactional and security concerns that may occur during online banking. It is predicted that the failure of the Internet in retail banking is largely attributable due to the lack of trust consumers have in the electronic channels. Provisions of infrastructural facilities could be another factor that could lead to quicker diffusion of innovation. Studies reveal that there is a

significant correlation between the website downloaded speed and web users satisfaction.

1.11. Mobile Banking

The advent of mobile communication technology innovations and globalization are increasingly driving the financial services to become ubiquitous, personalized, convenience, disseminative and secured. The lack of security and a high level of fraud is seen as a major obstacle to people embracing the possibilities and advantages of using internet based online banking services. For online financial transactions, the security at both the client and the server end must be taken care. On the client side, the poor platform integrity, the multitude of default CA certificates and the arcane user interface pose severe security threats. On server side, most important types of system attacks which pose severe threat on internet financial transactions are : Password cracking, screen emulators, data diddling, social engineering, malicious code, distributed denial of service, physical perimeter penetration, and wireless intercepts. Online banking through mobile service providers is more secure than online banking through internet because of the usage of private network of the service provider and the user's personal mobile device.

In mobile banking applications, the primary concern is the limited size and poor user interface of mobile devices than the security due to the fact that the characteristics of mobile architectures are strictly controlled can make it easier to obtain satisfactory security. Communication security is often described in terms of confidentiality, integrity, authentication and non-repudiation of transmitted data. These security services are in turn implemented by various mechanisms that are usually cryptographic in nature. In addition there is confidentiality of traffic, of location and of the communicating parties' address, all of which are important for privacy. A casual level of security is usually provided implicitly even without taking any extra measures. Casual authentication between mobile phone users is indirectly provided by the calling and called party numbers. Confidentiality of transmitted data can be provided by encrypting the information flow between the communicating parties, and the encryption can take place end-to end between the communicating parties or

alternatively on separate legs in the communication path. Mechanisms for implementing confidentiality of traffic, location and addresses will depend on the technology used in a particular mobile network. Different parties will have different interests regarding authentication and non-repudiation services. Network operators are interested in authenticating the users for billing purposes and to avoid fraud. This kind of authentication also helps secured mobile banking through such networks. Users and banking service providers are interested in authenticating each other and might also be interested in authenticating the network service provider.

The biggest advantage that mobile banking offers to banks is that it drastically cuts down the costs of providing service to the customers. For example an average teller or phone transaction costs about $2.36 each, whereas an electronic transaction costs only about $0.10 each. Additionally, this new channel gives the bank ability to cross-sell their other complex banking products and services such as vehicle loans, credit cards etc. For service providers, Mobile banking offers the next surest way to achieve growth. In developed countries, where mobile penetration is nearing saturation, mobile banking is helping service providers increase revenues from the now static subscriber base. Also service providers are increasingly using the complexity of their supported mobile banking services to attract new customers and retain old ones.

Banks offering mobile access are mostly supporting some or all of the following services:

1. Account Balance Enquiry
2. Account Statement Enquiries.
3. Cheque Status Enquiry.
4. Cheque Book Requests.
5. Fund Transfer between Accounts.
6. Credit/Debit Alerts.
7. Minimum Balance Alerts.
8. Bill Payment Alerts.
9. Bill Payment.
10. Recent Transaction History Requests.

11. Information Requests like Interest Rates/Exchange Rates.

One way to classify these services depending on the originator of a service session is the 'Push/Pull' nature. 'Push' is when the bank sends out information based upon an agreed set of rules, for example your banks sends out an alert when your account balance goes below a threshold level. 'Pull' is when the customer explicitly requests a service or information from the bank, so a request for your last five transactions statement is a Pull based offering.

The other way to categorize the mobile banking services, by the nature of the service, gives us two kind of services – Transaction based and Enquiry Based. So a request for your bank statement is an enquiry based service and a request for your fund's transfer to some other account is a transaction-based service. Transaction based services are also differentiated from enquiry based services in the sense that they require additional security across the channel from the mobile phone to the banks data servers. Based upon the above classifications, we arrive at the following taxonomy of the services listed before.

Table 1.4 : Classification of mobile banking Services

	Push Based	**Pull Based**
Transaction Based		Fund Transfer Bill Payment Other financial services like share trading.
Enquiry Based	Credit/Debit Alerts. Minimum Balance Alerts Bill Payment Alerts	Account Balance Enquiry Account Statement Enquiry. Cheque Status Enquiry. Cheque Book Requests. Recent Transaction History

"The account that travels with the customer". This is needed in today's fast business environment with unending deadlines for fulfillment and loads of appointments to meet and meetings to attend. With mobile banking facilities, one can bank from anywhere, at anytime and in any condition or anyhow. The system is either through SMS or through WAP.

1.11.1. SMS Banking :

The following type of services could be made available through SMS Mobile Banking Solutions –

Push – This is a purely one-way interaction and helps the bank to inform customers about various transactions related to his/her account. The alerts that can be sent include but not limited to credit/debit information, salary credit information, bounced cheque alert, balance below alert etc.

Push-pull – This requires two-way interaction. Bank-customers, usually from the retail segment, can send requests for the services listed in succeeding paragraphs. This is based on a pre-decided menu and they would receive information on demand like balance enquiry, last three transactions, cheque clearance status enquiry etc.

List of possible services :

Inquiries

Balance Inquiries:

- Daily Balance
- All Debit Balances
- Debit Balance Over <X> Amount
- Debit Balance Below <X> Amount
- Credit Balance Only
- Credit Balance Over <X> Amount
- Credit Balance Below <X> Amount

Transaction Inquiries:

- All Transactions
- All Debit Transactions
- Debit Transactions Over <X> Amount
- Debit Transactions Below <X> Amount
- All Credit Transactions
- Credit Transactions Over <X> Amount
- Credit Transactions Below <X> Amount

Other Inquiries:

- Inward Remittances
- Salary Credit
- Other Bank's Cheque Cleared
- Other Bank's Cheque Returned
- Your Cheque Cleared
- Your Cheque Returned

Where <x> Amount refers to any amount specified by the account owner.

Transactions

Funds Transfer

Between own accounts

From own account to third party account (intra bank)

From own account to third party account (inter bank)

From / To Credit Card

Payments

Utility Bills

Loan Repayment

Insurance Premiums

Payment Options

Pay through credit card

Pay through debit card

Wire from account

Purchase

In house products and services

Third party products and services

Device related issues and Security risks :

User and device authentication

The SMS Mobile Banking application is bound to each deployment of SMS Enterprise server application in turn making it bound to the bank's server. Whenever an SMS Mobile Banking application is issued to the user, the bank's public key is embedded inside the application. This application is set up in a closed user group setting to accept signature messages only from the bank's server. On installation on the mobile handset of the authorized user, the application would generate a key pair comprising a public key and private key automatically. These keys would be bound to the mobile number of the device and the user defined password (known only to the user). The user would send the device public key using the application interface through an encrypted SMS to the bank's central key repository. To add another layer of security the keys are stored on the bank's server in encrypted form.

Password Security on the device

Wireless banking increases the potential for unauthorized use due to the limited availability of authentication controls on wireless devices and higher likelihood that the device may be lost or stolen. Authentication solutions for wireless devices are currently limited to username and password combinations that may be entered and stored in clear text view (i.e., not viewed as asterisks "****"). This creates the risk that authentication credentials can be easily observed or recalled from a device's stored memory for unauthorized use. In SMS Mobile Security application on the handset/PDA, every time the user needs to use the application or any of its features he/ she has to enter the unique password (known only to him / her – not even the

bank). There is no specific requirement for a password / PIN that the user gets from the bank.

Authenticating initial users and existing customers

Digital Signing and verification

Verifying a customer's identity, especially that of a new customer, is an integral part of all financial services. In addition to the initial verification of customer identities, the financial institution must also authenticate its customers' identities each time they attempt to access their confidential information. Financial institutions need to weigh the cost of the authentication method, including technology and procedures, against the level of protection it affords and the value or sensitivity of the transaction or data to both the institution and the customer.

Authentication methods that depend on more than one factor are typically more difficult to compromise than single-factor systems therefore suggesting a higher reliability of authentication. SMS Mobile Solution involves the following authentication and verification mechanisms (factors):

• Something the user possesses – The mobile device with the bank's application bound to the user's device.

• Something only the user knows - A user defined password.

• Something that binds each message to the user – The SMS message which contains the user's transaction information is bound to the user through user's digital signature (user's private key is used for signing the SMS message).

Secure Inter bank settlement

Once the user's inputs are received securely at the bank's server through SMS Mobile Banking Solutions, the bank's server would interface with its core banking infrastructure as well as other participating banks for the background settlement. It is assumed that appropriate security controls existing within the banks infrastructure would provide for intra as well as inter bank transfer and settlements / information notifications.

1.11.2. WAP Banking :

Wireless Application Protocol (WAP) is a set of protocols that allow for the development of Internet and Web-based services for mobile phones and other mobile devices. The WAP standard was developed by the WAP Forum whose founding members include Ericsson, Motorola, Nokia and Phone.com and addresses the limitations of mobile networks (low bandwidth, high latency, and unpredictable availability and stability) and mobile devices (limited CPU, memory, and battery life, and a simple user interface). The WAP Forum has developed their standards in such a way that they leverage and compliment existing industry standards as much as possible. The WAP standard specifies two essential elements of wireless communication: an end-to-end application protocol and an application environment, the Wireless Application Environment (WAE), based on a browser.

There are a number of products currently available that implement the end-to-end application protocol for WAP. These products, called WAP Gateways, form the connection between clients on the mobile network and applications hosted on application servers on the Internet. The WAP Gateway builds a bridge between the telecommunication and computer networks by routing requests from mobile clients to the application servers. It can be physically located in either network, though it is needed in only one of them.

Mobile application standalone clients bring along the burden of supporting multiple mobile device profiles. According to the Gartner Group, a leading wireless computing consulting organization, mobile banking services will have to support a minimum of 50 different device profiles in the near future. However, currently the best user experience, depending on the capabilities of a mobile phone, is possible only by using a Standalone client. Mobile banking has the potential to do to the mobile phone what E-mail did to the Internet. Mobile Application based banking is poised to be a big m-commerce feature. Nevertheless, Bank's need to take a hard and deep look into the mobile usage patterns among their target customers and enable their mobile services on a technology with reaches out to the majority of their customers.

1.12. Mobile Banking In India

Banks in India have for long concentrated on the corporate customer, but are now offering personalized services like phone banking, online banking and even mobile banking to all customers. ICICI Bank, HDFC Bank, Global Trust Bank and Citibank pioneered Internet banking in India, are now started mobile banking, but other private and public sector banks are also gearing up to offer personal banking services. ICICI was the first bank to initiate the mobile banking revolution in India as early as 1999. This was soon followed by HDFC, IDBI. Presently, seven out of eleven prominent private sector banks are providing mobile banking facility to their customers. Large public sector banks like State Bank of India, Unit Trust India and Bank of Baroda, initially slow to adopt online banking, have jumped into the fray and invested around Rs. 250 crore for their online banking operations and now six out of twenty seven public sector banks are providing mobile banking facility to attract more customers. Surprisingly, Indian private sector banks have outnumbered foreign banks in terms of the quality and number of facilities under mobile banking banner. Only five foreign banks out of fourteen are offering retail mobile banking.

India is an important market as far as banking is concerned. It is also interesting to study, not only due to its sheer size, but also because of the sweeping changes the sector has witnessed in the last decade. Over 50 banks in the Indian financial sector offer a variety of online banking services. Out of these, 55 per cent have basic Web sites, offering mainly company information and promotional materials. A total of 18 per cent of the sites offer "advanced transactions" such as online funds transfer, transactions and cash management services. Foreign banks in India like Citibank, Standard Chartered Bank, American Express Bank, and ABN Amro Bank; and local private banks like ICICI Bank, HDFC Bank, IndusInd Bank and IDBI Bank are leaders in offering advanced online banking facilities to the Indian customers. ICICI considered a leader in providing online banking services, has more than one million customers banking through their computers. This is one-sixth of the total customer base of ICICI Bank. Also, their number of online customers is doubling every year,

which is also true for other banks. The spectacular success in computer literacy and wide adoption of information technology by the educated middle and upper classes in urban India make the issue of consumer trust in online banking even more relevant.

Considering the fact that these services are offered without charging a fee, the effort is commendable. Both HDFC and ICICI have free demonstrations on their respective websites which are self-explanatory and can guide a first time user on how to use the facility. There are others who also have the facility like Global Trust Bank, which is the latest entrant in the bandwagon. Others like ABN Amro and Times Bank are also started the mobile banking.

There is no doubt that potential for mobile banking in India is immense considering the rising penetration levels of the World Wide Web in Indian homes and offices. When one takes a look at what is available worldwide, one sees that online banking is more of a norm rather than an exception in many developed countries. The services offered enables one to check credit card transactions, paying bills, transferring funds between accounts in two different banks and scheduling future payments and transfers. The gradual increase in net banking is logical as the need to minimize costs catches attention.

In India, however, there may arise problems with nationalized banks, which have in the past opposed computerization. However, the fact remains that given a choice, customers would like to bank via the net and the next decade could well see virtual banking becoming a reality.

Bank of Punjab now puts its Banking Services in the customers pocket. On the move, between rushed chock-o-block, appointments, is another service available to the harried entrepreneur. Mobile Banking comes in as a part of the bank's initiative to offer multiple channel banking providing convenience for its customers. A versatile multifunctional, free service that is accessible and viewable on the monitor of customers mobile phone. Now Bank of Punjab has become the first Indian Bank to

offer Global Mobile banking service which, customer will be able to avail from not only the city in which customer are having cellular service provider, but also from anywhere across India, and the globe. This facility is available on all the mobile phones irrespective of cellular service provider. The technology works on a push-pull architecture. Pull services are driven by customer. Push services are sent out by the bank to customer.

IDBI Bank mobile banking services include balance enquiry, fixed deposits enquiry, Last 3 transactions, Cheque payment status, Request for cheque book, Request for statement of account, Change of PIN, Demat enquiries like Free balance holdings, last two transactions, Bill payment facilities like, pending bills, pay bills, Registered billers, Supplementary operations like change primary account etc. Both SMS and WAP versions are available. Mobile banking is poised to become the big killer mobile application arena. However, Banks going mobile the first time need to tread the path cautiously. The biggest decision that Banks need to make is the channel that they will support their services on.

Mobile banking through an SMS based service would require the lowest amount of effort, in terms of cost and time, but will not be able to support the full breath of transaction-based services. However, in markets like India where a bulk of the mobile population users' phones can only support SMS based services, this might be the only option left. SMS banking is very much safe. First, one authenticates the mobile number with the authentications key. Second, the customer uses secret Mobile Personal Identification Number (MPIN). A new concept has been developed by Bank of Punjab Ltd. They call it "Mobile Wallet". With the support of this technology, a customer can make payment and receive payment of account of buy/sell (merchants) through SMS. In this system, a buyer sends a message for buying and the bank in return sends a message confirming the purchase both to the merchant as well as to the buyer. Debit card number is the key field which is used for the authenticity of the customer.

On the other hand a market heavily segmented by the type and complexity of mobile

phone usage might be good place to roll of WAP based mobile applications. A WAP based service can let go of the need to customize usability to the profile of each mobile phone, the trade-off being that it cannot take advantage of the full breadth of features that a mobile phone might offer.

ICICI became the first organization in India to offer services based on WAP when, in April 2000, it launched the offering of real time stock quotes and the ability to monitor the performance of equity portfolio on-line. Subsequently, ICICI introduced the ATM and branch locator facility for WAP phone users, which provides a menu driven facility for identification of an ICICI ATM closest to the subscriber's current location. ICICI has proposals to launch a range of its Personal Financial Services on WAP including personal banking services, on-line information tracking of utility bills, travel and ticketing information etc. The WAP solution to be offered by ICICI includes enhanced security mechanisms as compared to SMS. ICICI has achieved the first milestone by launching various banking services for ICICI Bank customers. These include online balance update, cheque book request, details of last 5 transactions, statement request and verification of TIFD status in the demat account. In addition, ICICI's WAP solution would also enable an ICICI Bank credit card customer to check his outstanding balance, payment status, cash/credit limits and details of last 3 transactions. Payment services to certain standard utilities are expected to be launched shortly.

Mobile banking/commerce using Wireless Application Protocol (WAP) technology allows secure on-line access of web using mobile devices as opposed to using the SMS (short messaging service) technology, which works on e-mail, thereby entailing a time lag. For the WAP technology project, ICICI has partnered with ICICI Infotech Services Limited (a group company) which has provided the technology, design, software solution and implementation of the project. The WAP server was provided by wabot.com. HDFC bank provides WAP banking to all its customers having GPRS handset. Customers who have GPRS connectivity can simply visit HDFC's WAP Portal and navigate through the user-friendly menu to seamlessly carry out various

banking transactions while on the move. HDFC bank has understanding with Airtel, Idea and Vodafone.

Bharti Airtel Limited has awarded Nokia an estimated US$400 million contract to expand its managed **GSM/GPRS/EDGE** networks in eight Airtel circles and to deploy a pan-Indian WAP solution across its networks. Within the three-year contract, Nokia will provide managed services and expand Airtel networks to cover all towns and cities in the eight telecom circles of Mumbai, Maharashtra and Goa, Gujarat, Bihar (including Jharkhand), Orissa, Kolkata, West Bengal and Madhya Pradesh (including Chattisgarh). Network monitoring operations will be carried out from Nokia's state-of-the-art Global Network Services Centre in Chennai. Nokia will also deploy its WAP solution across Airtel's national network to enhance the operator's mobile packet core network capabilities. The WAP gateway will enable easy usage of data services, thereby increasing the consumption of content on the Airtel network. Nokia will provide consulting services and integrate the WAP gateway into a multi-vendor environment.

Mobile banking, a symbiosis of technology and financial services, is the hottest area of development in the banking sector and is expected to replace the debit/credit card system in future. In the past two years, the number of people using mobiles has increased three times, as compared to the use of debit/credit card holders. And, 85 per cent -90 per cent of mobile users do not own credit cards.

After branch banking and ATMs, banks are now planning to use mobile phone as a device to expand their reach. In fact, given the Reserve Bank of India's directive to banks on financial inclusion, bankers feel that mobile banking could be a more feasible route to cater to the under-banked and unbanked sections of the population. "There are more than 220 million mobile phone users in the country, compared to a little over 40 million internet users, this in itself represents a major opportunity,". However, only a few banks have so far adopted mobile phones as a medium to reach out to the customers. The mobile phone is an extremely personal device and will

help maintain the privacy of the customer and make it more real time, as one could perform transactions on a 24 x 7 basis.

"Technological implementation worth Rs 6,500 crore has happened in the Indian financial sector in the last five years. Banks are waking up to the necessity of Anti-Money Laundering (AML) systems and that by 2009, most Indian banks would be AML-compliant.

1.13. Survey on selected Indian Banks

A survey on internet and mobile banking facilities in selected Indian banks is made by considering only the banks which are providing mobile banking facility to their customers. The following tables lists the Public, Private and Foreign sector banks and the quality of both Internet and mobile banking facilities provided by them.

Table 1.5 : Study of Indian Public Sector banks for Online banking (2007)

Sr No	Bank	Internet Banking	Mobile Banking	
			SMS Banking	WAP Banking
1	State bank of India	Available	Not Available	Not Available
2	State bank of Bikaner and Jaipur	Available	Not Available	Not Available
3	State bank of Hyderabad	Available	Not Available	Not Available
4	State bank of Indore	Available	Not Available	Not Available
5	State bank of Mysore	Available	Not Available	Not Available
6	State bank of Patiala	Available	Not Available	Not Available
7	State bank of Saurashtra	Available	Not Available	Not Available
8	State bank of Travancore	Available	Not Available	Not Available
9	Andhra Bank	Available	Not Available	Not Available
10	Allahabad Bank	Available	Not Available	Not Available
11	Bank of baroda	Available	Available	Available
12	Bank of India	Available	Not Available	Not Available
13	Bank of Maharashtra	Not Available	Not Available	Not Available
14	Canara Bank	Available	Available	Available
15	Central Bank of India	Not Available	Not Available	Not Available
16	Corporation Bank	Available	Available	Not Available
17	Dena Bank	Available	Available	Not Available
18	Indian Overseas bank	Not Available	Not Available	Not Available
19	Indian Bank	Available	Available	Not Available
20	Oriental bank of commerce	Available	Not Available	Not Available
21	Punjab National Bank	Available	Not Available	Not Available
22	Punjab and Sind bank	Not Available	Not Available	Not Available
23	Syndicate Bank	Available	Not Available	Not Available

24	Union bank of India	Available	Not Available	Not Available
25	United bank of India	Available	Not Available	Not Available
26	UCO bank	Available	Not Available	Not Available
27	Vijaya Bank	Available	Not Available	Not Available

Table 1.6 : Study of Indian Private Sector banks for Online banking (2007)

Sr No	Bank	Internet Banking	SMS Banking	WAP Banking
1	ING Vysya Bank Ltd	Available	Not Available	Not Available
2	UTI Bank Ltd	Available	Available	Not Available
3	Indusind Bank Ltd	Available	Available	Not Available
4	ICICI Banking Corporation Ltd	Available	Available	Available
5	Global Trust Bank Ltd	Not Available	Not Available	Not Available
6	HDFC Bank Ltd	Available	Available	Available
7	Centurion bank Ltd	Available	Not Available	Not Available
8	Bank of Punjab Ltd	Available	Available	Not Available
9	IDBI Bank Ltd	Available	Available	Available
10	Karnataka Bank	Available	Available	Not Available
11	Federal Bank	Available	Available	Not Available

Table 1.7 : Study of Indian Foreign Sector banks for Online banking (2007)

Sr No	Bank	Internet Banking	SMS Banking	WAP Banking
1	American Express Bank Ltd	Not Available	Not Available	Not Available
2	ANZ Gridlays Bank Plc	Not Available	Not Available	Not Available
3	Bank of America NT and SA	Not Available	Not Available	Not Available
4	Bank of Tokyo Ltd	Not Available	Not Available	Not Available
5	Banquc nationale de Paris	Not Available	Not Available	Not Available
6	Barclays Bank Plc	Available	Not Available	Not Available
7	Citi Bank N.C.	Available	Available	Not Available
8	Deutsche Bank A.G.	Not Available	Not Available	Not Available
9	Hongkong and shanghai Banking Corporation	Available	Not Available	Not Available
10	Standard Chartered bank	Available	Not Available	Not Available
11	The chase Manhattan bank Ltd	Not Available	Not Available	Not Available
12	Dresdner Bank AG	Available	Not Available	Not Available
13	ABN AMRO Bank	Available	Available	Not Available
14	Abu Dhabi Commercial Bank	Available	Available	Not Available

Table 1.8 : Quality of Internet and Mobile banking facilities provided by Banks in Karnataka

Bank	Sector	Internet Banking	Mobile banking
State Bank of India	Public	High	Very Low
Canara Bank	Public	Medium	Medium
Bank of Baroda	Public	Medium	High
Dena Bank	Public	High	High
IDBI Bank	Public	High	High
Indian Bank	Public	Low	Low
Bank of Punjab	Private	High	Very Low
Karnataka Bank	Private	Low	Low
CitiBank	Private	High	High
UTI Bank	Private	High	Low
ICICI Bank	Private (NG)	Very High	Very High
HDFC Bank	Private (NG)	Very High	High
Federal Bank	Private	High	High
ABN AMRO Bank	Foreign	High	High
Corporation Bank	Public	High	Medium
Abu Dhabi Commercial Bank	Foreign	High	Medium
Indusind Bank Ltd	Private	High	Low

Table 1.9 : Comparative study of ATM banking facility, Internet banking facility and Mobile banking facility available in Indian Banks during 2002 and 2006 :

Name of the Bank	ATM Banking facility		Internet Banking facility		Mobile Banking facility	
	2002	2006	2002	2006	2002	2006
State Bank of India	Yes	Yes	Yes	Yes	No	Yes (Only Alert Facility)
Syndicate Bank	Yes	Yes	Yes	Yes	No	No
Canara Bank	Yes	Yes	No	Yes	No	Yes
Dena Bank	Yes	Yes	Yes	Yes	Yes	Yes
Bank of Baroda	Yes	Yes	Yes	Yes	Yes	Yes
IDBI Bank	Yes	Yes	Yes	Yes	Yes	Yes
Indian Bank	Yes	Yes	Yes	Yes	No	Yes
Corporation Bank	Yes	Yes	No	Yes	No	Yes
State bank of Mysore	Yes	Yes	No	Yes	No	Yes(Only Alert Facility)

HDFC Bank	Yes	Yes	Yes	Yes	Yes	Yes
ICICI Bank	Yes	Yes	Yes	Yes	Yes	Yes
Karnataka Bank	Yes	Yes	No	Yes	No	Yes
Bank of Punjab	Yes	Yes	Yes	Yes	No	Yes(Only Alert Facility)
Federal Bank	Yes	Yes	Yes	Yes	No	Yes
IndusInd Bank	Yes	Yes	No	Yes	No	Yes

Table 1.10 : Technology adoption in Public Sector banks

PUBLIC SECTOR BANKS				
Bank Name	**ATM Facility**	**Internet Banking Facility**	**Mobile Banking Facility**	**WAP Banking Facility**
1.Dena Bank	Yes	Yes	Yes	No
2.Bank of Baroda	Yes	Yes	Yes	Yes
3.Indian Bank	Yes	Yes	Yes	No
4.Canara bank	Yes	Yes	Yes	Yes
5.State Bank of India	Yes	Yes	Yes	No
6.Corporation Bank	Yes	Yes	Yes	No
7.Syndicate Bank	Yes	Yes	No	No
8. Vijaya Bank	Yes	Yes	No	No

Table 1.11 : Technology adoption in Private Sector banks

PRIVATE SECTOR BANKS				
Bank Name	**ATM Facility**	**Internet Banking Facility**	**Mobile Banking Facility**	**WAP Banking Facility**
1.HDFC Bank	Yes	Yes	Yes	No
2.ICICI Bank	Yes	Yes	Yes	Yes
3.Karnataka Bank	Yes	Yes	Yes	No
4.Bank of	Yes	Yes	Yes (Only alert	No

Punjab			facility)	
5.Federal Bank	Yes	Yes	Yes	No
6.IndusInd Bank	Yes	Yes	Yes	No
7.South Indian Bank	Yes	Yes	No	No
8.IDBI Bank	Yes	Yes	Yes	Yes
9.UTI Bank	Yes	Yes	Yes	No
10.ING Vysya Bank	Yes	Yes	No	No

Table 1.12 : Technology adoption in Foreign Sector banks

FOREIGN SECTOR BANKS				
Bank Name	**ATM Facility**	**Internet Banking Facility**	**Mobile Banking Facility**	**WAP Banking Facility**
1.ABN AMRO Bank	Yes	Yes	Yes	Yes
2.Abu Dhabi C. bank	Yes	Yes	Yes	No
3.Standard Charted Bank	Yes	Yes	Yes (Only Alert facility)	No
4.Citi bank	Yes	Yes	Yes	No
5.American Express Bank	Yes	Yes	Yes (Only Alert facility)	No

There are about 68,000 bank branches in this country and 23,000 ATMs. But what's astounding is that the number of mobile subscribers in India, which is 235 million, is growing by 7 - 8 million each month. So while today mobile banking is still not as widely used, the possibilities are limitless. The micropayments for meals, air tickets, movie tickets, purchasing in retail shops etc, are some of the options mobile banking is looking to turn into a reality.

Mobile banking is expected to be very visible in the next 2-3 years. In the next 5 years it is expected to rule a large segment of the micro payment industry. However, right now the major challenge it faces is regulatory, so it needs to deal with that before it goes forward. Unlike online banking, mobile banking has certain advantages on its

side. It will not attract much investment from the bank and will not need a change in the existing infrastructure of the bank. However, for now; security, transaction time and interoperability are some of the major challenges that mobile banking need to overcome. Despite all the challenges, it appears that the Indian banking industry is all set to introduce more banking channels in its relentless drive towards customer satisfaction, provided the customer is willing to accept the change.

1.14. Research Issues in this Study

In India, the growth of mobile phone subscriber base is increasing in an exponential manner. It is predicted that all inhabited areas (and hence the entire population) of India would be covered by mobile networks by the end of 2009, despite only 45-50per cent coverage today. The number of total mobile subscribers is expected to increase to over 500 million by year-end of 2010. This will support the usage of mobile devices for various kinds of online business and also financial transactions. In this scenario, the Indian banks have to be equipped to start online banking channel as new distribution channel. But, presently, the acceptance of mobile banking services by the Indian customers is not encouraging. It is necessary to find the reason for slow penetration of this value added service in the country. Hence it is planned to study the technological aspects, business model, Indian banks perspective of adopting new innovative distribution channel and the customer's perspective of accepting this new distribution channel.

The motivation behind this study are to analyze the significance of mobile business activity in financial sector with special emphasis on banking activities in chosen cities in Karnataka State, to study present M-business models and their limitations and to propose new business model in order to accelerate the financial transaction processes and to provide Value added Services to the customers, to identify the gap between mobile communication technology innovations, their penetration in banking industry as a new distribution channel and the customer acceptance, and to provide suitable policy and regulatory guidelines to strengthen the mobile business framework in the country. The sub-goals are to investigate the market status for mobile banking in India, to identify the target customers for mobile banking based

on the demographics characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security and trust, psychology and culture, prior personal banking experience, incentives from banks etc.

Following research issues are discussed and analyzed :

- Opportunities and challenges for mobile business in India
- Significance of mobile business activity in financial sector with special emphasis in banking sector
- To study and analyze the mobile banking technology models like SMS banking and WAP banking
- To study the extent of online banking adoption by Indian banks during the period 2002 to 2006
- To study the mobile banking services available in public, private and foreign sector banks in India through facility and content analysis
- To study Indian bankers perspectives to introduce mobile banking as new distribution channel and evaluation of banks strategy to procure and to maintain this new channel
- Factors determining the adoption of mobile banking by financial services institutions
- Customer's perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services.
- To study various mobile banking business models and their suitability in Indian scenario
- To propose a suitable business model of mobile business through mobile payment to take care of security and authentication problems
- To suggest suitable policy and regulatory guidelines for various stake holders of mobile banking in India.

1.15. Research Questions

Even though, in India, there are 400 million bank account holders, about 300 million mobile phone users, and about 100 million internet users, the availability of mobile

banking services from the banks, and the usage of mobile banking services by the customers are not encouraging. Hence in this research, the research questions are :

1. Why the strategy of Indian Banks to provide online mobile banking as new distribution channel and to attract more customers to use this channel is not so successful ?
2. What is the reason for low acceptance of mobile banking services by the customers.
3. How to make mobile banking payment and mobile business financial transactions as user accepted reality.

CHAPTER TWO

Literature Review on Mobile Technology and Mobile Banking Services

CONTENTS **PAGE No.**

2.1. Introduction

Current wireless devices include phones, hand-held or palm-sized computers, laptops, and vehicle-mounted interfaces. In order to be easily carried, these mobile devices must be physically light and small. In addition, a mobile device should be a multiple-purpose device so that a user does not have to carry other appliances. While achieving mobility, mobile devices suffer from some drawbacks compared to personal computers. They have (1) small screens and small multifunction key pads; (2) less computational power, limited memory and disk capacity; (3) shorter battery life; (4) complicated text input mechanisms; (5) higher risk of data storage and transaction errors; (6) lower display resolution; (7) less surfability; (8) unfriendly user-interfaces; and (9) graphical limitations. In addition to these device limitations, there are technical restrictions related to the wireless network. As compared to wired networks, wireless communications add new challenges: (1) less bandwidth, (2) less connection stability, (3) less predictability, (4) lack of standardized protocol, and (5) higher cost.

Mobile business is enabled by a combination of technologies such as networking, embedded systems, databases, and security. Mobile hardware, software, and wireless networks enable mobile business systems to transmit data more quickly, locate users' positions more accurately, and conduct business with better security and reliability. In this section, the key technologies that make mobile business a reality and that will improve its performance and functionality in the near future are discussed. This includes review on mobile communication technology, wireless operating systems, alternative and complementary technologies, information exchange technology, location identification technology, and security considerations. The chapter also contains an overview of wireless data services, and mobile communication devices. Technological aspects of SMS banking and WAP banking, and various mobile payment technologies are also discussed with their advantages and limitations. Since, mobile banking channel is a technological advent, various technology acceptance and penetration models like Technology Acceptance Model (TAM) originally proposed by Davis, Theory of Reasoned Action (TRA) originally

proposed by Fishbein and Ajzen, and Theory of Planned Behavior (TPB) are reviewed.

Literature review on the various research issues like Opportunities and challenges for mobile business in India, Significance of mobile business activity in financial sector with special emphasis in banking sector, and Study and analysis of the mobile banking facilities like SMS banking and WAP banking are also included. Finally a qualitative survey on WAP technology adopted in a new generation private sector bank - HDFC bank and user awareness study is made and the results are discussed.

2. 2. Mobile Communication Technology

Though Internet access is available in most major cities and many rural areas, the Internet connections for many businesses, homes, and schools use relatively slow modem connections through Internet Service Providers (ISPs). Making high-speed (broadband) connections directly available to all locations is the key to realize the true benefits of mobile business applications. A number of existing or future technologies that enable connections between mobile devices and other information appliances, and between mobile devices and the Internet, are discussed below:

1. First-generation (1G) networks : Less often used than the following terms, 1G denotes the very first generation of common mobile communication networks connectable to the Public Switched Telephone Network (PSTN). These were analog cellular systems such as Advanced Mobile Phone System (AMPS) in the USA, Nordisk Mobiltelefon (NMT) in Scandinavia, or C-Netz in Germany. 1G technologies embodied the first realization of cellular concepts, including frequency reuse and handoffs.

2. Second-generation (2G) network : GSM (Global System for Mobile Communication) is considered the second-generation (2G) digital network. It is a circuit-switched service, where users must dial-in to maintain a connection when data communications are desired. It operates in the 900 MHz and 1,800 MHz frequency bands, and is widely used in Europe and Asia. Other 2G networks are

Digital AMPS (D-AMPS) in the USA, Code Division Multiple Access (CDMA) in USA and Japan, and Personal Digital Cellular (PDC) in Japan. Major functional enhancements of 2G technologies are voice coding, digital modulation, and forward error correction. Additional services like fax, data, messaging, and roaming between networks were provided. Especially in the GSM case, the successful Short-Message Systems (SMS) service has shown that voice traffic is not the only service users want. The standardization of the Wireless Application Protocol (WAP) brings the first phones with an integrated browser onto the market. These 2nd generation systems had such a wide impact due to the rapid reduction in costs and the perceived quality.

3. 2.5G network : GPRS (General Packet Radio Service) are so-called 2.5G technologies. GPRS, based on GSM, is a continuous packet data service. It uses the existing network infrastructure but is being marketed as delivering ISDN-type speeds. Rather than sending a continuous stream of data over a permanent connection, GPRS's packet switching system only uses the network when there is data to be sent. Users can send and receive data at speeds of up to 115 kbits / second with GPRS. From the revolution intensity point of view, there are many industry opinions expecting 2.5G networks to represent the most remarkable change (The Boston Consulting Group, 2000).

4. 2.75G network : Whereas 2.5G technologies introduce a set of packet-switched functionalities and minor changes of transmission speed only, 2.75G denotes 2.5G technologies with major improvements in transmission speed. EDGE (Enhanced Data GSM Environment), a faster version of GSM, is designed to enable the delivery to multimedia and other broadband applications. It will use new modulation techniques to enable data rates of up to 384 kbits/second over the existing GSM infrastructure. CDMA networks are upgraded to the first versions of cdma2000 (Autio et al., 2001).

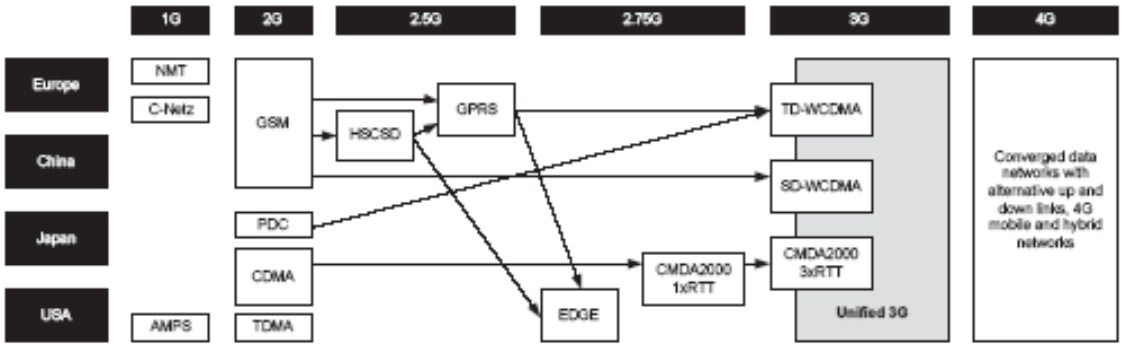


Figure 2.1: Wireless network technology evolution (Autio et al., 2001]

5. Third-generation (3G) network : UMTS (Universal Mobile Telecommunications System) is the so-called "third-generation (3G)" technology. It aims to offer higher-bandwidth, packet-based transmission of text, voice, video, and multimedia needed to support data-intensive applications. Once UMTS is fully implemented, computer and phone users can be constantly connected to the Internet and have access to a consistent set of services worldwide. Integrating the functions of a whole range of different equipment, the new 3G mobile phone can be used as a phone, a computer, a television, a paper, a video conferencing center, a newspaper, a diary, and even a credit card. There are two major competing schemes for UMTS. Wide band-CDMA (W-CDMA), which is supported by Nokia and Ericsson among others, and time division-code division multiple access (TD-CDMA). W-CDMA is similar to standard CDMA except that it uses higher bandwidth on the transmission channel. TD-CDMA is a scheme that makes use of both TDMA and CDMA techniques. 3G technologies can support data rates from 384 kbps up to 2 Mbps. Auctions for 3G spectrum licenses occurred in a number of countries in 2000 and the first commercial offerings of 3G services began in Japan in October 2001. More recently, Verizon Wireless has started offering ''3G'' service in portions of its serving territory (although this is not true-3G service). Fundamental changes are required on the terminal side, as the terminal is drifting away from the classic telephone, and going towards smartphones, Personal Digital Assistants (PDA), and Pocket Computers. An obvious need for software platforms rises, and several Wireless Operating System (Wireless OS) approaches already exist.

6. Fourth Generation (4G) Technology : Mobile services, applications, and even core network are evolving at high speeds, and distinguishing different generations is not really possible anymore. The evolution and sometime revolution, is a very significant trend and 4G is such a revolution of air interface rather than new phase of evolution. The Japan's leading mobile phone company NTT, DoCoMo's next target is to achieve a speed of 100 million bits per second for 4G by 2010. 4G technology is characterized by advanced personalization, Industry specific e-process models, Optimized CRM, and Niche customization. E-marketplace is an evolving example of a parallel to a true 4G enterprise business environment. 4G technology provides Web transformation through external automation. The various external automation technology may involve High optimization, Niche customization, Transparent processes, Self-service, Any –to-any multi-channel integration, Advanced personalization, Voice customer service, E-process driven technology, and Architectural interoperability.

The various 4G initiatives are very recent. Most of these set out to achieve the performance that 3G initially intended to provide, but the focus remains on the convergence between existing networks. The use of the 4G term remains questionable and open for discussion, since no real revolution in convergence between telecommunication and data communication is expected after the third generation. On the other hand, deployments of all-IP based wireless networks might originate from operator independent developments. Simply increasing performance, speed, quality, etc.—as long as it can be described within the 3G service space dimensions, could still be regarded as development of 3G technologies.

7. The 3G Service Space

The next generation of wireless and mobile technologies is the third generation (3G). There is a large diversity of parallel development trends in related technologies, and one might argue that there is no common way to summarize these trends. However, the 3G technology trends can be described by three fundamental dimensions, which together form the 3G technology space or the 3G service space (Rasanen, 2001) :

The 3G service space can be identified by the space as spanned by the following set of abstract dimensions:

- Terminal capabilities,
- Bandwidth,
- Packet data service.

The parallel, mostly independent development of wireless terminal capabilities, wireless transmission bandwidth technologies, and wireless packet data functionality enable 3G solutions, services, and applications. Although there might be some 3G technologies which only benefit from one of the three dimensions, most technologies are dependent on at least two of the three dimensions. The real 3G value results from an environment with increased terminal capabilities, increased packet data support, and increased bandwidth. For avoiding misleading use of the 3G terminology, we define it such that if a solution cannot be explained by and located in the 3G service space, it should not be considered as related to 3G (figure 2.2) (Lin et al., 2001).

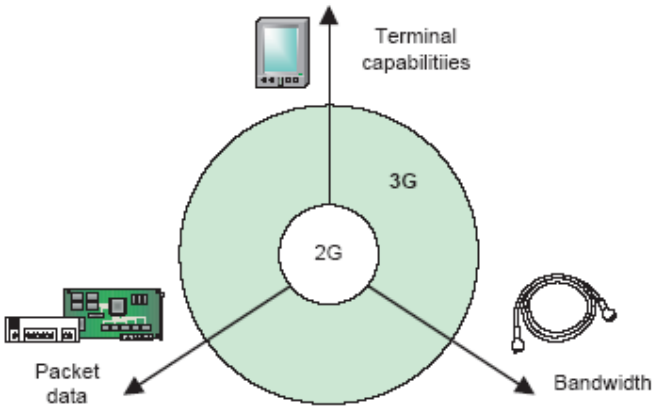


Figure 2.2: From 2G to 3G in three dimensions: the 3G service space

8. Universal Mobile Telecommunications System :

With remarkably higher transmission rates, the Universal Mobile Telecommunications System (UMTS) delivers true universal multimedia coverage and nationwide roaming. More than that, UMTS offers greater spectrum efficiency and capacity compared to the current 2G and 2.5G networks. UMTS is intended to be a solution for managing increasing and converging demands for mobility, data, and multimedia. Due to the absence of global standardization in the early ages of

wireless communication, there are today two major regional telecommunication standards dominating the global market, TDMA/CDMA developed by TIA in the USA and GSM developed by ETSI in Europe. Moving toward 3G wireless, there has been a rising need to develop more global and collaborative standards (Patel and Dennett, 2000).

9. Information Exchange Technology

Information is at the heart of any system that makes use of mobile devices and telecommunication technology. The current methods for information exchange in mobile application rely on standards supported by the wireless infrastructure.

1. HTML-based Information Exchange Standards : HTML (Hyper-Text Markup Language) is widely adopted by the Internet community as the document format for browsing. The availability of authoring tools and browsers makes it easy for users to create HTML documents incorporating multimedia objects. Although HTML is not a suitable format for information exchange in the wireless domain, a compact version of HTML, known as cHTML, has been used in the NTT DoCoMo's iMode services.

2. XML-based Information Exchange Standards : eXtensible Markup Language (XML) tags data and puts content into context, and thus enables content providers to encode semantics into their documents, eXtensible Stylesheet Language (XSL) works to transform XML data into structured documents such as HTML. XML and XSL work together to allow the complete separation of content from layout information. However, XML and XSL alone are not enough to provide the compact information exchange required by mobile business applications. To address this shortcoming, Wireless Markup Language (WML) has been derived from XML. WML allows information to be represented as cards suitable for display on mobile devices. WML has also been adopted by WAP as the format for information exchange.

10. Location Identification Technology

In mobile communication, knowledge of the physical location of a user at any particular moment is central to offering relevant service. Location identification technologies are important to certain types of mobile business application, particularly those whose content is varied depending on location. Global Positioning

System (GPS), a useful location technology, is a system of satellite stations used to calculate geographic location with great accuracy. It is widely used and will also play an important role in wireless communication.

11. Network Problems

1. Network incompatibility : Multiple, complex and competing protocols exist in today's cellular network standards. TDMA (time-division multiple access) was chosen by many cellular networks equipment suppliers and network operators in the early 1980s when cellular networks were first introduced in the U.S. CDMA (code division multiple access) was adopted later by other operators for its greater capacity. GSM is used as a single technical standard for the network operators in Europe, and it has become the standard used by most of the world's cellular subscribers. These different standards have resulted in a global incompatibility of cellular handsets.

2. Bandwidth access : The Federal Communications Commission (FCC) has established several frequency bands for use by cellular network operators across the country. In order to encourage competition, the FCC prohibits cellular operators from owning more than 45 MHz of radio spectrum in a given geographic region. Known as the "spectrum cap", this regulation imposes barrier for U.S. cellular network operators who are attempting to implement the new high-bandwidth, next-generation networks.

3. Responsibility and control : The mobility enjoyed by m-business also raises very important responsibility and control issues. While the technology ensures transmission security between the phone and the base station, it does not cover the rest of the network infrastructure. Though most wireless data networks today provide reasonable levels of encryption and security, serious consideration must be given to the issue of security as we move towards a mass-market adoption of mobile business applications.

12. Infrastructure Tasks

1. Lack of a standardized Web language : Today's mobile devices utilize a broad range of often incompatible standards, making the process of creating a successful

m-business application even more difficult. While newer mobile phones will incorporate WAP and its Wireless Markup Language (WML), NTT DoCoMo's iMode uses condensed HTML. Since numerous standards exist, the standardization issue is a complex one to manage, and may affect mobile business adoption.

2. Seamless integration : The integration between network operators and businesses is another key issue for mobile business. While location-based services will make it possible for a carrier to know where you are, the problem of privacy has simultaneously emerged. At the same time, the carriers, who will likely be asked to provide the same level of quality service for their wireless networks as for their wired data service, will be faced with legal concerns.

3. Support services : To conduct business via mobile devices, a company must be capable of managing and supporting a large base of mobile customers or employees. This poses a challenge to the traditional helpdesk and customer care function. On one hand, the company must deal with the logistics, procurement, and asset management issues surrounding large numbers of devices and software. On the other hand, the broad range of mobile devices makes customer care far more complex and harder to manage.

13. Security Considerations

As a new way of conducting business, mobile business must tackle security issues in its implementation. Mobile business has to solve such problems as hostility, information security, and vulnerability:

1. Hostility : Since we cannot assume that all participants in mobile business are honest, the mobile business system should provide enough mediated and stored information so that dishonest merchants, customers or other players can be found later.

2. Information security : This is a key issue in mobile business. In a transaction, each party involved needs to be able to authenticate its counterparts, to make sure that received messages are not tampered with, to keep the communication content confidential, and to believe that the received messages come from the correct senders.

3. Vulnerability : Data can be lost due to the mobile terminal malfunctions. Worse, these terminals can be stolen and ongoing transactions can be altered.

Some of the above problems seem solvable. Motorola is exploring personal identification numbers for cellular phone security and fingerprint for wireless identification. Some payment methods have been developed to address the secure payment issue in mobile business. The eCyberPay payment solution is such an example. It provides a central contact point for both the Internet and mobile users for accessing services and making payments. It is very user friendly, and does not require credit card information, extra software downloads, or tedious registration procedures or advance payment.

Assessment of Technological threats and Opportunities :

There is a growing realization among companies that technological innovation is a powerful source of competitive advantage. As such, technological innovations present both threats and opportunities not only to companies' short- and medium-term profitability, but also to the longer-term growth and survival. This is true of all technology-based organizations, i.e., those organizations where technology can have an effect on the bottom line in one way or another—and we have yet to be convinced that there is any organization in which this is not the case. There are many examples of companies that were market leaders and financially very strong, but failed or came to serious grief because they misjudged the impact that technological innovations can have on their business (Utterback, 1994; and Christensen, 1997). The ability to develop and deploy offensive and defensive innovation strategies has become a necessary element of companies' strategy portfolio, and a framework to assess technological threats and opportunities is an essential component of these strategy.

The framework for assessing technological threats and opportunities that was previously proposed is shown in Fig. 2.3. It follows a two-pronged approach. Firstly, a rapidly changing global technological landscape necessitates keeping track of technological developments. Since the focus here is on innovation (as opposed to mere invention), the market implications are as important as the technological ones

and have to be considered as well. One must assess developments not only in the technology field or the market, but rather the interaction in the technology–market domain. Also, although the emphasis is on technological threats and opportunities, social, economic and political issues tend to affect technological diffusion acutely, and hence any methodology for keeping track of technological developments should be able to translate these trends into technological impacts. It is essential to monitor and scan broadly, since industry-shattering and paradigm-shifting innovations very often originate in an entirely different industry than the one that they eventually have the greatest impact on (Utterback, 1994).

Secondly, as pointed out above, any organization could be considered to be technology- based to some or other degree, and the second core element of the framework is thus to assess which of the technological developments could potentially impact the organization, typically through a technology or innovation audit. Also, no organization operates in a vacuum, and therefore other entities that interact with the organization in question needs to be identified, be they partners, competitors, suppliers or distributors. Some competitive intelligence practices are thus highly applicable for this activity.

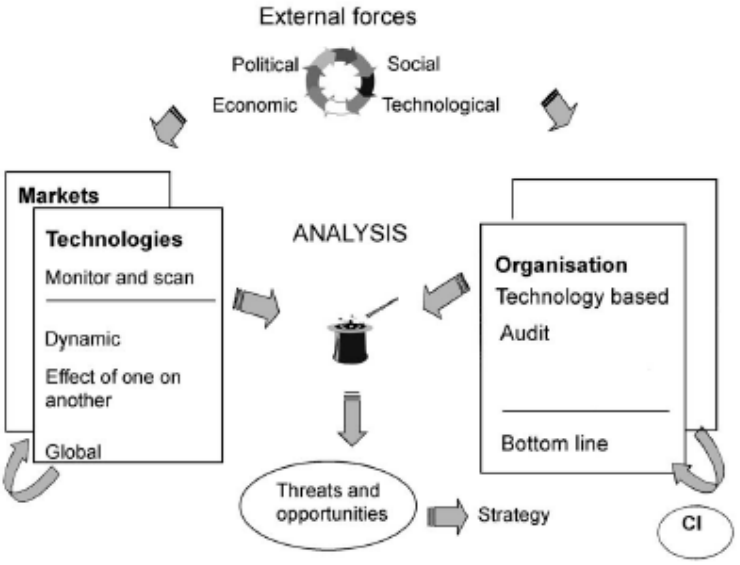


Fig. 2.3 : Technological threat and opportunity assessment (Du Preez et al., 2002).

14. Mobile Communication Devices :

Mobile and wireless technologies are becoming increasingly pervasive. Mobile phones were once considered a luxury, but are now taking the place of conventional telephones in residential use. Wireless networks free users from the tethers that have bound them to their desk, enabling them to live and work more flexible and convenient ways. Historical perspective is presented on the two most widely used mobile communications devices—cell phones and personal digital assistants. Current state, including growth and new developments, of mobile communications is reviewed and a number of industry applications are briefly described. Analysis and ramifications of mobile communications in so far as global business operations are affected providing the concluding thoughts.

1. History of cell phones :

In 1946, AT&T started the first mobile telephone service through the public telephone system. It required a manual search of an open radio channel prior to placing a phone call. The user would link to a mobile operator, who would then dial the call over the public telephone system. In this arrangement, controlled by a talk button, only one party was able to speak at a given time. This was called a "simplex" radio connection (Dalglish, 1999). In 1964, Ma Bell improved mobile telephone service. It featured automatic dialing and channel searching with a "duplex" connection. This system had a few channels available as each radio frequency was used only once in the whole geographic region. Usually, in a large city this system could serve about 300 plus customers with another 2000 or more customers waiting for service. In order to provide coverage throughout the entire service area, the antenna for this service had to be placed on a very high structure.

Motorola and AT&T developed and introduced advanced mobile phone system (AMPS) in 1983 with over 2 million subscribers of this system by 1988, which was not adequate to cover the demand. In 1991, Motorola came up with an analog system called Narrowband AMPS in which each existing 30 kHz channel was divided into three 10 kHz channels. During same period, late 1980s and early 1990s, Inter Digital Communications Corporation developed and introduced another system, which

used digital technology and Time Division Multiple Access (TDMA) method. This approach enabled three new voice channels in place of one AMPS channel. Each subscriber of service could use the entire radio frequency channel to transmit data for shorter time frames. TDMA was designed to operate with the efficiency of digital technology and to create a global standard in which all systems would be compatible. Qualcomm, a San Diego, California company introduced in 1994, another cell phone technology known as Narrowband Code Division Multiple Access (CDMA), which was adopted as standard by the Telecommunications Industry Association. It offered 10–20 times the capacity of existing analog AMPS systems. The rate of growth of worldwide mobile phone sales has been dramatic but has recently tapered off (Standard and Poor's Industry Surveys, 2002). Fig. 2.4 presents the growth of worldwide mobile phone sales on a yearly basis.

Within the United States the wireless industry has grown dramatically. Fig. 2 reports yearly growth in the number of subscribers. Along with the growth in subscribers has come a growth in service revenues. Fig. 3 presents yearly growth in total service revenues. Why have cell phones been so popular over the last decade? The answer is simple—mobility. The overall dynamics of the industry have changed, with carriers concentrating on profitability rather than raw subscriber growth. In addition, customers had been delaying their orders until new Internet-ready phones were available. On the profitability front, various mobile standards and new technologies have created a more complex production cycle that is increasing manufacturing and research costs. With growth rates for the wireless sector declining, product pricing will become an even more important differentiating factor. Wireless handset vendors that cannot produce in large volumes and gain economies of scale will have difficulty turning profits.

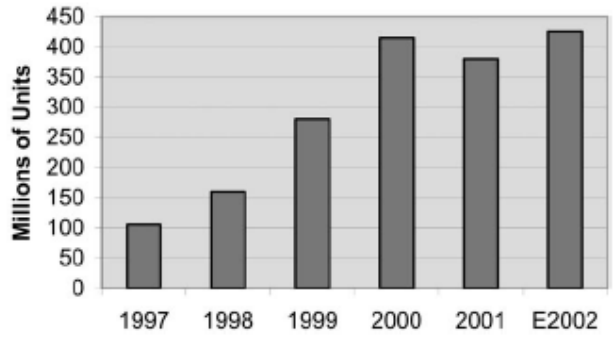


Fig. 1. Worldwide mobile phone sales

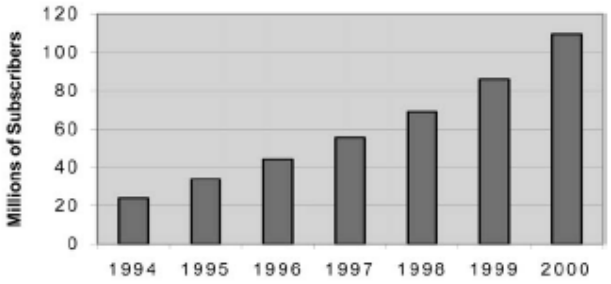


Fig. 2. US wireless industry total subscribers by year

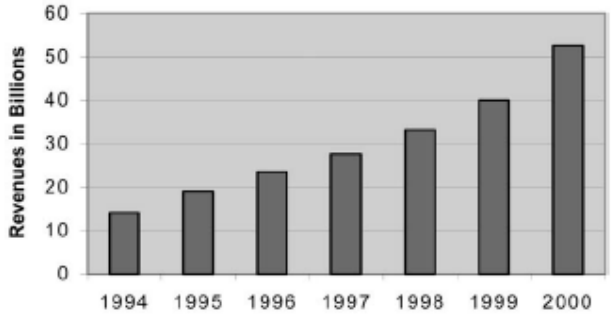


Fig. 3. US wireless industry total service revenues

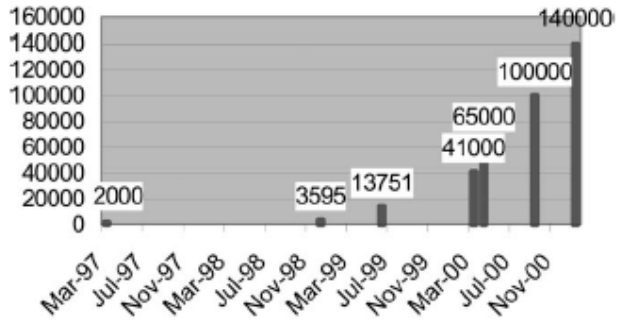


Fig. 4. Number of palm developers

Fig. 2.4 : Growth of worldwide mobile phone sales, number of subscribers etc on a yearly basis (Standard and Poor's Industry Surveys, 2002).

2. History of Personal Digital Assistants :

The personal digital assistant (PDA) developed from the desire to carry a handheld version of items found on one's computer, such as addresses and phone numbers, date book, calculator, etc. This topic revolves around Palm, Inc., a pioneer in mobile and wireless Internet solutions and the world leader in handheld computing. It was founded in 1992 (Palm, 2002). US Robotics Corporation acquired the company in 1995. In 1996, Palm introduced the Pilot 1000 and Pilot 5000 products that led the resurgence of handheld computing. In June 1997, Palm became a subsidiary of 3Com Corporation when 3Com acquired US Robotics. With its acquisition of Smartcode Technology in February 1999, Palm added advanced wireless communications capabilities to the Palm OS platform to address the market for mobile information appliances, such as cellular telephones, messaging devices, data communicators and smart phones. In June 2000, Palm announced the acquisition of Actual Software Corporation, a leading provider of email solutions for the Palm OS platform and the provider of the award-winning MultiMail line of products. According to 2001 figures, Palm is the leading global provider of handheld computers with a 41.5per cent share of the worldwide personal companion handheld device market, and a 60.3per cent share of the worldwide handheld OS market. Palm products are sold in more than 54 countries and through Internet retail websites.

The Palm Economy—a community of Palm OS licensees, nearly 200,000 registered developers and others committed to advancing the platform and its offerings—has created more than 13,000 software applications and more than 100 add-on devices. Palm handhelds are growing increasingly pervasive as information management becomes ever more mobile. Palm believes that handheld computing is the next wave in individual productivity tools for the global workforce. Developing applications for mobile units to generate revenues is a major undertaking. Fig. 4 presents the increase in Palm applications developers since March of 1997 when there were 2000 such developers.

2.3. Technologies enabling Mobile Banking

Technically speaking most of these services can be deployed using more than one channel. Presently, Mobile Banking is being deployed using mobile applications developed on one of the following four channels.

1. IVR (Interactive Voice Response)
2. SMS (Short Messaging Service)
3. WAP (Wireless Access Protocol)
4. Standalone Mobile Application Clients

1. IVR – Interactive Voice Response :

IVR or Interactive Voice Response service operates through pre-specified numbers that banks advertise to their customers. Customer's make a call at the IVR number and are usually greeted by a stored electronic message followed by a menu of different options. Customers can choose options by pressing the corresponding number in their keypads, and are then read out the corresponding information, mostly using a text to speech program. Mobile banking based on IVR has some major limitations that they can be used only for Enquiry based services. Also, IVR is more expensive as compared to other channels as it involves making a voice call which is generally more expensive than sending an SMS or making data transfer (as in WAP or Standalone clients).

2. SMS – Short Messaging Service

SMS uses the popular text-messaging standard to enable mobile application based banking. The way this works is that the customer requests for information by sending an SMS containing a service command to a pre-specified number. The bank responds with a reply SMS containing the specific information. For example, customers of the HDFC Bank in India can get their account balance details by sending the keyword 'HDFCBAL' and receive their balance information again by SMS. Most of the services rolled out by major banks using SMS have been limited to the Enquiry based ones.

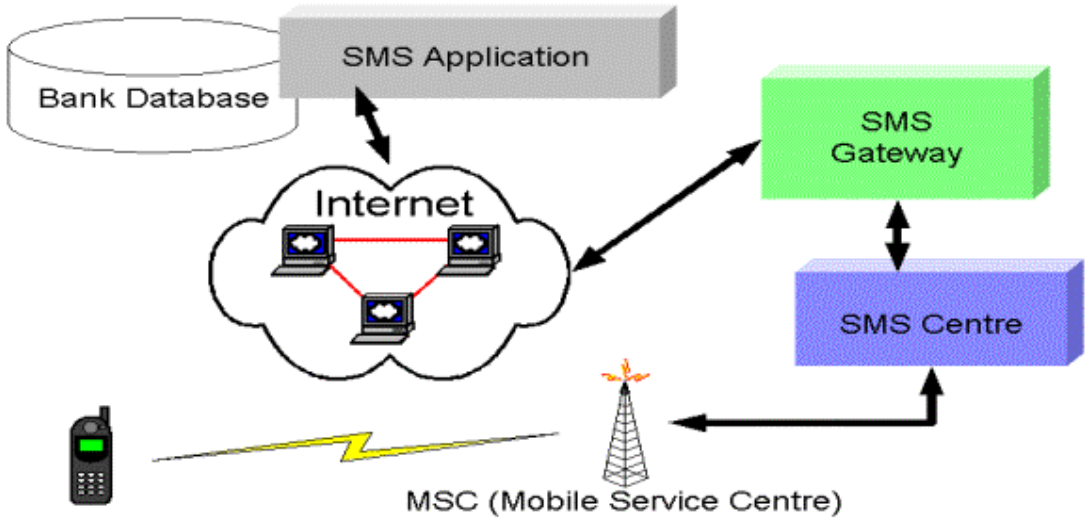


Figure 2.5 : SMS Network Architecture

Short Message Service is particularly adapted to 2G networks because they require low capabilities for data exchange (160 characters for 7 bit by message). For example, SMS make possible to answer quickly a customer request to consult the account balance. The sensitivity of this information requires that the bank lodges and manages its own SMS server since the telecom operators are not authorized to treat them. "The main problem with this kind of transmission is the missing encryption of the data during the on-the-air transmission between the service center and the mobile phone" (Pousttchi et al., 2004). Thus, banks are just satisfied to deliver a limited information service to customers; but, it is impossible to carry out SMS-based transactions.

3. WAP – Wireless Access Protocol :

WAP uses a concept similar to that used in Internet banking. Banks maintain WAP sites which customer's access using a WAP compatible browser on their mobile phones. WAP sites offer the familiar form based interface and can also implement security quite effectively. Bank of America offers a WAP based service channel to its customers in Hong Kong. The banks customers can now have an anytime, anywhere access to a secure reliable service that allows them to access all enquiry and transaction based services and also more complex transaction like trade in securities

through their phone. A WAP based service requires hosting a WAP gateway. Mobile Application users access the bank's site through the WAP gateway to carry out transactions, much like internet users access a web portal for accessing the banks services.

The following figure demonstrates the framework for enabling mobile applications over WAP. The actually forms that go into a mobile application are stored on a WAP server, and served on demand. The WAP Gateway forms an access point to the internet from the mobile network.

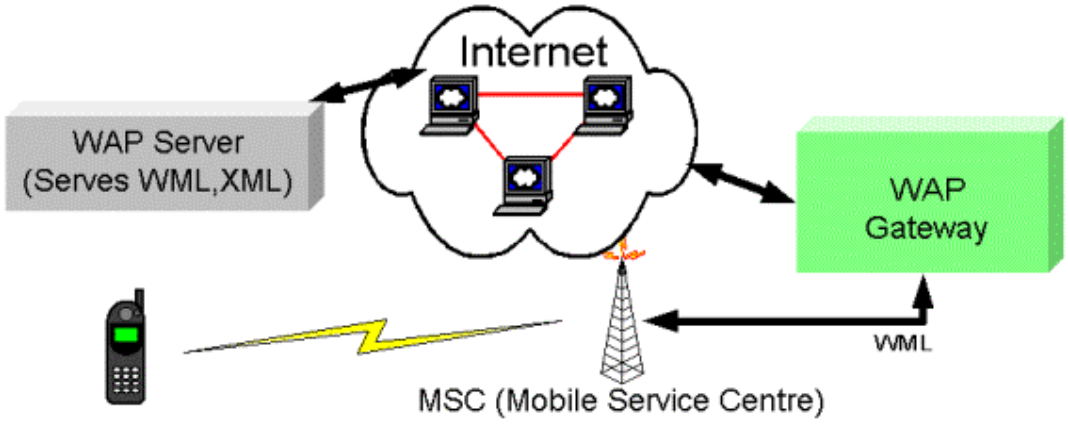


Figure 2.6 : WAP Network Architecture for Mobile Applications

Wireless Application Protocol offer an access to microwebsites managed by a bank's server. Customer access process looks like via Internet. Also, transactions safety via WAP is guaranteed by Internet cryptography systems. The customer authentification is made via his PIN code (Personal Identification Number) and the transaction authorization is given by a customer validation (TAN: Number Transaction). WAP requires 30-40 seconds of connection login, an important number of "clicks" before accessing to useful information or carrying out a full transaction.

2.4. Mobile Payment Technologies

There are many motivations for both retailers and consumers to adopt mobile payment technology. Compared to the current system that includes credit cards, debit cards and checks, mobile payments will be faster, safer, more widely

acceptable, less susceptible to fraud and in the long run will save on costs and increase profitability.

While both sides will benefit from the technology, it will be the retailers that have the most gain and will push for it to be adopted more than the consumer will. Mobile payments have a faster processing time (especially compared to checks), so the retailer gets access to their money faster. The transaction time at the point of sale is also faster, which means that customers can make purchases quickly and long lines will be eliminated (Karnouskos and Fraunhofer, 2004). This can lead to more sales, as some sales are lost due to customers not wanting to wait to make a purchase. The new investment and usage cost for mobile payment technology is expected to be low, since the consumers are paying most of the cost when they purchase their own mobile devices. Depending on how privacy laws are defined for this technology, retailers may also be able to obtain more information about their customers. This information will improve their ability to do market analysis, and they also could use customer information to customize service to each customer depending on their purchase history. Mobile payments will be more resistant to fraud, which is a huge benefit to retailers. In cases of credit card fraud, it is the merchant that ends up paying for most of the losses.

The increased security on mobile payments due to added security precautions would greatly increase their profitability. While credit and debit cards already perform most of the payment functions that a mobile device would be able to handle, consumers still have a number of reasons to adopt this new technology due to fraud. It will be very easy for customers to learn to use and gradually will be more widely available to use than credit cards. In fact, it is expected that global standards will be put into place that will allow mobile payments to be accepted worldwide, regardless of where the customers have their accounts.

With mobile payments one will be able to make a payment to anyone else with a compatible mobile device. Finally, the customer will be able to access his/her

transaction history easily by viewing it right on the mobile device. In addition to retailers and consumers, other companies can benefit from this new technology. Mobile network operators will grow and increase profits by providing these new services. Mobile device manufacturers will see increased demand and will develop profitable relationships by working with banks and other payment processing providers. When introducing a new form of payment to the public, mass-market acceptance of the new technology is extremely important (McMahon et al., 2005; Walker and Barnes, 2005). A large number of retailers and customers have adopted the new technology; otherwise it will fail since few people will use it instead of current payment methods. When credit cards were first introduced in 1951, only a few hundred people had the cards and only a small number of restaurants were willing to accept them.

There are a variety of different technologies that different companies want to standardize handling local transactions. Palm and HP have partnered to develop IrFM (infra-red) technology to allow Palm Pilots to act as a digital wallet. Some US companies such as Verizon, Visa and many Asian companies are also involved with IrFM payment procedures. Many other companies are working on 'Wireless Wallet' technology, which requires an always-on connection to the user's wireless network (Chameleon Network, 2003). There are also Radio Frequency Identification-(RFID-) based payment procedures being developed. With RFID, a small chip built into the cover of the phone is scanned, and a Personal Identification Number (PIN) must be entered to authorize the payment. This was developed to be similar to existing credit card technology and to be more able to quickly and easily replace current systems. Some companies have implemented other interesting ways to use mobile devices for transactions. A bank company in Japan allows customers to withdraw money from an Asynchronous Transfer Mode (ATM) by using their mobile phone for identification. Another Japanese company called Telcos has come up with a way to use a mobile device as a form of payment without the retailer having to make any extra efforts to accept mobile payments. A system has been developed that allows a customer at a store to purchase goods with an online transaction, at which point an

image of the barcode is sent to the customers' screen. This bar code can be scanned through an existing optical technology.

Future of Mobile Payment Technology

Because mobile payment is still a new technology that is just beginning to be utilized there is much room for improvement and future technological advancement. The first of these technological advancements, which is being considered, is that of the 3G technologies. Currently all existing systems focus on 2G and 2.5G infrastructures. A few of the approaches to the new 3G technologies were tested with the debut of the Universal Mobile Telecommunications System (UMTS), wireless LAN and WiMAX. With these new systems mobile payment will be freed from some of its current limitations. As the device manufacturers continue to introduce new mobile phones with more sophisticated technology, the idea of advanced cryptographic services will be integrated into the mobile phones, which will allow for a secure voice and data communications. This is an issue that will fix many of the questions of security and privacy. Currently the mobile payment security is very weak. The only reason why this weak security of mobile payment has not been widely exploited is because mobile payment has not become a mainstream medium for payments (Young, 2006).

Other security technology expected to become available in the future are Mobile PKI, mobile digital signatures, encryption and biometric authentication. Many standardizations efforts are being implemented and mobile payment industry is working towards a federated identity in the virtual world. The security issue that we face in the future is a major obstacle because security was not originally instituted within the networks; security was added later after the vulnerability was noticed. If security standardization is made in the virtual world, this will have a catalytic effect on mobile payment development and the acceptance by the public. This advancement will bridge the gap between the physical world and the virtual world.

Mobile payment is paving the way of the future by rendering the need for paper money obsolete. With the demand for wireless technology growing at such rapid

rates it is adding fuel to the fire of mobile payment. With minimal boundaries, mobile payment has a clear shot into the future. Even today new mobile payment infrastructures are being introduced into the world. Many issues still plague mobile payment. The main one is security, but, with the research and standardization being implemented around the world it is in the near future that one's next purchase will happen with a virtual dollar (Herzberg, 2003). These values show that mobile payment reduces the time of a transaction and the cost significantly thus proving to be very beneficial to the economy. It is found that this technology has proven to be very efficient and could be a reliable source of currency in the years to come. With various improvements that are taking place to advance the security of mobile payment, it is in the very near future it is expected to see mobile payments become a widely spread technology and replace paper currency.

2.5. Major Banks in India

There are 289 scheduled commercial banks operating in India as on 31st March 2004. Scheduled commercial banks comprise 27 Public Sector banks, 30 Private Sector banks, 36 foreign banks and 196 Regional Rural banks.

The following are the major Scheduled Banks in India (Public Sector):

State Bank of India, State Bank of Bikaner and Jaipur, State Bank of Hyderabad, State Bank of Indore, State Bank of Mysore, State Bank of Patiala, State Bank of Saurashtra, State Bank of Travancore, Andhra Bank, Allahabad Bank, Bank of Baroda, Bank of India, Bank of Maharashtra, Canara Bank, Central Bank of India, Corporation Bank, Dena Bank, Indian Overseas Bank, Indian Bank, Oriental Bank of Commerce, Punjab National Bank, Punjab and Sind Bank, Syndicate Bank, Union Bank of India, United Bank of India, UCO Bank, Vijaya Bank. Out of 27 major public sector banks only 6 banks provided mobile banking facility in February 2007.

The following are the major Scheduled Banks in India (Private Sector):

Vysya Bank Ltd., UTI Bank Ltd., Indusind Bank Ltd., ICICI Banking Corporation Bank Ltd., Global Trust Bank Ltd., HDFC Bank Ltd., Centurion Bank Ltd., Bank of Punjab Ltd., IDBI Bank Ltd., Karnataka Bank, Federal Bank. Out of 11 major private sector banks 7 banks provided mobile banking facility in February 2007.

The following are the major Scheduled Foreign Banks in India:

ABN-AMRO Bank, Abu Dhabi Commercial Bank, American Express Bank, Bank of Ceylon, BNP Paribas Bank, Citi Bank, China Trust Commercial Bank, Deutsche Bank, HSBC, JPMorgan Chase Bank, Standard Chartered Bank, Scotia Bank, Taib Bank. Out of 13 major foreign sector banks only 5 banks provided mobile banking facility in February 2007. By the year 2009, the list of foreign banks in India is going to become more quantitative as number of foreign banks are still waiting with baggage to start business in India.

2.6. Review of Literature on Online Banking

In India not many studies have been conducted on the current status of online mobile banking. Thus almost no literature is available on this subject in India. There are numerous papers that sought to study the growth of online banking internationally, for instance, Sathye (1997) surveyed the status of Internet banking in Australia. The study found that only two of the 52 banks started Internet banking services at that time. However still there was a lot of room for Internet banking to expand in Australia.

Booz Allen and Hamilton Inc. (1997) conducted a global survey covering 386 retail and corporate banking institutions in 42 countries to assess the strategic impact of Internet banking on the financial service industry. According to the study, there is a huge perception gap between North American/European banks and Japanese banks regarding the future of Internet banking. North American and European banks expect Internet banking to become the most important retail channel within 10 years, but Japanese banks expect traditional branches to remain the most important channel. The study also indicates the rapid growth potential of Internet banking. Many of the banks that responded have plans to upgrade the functionality of their Internet service offerings. Egland (1998) conducted the first important study that estimated the number of U.S. banks offering Internet banking and analyzed the structure and performance characteristics of these banks. They have found no evidence of major differences in the performance of the group of banks offering Internet banking activities compared to those that do not offer such services.

Furst et al., (1998) a U.S. based study found out a significant shift by consumers and businesses to electronic payments. In response to developments in electronic payments and remote banking, banks have greatly increased their investment in technology, particularly in retail banking. The gains from technological advancements in banking and payments are likely to be substantial, both from the point of view of individual financial institutions and economy-wide. In this environment, banks should review and, if necessary, adjust their risk management practices in tandem with upgrading their technology activities.

Diniz (1998) reported a survey of web sites of banks in USA. It was found that most of the bank websites were basic and intermediate level. No website was found to be of advanced level.

Furst et al., (2000) presented data on the number of national banks in U.S. offering Internet banking and the products and services being offered. Only 20 percent of national banks offered Internet banking in the third quarter of 1999. However, as a group, these Internet banks accounted for almost 90 percent of national banking system assets, Banks in all size categoriesand 84 percent of small deposit accounts. offering Internet banking tend to rely less on interest-yielding activities and core deposits than do non-Internet banks. Also, Institutions with Internet banking outperformed non- Internet banks in terms of profitability.

Sullivan (2000) found that Internet banks in 10th Federal Reserve District incurred higher expenses but also generated higher fee income and concluded that the measures of profitability for Internet banks are similar to those of the non-Internet banks.

Guru et al., (2000) examined the various electronic channels utilized by the local Malaysian banks and also accessed the consumers reactions to these delivery channels. It was found that Internet banking was nearly absent in Malaysian banks due to lack of adequate legal framework and security concerns. However over 60 percent of the respondents were having Internet access at home and thus represented a positive indication for PC based and Internet banking in future.

DeYoung (2001a) investigated the performance of Internet-only banks and thrifts in the U.S. The empirical analysis found that the newly chartered Internet-only banks

substantially underperform the established banks at first, but these performance gaps systematically diminish over time as new banks grow older and larger. The study suggested that the Internet-only banking model may be feasible when executed efficiently.

DeYoung (2001b) found that the average one year old Internet-only bank earned significantly lower profits than the average one year old branching bank, due to low business volumes and high non-interest expenses. It supports the proposition regarding the Internet-only banks, fast growth but low (or no) profits.

Jasimuddin (2001) found that within one year of the introduction of Internet service in Saudi Arabia, Saudi banks had at least decided on their Internet presence. 73per cent of the Saudi banks possessed their own web sites and 25per cent of the web sites were offering full services over Internet. The banks viewed the Internet as a key alternative delivery channel.

Suganthi et al., (2001) conducted the review of Malaysian banking sites and revealed that all domestic banks were having a web presence. Only 4 of the ten major banks were with transactional sites. The remaining sites were at informational level. There are various psychological and behavioral issues as trust, security of Internet transactions, reluctance to change and preference for human interface which appear to impede the growth of Internet banking.

Furst et al., (2002) provided a comparative study of Internet and non-Internet banks in U.S. and found that institutions with Internet banking outperformed non-Internet banks in profitability. Also, banks in all categories of size offering Internet banking tended to rely less on interest yielding activities and deposits than non-Internet banks do.

Koedrabruen et al., (2002) investigated, designed and developed an Internet based retail banking prototype that meets the requirements of the Thai customers. It found that more than half of the sample Internet users in Thailand are very interested in using the Internet banking services. The main features needed are balance inquiry, bill payment, fund transfer, business information, and payment for goods purchased. The prototype was then developed and validated. The survey from the executives of

four Thai banks revealed that there was a potential growth for retail Internet banking in Thailand.

Corrocher (2002) investigated the determinants of the adoption of Internet technology for the provision of banking services in the Italian context and also studied the relationship between the Internet banking and the traditional banking activity, in order to understand if these two systems of financial services delivery are perceived as substitutes or complements by the banks. From the results of the empirical analysis, banks seem to perceive Internet banking as a substitute for the existing branching structure, although there is also some evidence that banks providing innovative financial services are more inclined to adopt the innovation than traditional banks.

Hasan (2002) found that online home banking has emerged as a significant strategy for banks to attract customers. Almost 75 percent of the Italian banks have adopted some form of Internet banking during the period 1993-2000. It also found that the higher likelihood of adopting active Internet banking activities is by larger banks, banks with higher involvement in off-balance sheet activities, past performance and higher branching network.

Janice et al., (2002) based on interviews with four banks in Hong Kong noted that banks view the Internet as being a supplementary distribution channel for their products and services in addition to other forms of distribution channels such as Automated Teller Machines (ATMs), phones, mobile phones and bank branches. Basic transactions and securities trading are the most popular types of operations that customers carry out in Internet banking.

Lustsik (2003) based on the survey of experts of e-banking in Estonian banks found that Estonia has achieved significant success in implementation of e-banking and also on the top of the list in emerging countries. All the major banks are developing e-business as one of the core strategies for future development.

Awamleh et al., (2003) found that banks in Jordan are not fully utilizing concepts and applications of web banking. In comparison to developed international markets, it is fair to say that this sector is largely undeveloped. Indeed, only two banks offered limited number of services through their web. The major challenge facing

further development of web banking in Jordan is, for example, the high cost of telecommunication. Another element is the non-availability of information technologies, packages, solutions, and human resources, which facilitates optimum use of technology. The study revealed that Jordanian banks have been successful in the introductory phase of web banking. However Jordanian banks are required to move towards web banking usage with a view to conducting real financial transactions and improving electronic customer relations.

Mari Suoranta et al., (2003) focused on studying diffusion and adopters of mobile banking services. The paper explores some contradictory empirical findings drawn from a mobile banking survey. The results provide an indication of the characteristics of potential subsequent adopters of mobile banking, and of differences between user segments. It also commented on the influence of certain demographic characteristics and the preferred communication mode of customers on the adoption and future usage of mobile banking services.

Jukka Riivari, (2005) looks at how and why financial organisations across Europe are beginning to take advantage of mobile services and in particular mobile banking as a powerful new marketing tool to build long-lasting and mutually rewarding relationships with new and existing customers. Examples show how European financial organisations are using mobile banking to improve their customer service and relationships, to reinforce their brand by literally placing it in their customer's pocket and to reduce their costs.

Mari Suoranta et al., (2005) reviews recent technological advances in banking and forces that will drive or inhibit mobile banking services adoption. Drawing on the relevant literature and empirical implications of the study, the paper proposes a model that conceptualizes different affecting factors in electronic banking environment, and particularly in mobile banking. A quantitative survey sheds more light on this researched issue. The data was collected in Finland during May–July 2002.

Irwin et al., (2005) explored the factors that affect Internet and Cell Phone banking adoption in South Africa. The paper also compare the differences in the perception of Internet banking and cell phone banking and the influence factors. The findings

indicate that both the adoption intent and the perception of Internet banking users differ markedly from cell phone banking users.

The exploratory study of Vijayan et al., (2005) seeks to examine the consumers' intention to adopt themselves to multimedia banking based on three commonly used theories known as Technology Acceptance Theories (TAT). Even though multimedia banking is well available in the market banks are generally facing immense challenges in attracting visitors to their websites. As much of these phenomena were blamed on the traditional brick and mortar type of banking, knowledge and understanding of this challenge can help bankers to fish in more clients into this new wave of banking. At the same time to stay competitive in the market banks have to develop a framework that incorporates latest technological aspects of multimedia banking.

Chai Lee, (2006) found that there are several underlying forces coming together have caused the E-banking development in Malaysia. The development mainly because of new marketing strategy especially to create E-Customer Relationship Management (E-CRM) and to improve banking activities. The other reasons are development of technology, applications and tools, as well as supported by the government.

Lee et al., (2007) identified factors influencing the adoption of mobile banking service. The paper focused on perceived risk, perceived usefulness, and trust in mobile banking adoption. This study modified the concept of a technology acceptance model (TAM) within the context of mobile banking. It introduced "perceived risk" and "trust" in a proposed model to reflect consumers' needs to use mobile banking. Evidence for a composite perceived risk variable was identified. We found the strong inhibiting effect of perceived risk on trust. It is found that Trust also had stronger influence on the adoption behavior of mobile banking than perceived usefulness, which was used as an important variable in the traditional TAM variables. There are a series of papers that observe that mobile banking has revolutionized the banking industry and the banking industry is under pressure to offer new products and services. However, to succeed in today's electronic markets a strategic and focused approach is required.

In the Indian context many publications throw light over the importance of Internet banking and also its prospects for the Indian banking industry. However these papers don't identify key differences between Internet banks and non-Internet banks. Unnithan et al., (2001) studied the drivers for change in the evolution of the banking sector, and the move towards electronic banking by focusing on two economies Australia and India. The paper found that Australia is a country with Internet ready infrastructure as far as telecommunication, secure protocols, PC penetration and consumers literacy is concerned. India, by comparison, is overwhelmed by weak infrastructure, low PC penetration, developing security protocols and consumer reluctance in rural sector. Although many major banks have started offering Internet banking services, the slow pace will continue until the critical mass is achieved for PC, Internet connections and telephones. However, the upsurge of IT professionals with growing demands is pressuring the government and bureaucracy in the country to support and develop new initiatives for a faster spread of Internet Banking. The economy is classically the catch-up one, trying to develop and catch up with leading economies. Rao et al., (2003) provided a theoretical analysis of Internet banking in India and found that as compared to banks abroad, Indian banks offering online services still have a long way to go. For online banking to reach a critical mass, there has to be sufficient number of users and the sufficient infrastructure in place. Agarwal et al., (2003) explored the role of e-banking in e-democracy. With the development of asynchronous technologies and secured electronic transaction technologies, more banks and departments were using Internet for transactional and information medium. Initiatives such as E-SEVA and FSC's are the milestones towards achieving comprehensive e-governance.

Balwinder Singh et al., (2004) made a survey of commercial banks websites, on the number of commercial banks that offer Internet banking in India and on the products and services they offer. It investigates the profile of commercial banks that offer Internet banking, using univariate statistical analysis, relative to other commercial banks with respect to profitability, cost efficiency, and other characteristics. By the end of first quarter, 2004, differences between Internet and

non-Internet banks had begun to emerge in funding, in sources of income and expenditures and in measures of performance. It was also found that the profitability and offering of Internet banking does not have any significant correlation.

Sakkthivel, (2006), conducted an extensive primary research in Bangalore, India (Silicon Valley of India) in order to identify the willingness of Internet users to buy different services over Internet. The paper aims at providing a specific focus to identify the impact of demographics in influencing Indian Internet users in consuming different services online. The outcomes would help the corporate world to understand the importance of demographics on online purchase which could be adopted and deployed for better use.

Internet banking is fast becoming popular in India. However, it is still in its evolutionary stage. By the year 2005, a large sophisticated and highly competitive Internet banking market will develop. Almost all the banks operating in India are having their websites but only a few banks provide transactional Internet banking (Mookerji, 1998; Pegu, 2000; Gupta, 1999; and Dasgupta, 2002).

2.7. Significance of Mobile Business in Financial Sector

2.7.1. Penetration of Mobile Usage in India :

In India, the growth of mobile plateaus is at around 13,00,000 new subscribers every month. India had 14.17 million mobile phone subscribers by May 2003, about 102.8 percent more than the year 2003 and as of end October 2004, the total number of mobile subscribers in the country was 44.51 million as compared to 43.96 million fixed line subscribers. It is also noted that the GSM industry continued to maintain its dominance in the mobile market accounting for 78per cent of India's total mobile subscribers. Mobile phone users are grown to over 160 million by the end of the year 2006 and 220 million by the end of the year 2007. This is due to the following seven reasons :

Essentiality of mobile device rather than luxurious :

The tight emotional attachment with the family members and friends, Indian citizens like to keep continuous contact with each other at any where any time. This attitude of Indian people is supported by the advent of less cost mobile communication technology and becoming popular in upper as well as middle class people.

Continuously decreased price of mobile devices :

The price of mobile devices is continuously decreasing year by year and is now affordable to common people in India. In addition, the technology of mobile device is improving such as increase in screen size, improved bandwidth and internet accessibility.

Low usage cost :

Due to high competition between mobile service providers and globalization of business, the cost per call is very small and is further decreasing substantially.

Availability of services in rural areas :

Due to decreased cost of mobile equipments and communication services, rural people also attracted towards the usage of mobile services. Moreover, the competition between mobile service providers and hence decreased usage cost also attracted the middle class people in rural areas. Also, the additional bundled services like mobile banking, internet access facility using mobile device and mobile commerce attracted educated people in rural area which caused further penetration of mobile usage in India.

Integration of various service applications within a device :

The bundling of various additional services like, video camera, free SMS, broad band Internet access facility at nominal charges, Downloading video games, weather report, Alarm, date and time, calculator, hot news, online banking facilities, online purchasing of various products and services attracting people to use mobile devices and services.

Improved willingness to use mobile devices :

The attitude of the people towards the usage of mobile devices for their daily applications is changing and the willingness of the people especially youngsters towards usage of mobile devices is increasing. More and more people in urban and rural places are attracted to the advantages of mobile communication technology and willing to use them in their daily life.

Improved economic conditions of the people :

Such an extremely high penetration rate of mobile devices, especially mobile phones coincidences applications other than communication between people, which include mobile financial applications such as mobile banking and mobile payments. This is also due to the fact that users considered their mobile phone as a personal trusted device making it to an integral part of their lives and more and more of these devices became Internet-enabled, which is suitable for banking applications.

Cellphone firms in India get ready to harvest the high growth potential of mobile phone market. With subscriber addition drying up in older cellphone markets in Western Europe and North America, the bigger players in the mobile phone industry are turning to emerging markets – India and China to keep growth rates high. World leaders Nokia and Motorola, who accounts for more than 51per cent of the phones sold in the World today, continue to bring out cheaper and cheaper models in the market with basic features like voice, SMS and mobile banking at around Rs. 1000. Another player, Philips, less dominant in handset market but which accounts for almost 15per cent of the chipset business has also a plan to bring out Cellphones under Rs. 1000.

The Indian Government has given unstinting support to the telecom sector, which is a critical infrastructure for economic growth of the country and has a direct multiplier effect on the economic growth. Responding to the support, the Indian cellular industry has put in a significant performance in the recent past. Today, the number of mobile subscribers has exceeded the number of fixed line subscribers and is continuing to grow appreciably. The Telcom industry has invested over Rs. 60,000 crores in setting up 150 state-of-the-art cellular mobile networks serving about 4,000

cities/towns and over 60,000 villages all over the country. The Cellular service providers are offering world-class digital mobile services to the consumers at the most affordable tariffs in the world.

2.8. Services in Online Mobile Banking

Basic online banking covers the account management via electronic devices. However, type of mobile banking services are classified in three types as : Information services, communication services and transaction services. The information service provides the information about various products and services available for the customers. This level of banking service can be provided on a stand-alone server by the bank itself or by sourcing it out. Since, the server or Website may be vulnerable to alteration, appropriate controls must therefore be in place to prevent unauthorized alterations to data in the server or website. The communication level allows interaction between bank's system and the customer. This types of services may be limited to account inquiry, loan applications, request for cheque book, an e-mail to stop account transfer, static file updates etc. Under this kind of services, the customer makes a request to which the bank subsequently responds. In communication service, the risk of any unauthorized attempt to access to banks internal network and computer system is more compared to information service. The transaction level allows customers to execute transactions like accessing and fund transfer between accounts, paying utility bills etc. These services require higher level of risk and must have strongest controls which demand very stringent security.

The online services generally offered by Indian banks are :

Account balance/statement: After logging in, one could check his account balance and view a list of recent transactions, view an account statement online and print it if needed. Citibank also lets to view the relationship summary and loan account statement online.

Electronic transfers: Enables the customer to transfer money between two accounts in the same bank. Some banks provide a facility for transferring money between NRI (Non-Resident Indian) and local accounts.

Bill and loan payments: Banks offering this facility to receive, review and pay customers bills or loans online. Besides loan payment, one can opt to pay electricity, water, phone, credit card and cellular phone/pager bills, through the bank. Once the customer confirm the transaction, the payment will be automatically made. Some banks also provide schedule payments for a future date.

Credit Cards: Using this facility, the customer can access details about his credit card statements, payment status and requests. Citibank allows its customers to increase his credit limit online, or apply for a second credit card.

Requests: This facility allows to request a new cheque book, some deposit slips or a demand draft. It also allows to issue a stop-payment instruction using a mobile device. The cheque book, deposit slips and draft will be delivered by courier.

Information: Mobile banking can also provide information at customers fingertips. For instance, one can view forex rates or interest rates.

E-mail: Some mobile online banks offer an e-mail facility. This is used exclusively for sending queries to a bank executive. Although an e-mail response from the bank may not be as instantaneous as telephonic help, it does help in providing specific information.

Investment services: This includes online transactions for stocks and shares and investments like mutual funds and demat.

Miscellaneous services: Online banking facility also allows to inform lost cheque, stop payments, lost ATM card or credit card, to the bank, and expect some immediate action.

E-commerce: Online banks are setting up their own payment gateways and are preparing to become payment facilitators for B2C e-commerce transactions. HDFC and ICICI Banks have already set up a payment gateway for facilitating payments for goods.

Table 2.1 : Push or Alert and Pull or Request Facilities available in Indian Banks :

Type of Mobile banking service	Facilities
	1. All significant transactions alert 2. Cheque bounce alert 3. Cheque paid alert 4. Clearing cheque

Push or Alert	deposited/regularized alert 5. Maturing and matured term deposit alert 6. Standing instructions to operating account 7. Nearest bank branch location 8. Balance in Account falls below certain amount. 9. Credit of salary into account 10. Loan installment overdue 11. Locker rent overdue 12. Suspending self from SMS alerts
Pull or Request	1. Account balance 2. Last 3/5 transaction details 3. Cheque book request 4. Enquire cheque status 5. Stop cheque payment 6. Account statement 7. Registration for SMS banking 8. Fixed deposit details 9. Pay your utility bills 10. Bill presentment 11. Fund transfer between own accounts 12. Renew term deposits 13. Set operative account 14. Change your primary account 15. Debit card reward points 16. Help facilities 17. Details of balance in Credit card 18. Reward points available 19. Credit card details of last payment 20. Credit card payment due date 21. Demat status enquiry 22. Demat status of transaction 23. Information related to loan 24. Nearest bank branches 25. Nearest ATM location 26. List of banks under ATM sharing 27. Latest deposit interest rate 28. Change SMS password 29. Cancel Registration of SMS banking 30. Domestic/NRE/FCNR deposit interest rate 31. IFSC code and name of the bank branch 32. Applying for new PIN 33. Mobile phone recharge

2.9. Mobile Banking by Indian Banks

Public Sector : (collected from the website of respective banks)

1. Dena Bank :

The strategy is poor. There is no mention about mobile banking in first page of the website. Under banking services, Dena m-banking is missed in first page listing and is included in Services page. Mobile Banking is a new service from Dena Bank, which enables customer to make inquiries about account through their mobile phone by using the SMS facility with total confidentiality and security. The facilities like Balance enquiry, Mini Statement, and Cheque Status are available along with information about how to register and m-banking facility available branches. The facilities are presently absolutely free of cost and a normal SMS charge, as charged by the Mobile service provider is only applicable.

2. Bank of Baroda

Mobile banking service can be availed by SMS and WAP enabled mobile phones. Only basic facilities are available like balance enquiry, last three transactions, requesting a cheque book, knowing status of cheque book request. Online Registration through their website is possible for existing customers.

3. Indian Bank

With the name INDMobileBANKing, Indian bank provides SMS alerts and basic banking facilities like : Balance Enquiry, Issued cheque status Enquiry, Deposited Cheque status Enquiry, and Change of T-PIN. Registration for existing customers and Demo for using the facility are provided in bank Website.

4. Canara Bank

The mobile banking facility is started in 2006. The facilities available for the customers are Registration for SMS Banking, Change of primary account, View of balance, View of Term Deposit details, Issued Cheque status, View of last 5 transactions, De-register for SMS Banking, and Help message for Keywords

5. State Bank of India

Only SMS Alert facility is available

6. Corporation bank

The mobile banking facility is started in 2006. The bank provides SMS Alerts and SMS Pull Services. The push services are Debit / Credit in account above Rs 5,000 for all running accounts, Balance in account falls below Rs 500 for Savings/Current accounts, Return of cheque deposited by account holder, Return of cheque issued by account holder, Credit of salary into account, Unsuccessful execution of Standing Instruction, Loan Installment overdue, and Locker rent overdue. The Pull services are Enquiry of Current Balance in account, Details of last 3 transactions, Funds Transfer between your own accounts, Request for Cheque Book, Stop Cheque request, Status of Cheques, Renew Time Deposits, Change default account for SMS Banking, Changing SMS PIN, Help for getting service etc.

Private Sector Banks :

1. HDFC Bank

MobileBanking service provides both SMS and WAP enabled services : balance details, last 3 transaction details, Request a cheque book, Stop a cheque payment, Enquire cheque status, Request an account statement, Get Fixed Deposit details, Request for Internet PIN re-generation, and Pay your bills.

2. ICICI Bank

ICICI Bank offers the Mobile Banking facility to all its Bank, Credit Card, Demat and Loan customers. ICICI Bank Mobile Banking can be divided into two categories of facilities:

Alert facility: The ICICI Bank Mobile Banking Alert facility informs you promptly of the significant transactions in your accounts. It keeps you updated wherever you go.

Request facility: ICICI Bank Mobile Banking Request facility enables you to ask for your account information.

All mobile service providers have tie –up with ICICI and hence the service can be accessed by any mobile phone.

3. Karnataka Bank

Karnataka Bank offers Mobile Banking facility to all its Bank customers. Karnataka Bank Mobile Banking can be divided into Alert and Request categories of facilities:

Kanrataka Bank Mobile alerts provides Transaction Alert, Cheque Bounce Alert, Cheque Paid Alert, Clearing Cheque Deposited, Regularized, Maturing Term

Deposit Accounts, Matured Term Deposit Accounts, Standing instructions to Operative Accounts. Karnataka Bank Mobile requests provides Account Balance Inquiry, Last 5 transactions in your Account. Change SMS password, Suspend yourself from SMS Banking. Rs. 2 will be charged for the service.

4. Bank of Punjab

Centurion bank of Punjab customers with mobile subscriptions can stay updated about their bank account through Centurion Bank of Punjab's following SMS Alerts service.

- Bank Balance - Bank balance sent weekly
- Account getting credited for an amount of Rs 1000/- or more
- Account getting debited for an amount of Rs. 1000 /- or more
- Deposit maturity advice - SMS Alert is sent 3 business days before maturity date.
- Notification of standing order execution
- Important Banking information alerts

5. Federal Bank

FedAlert is currently offered absolutely free and there is no need to upgrade existing Mobile Phone or change existing Mobile Service Provider. It is available across the globe irrespective of the service provider. Various Services Available are Credit of Amount Above Limit, Debit of Amount Above Limit, Credit of Particular Amount, Debit of Specified Amount, Balance Amount Exceeds Limit, Balance Amount goes below Limit, New Cheque Book Issued, Cheque Deposited Returned Unpaid, Cheque Issued Returned Unpaid, Day End Balance, and Excluding ATM Withdrawal.

6. IndusInd Bank

For registered mobile banking customers the bank offer information in the form of SMS messages, which could be event or frequency based alerts. These include, Daily balance update, Transaction based Alerts on Debits and Credits into the account, Standing Instructions 'Success' messages, PULL message, Deal maturity information would be sent to the customers before 3 days of maturity, and Broadcasts. Benefits of m-banking usage are mentioned in the website. PUSH messages and Broadcasts are not charged.

7. IDBI Bank

The strategy to encourage mobile banking is good. Both SMS and WAP enabled mobile banking facility are available to the customers. The major facilities are Balance enquiry, Last three transaction, Cheque payment status, Cheque book, Statement request, Demat - free balance holding, Demat - last two transactions, and Bill payment. To draw the cash while travelling, the mobile indicates the nearest IDBI branch and its phone number.

Foreign Banks :

1. ABN AMRO :

The strategy of ABN Amro bank is considerably good. The website has mention and link for Mobile Banking in the first page. The bank provides mobile banking facility in the name of mPOWER. MPOWER allows customers account for inquiry and transactions using simple SMS messages. It offers bonus points to using mPower banking facility to its customers. The facilities currently providing under mPOWER are : Balance and Transaction Inquiry, Share Holdings in Demat Account, Funds Transfers to ABN AMRO and other banks, Bill Presentment and Payment, Cheque Inquiry and Stop Cheque, Online Fixed Deposit Opening, Request for Cheque Book and Statement, Request for new PIN and change PIN online, and Help and Query to use mobile banking facility.

2. Abu Dhabi C. bank :

The strategy of Abu Dhabi C. bank to attract customers to use mobile banking is very good. The bank has given importance to mobile banking (Cellphone banking) in the first page of website. The bank named their mobile banking facility as CELLutions, and according to the bank, CELLutions makes banking not only a pleasure, but also imparts value to their relationship. CELLutions Banking enables customer to access basic banking information from virtually anywhere and they will experience ease, speed and convenience while banking. Presently, this service is available for customers banking with ADCB Bombay and Bangalore branch. The Pull Options available are Account Balance, last 5 transactions, Cheque Status, request for Cheque Book, get Term Deposit details, to verify the stocks in DP account, to get Loan Details, to disable the Service, to get Help, to enquire interest rates on deposits, and to enquire foreign exchange rates currency-wise. The Alert Options are FD Maturity

Reminder, Closing Account Balance, Balance Below a Minimum, Alert on Loan Installment Due, Credits/Debits to Bank Account, and Credits/Debits to Depository Account. A service fee of Rs. 1/- will be applicable for these "ALERTS" transmitted by Bank.

The bank provides the detailed information in its website about how to operate and receive messages and how to register for mobile banking facility.

3. Citi bank :

The strategy of City bank is considerably good. The website has mention and connection for Mobile Banking in the first page. The bank provides mobile banking facility for Account related transactions (Pull), Account related Alerts, Re-charging pre-paid mobile Phone, Pay Utility Bills, and even shop on move using mobile phone.

4. Standard Charted Bank :

Only SMS Alert facility is available.

5. American Express Bank :

Only SMS Alert facility is available.

The following tables compares the mobile banking facility and internet banking facility provided by various Public sector, Private sector and Foreign sector Indian Banks (collected from the websites of respective banks).

Table 2.2 : Comparative study of some Indian Banks for various mobile banking services (2007 November from their website) :

Service	ABN AMRO	CITY BANK	ICICI BANK	HDFC BANK	IDBI BANK	CANARA BANK	KARNATAKA BANK	CORPORATION BANK
Balance Enquiry	✓	✓	✓	✓	✓	✓	✓	✓
Last transactions	5	1	3	3	3	5	5	3
Last salary credit	✗	✓	✗	✗	✗	✗	✗	✓
To locate nearest ATM	✓	✓	✗	✗	✗	✗	✓	✗
New Cheque Book	✓	✗	✓	✓	✓	✗	✗	✓
Cheque status enquiry	✓	✗	✓	✓	✓	✓	✓	✓
Stop Cheque	✓	✗	✓	✓	✗	✗	✗	✓
Credit Card Outstanding with credit limit	✗	✓	✓	✗	✗	✗	✗	✗
Credit card last statement	✗	✓	✓	✗	✗	✗	✗	✗
Pay bill online	✓	✓	✓	✓	✓	✗	✗	✗
Bank initiated alert message	✓	✓	✓	✓	✓	✗	✓	✓
Prepaid mobile phone recharge	✗	✓	✗	✗	✗	✗	✗	✗
Demat Enquiry	✓	✗	✓	✗	✓	✗	✗	✗

Table 2.3 : Comparative study of Six Prominent Public sector banks mobile banking facility in Karnataka as on February 2007

Features	Dena Bank	Bank of Baroda	Indian Bank	Canara Bank	Corp Bank	State Bank of India
Balance enquiry	√	√	√	√	√	×
Last 3 or 5 Transactions	√	√	√	√	√	×
Cheque Payment status	√	√	√	√	√	×
Order Cheque book	×	√	×	×	√	×
Statement request	×	×	×	×	√	×
View term deposit	√	×		√	×	×
Credit of salary to account	×	×	×	×	√	×
Demat - free balance holding	×	×	×	×	×	×
Demat - last two transactions	×	×	×	×	×	×
Bill payment	×	×	×	×	×	×
Change of T-PIN	×	×	√	×	√	×
SMS Alert facility	×	×	√	×	√	√

Table 2.4 : Comparative study of Nine Prominent Public sector banks Internet banking facility in Karnataka as on February 2007

Features	1	2	3	4	5	6	7	8	9
Account Details	√	√	√	√	√	√	√	√	√
Balance Enquiry	√	√	√	√	√	√	√	√	√
Demat Account Information	√	√	√	√	√	×	√	×	×
Cheque Payment status	√	√	√	√	√	√	√	√	√
Order Cheque book	√	√	√	√	√	√	√	√	√

FD renewal	×	×	×	×	√	×	×	×	×
Mail or Messages	×	×	×	√	×	×	√	×	×
Alerts	×	×		√	√	×	×	×	×
Bill payment	×	×	×	×	√	√	√	√	×
Change of login and transaction passwords	×	×	√	√	√	×	√	×	×
Date and amount format choices	√	×	√	×	√	×	√	×	×
Insurance premium payments	×	×	×	×	√	×	√	×	×
Credit card dues payments	×	×	×	×	√	√	√	×	×
Deposit your taxes	×	×	×	×	√	×	√	×	×
Funds Transfer	×	×	√	×	√	√	√	√	√

1. Dena Bank 2. Bank of Baroda 3. Indian Bank
4. Canara Bank 5. State Bank of India 6. Corporation bank
7. Syndicate Bank 8. State bank of Mysore 9. UTI Bank

Table 2.5 : Comparative Study of seven Prominent Private Sector Banks Mobile Banking facilities in Karnataka as on February 2007

Features	**HDFC Bank**	**ICICI Bank**	**IDBI Bank**	**Karnataka Bank**	**Bank of Punjab**	**Federal Bank**	**IndusInd Bank**
Account Balance Enquiry	√	√	√	√	×	√	√
Last 3 Transactions	√	√	√	√	×	√	√
Cheque Status Inquiry	√	√	√	√	×	√	×
Stop Cheque Request	√	√	×	√	×	√	×
Cheque	√	√	√	√	×	√	×

Book Request							
Change your Primary Account	×	√	√	√	×	√	×
Make Payment for your Bills.	√	√	√	√	×	×	×
View your Presented Bills.	√	√	√	√	×	√	×
Debit Card Reward Points	×	√	×	×	×	×	√
SMS Alert Facility	√	√	√	√	√	√	√
Demat Enquiry	×	√	√	×	×	×	×

Table 2.6 : Comparative Study of Nine Prominent Private Sector Banks Internet Banking facilities in Karnataka as on February 2007

Features	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Account Balance Enquiry	√	√	√	√	√	√	√	√	√
Last 3 Transactions	√	√	√	√	√	√	√	√	√
Cheque Status Inquiry	√	√	√	√	√	√	√	√	√
Stop Cheque Request		√	√	√	√	√	√	√	√
Cheque Book Request	√	√	√	√	√	√	√	√	√
Transfer funds online	×	√	√	×	√	√	√	√	×
Make Payment for your Bills.	×	√	√	×	√	×	√	×	×
Request for debit card	×	√	√	×	×	×	×	×	×
Subscribe for mobile	×	√	×	×	×	×	×	×	√

banking									
Prepaid mobile recharge	×	√	√	×	×	×	√	×	×
Secure mailbox	×	√	√	×	√	√	√	×	√

1. HDFC Bank 2. ICICI Bank 3. Karnataka Bank 4. Bank of Punjab
5. Federal Bank 6. IndusInd Bank 7. South Indian Bank 8. ING Vysya Bank
9. IDBI Bank

Table 2.7 : Comparative Study of five prominent Foreign Sector Banks Mobile Banking facilities in Karnataka as on February 2007

Features	**ABN Amro Bank**	**Abu Dhabi C. bank**	**Standard Charted Bank**	**Citi bank**	**American Express Bank**
Account Balance Enquiry	√	√	×	√	×
Transaction Enquiry	√	√	×	√	×
Share Holdings in Demat account	√	√	×	×	×
Stop Cheque Request	√	√	×	×	×
Cheque Book Request	√	√	×	×	×
Transfer funds online	√	√	×	×	×
Make Payment for your Bills.	√	×	×	×	×
Request for debit card	√	×	×	√	×
Online fixed deposit opening	√	×	×	×	×
Change PIN	√	×	×	×	×
Secure mailbox	√	×	×	×	×
To get loan details	×	√	×	×	×
To Disable service	×	√	×	×	×
Get help	×	√	×	×	×
Alert facility	√	√	√	√	√

Table 2.8 : Comparative Study of four prominent Foreign Sector Banks Internet Banking facilities in Karnataka as on February 2007

Features	ABN Amro Bank	Abu Dhabi C. bank	Standard Charted Bank	Citi bank
Account Balance Enquiry	√	√	√	√
Transaction Enquiry	√	√	√	√
Share Holdings in Demat account	√	×	×	×
Stop Cheque Request	√	√	√	√
Cheque Book Request	√	√	√	√
Transfer funds online	√	√	√	√
Receive Alerts on mobile	√	√	√	√
Secure Mail	√	√	×	×
Register Online	√	√	×	×
Online rewards	√	×	×	×
Changing ID or Address	√	√	√	×

2. 10. Customer Acceptance Theories on Mobile Banking Transactions

Researchers in information systems rely on acceptance theories to study implementation problems. A major focus of these studies has been how potential users' perception of an IT innovation influences its adoption.

Generally, studies of adoption of information technology takes one of three possible approaches*, a diffusion approach, an adoption approach or a domestication approach.* Diffusion researchers typically describe the aggregate acceptance process as a function of time that may be used to categorize adopters of different kinds (Mahajan, et al., 1990). Others like, Rogers (1995) describe the *diffusion* process as consisting of four elements: an innovation or new technology, a social system, the communication channels of the social system and time. *Adoption* researchers, on the other hand, typically describe and explain the acceptance decision of individual users applying

different social theories of decision-making. Three models, collectively called the Technology Acceptance Theories (TAT), stand out as the most widely applied explanation within the adoption approach. *Domestication* research is typically a descriptive study of the acceptance of technology and the main focus is on the societal consequences of the domestication of technology. As the adoption approach as outlined by TAT appears to be the most comprehensive in explaining perception and acceptance of technology this study will examine this approach in greater detail.

Importance of Information Technology Adoption Research

The outlook of B2C mobile business in the financial industry not only depends on consumers accepting online banks as acceptable to traditional brick and mortar branches, but also on recognizing mobile technologies as transaction media. One of the key objectives of this study is to assess the value of mobile communication technology to financial institutions and to understand the determinants of that value. Consequently this work should be in a position to assist financial institutions to understand attitudes of customers towards mobile banking, to help banks deploy and manage their information technology (IT) resources and enhance overall quality and usability.

To understand attitudes, one must know what exactly is meant by the term attitude. There are many definitions for the term attitude. According to Zikmund (2000), an attitude is usually viewed as an enduring disposition to respond consistently in a given manner to various aspects of the world and is composed of affective, cognitive and behavioral components. Alternatively, attitude can be defined as a learned predisposition to react in some consistent positive or negative way to a given object, idea or set of information (Hair et al., 2000). Many variables that business researchers wish to investigate are psychological variables that cannot be directly observed. To measure an attitude, the researcher must infer from the way an individual responds to some stimulus. The term hypothetical construct is used to describe variables that are not directly observable but measured through indirect indicators such as verbal expression or overt behavior using a variety of measurement scales such as category scale, Likert scale, semantic scale and graphic/pictorial scale (Zikmund, 2000; and

Cooper et al., 2002). Such scales are important for bankers who are determined to discover the attitudes of their customers towards specific technology.

Acceptance Research Components

In acceptance studies, researchers focus on the attitudinal explanations of the use of a specific technology or service. The studies rely largely on the following five concepts: perceived user friendliness, perceived usefulness, attitudes towards use, intention to use and actual use. As mentioned earlier, adoption research is grounded in three models from social psychology, namely, the Technology Acceptance Model (TAM) originally proposed by Davis (1989), the Theory of Reasoned Action (TRA) originally proposed by Fishbein and Ajzen (1975) and the extension of TRA into the Theory of Planned Behavior (TPB) originally proposed by Ajzen and Fishbein (1980). Of the three theories, TAM has emerged as the most powerful and parsimonious theory to represent the antecedents of technology usage through belief in two factors that is, perceived usefulness and perceived ease of use of an information system (Davis, 1989).

The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) which was formulated in 1975 by Fishbein and Ajzen has been used extensively in marketing research. TRA has been applied to explain the behavior beyond the acceptance of technology and includes four general concepts: *behavioral attitudes, subjective norms, intention to use and actual use*. It argues that individuals evaluate the consequences of a particular behavior and create intentions to act that are consistent with their evaluations. More specifically, TRA states that individuals' behavior can be predicted from their intentions, which can be predicted from their attitudes and subjective norms. Following the chain of prediction further back, attitudes can be predicted from an individual's beliefs about the consequences of the behavior. Subjective norms can be predicted by knowing how significant other individuals think the behavior should or should not be done. A particularly helpful aspect of TRA from a technology perspective is its assertion that any other factors that influence behavior do so only indirectly by influencing attitude and subjective norms. Such variables would include, amongst others things,

the system design characteristics, user characteristics (including cognitive styles and other personality variables) and task characteristics. Hence, TRA is quite appropriate in the context of predicting the behavior of using mobile communication technology. Although TRA, is a very general theory and as such does not specify what specific beliefs would be pertinent in particular situations. Nevertheless, the inclusion of subjective norm represents an important variable, which is not even included in more popular models such as TAM. *Figure 2.7* presents a diagrammatic model of the theory.

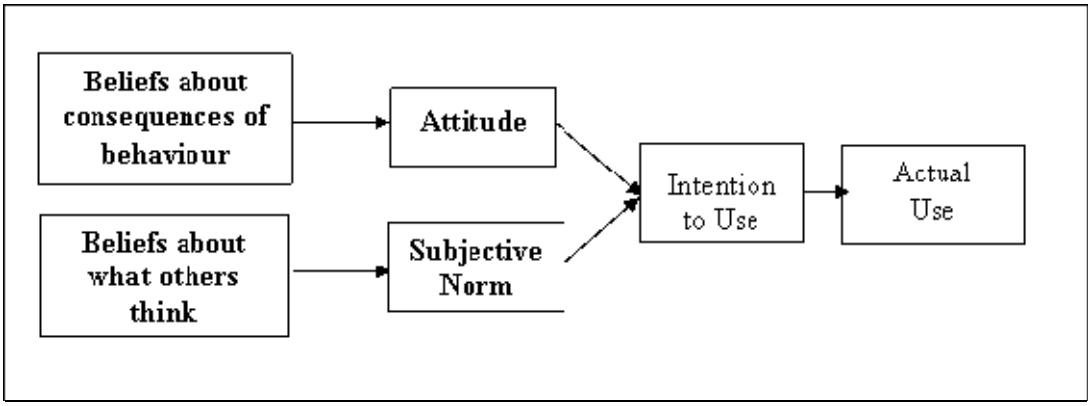


Figure 2.7 : Theory of Reasoned Action (TRA)

The Theory of Planned Behavior (TPB)

In exploring consumer's usage behavior, researchers adopt behavior theories from psychology and marketing. It is in this context that the TPB was constructed. The TPB was proposed as an extension to the TRA, by Ajzen in 1991. The TPB sought to account for conditions where individuals do not have a complete control over their behavior. When applied to the acceptance of information technology systems or services, the model contains five concepts. As in TRA, it includes behavioral attitudes, subjective norms, intention to use and actual use. However, this theory interprets *behavioral control as a perceived construct.* Perceived behavioral control covers both the intention to use and the actual usage. Actual usage is in turn a weighted function of intention to use and perceived behavioral control. Under this arrangement control aspects of the observation is introduced into the model. This makes the TPB more functional in its application. Researchers have used the TPB widely to model the acceptance of a variety of new information technologies in

businesses as well as to predict levels of usage. For example, Mathieson (1991) used the TPB as well as the Technology Acceptance Model to predict user's intentions, specifically with respect to the usage of spreadsheets.

The TPB is diagrammatically presented in Figure 2.8 for greater clarity.

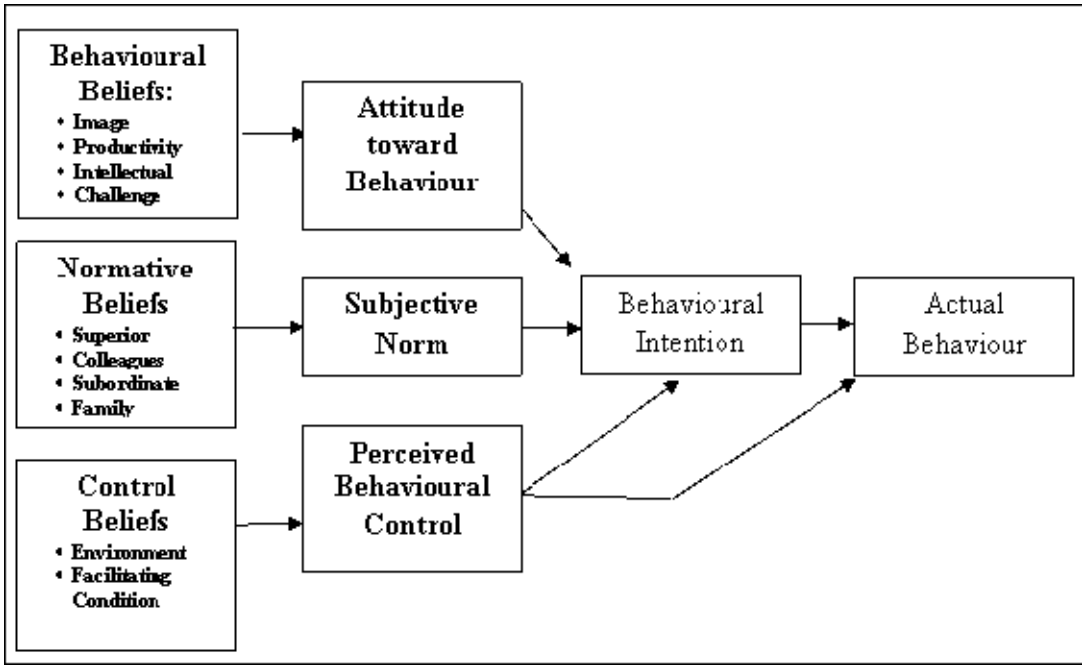


Figure 2. 8 : Theory of Planned Behavior **(**TPB)

The Technology Acceptance Model (TAM)

The TAM is a further adaptation of TRA specifically tailored for modeling user acceptance of information systems (Davis, 1989). TRA suggests that social behavior is motivated by an individual's attitude towards carrying out that behavior. However, it does not specify what specific beliefs would be important in a particular situation. TAM posits that the actual usage of technology can be predicted by user's behavioral intention and his/her attitude towards use, which in turn are influenced by the technology's *perceived ease of use and perceived usefulness* . TAM adopts the well-established causal chain as follows:

beliefs > attitude > intention> behavior

Based on certain beliefs, a person forms an attitude about certain objects, on the basis of which one forms an intention as to how one should behave with respect to that object. The intention to behave is the sole determinant of actual behavior. Davis

adapted the TRA by developing two key beliefs that specially account for information system usage. The first of these beliefs is perceived usefulness, defined as the 'degree to which a person believes that using a particular system would enhance his/her job performance. The second is perceived ease of use, defined as 'the degree to which a person believes that using a particular system would be free of effort' (Davis, 1989). A diagram of the model is presented in Figure 2.9.

Researchers, such as Lin and Wu (2002), further modified the TAM and extended its application to the Internet or WWW. However, studies related to the usage behavior within the Internet environment is still at an infancy stage. It is not clear how external variables would affect the usage behavior and intentions. In this chapter we have carried out further research which would provide greater understanding of the factors that influence acceptance of new technology like mobile communication technology in the banking environment.

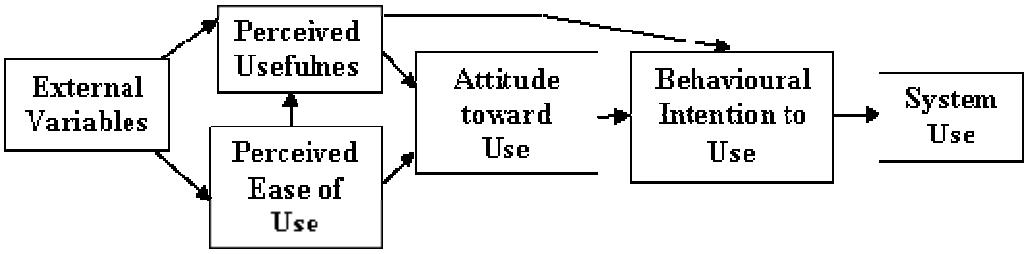


Figure 2.9 : The Technology Acceptance Model

Consumers' Intention to Transact Online

It needs to be reiterated that the intention to use is quite different from the actual usage. Bernadette (1996), applying TAM, however showed that there nevertheless was a high degree of correlation between the two positions of intention and usage. The intention to transact online is explained as the consumer's resolve to engage in an electronic exchange relationship with a bank's website, such as sharing customer information, maintaining customer relationships and conducting online banking transactions. Consumer-retailer exchange relationships typically involve several activities as shown in Figure 2.10. The first step may involve basic data exchange from the bank to the consumer through mobile service providers, gathering

information and making product/service and price (interest) comparisons. The next step usually involves consumer providing some private and personal information through SMS, describing product/service preferences and providing feedback. This step is often supplemented by automatic information exchange that is intentionally or involuntary captured through cookies, log-data, and data mining tools. The final step typically involves provision of private and monetary information such as bank account information, debit/credit card information, actual product/service preferences and finally completion of banking task such as balance inquiry, transfer of funds, request for cheque books and bill payment (Singer et al., 2001). Based upon the description of the online transaction process, online banking acceptance essentially necessitates that consumers uses banks' websites/server to receive and provide information and then complete the transactions.

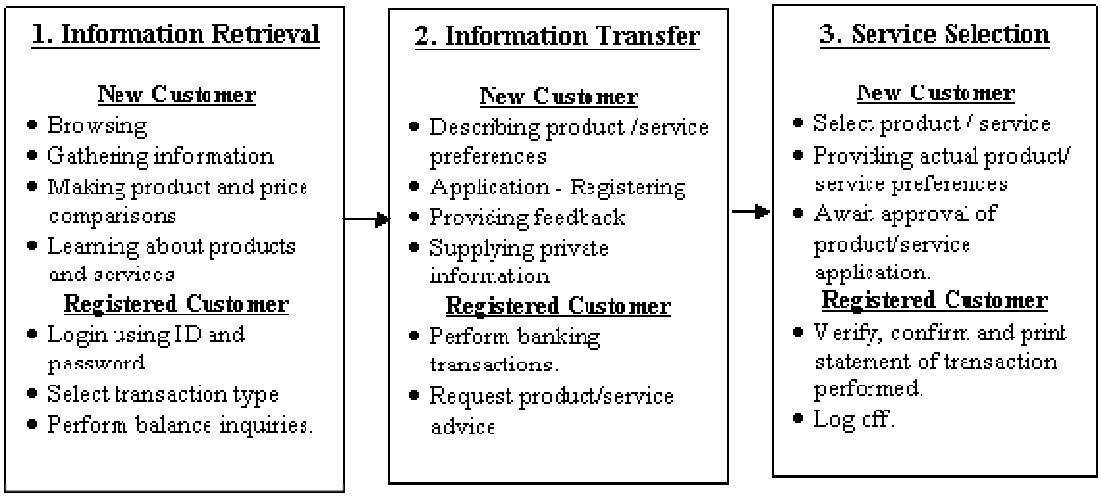


Figure 2.10 : Consumer online transaction process

In contrast to traditional banking consumer behavior, mobile banking transactions have some unique dimensions, such as (a) the extensive use of technology for transactions, (b) the distant and impersonal nature of the online environment and (c) the implicit uncertainty of using an open technological infrastructure for transactions. More specifically, consumers must first actively engage in extensive technology use through interacting with the bank's website. Second, the spatial and temporal separation among consumers and banks increases fears of performing banking transaction with product and identity uncertainty. Third, there is a concern

about the reliability of the underlying mobile communication channel and related infrastructure that banks employ to interface with consumers. Overall, these three unique differences reduce consumer perceptions of control over their online transactions and increasing their apprehension about adopting online mobile banking. These perceptions result in a greater disparity between intention and usage.

Virtually all steps in the proposed online transaction process require customers to interact with banks and essentially use mobile communication technologies. Since intentions to transact entail technology use, it is justifiable to consider variables to predict intentions to use mobile technology for online transactions.

Luarn and Lin's m-banking acceptance model

Based on literature relating to the TPB and the TAMs, Luarn and Lin (2005) extends the applicability of the TAM in a m-banking context by adding one trust-based construct ('perceived credibility') and two resource-based constructs ('perceived self-efficacy' and 'perceived financial cost') to the model, with careful attention being given to placing these constructs in TAM's existing homological structure. Compared with prior studies integrating the TAM and TPB, Luarn and Lin's (2005) m-banking acceptance model has a higher ability to predict and explain behavioral intention to use an IS. However, whether their m-banking acceptance model can be generalized to investigating overall m-service acceptance has not been addressed.

2. 11. Study WAP at HDFC Bank and User Awareness Study

2. 11. 1. WAP :

Wireless Application Protocol (WAP) is a system of protocols and technologies that lets cell phones and other wireless devices with tiny displays, low bandwidth connections, and minimal memory access Web-based information and services. A WAP provides a set of application and network protocols called the Wireless Application Environment (WAE) to support mobile wireless Internet applications. WAP is designed to enable the use of normal Web application on computers and devices with small display screens operating over low-speed wireless connections.

With hundreds of millions of mobile phones in use all over the world, the market for services targeted at mobile users is mind bogglingly immense. Even simple services find plenty of users, as long as they are useful or fun. Being able to get news, send e-mail or just be entertained wherever you are is extremely attractive to lots of people.

Wireless Application Protocol (WAP) is designed specifically to deliver Web information to mobile phones enabling them to access the Internet. It specifies an end-to-end application protocol and an application environment based on a browser as two essential elements of wireless communication. With WAP technology, mobile phones become communication devices capable of communicating with other devices over a wireless network. Although WAP could provide many new opportunities for mobile business, its application is severely restricted by slow service, clumsy controls, and a limited number of Web sites (Shin-Yuan Hung 2003).
The structure of WAP Stack can be described using a five layer scheme (Erlandson, 1998; and Mann, 1999):

1. Application layer: WAE (wireless application environment) provides a portable application and services environment for development and execution.
2. Session layer: WSP (wireless session protocol) provides methods for orderly content exchange between client/server applications.
3. Transaction layer: WTP (wireless transaction protocol) provides various methods for performing transactions, with varying degrees of reliability.
4. Secure layer: WTLS (wireless transport layer security) is an optional layer providing authentication, privacy, and secure connections between applications.
5. Transport layer: WDP (wireless datagram protocol) is the bottom layer of the WAP stack, which hides the upper layers from the bare services provided by the operator.

WAP provides a long-term, durable platform for developers to build compelling content and applications for consumers and enterprises. Some possible WAP applications (Jovanovic, 2000) are listed below:

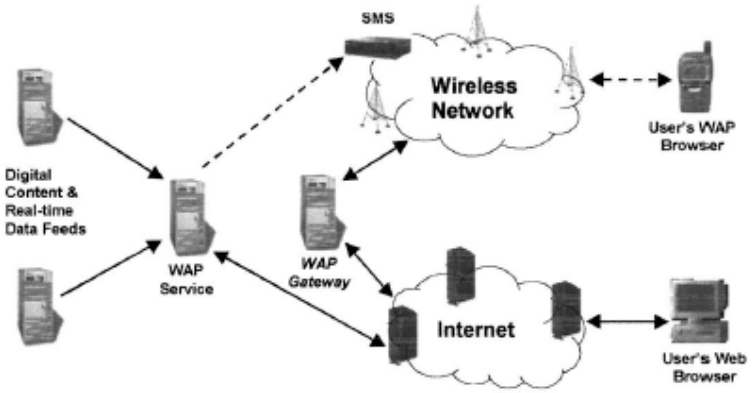


Fig. 2.11 : The role of WAP gateways in connecting to the Internet

1. Reading and sending E-mail: send and receive e-mail and unified messaging from anywhere on the planet.
2. Staying informed about stock market movements.
3. Paying bills.
4. Mobile banking: checking account status and making transfers.
5. Infotainment: weather forecasts, horoscopes, traffic, event calendars and news.
6. Location-based services: location dependent services such as mapping and vehicle location information.
7. Customer services: technicians can quickly provide information required for fixing problems, or software upgrades can be provided.
8. Personal information management: including services such as call management and personal directories, which enable the modification of personal information. Stock checking: employees can check whether a requested product is in stock. Mobile organizer: organizer containing modern communication tools, such as e-mail, online chat, and so on.
9. Internet browsing.
10. Automated home appliances.

Besides fundamental limitations of power, memory, and processing capability, wireless data networks have less bandwidth, more latency, less connection stability, and less predictable availability than wired networks (Jovanovic, 2000b). Furthermore, WAP also has the following shortcomings (Web Pro Forum 2002):

1. Configuring WAP phones for new WAP applications is very difficult.

2. The number of handsets supporting WAP is small compared with the number supporting short message service (SMS).
3. Other protocols such as SIM application toolkit and mobile station application execution environment (MexE) have received wide support and could supersede WAP.
4. WAP applications are expected to be expensive to use because of the need for long circuit switched data (CSD) calls.

Subscribers must benefit from using WAP services, otherwise no incentive exists for the adoption of WAP. Actually, despite the above mentioned weaknesses, the key benefits of WAP include portability, ease of use, access to a wide variety of services, and availability in various handheld devices, such as pagers, personal digital assistants (PDA), cellular phones and so on. The future of WAP thus seems to depend on future trends in the cellular environment, killer applications, and service costs. These are also the key focuses of this empirical study.

The banking industry has tried to capitalize on this new technology to enter the new age of wireless technology, in order to give customers a better service so as to attract more of them. This has spread all over the world including India. The first bank that uses this technology in India is HDFC Bank, and this study will investigate the effectiveness of WAP technology in HDFC Bank to help improving customer services.

2. 11. 2. METHODOLOGY :

This part of the research is used to study the terms of WAP service in an Indian Bank by focusing on describing and evaluating the events of WAP and providing qualitative information about actions or scenarios of WAP in Indian environment. Different tools of research have been used, an interview was held with the IT Manager of the HDFC Bank, who is called Informant A in this research. In addition, fifty questionnaire's have been distributed randomly to collect their perspectives toward WAP and WAP banking. Moreover, the researcher used their observations to link the results, which came from the questionnaires and the interview.

2. 11. 3. RESULTS AND DISCUSSIONS :

Four sub problems are highlighted as follows. Firstly why and how is HDFC Bank implemented WAP technology services? What services are available for customers and what is their behavior toward them? The consequences (benefits and limitations) of WAP in HDFC bank are the third sub problems. The last sub-problem concerns what the customers think about WAP and what is the future of WAP banking from their point of view**?** Each sub problem is explained here in detail.

WAP in HDFC bank

In this section, two questions were answered, these questions are: (1) Why HDFC bank uses WAP technology in their bank and what is their business view toward WAP technology in use? (2) How is WAP technology established and how it works between HDFC and local Internet Service Provider (ISP) in India? The aim is to understand WAP architecture, WAP infrastructure components and the transmission of messages through it. In order to understand these sub-problems, an interview with an employee of HDFC bank is conducted and is described below as informant A.

Informant A :

An interview was held with the Manager of the IT Banking Division of HDFC. This manager has MBA in marketing and corporate change in 2000 and a Bachelor degree in Electronic Engineering in 1998. He joined HDFC in 2000 as an executive trainee. In 2001, he was an officer in IT Operations. Then in 2002, he became an Assistant Manager in IT Development. After that, in 2004, he was in a Business Process Reengineering Operation, and then became what he is today, Center Manager. His projects and developments in HDFC are concerned with Mobile Banking (WAP), SMS Banking and Interactive Loans. In this interview, the manager answered number of questions related to WAP. These questions and their related answers are explained and categorized by the sub problems mentioned earlier.

1. Why establishing WAP in HDFC ?

Informant A answered that:

"First of all we thought of establishing new technology which enables our customers to deal with their banking transactions by using a mobile phone. We already have Web technology, SMS mobile banking technology but we added WAP to increase the opportunities toward customers, because most of the people in India now have mobile phones … and because WAP is one of technologies that enable dealing with bank anywhere and anytime - we decided to choose this technology. "

Informant A further added:

"We want to create a new demand in the market before any bank thinks about this technology, also we want to be the first in the market of India because we wish to be the leader of this technology and keep the HDFC's name in the customers' mind as HDFC uses WAP technology to deal and then reach out customers target.."

2. How HDFC bank established WAP with Local ISP?

Informant A answered that "Year 2000- HDFC Bank is also set to become the first bank in the country to offer wireless application protocol (WAP) services to customers. SkyCell Communications Ltd, one of the two cellular service providers in Chennai, has launched `Sky Banking`, for which the company has tied up with HDFC Bank. The bank has tied up with 12 utility companies nationwide including BSES, MSEB, BEST, Orange, BPL and MTNL. HDFC Bank, in association with cellular service provider Orange, has launched the entire range of mobile banking services and mobile commerce services using wireless application protocol (WAP) technology. BPL Mobile has tied up with HDFC Bank to offer Internet banking through the mobile phone. HDFC Bank, in association with Tata Cellular, has launched Mobile Commerce Service, for customers in Hyderabad and Vishakaptnam. The HDFC Bank and Airtel launched their mobile-banking service through WAP in Delhi. HDFC Bank has launched wireless application protocol-based mobile-banking in Coimbatore and Trichy in association with Aircel. In year 2003 - HDFC Bank launched India`s first mobile payment solution.

3. How does the WAP Infrastructure work?

In 1998, the idea of adopting WAP had been brainstormed by HDFC bank, but it really developed in the last quarter of 2000. Informant A explained the mechanism behind the WAP infrastructure and said that a normal WAP client in India that

typically uses mobile devices, the transaction made by the client goes through a WAP gateway which is a part of GLOBAL WAP gateway.

A WAP gateway is a proxy server that provides protocol translations, compression of WML/XML Script that is used to monitor all the transactions that happen in the WAP environment, and additional services. However, the HDFC WAP client communicates directly with GLOBAL WAP. The gateway receives the request from the HDFC WAP client, and translates it into HTTP proxy to communicate with the appropriate content server. In the implementation of a secure WAP system, WTLS "which is the security layer of the WAP, providing privacy, data integrity and authorization for WAP services" encrypts the communication between the HDFC WAP client and gateway. The gateway decrypts WTLS and re-encrypts it to connect it to the HDFC server.

He also added that in the HDFC server the request is delivered to demilitarized zone (DMZ) is a computer host or small network inserted as a "neutral zone" between a company's private network (HDFC) and the outside public network (customers). Typically, the DMZ contains devices accessible to Internet traffic, such as Web (HTTP) servers, FTP servers, SMTP (e-mail) servers and DNS servers. It prevents outside HDFC users from getting direct access to a server that has HDFC data where it is examined and authorized by the HDFC server after that it is sent to Application and Database zone. A DMZ is an optional and more secure approach to a firewall and effectively acts as a proxy server as well. A typical DMZ configuration for a small company, a separate computer (or host in network terms) receives requests from HDFC bank users within the private network for access to Web sites or other banks accessible on the public network.

The DMZ host then initiates sessions for these requests on the public network. However, the DMZ host is not able to initiate a session back into the private network. It can only forward packets that have already been requested. Users of the public network outside the banks can access only the DMZ host. The DMZ may typically

also have the bank's Web pages so these could be served to the outside world. However, the DMZ provides access to no other bank's data. In the event that an outside user penetrated the DMZ host's security, the Web pages might be corrupted but no other bank information would be exposed. After it has finished with the DMZ it will be sent to an application where the request is analyzed and then delivered to the middleware to match it with the other application and databases, after it is matched it is sent back to the middleware and then to the application where it prepares the reply for the request and sends it back to DMZ and then back to the client by the same way it came in.

4. What are the WAP applications available to HDFC customers today?

Banks concentrates on a way to simplify their customer's life when they want to do their banking applications. By using WAP technology, bank customers can perform:

- Balance enquiry
- Current monthly statement
- Mini statement (last five transactions)
- Fund transfer (between deposit accounts)
- Pre-set transfer instruction
- Standing order instructions (creation/deletion)
- Utility bill payment
- Account summary
- Currency exchange rates
- Interest rate
- Change of address
- Credit Card balance

Also interest is the accessibility of these WAP services, banks allows customers to conduct a complete range of secure banking and credit card transactions through any mobile phone with WAP, Banks mobile service is offered free of charge and is available 24 hours a day, 7 days a week with no pre-registration requirements. When customers want to login WAP service they "can configure their WAP mobile phones or PDA's (Personal Digital Assistant) by logging into banks website and follow the instructions provided.

5. Who are the real customers of HDFC WAP, what proportion of the whole HDFC customers are they, and why?

Informant A answered that youth or young people, because they are familiar with mobile phones and they mostly use the WAP to download pictures and music. A very small number of our customers use this technology today, because large numbers of them are unfamiliar with this and WAP in banking service are an emerging market in India today. In order to answer the questions of this sub-problem, totally fifty questionnaire papers have been distributed randomly to the customers of HDFC bank in Bangalore and Mangalore; these customers include young and older people, male and female. While analyzing the results of the questionnaires, it is found that 12per cent of the respondents have adopted WAP technology.

6. Limitations and Benefits of WAP in HDFC bank.

Informant A said that the main advantages of WAP for HDFC bank are the following:

- It provides more alternatives for HDFC bank to deal with their customers and this may increase their share of customers in the market.
- HDFC bank customers can reach their bank anywhere and anytime.
- It can be considered one of the competitive advantages in the market because HDFC bank is one bank out of very few banks that are using WAP technology. Informant A also added that WAP customers are very happy and feel convenience with this technology.

On the other hand, Informant A explained the limitations of WAP service technology and said that:

- Limitation of screen size for mobile devices could be considered one of the disadvantages, because it limits the size of information which can be displayed.
- Costly, developing WAP technology can be very costly because it takes a large amount of effort to conduct it and high infrastructure components that ensure the security of information transmitted.
- WAP may be considered as difficult technology to use for unskilled operators.
- Number of customers using WAP is very low in India.

WAP technology benefits and limitations toward HDFC bank were discussed above from the Informant A point of view. However, how do HDFC bank customers feel about this service in their bank? Do they find HDFC WAP service reduces the times they visit their bank? Do they think HDFC WAP is a convenient technology service or not ? According to HDFC customers who use this technology, about 82per cent of them said that HDFC WAP minimizes the numbers visiting their bank or its ATM machine. On the other hand, around 18per cent of them said that this service does not minimize their visiting numbers. From this point, it can be investigated that the majority of HDFC WAP users appreciate the benefits of this service, which is the accessibility of bank services, any time and anywhere. For this reason, it is clear that most HDFC WAP users are satisfied with this feature.

When the researchers asked the respondents of HDFC WAP customers whether the information that is displayed on their mobile device is sufficient and desirable, and does it cover the information required? Most respondents (more than 60per cent) agreed that the information which is displayed is enough, with no mention of the problem of limited screen as Informant A had highlighted. Also the majority of HDFC WAP customers (82per cent) said that this technology service is convenient. According to these points, it is valid to state that HDFC WAP users use this technology in a positive way which reduces their time, and mostly WAP of HDFC is reliable and comfortable for them. All these points emphasized that the advantages outweigh the disadvantages for HDFC WAP customers.

7. What do the customer think about WAP and what is the future of WAP banking from their point of view.

Actually, there is no doubt that mobiles are now of a high quality with colored screens that enable users to access a high level of applications and network capabilities.

2. 12. Conclusion

An overview of past, present, and future mobile banking technologies is presented. This includes review on mobile communication technology, wireless operating systems, alternative and complementary technologies, information exchange

technology, location identification technology, and security considerations. An overview of wireless data services, and mobile communication devices is elaborated. A detailed literature review is carried out on online banking and mobile banking research both in India and abroad.

A review on various Indian banks which provide mobile banking as new distribution channel is made and the various services of these banks are compared with internet banking services. Technological aspects of SMS banking and WAP banking, and various mobile payment technologies are also discussed with their advantages and limitations. Since, mobile banking channel is a technological advent, various technology acceptance and penetration models like Technology Acceptance Model (TAM) originally proposed by Davis, Theory of Reasoned Action (TRA) originally proposed by Fishbein and Ajzen, and Theory of Planned Behavior (TPB) are reviewed.

Literature review on the various research issues like Opportunities and challenges for mobile business in India, Significance of mobile business activity in financial sector with special emphasis in banking sector, Study and analyze the mobile banking facilities like SMS banking and WAP banking are also included. Finally a qualitative survey on WAP technology adopted in a private new generation bank - HDFC bank and user awareness study is made and the results are discussed. It is found that HDFC WAP users use this technology in a positive way which reduces their time, and mostly WAP of HDFC is reliable and comfortable for them. All these points emphasized that the advantages outweigh the disadvantages for HDFC WAP customers.

CHAPTER THREE

Research Objectives and Methodology

CONTENTS **PAGE No.**

3.1. Introduction

The convergence of the Internet and mobile networks has created new opportunities and applications. Considering mobile business only as an extension of the traditional internet can lead to missing out on unique and differentiable qualities for new value-added opportunities. Mobile banking is considered as potentially one of the most value-added and important mobile services available. The technological changes in mobile networks, mobile devices, and the innovative attributes of mobile internet, advances the theoretical framework of innovation in services allowed to develop a customer centric analysis of m-banking value proposition. The critical factors in the diffusion/penetration of m-Banking, reasons for failure, and further prospects of success depends on various factors and are different for different countries. Recently, some of the Indian banks started online mobile banking channel as new distribution channel, but the acceptance of mobile banking services by the customers is not encouraging. It is necessary to find the reason for slow penetration of this value added financial service in India.

In India, the growth of mobile phone subscriber base is increasing in an exponential manner. It is predicted that all inhabited areas (and hence the entire population) of India would be covered by mobile networks by the end of 2009, despite only 45-50per cent coverage today. The number of total mobile subscribers is expected to increase to over 500 million by year-end of 2010. This will support the usage of mobile devices for various kinds of online business and also financial transactions. In this scenario, the Indian banks have to be equipped to start online banking channel as new distribution channel. But, presently, the acceptance of mobile banking services by the Indian customers is not encouraging. It is necessary to find the reason for slow penetration of this value added service in the country. Hence it is planned to study the technological aspects, business model, Indian banks perspective of adopting new innovative distribution channel and the customer's perspective of accepting this new distribution channel.

The focus of the present study is to explore the banker's perspectives to introduce mobile banking as new distribution channel and Customer's perspectives on mobile banking adoption. Hence, exploratory research design is identified as appropriate for the study. A quantitative study on Banker's perspective of mobile banking adoption for improving operational effectiveness and service differentiation, and the Customer's perspective on acceptance of mobile banking service using mobile devices is presented. The chapter contains an elaborate discussion on responsibility of banks while deploying online banking as new distribution channel through our new "modified customer equity approach model". Through this model another new model for evaluation of banks strategy for online banking is developed in terms of new channel promotion strategy, Fee and incentives strategy, and registration and service strategy and a comparative study is made on adoption of such strategy by Indian banks. The strategy of adapting information technology and hence online banking services by Indian banks is studied by applying "Diniz Model" in terms of informational, transactional and customer relationship functional areas. Various determinants of online mobile banking are identified through Focus group interaction, under the headings : Organizational Focused Issues, Customer Focused Issues, Competitors Focused Issues, Operational Focused Issues, Technological Focused Issues, Strategic Focused Issues and Environmental/society Focused Issues. Based on these constructs, a model on "Determinants of online mobile banking" is developed. Finally a quantitative study on factors determining the adoption of online mobile banking as new distribution channel by financial service providers is carried out through this new developed model. Seven hypotheses are developed for 28 propositions and the hypotheses are tested through questionnaire survey and empirical analysis by collecting data from 100 bank Managers of public sector, private sector and foreign sector banks located in Bangalore and Mangalore of Karnataka State. Before data collection, a pre-test is conducted to test the reliability and validity of the questionnaire. After the pre-test, suitable modifications have been made in the questionnaire.

To study the customer's perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services, two models are described in present study through focus group interaction. The first model is "Customer acceptance model through Education and Training", and the second model is "conceptual model on customer adoption of online mobile banking".

In order to explain the customer behavior of adopting mobile banking channel, we have proposed a new model called "Technology Acceptance based on Theory of Customer Stimulation by Education and Training for usage (TCSET). The new model is based on four constructs – perceived usefulness, perceived assurance, perceived ease of use, and perceived cost. These constructs stimulate the customers intention and behavior control to use mobile banking services. The various issues under, customer behavior and intention to use mobile banking transactions, like attitude, trust, convenience, perception, loyalty, privacy, security and comfort issues are discussed based on the developed model. Hypotheses are developed on identified constructs and issues under customer behavior and intention through Focus group interaction. The empirical test on the developed model is performed by testing the hypotheses by means of a questionnaire survey. In order to select the samples, systematic random sampling method is adopted. The total number of mobile banking service users is collected from the banks and then the sample is generated. Based on the investigator's pilot study, observations, both Bangalore and Mangalore are identified on potential grounds for mobile banking service. The total number of respondents is 400, of which, 250 respondents from Bangalore and 150 respondents from Mangalore. The questionnaire focused on such important issues as customers' attitudes and reactions to new technology, customer's attitudes to the traditional retail banking distribution channel, customers' perceptions of online and mobile bank product attributes, customers' expectations and major concerns of online and mobile banking, psychological factors, and demographic factors.

Respondents are asked to complete a five point Likert scale on each question or proposition. Scales to measure each of the beliefs and attitudes are developed based on existing scales discussed in relevant methodological literature and in surveys in

the research area. This data forms the basis of the whole research. According to the chosen methodological research approach the quantitative data are analyzed using statistical methods such as mean, standard deviation, and correlation analysis by SPSS-program.

3.2. Objectives of Present Study

The goal of this study is to analyze the significance of mobile business activity in terms of their usability, opportunities, and challenges in financial sector with special emphasis on banking activities in chosen cities in Karnataka-State of India, to study the present situation of mobile banking scenario in the country, to identify the gap between mobile communication technology innovations, their penetration in banking industry as a new distribution channel and the customer acceptance of this new distribution channel, to study present m-business models and their limitations, to propose new business model in order to accelerate the financial transaction process and to provide Value added Services to the customers, and to provide suitable policy and regulatory guidelines to strengthen the mobile business framework in the country. The sub-objectives are to investigate the market status for mobile banking in India, to identify the target customers for mobile banking based on the demographics characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security and trust, psychology and culture, prior personal banking experience, and incentives from banks.

The objectives of the research are :

- To study the mobile banking services available in public, private and foreign sector banks in India through status, facility, and content analysis.
- To elicit Indian bankers perspectives to introduce mobile banking as new distribution channel and evaluation of banks strategy to provide and to maintain this new channel.
- To understand the factors determining adoption of mobile banking by financial service institutions.

- To examine the customers perspective on mobile banking adoption and its effect on intention and behavior on usage of mobile banking services.
- To identify the target customers for mobile banking based on the demographic characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security and trust, psychology and culture, prior personal banking experience, and incentives from banks.
- To study various mobile banking business models, their suitability to Indian scenario and to propose a suitable business model for mobile business through mobile payment to take care of security and authentication problems.
- To provide suitable policy and regulatory guidelines to strengthen the mobile business framework in the country.

3.3. Scope of the Study

The scope of the proposal is to explore the mobile business financial services in B-2-C sector. As for the success factors, this study mainly concentrates on business-related success factors for financial institutions and success factors from the customers point-of-view. The study includes the opinion of Bank managers and bank customers who use mobile phone for communication. Hence the findings of the study will help to know the view of Indian financial institutions towards adopting the new distribution channel and popularizing it among their customers. The findings of the study will throw light on the customer's attitude and behavior on using mobile banking facility and the factors which help to enhance the usage. It may also help in new mobile business model creation, policy-making and to invoke further research.

3.4. Research Planning

The qualitative study on comparison of mobile banking services in Public, Private and Foreign sector banks in India, and User awareness on WAP technology used in HDFC bank is made in Chapter 1 and Chapter 2 respectively as shown in Fig. 3.1.

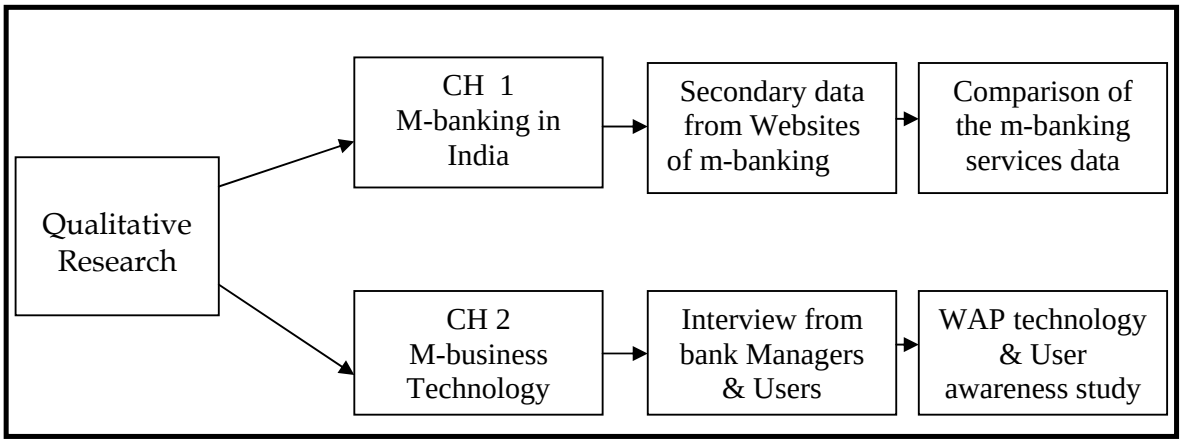


Figure 3.1 : Block diagram representing Qualitative Research in this Thesis

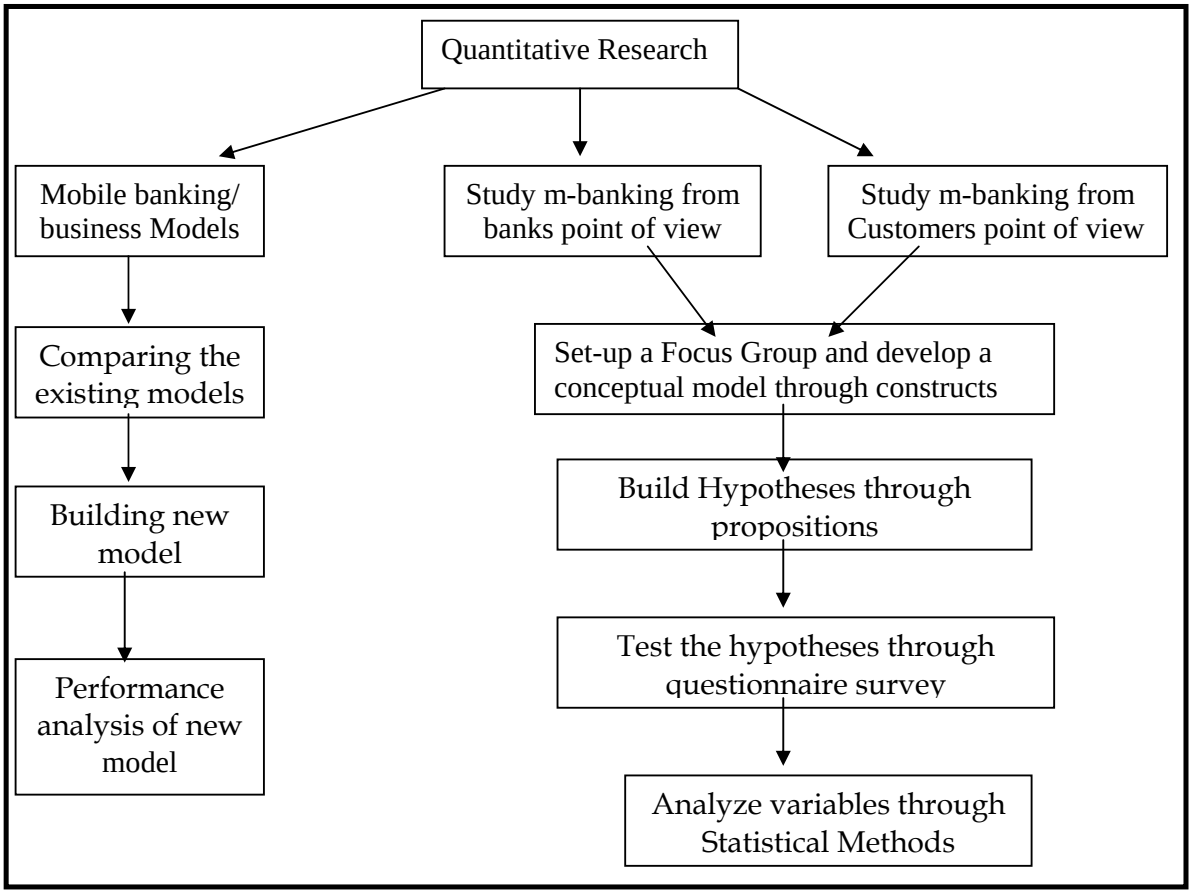


Figure 3.2 : Block diagram representing Quantitative Research in this Thesis

The quantitative study to answer the major research questions on bankers perspective, customers perspective and required business model is depicted in the Figure 3.2.

3.5. Chapter Scheme

Chapter 1 discus's an overview of the opportunity and challenges for mobile business and its adoption in various banking sectors in India and a survey on adoption of mobile banking facility in Indian banks.

Chapter 2 provides a brief review on technological aspects of mobile banking, various Technology acceptance theories, and bankers and customer's perspectives on mobile/online banking adoption in different countries. This also includes a survey on WAP technology adoption in one of the new generation private sector banking in India.

Chapter 3 contains the objectives and the methodology of the quantitative research on Bankers Perspectives on providing mobile banking as new distribution channel, and Customers perspective on acceptance of mobile banking services are discussed.

Chapter 4 provides findings of the research in the form of tables, graphs, figures and the results are discussed and interpreted.

Chapter 5 devoted on a detailed interpretation on the managerial implications of quantitative study, and new mobile business model for banking payment is proposed for financial sector and is compared with existing models.

The discussion on policy, recommendations on regulatory guidelines, general observations and general conclusions on the research work, and the scope and direction for further work are included in Chapter 6. Finally the bibliography of the citations is given for further reference.

The figure 3.3 clearly shows that the entire thesis is divided into four parts in which chapters 1 and 2 contains qualitative and quantitative literature review on Mobile business and Mobile communication technology respectively. In chapters 1 and 2 a survey on various services available in private sector, public sector and foreign sector banks in Karnataka state of India and a survey on WAP banking in one of the early adopted bank. The chapters 3, 4, 5 contains quantitative study on mobile banking models, Bankers perspective on mobile banking adoption as a new

distribution channel, and Customers attitude on mobile banking usage. Chapter 6 provides recommendations and guidelines to the Government, Banks, and Customers for enhanced and secured mobile banking usage in the Country.

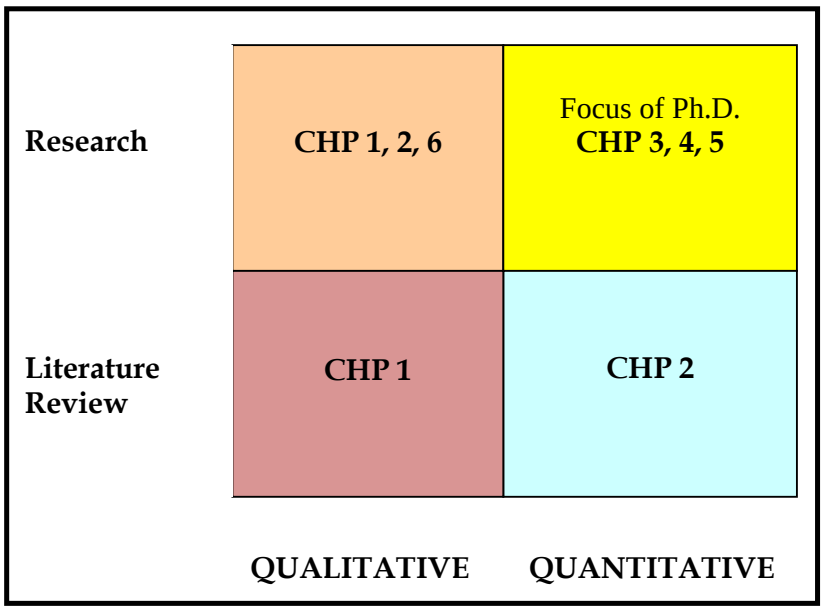


Figure 3. 3 : Methodology

3.6. Organization of Research

Research Design

The present study is to explore and understand the bankers perspective to introduce mobile banking as new distribution channel and to study the customer perspectives on usage of mobile banking services and hence to know the reason for slow penetration. Since the study is exploratory in nature, exploratory research design is used. The research models are described using focus group interaction.

Pilot Study

The investigator made frequent visits to various banks in Mangalore and Bangalore, and certain bank customers who use mobile phone for availing banking services to collect background information. The pilot study helped the investigator to formulate the research problem and research objectives.

Population and Sample

The data are collected from 100 bank personnel of public sector, private sector and foreign sector banks located in Bangalore and Mangalore of Karnataka State. Bangalore, being the capital city of Karnataka State, is considered as Silicon valley of India and it houses the population who possess high technological quotient, computer and Internet knowledge, and mobile phone for personal communication. Mangalore is an upcoming city and considered as an educational hub of Karnataka State. Based on the investigator's pilot study, observations, both Bangalore and Mangalore are identified on potential grounds for mobile banking service study both for bankers perspective on mobile banking as new distribution channel and customers perspective on mobile banking usage.

The total number of respondents (customers) used for determining customers perspective on mobile banking and the factors affecting the actual usage are 400, of which, 250 respondents are belonging to Bangalore and 150 respondents are from Mangalore. The respondents are randomly chosen and the questionnaires 2 and 3 shown in Appendix-1 are distributed to the respondents.

Inclusion Criteria

For bankers' perspectives study, 60 percent bank managers and 40 percent bank Clerical staff from public, private and foreign sector banks who use mobile phone and having bank account are included. Respondents are between 30 to 60 years age. For customers' perspectives study, the bank customers of all ages who have both bank account and mobile phone are included and randomly selected.

Limitations

The sample size for study of bankers' perspective is 100 and customers' perspective study is 400 and it does not represent the entire State population. The samples collected from Bangalore and Mangalore are only for getting a mix of attitudes and region wise study is not incorporated in the objective of the study.

3.7. Conceptual Study on Banker's Perspectives on Mobile Banking

Providing financial transactions through mobile devices is a new distribution channel for financial institutions. Using this new distribution channel, they can add further value to their financial services. One of the industries which seem to be more affected after inventing internet and mobile communication technology is retail banking. It holds all the opportunities and threats connected with the mobile devices and the mobile communication technology. Many retail banks have a dense branch network, close relationships with their customers, and are mostly local businesses operating in one country or part of a country or selected locations of the country only. However, their core services are perfectly digitizable and the new technology therefore has a potential for transferring all their banking business to mobile banking. This availability of new distribution channel is interesting for banks for many reasons due to possibility of improving operation effectiveness and service differentiation :

1. The new electronic distribution channel can offer the customers better service output in the form of a broader and deeper assortment, less waiting time, and higher market decentralization. This may attract new customers (Mols et al., 1999), increase the revenue of the innovative firms and consequently lead to higher profits over a long period of time.
2. The new electronic distribution channels are more cost effective than telephone and branch based networks, and lower cost may lead to lower prices for the consumers. In such cases, seemingly loyal customers may change to the new distribution channels, and the firms that have invested in the wrong channels may end up with channels that turn out to be useless, i.e., investments which may be difficult to recover.
3. The new electronic distribution channels may change the way in which financial institutions interact with their customers and may facilitate direct marketing, relationship marketing and mass customization and thus increase customer loyalty.
4. The number of customers demanding mobile banking channel is likely to increase in the future. With the increase in literacy and the availability of mobile phones at

cheaper rate and fall in the cost of mobile communication charges, there has been a considerable growth in the segment of customers preferring mobile banking. This will change the optimal distribution channel structure for the most retail banks.

Since the distribution channels changes very slowly, the need to act quickly has less obvious than in areas such as new product development, pricing and advertising. Before the widespread acceptance of internet banking and mobile banking, retail banks gained competitive advantage by adding new branches. These branches are expensive and no bank could afford to establish branches in every town. This resulted in differences in coverage and usually those banks which are the first to build a large network in an area gained a strong and lasting lead. Thus a right investment in distribution channels have traditionally been a long term protection against competition, and few researchers have been concerned with proposing strategic design principles focusing on feedback mechanisms to continuously monitor the design of distribution channels.

This study comprises of both qualitative phase and quantitative phase and suggests a tentative framework which integrates a number of hypotheses built using qualitative phase and testing those hypotheses using quantitative phase. These hypotheses are tried to explain the variations in banks abilities to be distribution channel inventors, to exploit the new channels, and to promote them. In quantitative phase, the hypotheses are tested based on a survey among key managers and employees of few public, private and foreign sector banks in India.

3. 7.1. Responsibility of Banks

Deploying online banking as a component of a customer equity-building strategy of present Indian banks may be the best way to succeed. The customer equity approach model (Fig 3.4) proposed in this work is based on a long-term strategy of acquiring, retaining and selling additional services to the desired customer and online banking capabilities could help banks to improve their efforts in acquisition and retention of the customers. An integrated online and offline channels can be effectively used by the banks to acquire new customers. Websites that provide

helpful information could attract prospective customers to investigate further products and services offered by the bank. These prospects can then use their preferred channels (online, telephone or a branch) to open a new account or apply for a loan. Online capabilities could be extremely helpful in retaining customers. By facilitating interaction and two-way communications, banks can learn about problems and opportunities before it becomes too late or costly to recover. Retention of individual customers can be enhanced as well as the ability to identify emerging service trends that may affect many customers. The last phase of a customer equity approach calls for increasing sales of additional products and services to existing customers. Additional sales contribute to increased profitability as well as to cementing the relationship with individual customers. The opportunities to use online capabilities to increase sales are enormous; most banks have not even scratched the surface of what is possible. Most sales efforts to date have been product-centric with little attention to the needs of individual customers. The online world allows banks to move proactively into customer-based marketing efforts. By developing meaningful databases, monitoring consumer needs and behavior, and experimenting with different tactics, new revenue streams are likely to materialize.

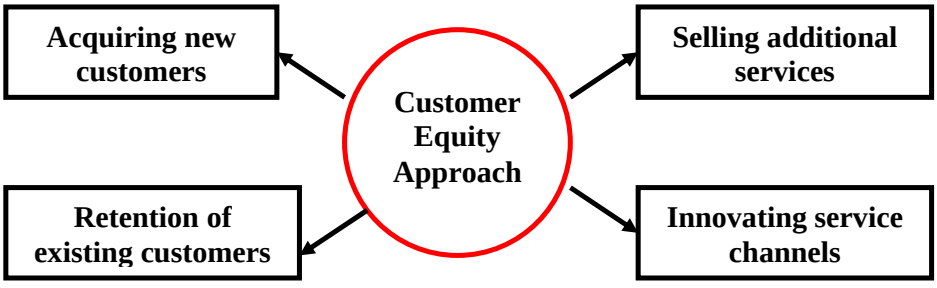


Fig 3.4 : Modified Customer Equity Approach Model.

In sum, a new goal of using online capabilities to acquire, retain and sell additional services to desirable customers is very feasible. To be able to get there, however, banks still face the challenge of convincing more customers to bank online. Thus, both for cost reduction and customer equity goals, banks need to find ways to accelerate the rate of consumer adoption of online banking. Only by pushing

forward banks can hope to derive the benefit from the opportunities outlined above. Yet, for most banks, the efforts to date have not been very successful.

3.7.2. Evaluation of Banks strategy to attract online banking Customers

The specific areas investigated here are based on the strategy of Indian banks on a framework of consumers' perceived benefits vs costs. The first issue to be examined is the banks strategy to communicate online the benefits of the service. The second aspect of the investigation focuses on cost issues, specifically price and incentives. The third area examines a non-monetary cost issue relating to the registration process and available customer service. The final area examines the Indian banks strategy to guide the customers through demonstration and training to use the online features. Taken together, these four strategies help to assess the banks' responsiveness to prospective customer concerns (Fig 3.5).

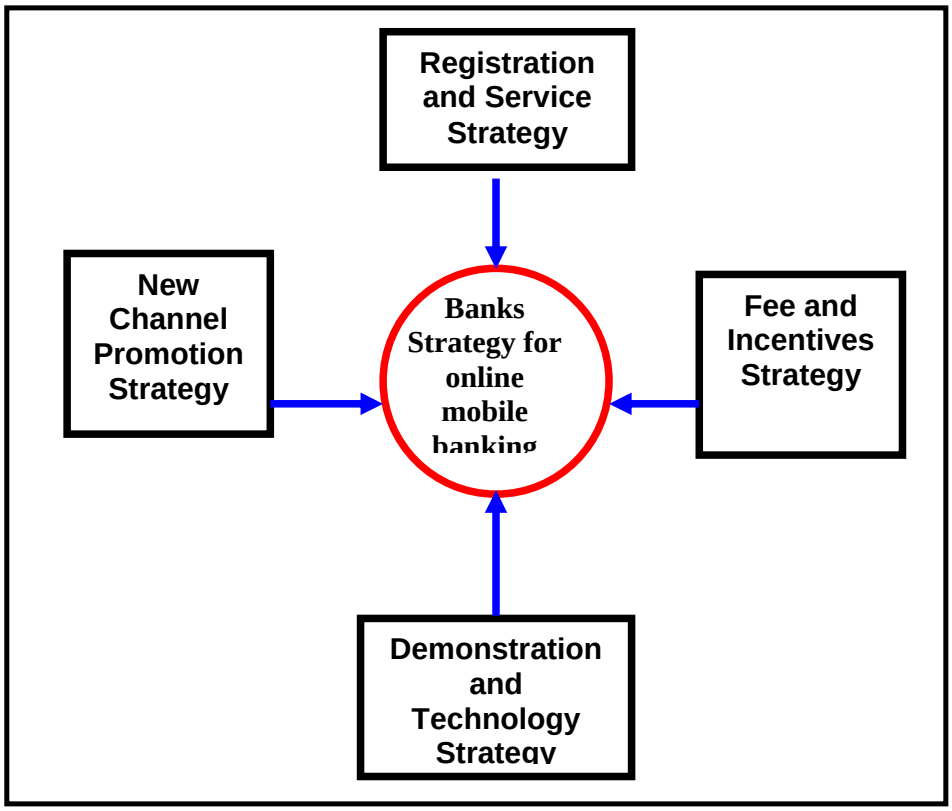


Fig. 3.5 : Evaluation of Bank Strategy for online mobile banking.

1. New Channel Promotion Strategy :

Given the fact that most prospects are not really convinced about the value of online mobile banking, it is important for banks to communicate the benefits to prospects. Banks are expected to entice customers and provide them with reasons to consider this new channel. Table 3.1 reports on the nature of the information to which customers are exposed upon reaching the front page of the websites of 18 Indian banks which provides mobile banking facility. The table distinguishes between 'list of functions', 'benefits', and 'links only'. Functions are lists of capabilities (eg check balances, transfer money) whereas benefits are defined here as outcomes (time savings, control, saving money etc). 'Links only' implies that no information about the online mobile banking service is provided on the front page; instead, only a link to a different page is available. Surprisingly, in 2004, all the banks provided 'links only' with no additional information on the front page. No banks provided benefit descriptions or incentives to consider the service on the front page. In 2006 the information provided on the front page had not changed materially. Benefits are still used in one banks website. There has been a slight increase in the list of functions and an increase in 'links only'. Clearly, the majority of banks still do not believe it is important to highlight the benefits. Almost all banks, at some point (in linked pages), provided a list of capabilities or benefits. During the year 2007, the number of banks providing mobile banking service with 'link only' connection at first page of website improved substantially.

Table 3.1 : Front page message (out of 18 banks)

Year	List of functions	Benefits	Links only	Total
2004	0	0	03	04
2006	01	01	09	11
2007	02	02	14	18

Table 3.2 examines the positioning of three key attributes on those lists provided in linked pages. A higher positioning logically reflects a bank's belief about the importance of an attribute to the consumers. A lower positioning is likely to get less attention. Table 3.2 reports that in 2004, balance check is mentioned in the 'top three' attributes in 75 per cent of the cases. Clearly, the bill payment is not recognized as a very important attribute that ought to be communicated early. In 2006 and 2007, the

situation is quite similar with even a slightly lower emphasis on bill payment. In fact, 75 per cent of banks did not mention it at all. In consumer study it is found that the bill payment is the most useful benefit among active users.

Table 3.2 : Ranking of key displayed benefits :

Year	Balance Check	Bill payment	Security	Total banks
2004	3, high	1, low	02	04
2006	8, high	03, low	03	11
2007	11, high	Low, 04	07	18

The final area to be examined in this table is security. In 2004, security is mentioned in the 'top three' in two banks out of four and later in 2007 it is in 07 banks.

Tables 3.1 and 3.2 tend to suggest that banks do not feel compelled to try to convince the customers. Most sites seem to be geared towards the favourably predisposed or even previously committed consumers, simply listing capabilities. Very little attempt to explain the benefits of mobile banking are observed. Interestingly, there has been very little change in the 3 years period reviewed here. The large majority of banks have not changed their online communication emphasis.

2. Fee and Incentives Strategy :

Access to basic mobile banking is offered free of charge in all banks. Significant differences, however, are observed in terms of pricing of bill payment services. Table 3.3 reports the fee structures in 2004, 2006 and 2007. The first part reports on the normal fee structure. The second part reports on the promotional fee-waiving tactics. The normal fee structure in 2004 indicates that 50 percent of all banks charge all of their customers for the bill payment service. A mixed pricing strategy of offering a no-fee bill payment to some of the customers is reported by 25 per cent of banks. This free service is provided to higher value customers. These are the customers who kept higher balances or had other loan and/or investment relationships with the bank. The pricing strategy reflects banks' belief that it is a costly service to provide.

Thus, those customers who want it should be asked to pay for it. In three out of four cases in 2004, bill payment is marketed as an additional, almost separate feature that is available to customers, often at a fee. The free bill payment is normally an indication of the service being a fully integrated feature of online banking, not a separate function. In those cases, every customer who registered for online banking has access to bill payment capabilities. The results in 2006 and 2007 are quite interesting. A few more banks have finally realized the wisdom of offering free bill payment to all. However, the majority of the banks are still charging all customers for this service.

Table 3.3 : Bill payment fee and incentives :

Mobile banking fees	**2004**	**2006**	**2007**
Free for all	2 out of 4	6 out of 11	10 out of 18
Free for some	1 out of 4	1 out of 11	4 out of 18
Not Free	1 out of 4	4 out of 11	4 out of 18
Total	4	11	18
Introductory Fee waived :			
Yes	3	6	8
No	1	5	10
Total	4	11	18

In other words, most banks have not changed their strategy. Interestingly, a further examination of the data reveals that the banks that appear on the list for the first time have all adopted a fee structure for bill payment services. Table 3.5 reports on the promotional incentives among those banks who charged for bill payment services. As an inducement, some banks realized that it might be beneficial to waive the fees for bill payment for a trial period. The study reports similar results in 2004 and 2006. Approximately 30 per cent of the banks who charge for bill payment are offering fee waivers for a trial period. In other words, almost 70 percent of the banks that charge for bill payment do not offer any fee waivers even for a short trial period. Apparently, those banks believed that no incentives are necessary. While it is in the banks' interest to convert their customers, their marketing reflects the view that those consumers who want the service should pay for it.

Table 3.4 : Incentives to try and use bill payment :

Incentives availability	Incentives to try (per cent) 2004	2006	Incentives to continue (per cent) 2004	2006
Available	01	04	01	02
Unavailable	03	07	03	09
Total	04	11	04	11

In addition to waiving the fees for bill payment service, few banks provided customers with additional incentives. These incentives are designed to encourage customers to make an effort to try bill payment. Two types of incentives are found in the study. The first focuses on an initial financial incentive for customers who activated their online bill payment service. The second type of financial incentive is designed to ensure continuous use of the bill payment service. Customers received financial rewards after using the service multiple times. In 2004 only one bank out of four banks in the study employed such incentives. Interestingly, the bank used both the initial incentive and the continuation incentive. In 2006, there is a very slight improvement. The data indicate that 25 per cent are used incentives to get customers to try. More striking is the fact that 80 per cent do not provide any monetary incentive to get customers to try the bill payment service.

3. Registration and Service Strategy :

The another area investigated here focused on online registration capabilities and live customer support in the event that customers had questions. Table 3.5 reports the key findings in these areas.

Table 3.5 : Online Registration and live customer service availability :

Online registration	2004 (per cent)	2007(per cent)
Available to existing customers only	25	30
Available for new and existing customers	25	40
Not available	50	30
Total	100	100
Live customer service		
Prominently displayed	50	30
Displayed elsewhere	25	30
Not displayed	25	40
Total	100	100

The first part of the table examines the online registration capabilities. In 2004, 50 per cent of the cases, online registration is feasible. However, most sites are not geared for new customers. In fact 25 per cent of the banks allow only existing customers to register. Those who are not currently customers of the bank would have had to use other channels to open an online account. Only 25 per cent of the sites allowed both existing and new bank customers to register online. Clearly, such systems are not very helpful for a prospective new customer. In 2007, the situation improved somewhat. Online registration is not available in 30 per cent of the cases and available to all in 40 per cent of banks. Again, the increment has been mainly due to the competition from new banks that are pursuing the more innovative banking strategies.

The second part of Table 3.5 reports on the availability and promotion of live customer service. The good news is that almost all banks do have live customer service, at least during some parts of the day. In 2004, however, 50 per cent prominently displayed the phone numbers on pages that relate to online registration or service description. The situation reported in 2007 is somewhat worst. 30 per cent of the banks prominently displayed the phone number, and 40 percent did not display it at all. It is very clear that banks are not making it easy for customers to find and call customer service as they would prefer customers to e-mail or SMS them rather than call. Such a strategy is not conducive to convincing uncertain consumers to register for online service. The findings of this study indicate that banks do not appreciate consumer requirements and are not providing the necessary information to convert these prospects on their websites. For the most part the results in 2007 indicated a worsening in the marketing efforts to be helpful to consumers. A few selected banks have realized the need to become more consumer friendly. The majority, however, still deploys a cost-plus approach to pricing with little regard or understanding of customer requirements.

4. Demonstration and Secured Technology Strategy :

Table 3.6 : Online demonstration and secured technology strategy :

	2004 (per cent)	2006 (per cent)	2007 (per cent)
Online demonstration	100	80	70
Additional security	50	30	30

Technological progress is giving a boost to existing online mobile banking services and devices. Their quality is improving. Ever faster and more powerful chips and the widespread use of broadband mobile communication technology make online banking more comfortable for more and more people without necessarily triggering the emergence of completely new devices and inventions.

3. 7.3. Diniz Model Applied to Indian Mobile Banking Sector

The role of informational technology in the success of banking is well documented (Pollais, 1994; Martin, 1998; Chatzky, 1998; and Van Aswegen, 1999). However, the acceptance of mobile banking service has been mixed. In an attempt to explain such conclusion, the Diniz (1998) model has been used to analyze the content of bank websites in the middle-east and Islamic countries (e.g., Guru et al., 2000; Jasimuddin, 2001; and Awamleh et al., 2003).

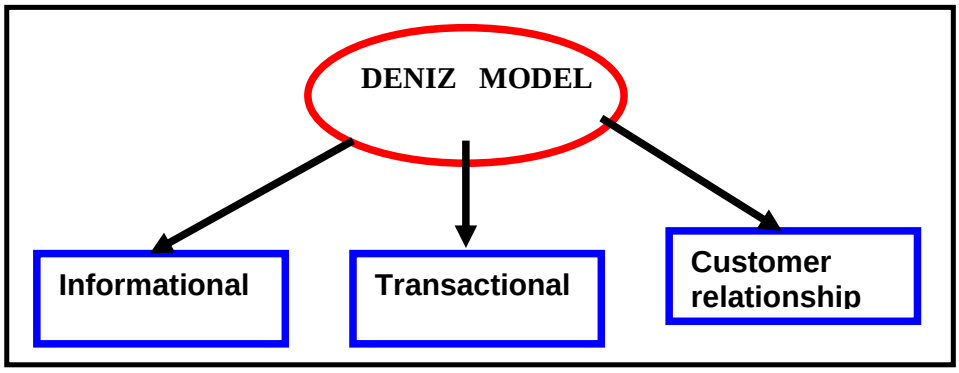


Fig. 3. 6 : Diniz model for online banking website.

The Diniz model delineates three functional areas and three levels of activity:

1. Informational :

Basic : – providing contact, electronic brochures and special events. Intermediate : – search engines, report downloads, economic information. Advanced :– subscriptions, interface customization and advertisements.

2. Transactional :

Basic : – opening accounts, check book requests, card requests. Intermediate : – balance enquiry, bill payments, fund transfers. Advanced : – electronic cash, electronic signature, electronic cheques.

3. Customer relationship :

Basic – electronic mail, suggestions and complaints forms, feedback forms. Intermediate – advising tools, what-if calculations, and calculators. Advanced – video conferences and service developments.

The adoption of mobile banking services is to a large extent dependent on the value added services they can offer. Diniz (1998) surveyed banks in the United States and reported that most of them offer basic and intermediate services at the transactional and informational levels. Awamleh et al. (2003) surveyed Jordanian banks and found limited evidence of web usage at the intermediate level while the basic level usage is dominant. Guru et al. (2003) found that overall bank website evaluation ratings are clearly related to the three functional and interactivity levels. There is evidence to suggest that banks are seeking to slowly move out of branch banking and into multi-channel banking, primarily internet banking through PC or mobile phone, to attain cost advantages (Kurtas, 2000) and to improve customer service (Polatoglu and Ekin, 2001). Some of the Indian banks have adopted online banking to take advantage of opportunities in providing market information, delivering banking products, and improving customer relationship. The following table provides our study on Indian Banks in terms of Deniz feature.

Table 3.7 : Study of Mobile banking strategy of Indian Banks based on Deniz Model (2007) :

S.No.	**Deniz Feature**	Public Sector Banks (6)	Private Sector Banks (8)	Foreign sector Banks (5)
1.	Basic Informational	100 %	100 %	100 %
2.	Intermediate Informational	More than 80 %	100 %	100 %
3.	Advanced Informational	Less than 20 %	50 %	30-40 %
4.	Basic Transactional	100 %	100 %	100 %
5.	Intermediate Transactional	Less than 40 %	Less than 60 %	Less than 80 %
6.	Advanced Transactional	30 – 40 %	50 %	30 – 35 %

7.	Basic Customer Relationship	More than 80 %	More than 80 %	More than 80 %
8.	Intermediate Customer Relationship	30 – 40 %	50 %	30 – 35 %
9.	Advanced Customer Relationship	Less than 20 %	50 %	Less than 20 %

3. 7.4. Conceptual Study on Determinants of Mobile Banking

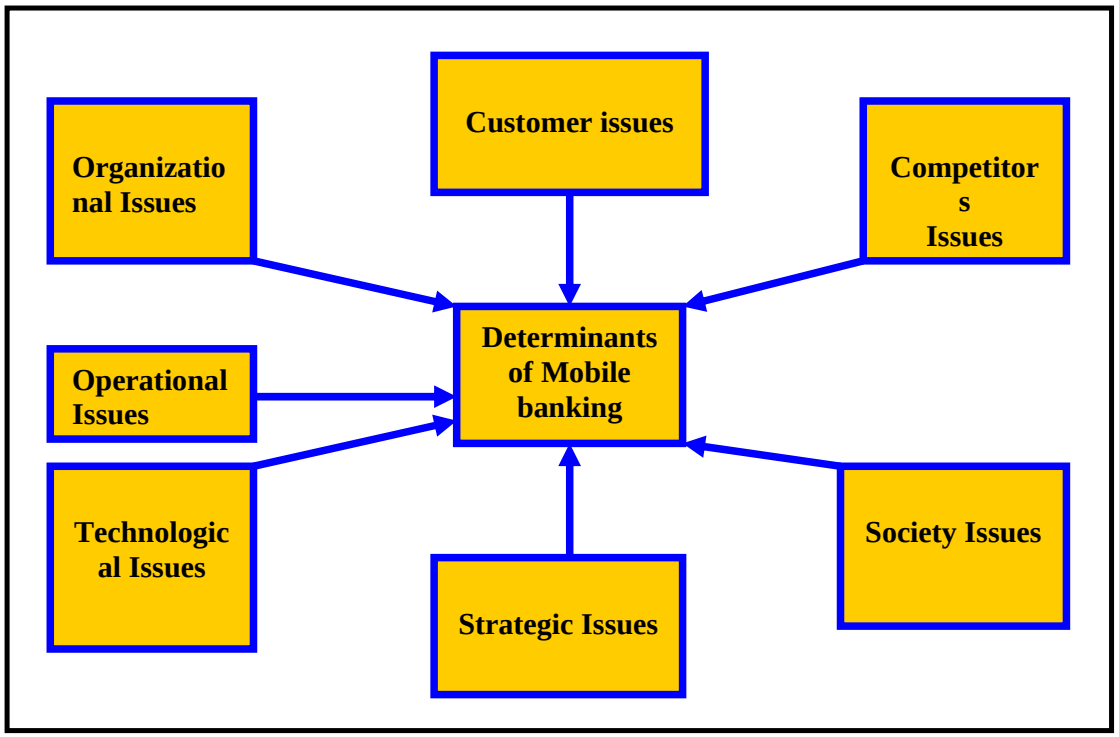


Figure 3.7 : Our Model of determinant of online mobile banking.

It is important to estimate the factors determining the adoption of online mobile banking by financial service providers. This also includes, determining why some banks offer a wide range of online mobile banking services. To study the factors explaining which banks chose to offer online mobile banking, we proposed a new model called "Determinant of Mobile Banking" as shown in the figure 3.7. The purpose of this model is to know how banks view and evaluate the mobile banking as a channel of financial transaction and as a source of banking information. The qualitative data collection instrument chosen is the focus group. This technique provides data on group interaction, on realities defined in a group context, and on interpretation of events that reflect group input. Rogers (1995) proposes that the

adaption process is heavily influenced by word-of-mouth; therefore it is appropriate to utilize group discussion to explore the extremes of views expressed, the interaction between these views and the consensus achieved. In this way focus group add more depth and provide more breadth of information than individual interview (Morgan, 1994).

Table 3.8 : Determinants of Mobile banking channel adoption by Banks

Organization Focused Issues : Willingness to cannibalize, Channel specific investments, Infrastructure investment, Support from senior management, Employees view on new channel, Organizational size, Cost savings, Loyal customer.
Operational Issues : Easy operation, Boundary-less operation, Improved efficiency.
Customer Focused Issues : Predicted advantages for the customers, Value for customer time, Value for customers money, Additional support for high profit customers, Reduced/enhanced customer relationship, customer satisfaction.
Competitors Focused Issues : External competition, Better service, Bundled services.
Technology Focused Issues : Technological innovations, Early adapting advantage, Technology penetration. Lower operating cost, Outsourcing, Possibility of using e-cash.
Strategic Focused Issues : Future market focus, Challenge seeking top management, Additional and Bundled services, Profit generation, Organizational strategy, Customer education and training.
Society Focused Issues : Dissemination of information to the community, better service for the community.

Three focus groups, each comprising of six young adults, are formed. Group 1 comprised of 3 males/3 females, Group 2 consists of 2 males/4 females, and Group 3 consists of 4 males/2 females. Participants are chosen from the population of final year Business studies students at Srinivas Institute of Management Studies, Mangalore, India, who are doing their projects in finance and banking area. Based on focus group interaction, 28 propositions are proposed and the related literature is reviewed. These propositions are integrated into a framework model as shown in figure 3.5 to indicate how variables are inter-related.

3.7.5. Empirical Test on Developed Model :

The variables identified through Focus group, are divided into seven issues as organizational focus issues, operational focused issues, customer focused issues, competitor focused issues, technology focused issues, strategy focused issues and society focused issues. All the variables have a direct effect on the promotion and exploitation of the new channels. Furthermore, it is argued that the effect from all the independent variables on the effective exploitation of new channels is both direct and mediated by the use of other marketing mix variables such as promotion by advertising, promotion in the personal interaction in the branches, and the use of pricing.

Organization Focused Issues :

The identified issues are : Willingness to cannibalize, Channel specific investments, Infrastructure investment, Support from senior management, Employees view on new channel, Organizational size, Cost savings, and Loyal customer.

(a) Willingness to cannibalize :

According to Chandy and Tellis (1998), willingness to cannibalize is defined as "the extent to which a firm is prepared to reduce the actual or potential value of its investments". For example, a bank may have invested in branches, employees at the branches and the promotion of the branches. A firm which is willing to cannibalize existing distribution channels does not avoid introducing new channel in order not to render employees or existing branches redundant. It will not wait to innovate until it is forced by competitors. Such organization is pro-active regarding new distribution channels, and allocates resources in order to integrate them in the existing organization and it is likely to offer and promote its products and services through these channels before its competitors. The willingness to cannibalize is a desirable trait, because it promotes innovation and is necessary for the long term survival of the firm. It may, however, hurt short term profit, because new distribution channels may result in old channels becoming unprofitable. Thus the following proposition P1 is suggested.

P1 : The higher the degree of willingness to cannibalize a bank exhibits, the more likely it is a distribution channel for mobile banking activities and more it will promote such distribution channel.

(b) Channel Specific Investments :

Many firms have invested huge resources in their existing distribution channels. They have opened large number of branches, hired employees, taught them to work with their products and services and implemented effective organizational routines (Stren et al., 1996). These investments are channel specific investments, i.e., they have only limited or no value at all if these channel cease to exist. Traditional retail banks have invested in their branches, the promotion of the branches, their employees at the branches, and the procedures used for their day to day activities – all of which are investments which will be of no or lower value if mobile banking becomes the single most important distribution channel. Hence in order to protect the channel specific investments, the manager may hesitate to introduce competing channels. Thus the following proposition P2 is suggested.

P2 : The more investment the bank made on expansion through branches, the less likely it is promoting mobile banking activities.

(c) Infrastructure Investment :

According to Leonard-Barton (1992), development projects imply an organizational struggle to both maintain, renew, and replace core capabilities, because new technologies may both enhance and destroy existing competencies within an industry. The existing values, skills, managerial systems, and technical systems may be inappropriate for some projects and that these inappropriate sets of knowledge become core rigidities and may create problems for projects which require new capabilities. Hence both the willingness to cannibalize and the actual ability to introduce, promote, and exploit the new channel of mobile banking is negatively affected by channel specific investments and the new and different requirements of this new channel. Thus the following propositions P3 is proposed.

P3 : The more investment required to improve the infrastructure for mobile banking, the less likely the bank to be a mobile banking distribution channel, and less it will be promoting the mobile banking activities.

(d) Support form the Senior Management :

Most of the literature on new channel development emphasizes management support for innovations and implementation of changes as most important requirement for new service development. (Johne, 1996, and Lievens et al., 1999). It is argued that, top management and their provision of a clear corporate vision, resources and help as one of the most important factor for successful new channel development process. For example, Drew (1995a), found that lack of senior management support is a major barrier to new product development in financial institutions. Drew (1995b) argued that the speed with which a new service is brought to the market is critical to the competitive advantage of a bank and that top level commitment is one of the most important factors for the success. Thus management support gives new innovations such as mobile banking a better chance in retail banking where there will be resistance to such innovations. These things are summarized as a proposition P4 and given below.

P4 : The greater the support from senior management, more likely the bank exploit the mobile banking channel and more it will be promoting the mobile banking channel.

(e) Employees view on new channel :

Distribution Channel strategy and the development of a new channel of mobile banking are connected with a great deal of uncertainty. This means that the employees in a bank may hold different views on this, and thus distribution channel strategy may be a natural part of the political debate and the conflicts in a large organization. Furthermore, if the customers accept the electronic channels, an adaption process is likely to take place which will involve the closing of bank branches and a reduction of the staff in most banks (Mols et al., 1999). This development will not proceed without conflicts, as those who are likely to be worse

off under this scenario will try to slow down the process and delay the introduction of the new distribution channels. Based on this following proposition P5 is proposed.

P5 : The greater the employees get affected due to adapting mobile banking, less likely the bank is to be an innovator and the less it will be promoting the new mobile banking channel.

(f) Organization Size :

There is a positive relationship exists between organizational size and ability to innovate. The review of Chandy and Tellis (1998) on organization size and adaption of Website interactivity concluded that no consensus about the role of size has been reached. In their study, they found no significance relationship between firm size and product development. Attracting new customers to the new distribution channels may be done by use of advertising, sales promotion, public relations, personal selling and direct marketing. The expectation is that these type of promotion will lead to a more effective introduction and exploitation of the new channels. This supports the following proposition P6.

P6 : The larger the bank, the more likely it is an innovator of new channel and the more it will be promoting the new channel like mobile banking.

(g) Cost savings :

It is assumed that the benefits of online mobile banking outweigh the associated costs. Also, banks reported benefits in the following areas: increases in the customer base, improvements in customer service, lower transaction costs, and opportunities to offer additional services. It is also argued that the threat to the bank in terms of securities and due to the likelihood of fraud, increases with mobile banking. Even if there is an initial investment in procuring both hardware and software and security based solutions, banks can save lost of expenditure in terms of human resources, branch expansion and other investments for creating physical infrastructure. Such cost savings can substantially improves the profit of the organization.

P7 : New distribution channel like online mobile banking decreases the cost of business expansion and has a positive impact on cost savings.

(h) Loyal customer :

It has been shown that customer loyalty derives from one's trust in, and commitment to the service provider fostered over time (Sirdeshmukh et al., 2002). Trust is generally acknowledged as being essential to successful relationships (Morgan, et al., 1994; Dwyer, 1987, and Moorman, et al., 1993) and has been defined as 'customer confidence in the quality of products/services offered' Garbarino, et al., (1999). As a corollary, this can be extended to trust in the organization producing these products and services. Correspondingly, commitment has been defined as 'an enduring desire to maintain a valued relationship' (Moorman, 1992). This implies the commitment of both the customer and the organization, and a relationship that is deemed by both parties to be mutually valuable. Furthermore, Gundlach et al., (1995) have argued that commitment is made up of three main components: an instrumental component, an attitudinal component and a temporal component. The first implies investment and therefore some form of physical attachment, the second implies emotional attachment, and the third implies endurability. Thus relationships in which trust and commitment are inherent elements encourage loyalty (Sirdeshmukh et al., 2002, Reichheld, 2000). It is therefore reasonable to argue that customer loyalty to a service provider in virtual market space will depend, inter alliance, on the trust that a customer has in the service provider and what is offered, as well as the extent to which they believe they can trust and rely on the manner of service delivery or provision (Walker et al., 2000). Correspondingly, their loyalty will also be born of, and manifest as, a sense of attachment and commitment to the service provider for reasons both instrumental and emotional. This also suggest that customer trust in, and commitment to, individual banks may be disaffected as a consequence of dissatisfying experiences with their use of online mobile banking services, and by residual negative attitudes to the service provider. In other words, the experience of customers with banking services provided in this way, combined with their residual attitudes to banks, combine to create an attitude that may be antithetic to fostering a sense of relationship with the service provider.

P8 : Providing new distribution channel like mobile banking has positive effect on enhancing the relationship and trust between bank and customer and helps in enhancement of loyal customers.

Strategic Issues :

The impact of new banking channel on the strategic and operational aspects of banking has to be assessed. By not providing new channel of mobile banking, the banks may loose existing customers and fails to get new customers. The identified strategic focused issues are : Future market focus, Challenge seeking top management, Additional and Bundled services, Profit generation, Organizational strategy, and Customer education and training.

(a) Future Market Focus :

A future market focus is defined by Chandey and Tellis, (1998) as "the extent to which a firm emphasizes future customers and competitors relative to current customers and competitors". A future oriented firm will be interested in future profit, future customer segments and competitors. It is a measure of how alert the decision makers are to new technologies and changes among competitors and customers. Thus, firms which are oriented towards the present market may end up with channels which fall behind the needs and wants of their customers. A future oriented firm will be interested in those customers who will be most attractive customers in a year or more from now, whereas a firm oriented towards the past and present will be attached to its customers and focus on serving present customers' needs and wants without preparing for how these needs and wants may develop. This is in accordance with the findings that future oriented firms are more innovative. Hence the following proposition P9 is suggested.

P9 : The greater the bank's attention to the future, the more likely it is to be a new distribution channel innovator and will be promoting the mobile banking channel.

(b) Challenge Seeking Top management :

When the top management has keen interest in expanding the business and providing good facilities to the customers, it will spend more on innovations and tries to find new channels which delight the customers. Moreover, when the top management has formal management education and capable to anticipate global competition and challenges, the initiative to face such competition enhances the

process of forming a suitable strategy to identify and adapt new distribution channels like mobile banking.

P10 : When the top managers are more innovative and have educated youngsters, the more likely the bank identify and adapt new distribution channel like mobile banking and exploit the new channel.

(c) Profit Generation :

Mobile business, when properly integrated into existing banking operations, can lead to substantial cost savings and higher profitability. Cost savings occur by virtue of automating customer transactions such as funds transfers, payments, account balance inquiries, etc. Strategic alliances with insurance companies, mortgage companies, and stock brokerage firms can lead to additional business opportunities that otherwise will go unrealized. Furthermore, banks are able to retain customers more effectively when offering services that are value-added. As a result, the percentage of customers taking their business elsewhere drops substantially. As a result of these positive experiences with online banking, one in six of the bank's new customers are referrals from existing customers and, thus, did not cost the bank anything to acquire them.

P11 : Cost saving and higher profitability in long range has positive effect on decision related to starting new distribution channel like online mobile banking.

(d) Organizational strategy:

Organizational strategy of looking in to the changes in financial sector and to encashing the opportunities, decides the fate of the organization. In this changing business scenario, financial organizations have to evaluate the possible changes in the business models and have responsibility to promote new strategies like building alliances with former competitors to form networks or to implement differentiated customer relationship through new distribution channels. Based on this, following proposition P12 is framed.

P12 : The more the bank is promoting the new banking channels, the more likely it is to be a distribution channel innovator and exploit the new channel

(e) Additional and Bundled Services :

Many banks are moving towards offering clients a financial portal. This portal concept offers banks a new role in the business of serving clients. Simply having an online banking presence does not provide banks a revenue stream. However, by offering a wide array of products and services, banks can benefit from online integration. By creating financial portals where consumers can manage a broad range of financial activities such as stocks and mortgages, banks can profit from offering mobile banking capabilities to the clients.

P 13 : Bundled services and Increasing the service content through new channel have positive effect on attracting online mobile banking.

(f) Customer education and training :

Customer Education provides knowledge about innovation and its relative advantages over conventional service model to the customers. The training provided by the service provider allows customer familiarize him/her to use that innovation. Customer education leads to knowledge about innovation, which in turn influence the perceived usefulness of the innovation. In case of online mobile banking, Ubiquitous service, Enhanced Productivity due to adapting new innovation, Time saving, Opportunity for better service, Status in the Society, Challenging environment, and Enhanced security may be perceived usefulness for the customers. Customer Training influences the perceived ease of use of that innovation compared to traditional banking.

P14 : Customer education and training has positive effect on switching existing customers and potential new customers to online mobile banking.

Customer Focused Issues :

The identified customer focused issues are : Predicted advantages for the customers, Value for customer time, Value for customer money, Additional support for high profit customers, Reduced/enhanced customer relationship, and customer satisfaction.

The impact of mobile banking on the bank's customers and their relationship with the bank including such issues as customer trust, loyalty and security concerns are

important. The issues that the banks thought on benefits to the bank customers due to mobile banking and its effect on reduction of the frequency of customer visit to a bank branch is not clear. It is also believed that introduction of mobile banking would lead to a reduction in loyalty and customer-banker relationship. In contradiction to this, the second thought is that mobile banking will create more loyal customers due to online ubiquity advantages and multiple financial services offering.

(a) Predicted advantages for the customers : Customer needs and wants have been driving the development of many new services in market–driven firms. Satisfying all customers' wants has been argued to be important and their ability to engage in "one stop shopping" and has been a central assumption behind the development of financial supermarkets where the customers are able to buy all their financial services from the same bank. The banks argue that financial supermarkets are a pre-requisite for binding the customers to the bank and thus a prerequisite for the retention of existing customers. This is especially important as customer loyalty in the financial services sector is declining. Esaingwood and Storey (1995) commented that technology has to be managed for the provision of value to the customers. Thus in market-driven distribution system, the ability of new channels to satisfy the users' needs better or at lower costs than the existing channels is the ultimate condition for survival and success of the new channels. In order to explore the importance of these expected advantages from mobile banking channels, the following tentative proposition P15 is suggested.

P15 : Adopting online mobile banking channel has positive effect on additional advantages for customers and hence has enhanced attraction.

(b) Value for customer time, money and satisfaction :

The adoption of innovative online mobile banking channel saves significantly the customer time by automation of banking services processing and introduction of an easy maintenance tools for managing customer's money. Since the response of the medium is very fast, the customer can wait till the last minute before concluding a fund transfer.

P16 : Adopting online mobile banking channel has positive effect on banks view of the value on the customer's time, money and satisfaction and hence enhanced customer relationship.

(c) Customer satisfaction :

Because mobile devices are inherently portable, mobile users may be engaged in activities, such as meeting people or traveling, while conducting transactions or receiving information through their Internet-enabled mobile devices. Many customers secretly hate their banks because of punitive charges, inconvenient opening hours and unhelpful branch staff. In mobile banking due to quick and continuous access, transactions can be made 24 hours a day, without requiring the physical interaction with the bank. Due to ubiquity, reduced transaction time, and transaction cost and increased comfort and convenience, banks can expect increased customer satisfaction due to introduction of mobile banking.

P17 : The more advantages a bank thinks the customers will derive from mobile banking channel, the more it will be promoting this distribution channel.

Technology Focused Issues :

The identified technology focused issues are : Technological innovations, Early adapting advantage, Technology penetration, lower operating cost, and out sourcing.

(a) Technological Innovations :

The technological innovations like Internet, mobile communication devices can dramatically lower entry barriers for new competitors. Banks can enter into online banking easily because they do not need sales forces and huge capital investments as they do in offline markets. As the number of people with mobile communication and internet access increases, the competition for online business in many banks will also increase. The advances in mobile technology and internet creates new substitution threats by enabling new approaches to meet customers needs and performing business functions (Porter, 2001). Thus banks have to spend more on automation and networking to take full advantages of technological innovation. This supports following proposition P18.

P 18 : Decision for adopting new distribution channel has positive effect on innovations in technology.

(b) Early adopting advantage :

The organizations which are capable of adopting the global technology to local requirement certainly take advantages of early adaption. In India, ICICI bank and HDFC bank are having the advantage of early adaption of global technology of automation in banking sector and hence the pioneers of online mobile banking technology. In public sector, IDBI and Punjab National Banks are examples of finding advantage in early adopting such technology.

P 19 : Decision on early adoption of new distribution channel based on technological innovations has positive effect on reputation enhancement.

(c) Technology penetration :

The decision on innovative technology based service channel improves the IT infrastructure of the organization and hence responsible on technology penetration in all the segments of the institution. Such decisions from the top management has improves the automation level of all bank branches and allows to provide better networked computers in the organization.

P20 : Decision on adopting IT based distribution channel has positive effect on better technology penetration in the bank.

(d) Lower Operational Cost :

Due to automated operational process and accelerated credit decisions, the new distribution channel for banking is more attractive for banks and it also improves the operational efficiency of the organization.

P 21 : The more the bank is spending on automation and networking, the more likely it is to adapt mobile banking distribution channel and to exploit the new Channel.

(e) Outsourcing Issue : New channel like mobile banking increase banks' dependence on information technology, thereby increasing the technical complexity

of many operational and security issues and furthering a trend towards more partnerships, alliances and outsourcing arrangements with third parties, many of whom are unregulated.

P 22 : Adopting online mobile banking channel has positive effect on having more partnership, alliances and outsourcing arrangements to reduce initial investments and access better technology.

Competitors Focused Issues :

The identified competitors focused issues are : External competition, Better service, and Bundled services.

(a) External Competition :

Due to WTO reforms, local firms are facing intensive competition from multinational companies. As a result, for survival, firms have to rethink their business model and search for new distribution channels to add value to their business. To face external competition, banks should provide better services, and bundled services which may lead to using new distribution channel for their services. According to Porter and Miller (1985), a firm develops its business strategies in order to obtain competitive advantage over its competitors. It does this by responding to five primary forces : (1) the threat of new entrants, (2) rivalry among existing firms within an industry, (3) the threat of substitute products/services, (4) the bargaining power of suppliers, and the bargaining power of buyers. A bank assesses these five competitive forces and tries to develop the market channel at those points where the forces are weak. Based on this, the following proposition 23 is proposed.

P 23 : The more the bank faces competition for existing, the more it spends for satisfying the customers through better and bundled service and more likely to be a new distribution channel.

(b) Cost Savings :

Financial services through mobile device substantially reduce the cost incurred by the bank for providing such services. Orr (1999) argues that electronic processing dramatically reduces the cost per transaction. According to DiDio (1998), the average

transaction cost at a full service bank is about $1.07. It reduces to $0.27 at an ATM and falls to about a penny if the same transaction is conducted on the web. Also, there are opportunities for banks to present customer bills electronically. The cost of delivering bills electronically is substantially lower than if the bill is in paper form delivered through the mail. Irvine (1999) states that electronic bill presentment costs 40% less than paper delivery. These cost savings can offer customers and banks alike reduced cost of banking and still provide efficient and varied services.

P24 : Providing online new distribution channel has positive effect on reduction in cost per transaction to financial institution.

Loyal Customers :

In a recent study conducted by Forrester Research, 61% of respondents claimed that if their banks offered the financial services they wanted, they would prefer to utilize the bank's service (Dixon, 1999). With this knowledge of consumer interest in mind, banks are moving to offer a "hub" of financial services including bill presentment and payment, financial planning, estate planning, insurance, loans, and brokerage services. The mobile banking allows for this convergence of financial services in one previously unavailable central location. Offering financial convergence for the customer through mobile device will create a more involved banking customer who will more frequently patronize the banking site and more likely use the services offered. The idea is that by creating a more loyal customer who depends on a bank for many financial services, more bundling can occur and higher revenue per customer can be generated.

P25 : Online mobile banking channel enhances the involvement of customers and has positive effect on creating more loyal customers.

High-Profit Customers :

High-Profit customers are educated customers with high average annual income. Such customers once start to use electronic channel will be more beneficiaries to the bank because they are frequent users of banks products. Some studies suggest that the demographics of online banking customers are enticing. At Wells Fargo bank, online customers have an annual average income of $75,000 with education levels

higher than the average Wells Fargo customer (Hoffman, 1999). Also, this group of customers is more profitable than the bricks-and-mortar counterparts. They generate 50 per cent more revenue than the average Wells Fargo customer; hold 20 per cent higher balances; use 50 per cent more products, and their attrition rate is 50 per cent of the overall attrition rate. Furthermore, on average, it costs 14 per cent less to service these customers as compared to bricks-and-mortar customers (Timewell and Kung, 1999).

P26 : Starting new distribution channels like mobile banking has positive effect on attracting and satisfying high-profit customers.

Society Focused Issues :

The identified issues are : Dissemination of Information to the Community, and Better Service for the Community

(a) Dissemination of Information to the Community :

Some wireless infrastructure supports simultaneous delivery of data to all mobile users within a specific geographical region. This functionality offers an efficient means to disseminate information to large consumer population.

P27 : Adopting IT based new distribution channel has positive effect on simultaneous disseminating information to large number of customers.

(b) Better Service for the Community :

Due to the ability of simultaneous information transfer to the customers and other advantages to improve customer satisfaction, the online mobile banking channel has better opportunity to serve customer community.

P28 : Adopting online mobile banking channel has positive effect on providing better service for the community.

The above 28 propositions are converted into 7 hypotheses as follows and tested by means a questionnaire survey.

H1 : There is significant association between organizational issues and the decision of banks to adopt online mobile banking to its customers.

H2 : There is significant association between operational issues and the decision of banks to adopt online mobile banking to its customer.

H3 : There is significant association between Customer focused issues and the decision of banks to adopt online mobile banking to its customer.

H4 : There is significant association between Competitor focused issues and the decision of banks to adopt online mobile banking to its customer.

H5 : There is significant association between Technology focused issues and the decision of banks to adopt online mobile banking to its customer.

H6 : There is significant association between Strategic focused issues and the decision of banks to adopt online mobile banking to its customer.

H7 : There is significant association between Society focused issues and the decision of banks to adopt online mobile banking to its customer.

3.7.6. Data Collection, Processing and Tabulation :

Data for this study are collected using a questionnaire instrument. To generate an initial list of questionnaire items designed to capture bankers' perceptions regarding mobile banking as a new distribution channel, its effects on banks, customer-bank relationships, and technology considerations, focus group method is used. This study focuses on the effect of mobile banking as a new distribution channel for banks in terms of seven issues as organizational focus issues, operational focused issues, customer focused issues, competitor focused issues, technology focused issues, strategy focused issues and society focused issues. These issues include factors such as threats posed by banks and the need to offer mobile banking. Each item of the questionnaire is worded so that it can be measured using a 5-point Likert scale (1 = strongly agree; 5 = strongly disagree).

Steps are taken to refine this version of the questionnaire. Two volunteer bank executives reviewed the questionnaire for readability, clarity, and completeness. In addition, a faculty member specializing in banking issues examined the questionnaire. Feedback received from these experts is taken into account in

developing the final version of the questionnaire (Questionnaire 1 given in Appendix-1).

Data for this research are gathered by collecting the response from operational level employees of different public sector, private sector and foreign sector banks in Karnataka state in India. The managers/employees are requested to complete the questionnaire or forward it to a high level executive familiar with mobile banking. A total of 100 questionnaires (60 in Bangalore and 40 in Mangalore) are collected, which is typical for a study of this nature.

Data Processing Editing, coding classification and Tabulation

A relatively high response from bank managers/employees is obtained and is thought to be attributed mainly to the respondents' enthusiasm or willingness to participate obviously, to what they considered as an interesting subject to put their views across. The items in the questionnaire are focused on the identified seven issues and their variables mentioned above on factors determining mobile banking as new distribution channel. In Likert scale (Likert, 1932), the respondent is asked to respond to each of the statements in terms of several degrees, usually 5 degrees of agreement or disagreement. Each point on the scale carries a score.

Response indicating Strongly Agree carries score 5 and Strongly disagree carries score 1. The same thing is done in respect of each and every statement in the questionnaire. The total score for each statement by all the respondents is calculated by adding the scores. This would then measure the respondent's favorableness towards a given point of view. In our Bankers perspective study, 45 statements related to the factors determining for mobile banking adoption are studied and the following score values would be revealing.

100 x 5 = 500 Most favorable response possible

100 x 4 = 400 Favorable response

100 x 3 = 300 Neutral attitude

100 x 2 = 200 Unfavorable response

100 x 1 = 100 Most unfavorable response possible

The scores for any statement would fall between 100 and 500. If the score happens to be above 300, it shows favorable opinion to the given point of view, a score of below 300 would mean unfavorable opinion and a score of exactly 300 would be suggestive of a neutral attitude. Hence in this study, if the average score is more than 300, the corresponding hypothesis is considered as accepted.

3.8. Conceptual Study on Customers Perspective on Mobile Banking

Various Technology Acceptance Models are reviewed in Chapter 2. Generally, studies of adoption of information technology takes one of three possible approaches, *a diffusion approach, an adoption approach or a domestication approach*. Diffusion researchers typically describe the aggregate acceptance process as a function of time that may be used to categorize adopters of different kinds (Mahajan et al., 1990). Others like, Rogers (1995) describe the *diffusion* process as consisting of four elements: an innovation or new technology, a social system, the communication channels of the social system and time. *Adoption* researchers, on the other hand, typically describe and explain the acceptance decision of individual users applying different social theories of decision-making. Three models, collectively called the Technology Acceptance Theories (TAT), stand out as the most widely applied explanation within the adoption approach. Research literature states that information about technological innovations can travel through a variety of communication sources and modes to members of a social system (Roger, 1995) have found that communication factors are also significant predictors of customer adoption of electronic banking innovations. New product innovators in technology based products are likely to be drawn from heavy users of other products within the product category. Adopters who adopt earlier than others are likely to gain more from the use of the product and hence have a greater usage propensity. Additionally, it is argued that adoption of complex products depends on the adopter's ability to develop new knowledge and new patterns of experience. This ability can be enhanced by the knowledge gained from related products or the proper education on the new product and training on how to use it. In India, the educational and economical level of the people is not so advanced like other

advanced countries where the above acceptance theory is used to study the customers' behavior on new technology based products acceptance. Here, a new product usage can be enhanced by giving proper education on the product and training to use it. Accordingly, in this study, the Technological Acceptance Model is modified by considering local communication factors.

3.8.1. Modified Technology Acceptance Theory

In addition to three models proposed under Technological acceptance theories (TAT), this study proposes a new model which is a modification of Technology Acceptance Model and named as **Technology Acceptance Based on Theory of Customer Stimulation by Education and Training for Usage (TCSET).** As in TRA, it includes behavioral attitudes, subjective norms, intention to use and actual use based on user training. However, this theory interprets *behavioral control based on knowledge and training*. Perceived behavioral control covers both the intention to use and the actual usage. Actual usage is in turn a weighted function of intention to use and perceived behavioral control based on knowledge of that technology and training on usage of such technology.

According to this model, any innovation in Technology and its application in service sector gets popularity if that innovation reaches the end user through education and training. Customer Education provides knowledge about that innovation and its relative advantages over conventional service model to the customers. The training provided by the service provider allows customer familiarize him/her to use that innovation. **Customer education** leads to knowledge about innovation, which in turn influence the perceived usefulness and perceived assurance of the innovation. In case of online mobile banking, Ubiquitous service, Enhanced Productivity due to adapting new innovation, Time saving, Opportunity for better service, Status in the Society, Challenging environment, may be perceived usefulness for the customers and Security of Information. Accuracy of transaction and Reliability of service are perceived assurance for the customers. **Customer Training** influences the perceived ease of use of that innovation compared to traditional model. This also influences the customer perception on cost of the new innovation.

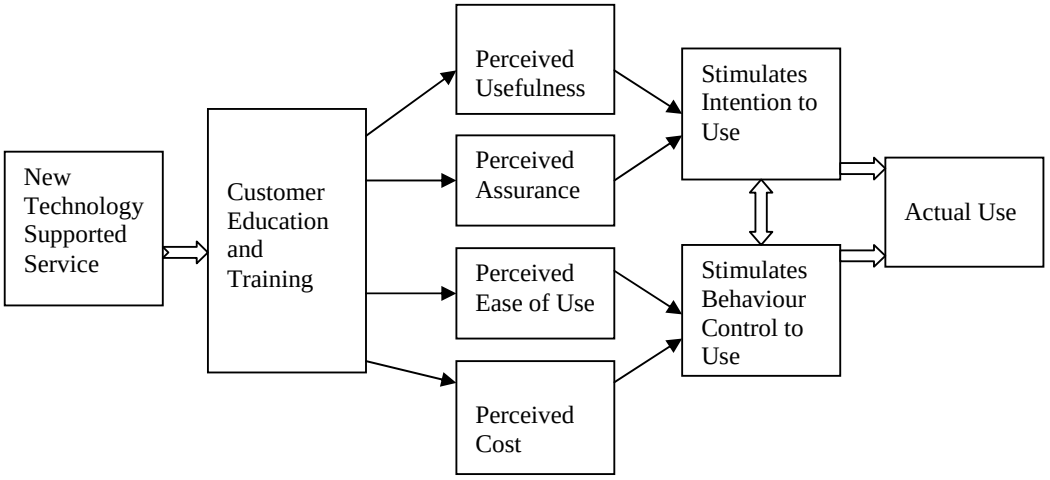


Fig. 3.8 : Technology Acceptance Model : Theory of Customer Stimulation by Education and Training for Usage (TCSET) (Our research Model)

Perceived Usefulness :

1. Ubiquitous service
2. Enhanced Productivity
3. Time saving
4. Opportunity for better service
5. Status in the Society
6. Challenging

Convenience
Better service
Speed of service

Perceived Ease of Use :

1. Easy Operation of the device
2. Easy and simple method of obtaining service
3. Bundled services
4. Availability of services & Network
5. Ease of switching between new and old models
6. Ease of making corrections
7. Ease of Registration to the bank

Attitude
Loyalty
Perception

Perceived Cost :

1. Low device cost
2. Low service cost
3. Avoiding inter-mediatories
4. Low transaction cost
5. Low cost registration for availing service
6. Zero hidden cost

Loyalty
Attraction

Perceived Assurance :

1. Security of customer Information
2. Accuracy of transaction information
3. Reliability of service

Risk free
Trust

In case of online mobile banking services, the perceived ease of use include : easy operation of the device, easy and simple method of obtaining service, bundled services, availability of services and network, ease of switching between new and old models, ease of making corrections, and ease of registration to the bank. The perceived cost involves the knowledge on cost of device, service cost, avoiding inter-mediatories, transaction cost, low cost registration for availing service, hidden cost etc.

The perceived usefulness of the innovation and perceived assurance stimulates the intention of customers to adapt new innovation and the perceived ease of use and the perceived cost of innovation stimulates the behavioral control of customer to use the new innovation. This model is more meaningful and applicable in developing and underdeveloped countries because of the low educational background and shy nature of rural people. To penetrate such innovative new service models effectively and efficiently, service providers should involve in customer education and training to stimulate the behavioral control and intention of the customer to adapt new service in their daily life.

TCSET adopts the following causal chain :

Innovation > Education and Training > Stimulation > Intention > Behavior > Actual usage

Stimulation = f(education and training)

Intention = f(usefulness and assurance)

Behavior = f(ease and cheap)

The three key stimulations that specially account for new innovation usage. The first of these beliefs is perceived usefulness, defined as 'the degree to which a person believes that using a particular system would enhance his/her job performance'. The second is perceived ease of use, defined as 'the degree to which a person believes that using a particular system would be free of effort'. The third is perceived cost, defined as 'the degree to which a person believes that using that system is cost effective and reduces his expenditure substantially'.

The most basic proposition of the TCSET is Customer Stimulation (S_C) and is a function of Stimulative Behavior (S_B) and Stimulative Intention(S_I). In previous models the behavior is postulated as a function of the individual's attitude toward the act and the social norms. Whether the attitude toward the act or the social norms exerts the greater influence on the behavioral depends on the individual and the decision object (Ajzen and Fishbein, 1980).

However, in our model we predict that individuals stimulative behavior is a function of ease of availing and performing service action (ease of use) and the comparative cost advantage (cheap). Therefore, it can be written as:

$S_B = f_1$ (perceived ease of use) + f_2 (perceived cheap of service) --------- (1)

The parameters f_1 and f_2 each reflect the strength of the relative impact of the ease of use and cost advantage of the service on the stimulative behavioral decision. The stimulative intention toward the adoption of the service is determined by the individual's beliefs on perceived usefulness (P_u).

That is:

$S_I = f_3$ (perceived usefulness) + f_4 (perceived assurance) ---------- (2)

Based on above, the customer stimulation S_C is defined as the algebraic sum of individuals perceived usefulness, perceived assurance, perceived ease and perceived cost effectiveness.

$$S_C = f(S_B + S_I) \quad \text{----------} \quad (3)$$

i.e. $S_C = f_1(P_E) + f_2(P_C) + f_3(P_U) + f_4(P_a)$ ---------- (4)

where P_E, P_C and P_U P_a are perceived ease, perceived cost, perceived usefulness and perceived assurance.

3.8.2. TCSET Model applied to Online Mobile Banking

Online mobile banking services is a new distribution channel for financial services for the banks. Adapting such distribution channels for basic services like, account checking, finding last few transactions, Cheque book request etc. will enhance banks obligation to provide ubiquitous service. Educating the old customers and the new customers by providing Training on how to use and get benefit by using these

services anywhere any time without fear. When the customer understands the easiness of operation and advantages of financial transaction using online mobile device in terms of cost benefit and other usefulness, he/she will tempted to use such distribution channel for future transactions by making use of his mobile set. Hence providing education and training to present customers, bank can teach the customers about perceived usefulness, perceived ease of operation of mobile device to make transactions and perceived cost-benefit by using such transactions frequently. This kind of training provided to the customers will certainly stimulate the intension to use such facility frequently and it also stimulates the behavior control to use such facility. Such stimulation of behaviour and intension due to perceived ease, perceived cost and perceived usefulness of mobile banking channel for ubiquitous financial transaction.

Thus the customers who have mobile phone will be educated towards the advantages of this channel, get trained to reduce hesitation of usage of mobile banking channel and hence considerable improvement is possible due to changes in behaviour and intension of usage. The education and training camps conducted by the banks not only stimulate the existing customers of the banks but it will attract new customers to the bank due to percolating effect.

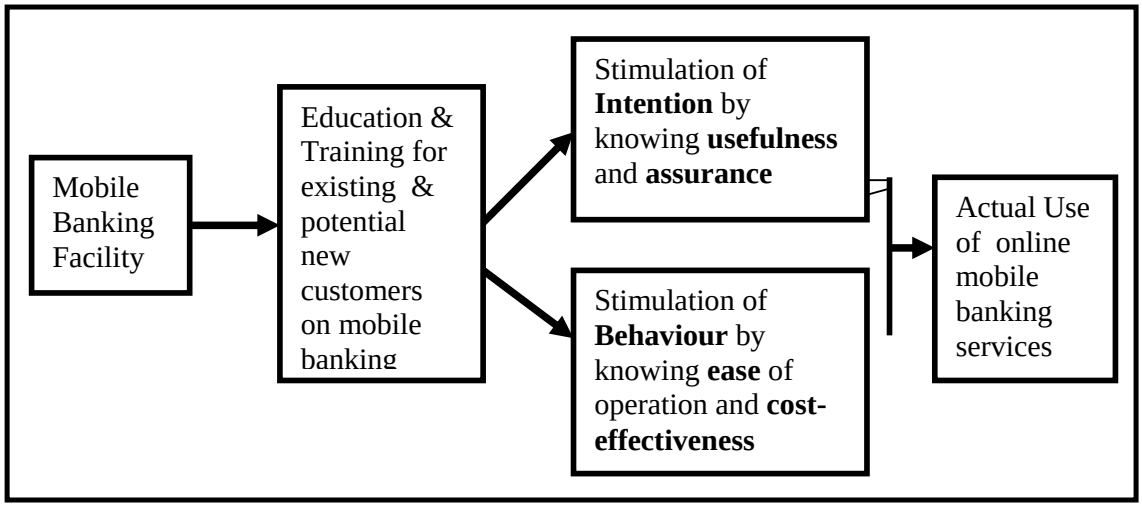


Figure 3.9 : TCSET Model applied to Online Mobile Banking

Issues Effecting the Intention and Behavior :

(a) Attitude

Attitude is defined as an individual's positive or negative feelings (evaluative affect) about performing a target behavior (Fishbein and Ajzen, 1975). It is related to behavioral intention because people form intentions to perform behaviors toward which they have positive affect. Taylor and Todd (1995) suggest that the different dimensions of attitudinal belief toward an innovation can be measured using the five perceived attributes like relative advantage, compatibility, complexity, and trialability of an innovation. These attribute, originally proposed in the diffusion of innovations theory (Rogers, 1995), are applied in this framework. Perceived relative advantage of an innovation like online banking is positively related to its rate of adoption. Online banking services allow customers to access their banking accounts from any location, at any time of the day, it provides tremendous advantage and convenience to users. It also gives customers greater control over managing their finances, as they are able to check their accounts, transact funds easily. In view of the advantages that online banking services offer, it would thus be expected that individuals who perceive online banking as advantageous would also be likely to adopt the service.

Online banking has been viewed as a delivery channel that is compatible with the profile of the modern day banking customer, who is likely to be computer-literate and familiar with the Internet. Therefore, it is expected that the more the individual uses online devices, and the more he or she perceives them as compatible with his or her lifestyle, the more likely that the individual will adopt Online banking. Online banking can be seen as an expeditious tool that allows customers to better manage their multiple accounts. As there are more financial products and services, it is expected that individuals who may have many financial accounts and who subscribe to many banking services will be more inclined to adopt online banking.

As the online banking devices are very user friendly, it is likely that potential customers may feel that online banking services are less complex to use, and hence

would be likely to use such services. Thus the lower the perceived complexity of using online banking, the more likely that it will be adopted. If customers are given the opportunity to try the innovation by means of education and training, certain fears of the unknown may be minimized. This is especially true when customers find that mistakes could be rectified, thus providing a predictable situation. Similarly, it is expected that only individuals who perceive using Internet banking as a low risk undertaking would be inclined to adopt it.

(b) Trust

Building customer trust in online mobile banking is a continuous process, which extends from initial trust formation to continuous trust development. The reliability and security needed to cultivate online trust are equally important for online banking transactions through internet or mobile technology. Extra emphasis should be placed on developing banks reputation because of the novel nature of mobile banking. A good reputation suggests certainty and less risk in conducting business, and thus helps foster customer trust. The factors like high quality information, attractive rewards, easy connectivity, multiple level passwords for high level security are plays important roll in building initial trust. The factors like quick transactions, maintaining banks' integrity, strengthen security controls, and providing additional financial supports provides continuous trust developments and maintenance.

(c) Convenience

One of the greatest advantage of online banking services is convenience. Unlike retail banking, customers need not travel to their physical bank branches, need not weight in a long queue, need not move from window to window for availing the banking services and need not vary about banking timings. Through online mobile devices, they can login to their banking account from anywhere, at any time for financial transactions and utility bill payments. Along with improved convenience, online mobile banking reduces cost of financial transactions. Presently most of the Indian customers use either internet based or mobile phone based online banking services. Such transactions cost less than Rs. 1 compared to cost incurred by retail

conventional banking. By using mobile devices such as mobile phones, customers can carryout financial transactions at anywhere and at any time. Such ubiquitous service certainly boost the usability of online banking services in India. Educating and training the customers to use online banking services through their mobile phone is one of the immediate requirement for all conventional banks to convert their customers to adopt online banking services.

Convenience, market forces, and speed are just some of the many reasons that over half of all banking transactions do not take place in a traditional branch. Consumers want instant access, in many different forms. However, there are opportunities to "modernize" banking transactions even further. One of these is the ability to view through alternative banking delivery mechanisms, images (pictures) of checks and deposits made by customers to a bank.

(d) Perception :

For a number of individuals, usage and attitudes to technologically facilitated services are influenced by perceptions of how reliably and easily the system caters for their needs. As a consequence, for some customers their perception of the advantages offered by the service used is influenced by their perception of the system's operational efficiency and reliability, ease of access and use. System complexity and clutter, crashes, drop outs, malfunctions and their consequential delays, if experienced regularly, can serve to inhibit regular use and provoke negative attitudes to both the service provider and the system generally. Therefore for marketed benefits of mobile banking services to be plausible and credible they must be consistently delivered and maintained by the mechanics of the system. Moreover, for a customer–service provider relationship to be established, nurtured and maintained, the facilitating means of service provision must function in a manner that enables and supports this effectively and reliably. It can be argued that more care needs to be taken to ensure that services and systems are designed more from a user perspective and in a way that enables users to complete their desired transactions straightforwardly, quickly and efficiently, in a way that enhances rather

than impedes accessibility, and that fosters positive rather than negative attitudes on the part of the customer. In turn, these positive attitudes will more likely serve to foster the sense of trust and commitment necessary to the customer's sense of relationship with the service provider.

(e) Loyalty :

It has been shown that customer loyalty derives from one's trust in, and commitment to the service provider fostered over time (Sirdeshmukh et al. 2002). The relationships in which trust and commitment are inherent elements encourage loyalty. It is therefore reasonable to argue that customer loyalty to a service provider in virtual market space will depend, inter alliance, on the trust that a customer has in the service provider and what is offered, as well as the extent to which they believe they can trust and rely on the manner of service delivery or provision. Correspondingly, their loyalty will also be born of, and manifest as, a sense of attachment and commitment to the service provider for reasons both instrumental and emotional. This also suggest that customer trust in, and commitment to, individual banks may be disaffected as a consequence of dissatisfying experiences with their use of online mobile banking services, and by residual negative attitudes to the service provider. In other words, the experience of customers with banking services provided in this way, combined with their residual attitudes to banks, combine to create an attitude that may be antithetic to fostering a sense of relationship with the service provider (Walker et al., 2000).

(f) Privacy, Security and Comfort Issues :

In on-line mobile banking, identity theft is rapidly becoming a serious problem that impacts both customers and service providers. As more and more people are turning towards the internet through mobile device to make their financial transitions, these users and the websites that they are using are becoming inviting targets for identity theft. It is relatively easy to obtain personal information via the web, and by using the internet to make purchases these consumers' personal information is being released for a variety of purposes over the web.

When exploring solutions to the problem of identity theft, one could simply not to pay any bills or purchase anything online. As this is sometimes impossible and not desirable, the only logical solution is to be cautious and protect oneself. Thus, when paying bills or purchasing merchandise over the web, consumers are taking the risk that someone will access their personal information and use it in a fraudulent manner. Consumers can do much to prevent becoming the victims of identity theft. Essentially, consumers can either take the time to develop preventative strategies or take the risk of identity theft. Many consumers are proactive in this area with the aid of the online financial institutions that serve them, while others do not know how to check the security of websites and therefore avoid using the internet at all to do their online mobile banking, which can also have a negative effect on businesses.

With the overwhelming fears of identity theft, it is critical for many businesses, especially banks that operate online to develop better ways to ensure the security of their websites. One of the most important steps an online bank needs to do to create better site security is to analyze their current systems. "As transactional systems and online traffic have become more common, lapses in current systems have led to breaches that have been real doozies" (Bielski, 2003, p.53). Owing to these lapses, several companies have fallen victim to the misuse of several of their sites. Next, online banks need to do is to identify their weakest points in their systems and improve them. "Most security experts agree that outsiders can and do get passwords and data on a fairly regular basis … much of the mayhem could have been avoided with a more organized approach to security or use of newer tools". When online banks bring in the newest technologies within the shortest amounts of time, there usually is less possibility that hackers could find their way into the systems. By the time many hackers figure out the old system, the new systems will already be in place.

Online banks need to create customer service strategies that make a more secure site through simple personal-based maintenance protocols. Management must understand that all financial information that is networked is vulnerable without

innovative security schema to protect it. To be constantly aware of how secure their systems are, they need to continuously analyze their systems. For example, Meta Security Group is one of the many firms that conduct security audits for online banks and other security conscious companies with e-enterprises (Bielski, 2003). If banks have to use such outsourcing sources, they could forfeit the internal costs of paying to train people to do these kinds of audits as well as providing for third-party audits, a very sound procedure after the recent Enron and Anderson financial audit disasters. It would not only decrease their costs, but it would also improve their systems by having professionals who are trained for some years to analyze systems looking for problems. If online banks or any other business are to incorporate all these matters, there may be having less fear concerning security attacks.

3.8.3. Empirical Study on Developed TCSET Model

The biggest opportunity for innovation in Indian banking system is the Indian consumer. Demographic shifts in terms of income levels and cultural shifts in terms of lifestyle aspirations are changing the profile of Indian consumer. This is the key driver of enhanced penetration of technology based banking services.

Here, it is worthwhile to mention that the adaptability of the Indian rural population to high-tech devices is one of the fastest in the world. The TCSET model can tested by Measuring the perceived usefulness, perceived ease and perceived cost effectiveness for customers. Thus the education and training provided to traditional and new customers has positive effect on intention and behavior of using online mobile banking channel. The ease of operation and cost effectiveness of online mobile banking has positive effect on customer behaviour factors like attitude, trust, perception, loyalty etc. The usefulness of online mobile banking has positive effect on the customer intension based on ubiquity, convenience, security and comfort.

Reflecting these considerations the following three hypotheses are formulated:

H1 : There is significant association between education and training, and intention and behavior of using online mobile banking channel.

H2 : There is significant association between customer intension and usefulness of online mobile banking to the customer.

H3 : There is significant association between customer behaviour and ease of operation and cost effectiveness of online mobile banking channel.

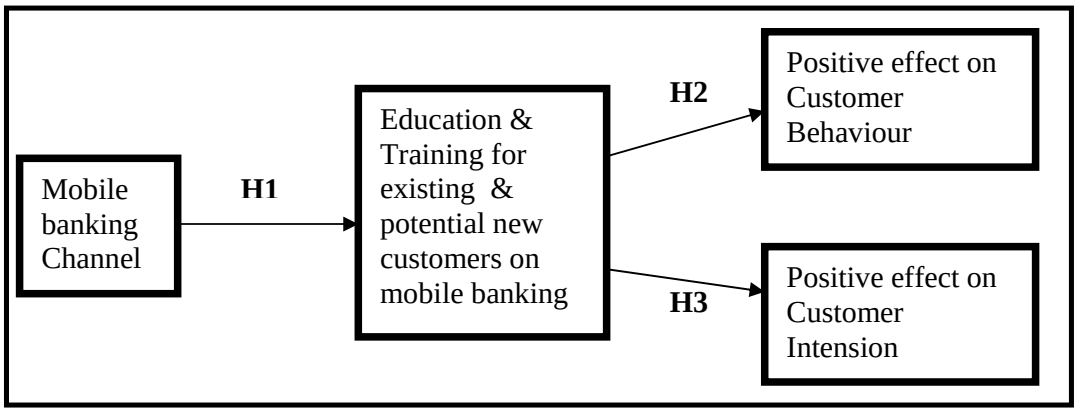


Fig. 3.10 : Customer study model

The study is conducted in Bangalore which is known the Silicon Valley of India, houses the population who possess high technological quotient, computer and Internet knowledge, and mobile phone usage knowledge for personal communication. The study mainly focuses on collecting primary data from the selected samples (N=250) from Bangalore and (N=150) from Mangalore using the Questionnaire 2 given in Appendix - 1. The probability and non-probability sampling techniques viz. quota sampling (Mobile phone Users and Bank account holders), Cluster sampling (Bangalore and Mangalore), Stratified Random sampling (selected respondents represent different demographics of the population), Judgment sampling are used to provide fairly accurate outcomes for the study.

3.9. Factors affecting the Customers Acceptance of Mobile Banking

The information obtained in this study can assist banks in determining a strategic direction to take with regard to enhance their mobile banking activities. The retail banking customer has very different needs than the corporate customer. The purpose of the qualitative phase is to gain insight into how consumers value and evaluate the mobile banking as a channel of financial transaction and as a source of banking information. The qualitative data collection instrument chosen is the focus group.

Four focus groups, each comprising of six young adults, are conducted. Group 1 comprised of 3 males/3 females, Group 2 consists of 2 males/4 females, and Group 3 consists of 4 males/2 females. Participants are chosen from the population of Business studies students at Srinivas Institute of Management Studies, Mangalore. A model on Factors affecting the acceptance of mobile banking services for actual use, is developed through Focus group interaction as shown in fig. 3.11.

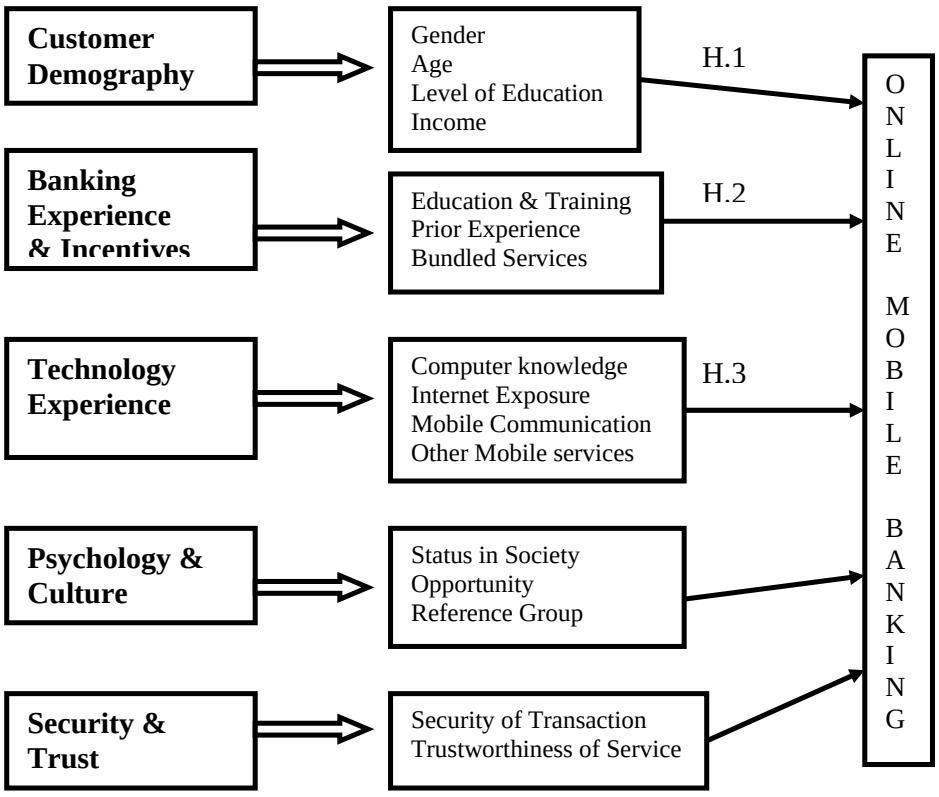


Figure 3.11 : Factors affecting the Actual Usage : Conceptual Model of Online Mobile Banking used in this Study.

3.9.1. Empirical Test on the Factors Affecting the Actual Usage

To support the model shown in Fig. 3.11, we have developed certain hypotheses and to test the hypotheses and the model, we have carried out a customer's survey using the Questionnaire-3 given in Appendix – 1.

1. Customers' Demographics

The effect of demographics has been found to be a significant determinant of behavior in various studies concerning electronic banking. High income, relatively young age, and good education have been found explaining the acceptance of electronic banking. In addition, a typical electronic banking user has been identified as a high involvement person belonging to the upper middle class or in parts as a member of the career-orientated upper middle class (Roemer and Buhl, 1996; Jayawardhena and Foley, 2000).

The technology acceptance literature points a strong relationship between age and the acceptance of new technologies, [e.g. Gattiker, (1992); Harrison et al., (1992)]. Older customers are found to have problems with new technologies, and hence, are expected to have negative attitudes towards innovations. Trocchia and Janda (2000), for instance, indicate that many older consumers possess more negative intention to change. However, they argue that person's overall perception of technology affects more than the age.

Gender has also been suggested as a factor of mobile banking adoption. Some studies argue that the mobile usage and internet is male dominated. In Finland the latest research counts that 45 percent of the Internet users are female (Statistics Finland, 2000). We are interested in examining whether demographic variables such as age, education, profession, and household income have an influence on mobile banking usage. The adoption and use of mobile banking channel depends on the personal profile of the users' Gender, age, level of education, Household Income and social class.

Hence we hypothesize that :

H1 : There is significant association between adoption and usage of mobile banking channel and personal profile of the users.

2. Personal banking experience and Incentives

Consumer behavior research has also studied the relationship between a person's experiences onto his/her behavior. In general, beliefs and attitudes are largely the result of personal experiences about a given object (e.g. Fishbein and Ajzen, 1975,

p.10). The satisfied bank customers have more positive perceptions also about mobile banking and, thus, are more likely to move online. A dissatisfied branch office customer may also try mobile banking, but only a satisfied customers adopt mobile banking as their regular bill payment mode. By providing education about new channel and providing training about the usage of new channel will certainly decreases the fear of using new channel. Once the customers are exposed to new channel, they will be comfortable to use it and based on simplicity, usefulness and comparative cost efficiency they will be stimulated by new channel and adapt it for their regular transactions. Similarly, if the new channel has bundled services and service content compared to traditional branch banking then it has better attraction. Based on the observation four propositions are developed.

1. People already using traditional banking are potential customers for new channel.
2. Proper training and education from the bank increases the usage of new channel.
3. Potential customers who are allowed to experiment an innovation will face more comfortable with it and are more likely to adapt it.
4. Bundled services and Increasing the service content through new channel have positive effect.

Hence by proper training and education by the banks, Customers of traditional banking can be converted into online mobile banking customers.

Based on these propositions, we hypothesize that :

H2 : There is significant association between adoption and usage of mobile banking channel and the banking experience of the customers.

3. Technology experience

Prior technology experience, especially prior computer experience or mobile communication experience and/or internet usage experience have been found to impact consumers' beliefs about related systems and information technology (DeLone, 1988; Igbaria et al., 1995). Au et al. (2000) extended this idea to the observation that the more experience consumer has about technology, the better will he/she understand new technologies and their ramifications. Thus, consumer's familiarity with technologies in general facilitates his/her appreciation of the potential added value which is inherent in a technology. Trocchia and Janda (2000)

introduce this logic to the realm of the Internet by arguing that consumers' adoption rate of the Internet is associated with their past experiences with the technologies. Non-users' negative experiences are suggested to have a great impact on their perceptions about the Internet. This logic is in line with the classic attitude theories of Fishbein and Ajzen (1975, p.14), who claim that the more positive the person's past experience about an object is, the more positive beliefs he will hold about it. As a result, the positive beliefs create positive perceptions. It should be highlighted that some prior experience with mobile device has a positive influence on the adoption of new banking channels, since the consumer acquires skill in usage and communication using such device (Dholakia and Uusitalo 2002; Korgankoar and Moschis 1987). Hirschman (1980) noted that understanding of the characteristics and operation of a new device is needed before it can be adopted. In the context of M-banking, it is to be expected that consumers with more experience of usage of mobile devices should be potential candidates for adopting online mobile banking. Based on the observation four propositions are developed.

1. Negative attitude of customer to use new technology based services prohibits the new channel usage.

2. Fear of fraud and mis-transaction decreases customer attitude of usage of new financial channels.

3. Lack of guidance in using mobile devices for financial transactions has negative affect.

4. Prior Mobile phone usage experience has positive influence on adoption of online Mobile banking channel.

Prior Mobile phone usage experience has positive influence on adoption of online Mobile banking channel.

Based on these propositions, we hypothesize that :

H3 : There is significant association between adoption and usage of mobile banking channel and the technology experience of the users like mobile phone and internet experience.

4. Psychology and Culture

Traditionally, all commerce has depended on trust, and that includes which is seen as complementary to traditional commerce. Although trust is of major importance and most people want it, they are wary of using the Internet technologies available for secure e-commerce transactions. Consumer behavior literature also suggests that reference groups, such as a social reference group, may impact on person's behavior (Fishbein, 1967, p.477; Fishbein and Ajzen, 1975, p.495). Two competing influences have been identified on the relationship between subjective norm and behavior: conformity and dissension (Snyder and Fromkin, 1977; Baumeister, 1982; Guerin, 1986; Simonson and Nowlis, 2000). Conformity is the result of people trying to conform to a subjective norm, thereby avoiding criticism and rejection.

The research literature shows support for the role of culture on behavioral intention. For example, Mathieson (1991) shows that behavioral control influences intention to use an information system. A positive relationship between control and intentions is also found in Taylor and Todd (1995), who examine users in a computer resources center, and Pavlou (2002) in e-commerce behavior. Overall, there is strong theoretical and empirical support for the role of perceived behavioral control on behavioral intentions. Applied to the context of online transaction intentions, behavioral control should have a positive effect on such intentions since consumers would not have fears of fraud in online financial transactions. In sum, perceived behavioral control is likely to reduce barriers to the adoption of m-business (Pavlou, 2002).

Cultural differences between India and other developed countries are also relevant to perceived behavior control. These qualities are translated into the long-term orientation dimension, which also includes personal steadiness and stability. A long-term orientation means that people feel free to put off making a decision until they are comfortable with its ramifications. In essence, this gives such people more control over their actions. In contrast to India, the developed countries ranks low on long-term orientation. Therefore, we would expect Indians to demand more control of their online financial transactions through mobile devices than other developed country customers, and rely on this control in their online transaction behavior.

The research literature shows support for the role of subjective norm on behavioral intentions. For example, in a cross-sectional comparison of pre- and post-adoption of information technology use, Karahanna et al. (1999) found that top management, supervisors, and peers significantly influenced adoption intention for both potential technology adopters and actual users. In addition, they found that MIS staff and friends are important influences for potential adopters, while computer specialists played a significant role for actual users. It is expected that subjective norm will have an influence on the intentions of customers to engage in online mobile financial transactions.

Subjective norm can be decomposed into (a) societal norm and (b) social influence. Societal norm refers to adhering to the larger societal fashion (large circle of influence), while social influence reflects adhering to opinions from family, friends, and peers (small circle of influence). India and the other developed countries share important cultural differences with respect to societal norm and social influence, as described below.

The consumption of banking services may be influenced by several reference groups of the customer such as the personnel of the bank and traditional ones such as friends and family. We hypothesize that *reference groups do influence the adoption of mobile banking*, and modify the hypothesis with the statement that even if mobile banking usage may be initiated by education and training provided by banking personnel, the continuance of the use of mobile banking depends more on other factors, mainly reference groups and customer's perception about technology in general. Based on the observation four propositions are developed.

1. Use of new electronic channel for financial transaction improves the customer status in the society.
2. More the bundled services provided by the banks, more the channel is used.
3. Lack of opportunities (like service area, mobile device etc) to use new channel will decrease the usage of such service channel.
4. Reference groups influence positively.

Human nature of testing new innovation, reference group influence, and status in the society, has positive effect in the usage of new electronic channel.

Based on these propositions, we hypothesize that :

H4 : There is significant association between Human nature of testing new innovation, reference group influence and status in the society and the usage of new online mobile banking channel.

5. Security challenges and Trust

One of the most significant challenges of online mobile banking has been consumers' security concerns about mobile banking. Security has been identified as one of the biggest barriers for the uptake of online banking [see e.g. Sathye, (1999). Mattila's (2001, p.129-133)] empirical study points out that Finnish Internet banking customers do not pay excessive attention to security concerns. For both developed and developing countries, consumers are of the perception that deception and risk of fraud and loss constituted one of the most important causes of the secure online financial transactions. Security and trustworthiness of usage of service is most important factor and has positive effect while switching to new service channel.

H5 : There is significant association between Security and trustworthiness of the usage of service and user attitude to switching to new online banking channel.

3.9.2. Data Collection, Processing and Tabulation :

The methodological approach in this study is descriptive, because we attempt to identify and explain variables that exist in a given situation and to describe the relationship that exists between these variables in order to provide a picture of a particular phenomenon, but not to ferret out cause-effect relationships. The phenomenon to be studied, mobile banking, is comparatively new in the field of academic research and thereby study aims at increasing the understanding of the current consumer behavior pattern in electronic services era. The data collection based on the distributed questionnaire from existing and potential customers in an advanced city (Bangalore) and in a less advanced city (Mangalore) who have both conventional bank account and a mobile phone. A sample size of 400 has considered

(250 from advanced city and 150 from less-advanced city). The empirical test on factors affecting the customers view on mobile banking and based on their actual experience are studied through Questionnaire 3 given in Appendix-1.

Respondents are asked to complete a five point Likert scale on each question or proposition. Scales to measure each of the beliefs and attitudes are developed based on existing scales discussed in relevant methodological literature and in surveys in the research area (e.g. Fishbein and Ajzen 1975). This data forms the basis of the whole research. According to the chosen methodological research approach the quantitative data is analyzed using statistical methods such as mean, standard deviation, Chi-square, and ANOVA by SPSS-program. To identify a hierarchy of importance concerning the critical factors influencing the adoption of mobile banking services, the appropriate statistical tool is used based on the ranking of the scores.

Response indicating Strongly Agree carries score 5 and Strongly disagree carries score 1. The same thing is done in respect of each and every statement in the questionnaire. The response of 400 respondents is converted into percentage and the score for each statement under 5 categories are calculated. The total score for each statement by all the respondents is calculated by adding the scores. This would then measure the respondent's favorableness towards a given point of view.

100 x 5 = 500 Most favorable response possible

100 x 4 = 400 Favorable response

100 x 3 = 300 Neutral attitude

100 x 2 = 200 Unfavorable response

100 x 1 = 100 Most unfavorable response possible

The scores for any statement would fall between 100 and 500. If the score happens to be above 300, it shows favorable opinion to the given point of view, a score of below 300 would mean unfavorable opinion and a score of exactly 300 would be suggestive of a neutral attitude. Hence in this study, if the average score is more than 300, the corresponding hypothesis is considered as accepted.

3. 10. Conclusion

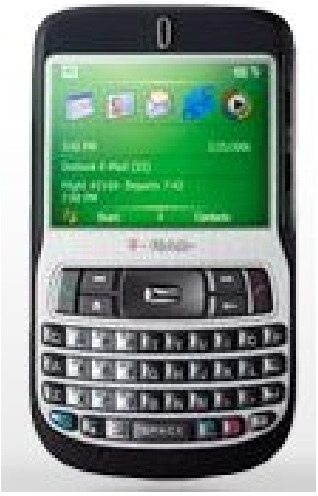
To explore the bankers perspectives to introduce mobile banking as new distribution channel and Customers perspectives on mobile banking adoption, exploratory research design is identified as appropriate. A quantitative study on Banker's perspective of mobile banking adoption for improving operational effectiveness and service differentiation, and the Customer's perspective on acceptance of mobile banking service using mobile devices is presented. The chapter contains an elaborative discussion on responsibility of banks while deploying online banking as new distribution channel through our new "modified customer equity approach model". Through this model another new model for evaluation of banks strategy for online banking is developed in terms of new channel promotion strategy, Fee and incentives strategy, registration and service strategy and a comparative study is made on adoption of such strategy by Indian banks. The strategy of adapting information technology and hence online banking services by Indian banks is studied by applying "Diniz Model" in terms of informational, transactional and customer relationship functional areas. Various determinants of online mobile banking are identified through Focus group interaction, under the headings : Organizational Focused Issues, Customer Focused Issues, Competitors Focused Issues, Operational Focused Issues, Technological Focused Issues, Strategic Focused Issues and Environmental/society Focused Issues. Based on these constructs, a model on "Determinants of online mobile banking" is developed. Finally a quantitative study on factors determining the adoption of online mobile banking as new distribution channel by financial service providers is carried out through this new developed model. Seven hypotheses are developed for 28 propositions and the hypotheses are tested through questionnaire survey and empirical analysis by collecting data from 100 bank Managers of public sector, private sector and foreign sector banks located in Bangalore and Mangalore of Karnataka State.

To study the customer's perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services, two models are described in the present study through focus group interaction. The first model is

"Customer acceptance model through Education and Training", and the second model is "conceptual model on customer adoption of online mobile banking". In order to explain the customer behavior of adapting mobile banking channel, we have proposed a new model called "Technology Acceptance based on Theory of Customer Stimulation by Education and Training for usage (TCSET). The new model is based on four constructs – perceived usefulness, perceived assurance, perceived ease of use, and perceived cost. These constructs stimulates the customers intention and behavior control to use mobile banking services. The various issues under, customer behavior and intention to use mobile banking transactions, like attitude, trust, convenience, perception, loyalty, privacy, security and comfort issues are discussed based on the developed model. Hypotheses are developed on identified constructs and issues under customer behavior and intention through Focus group interaction. The empirical test on the developed model is performed by testing the hypotheses by means of a questionnaire survey. In order to select the samples, systematic random sampling method is adopted. The total number of mobile banking service users is collected from the banks and then the sample is generated. Based on the investigator's pilot study, observations, both Bangalore and Mangalore are identified on potential grounds for mobile banking service. The total number of respondents (customers) is 400, of which, 250 respondents are from Bangalore and 150 respondents are from Mangalore. The questionnaire focused on such important issues as customers' attitudes and reactions to new technology, customers' attitudes to the traditional retail banking distribution channel, customers' perceptions of online and mobile bank product attributes, customers' expectations and major concerns of online and mobile banking, psychological factors, and demographic factors. Respondents are asked to complete a five point Likert scale on each question or proposition. This data forms the basis of the whole research. According to the chosen methodological research approach the quantitative data are analyzed using statistical methods such as mean, and standard deviation by SPSS-program.

CHAPTER FOUR

Results and Discussion on Bankers and Customers Perspective on Mobile Banking Adoption



CONTENTS **PAGE No.**

4.1. Introduction

The results of the study on Indian bankers perspectives to introduce mobile banking as new distribution channel and evaluation of banks strategy to provide and to maintain this new channel, Factors determining the adoption of mobile banking by financial services institutions, Customers perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services, and the target customers for mobile banking based on the demographics characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security & trust, psychology & culture, prior personal banking experience, incentives from banks etc. are discussed in this chapter.

The results of empirical investigation on determinants of mobile banking channel as new distribution channel are discussed under various issues viz., organizational issues, strategic issues, operational issues, customer related issues, technological issues, competitors focused issues, and society focused issues. It is found that organizational issues like : Willingness to cannibalize, Channel specific investments, Infrastructure investment, Support from senior management, Employees view on new channel, Organizational size, Cost savings, Loyal customer; Operational Issues like : Easy operation, Boundary-less operation, Improved efficiency; Customer Focused Issues like : Predicted advantages for the customers, Value for customer time, Value for customers money, Additional support for high profit customers, Reduced/enhanced customer relationship, customer satisfaction; Competitors Focused Issues like : External competition, Better service, Bundled services; Technology Focused Issues like: Technological innovations, Early adapting advantage, Technology penetration. Lower operating cost, Outsourcing, Possibility of using e-cash; Strategic Focused Issues like : Future market focus, Challenge seeking top management, Additional & Bundled services, Profit generation, Organizational strategy, Customer education and training; and Society Focused Issues like : Dissemination of information to the community, better service for the community; have substantial effect on the decision of providing online mobile

banking as a new distribution channel by Indian banks. According to the chosen methodological research approach the quantitative data are analyzed using statistical methods such as mean, standard deviation, correlation coefficients, by SPSS-program.

The important factors which affect the customer behavior and intension and their decision of customer on adaption of mobile banking for his/her day to day financial transaction is investigated. The TCSET model developed through focus group interaction is further verified and tested by this empirical study and statistical analysis.

In the second part of the customer's perspective study, a conceptual model on customer acceptance of new distribution channel is tested to gain insight into how customers value and evaluate the mobile banking as a channel of financial transaction and as a source of banking information. The model is tested by formulating suitable hypotheses and through a questionnaire survey conducted at two places in Karnataka state, the relationship in the variables are studies and analyzed through statistical techniques like mean, standard deviation, and Chi square.

4. 2. Results of Empirical Study on Determinants of Mobile Banking

The impact of mobile banking on the organizational, competitors, customer, technological, strategic, operational, and society focused aspects of banking is assessed. Questionnaire items pertaining to these issues were identified and grouped. Figure 4.1 to 4.5 shows the percentage/number of respondents, the type of the banks they are working, the availability of mobile banking facility in their banks, respondents' perspective on mobile banking benefits and respondents' view on mobile banking limitations respectively. The observed frequencies, expected frequencies, standard deviations, and the result of t test for the variables are shown in Tables 4.1 to 4.3. Using Likert scale, the scores of supporting statements of organizational, competitors, customer, technological, strategic, operational, and

society focused issues are measured and the total score for each statement by all the respondents are calculated and average score for each hypothesis is obtained. The hypothesis is accepted/rejected based on the value of average score (accepted if it is more than 300 and rejected if it is less than 300).

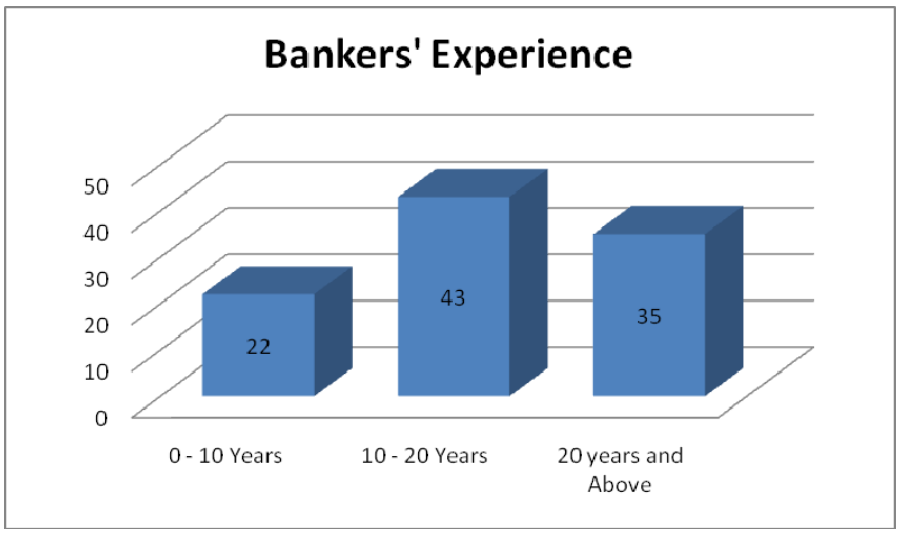


Figure 4.1 : Number of respondents with different experience range.

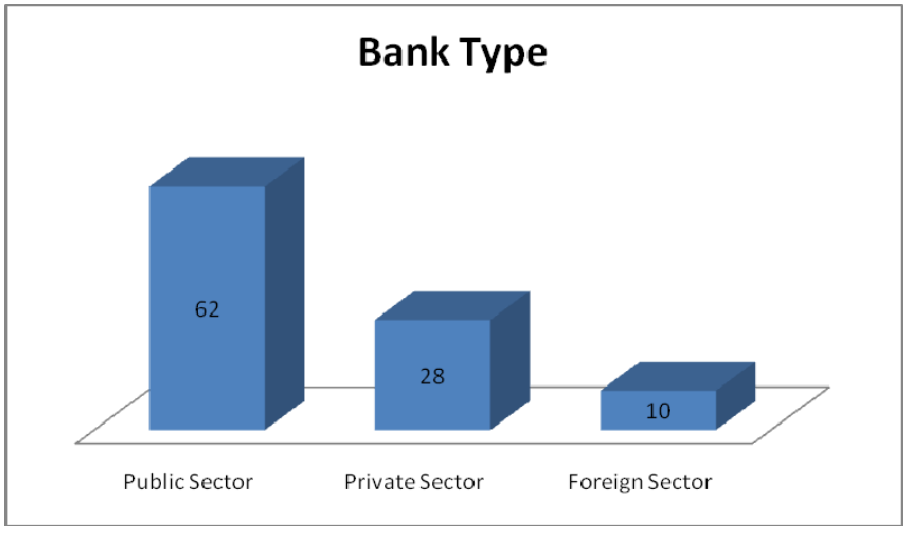


Figure 4.2 : The respondents' Bank type.

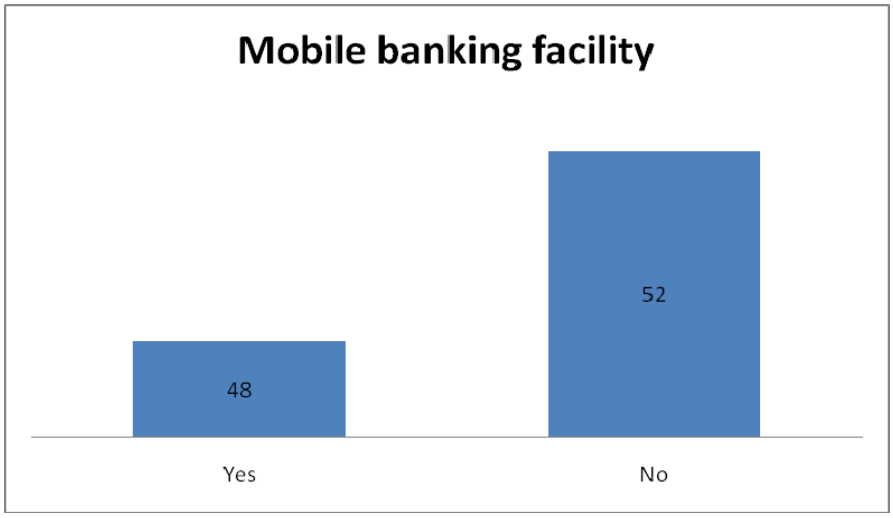


Figure 4.3 : Mobile banking facility provided by respondents banks.

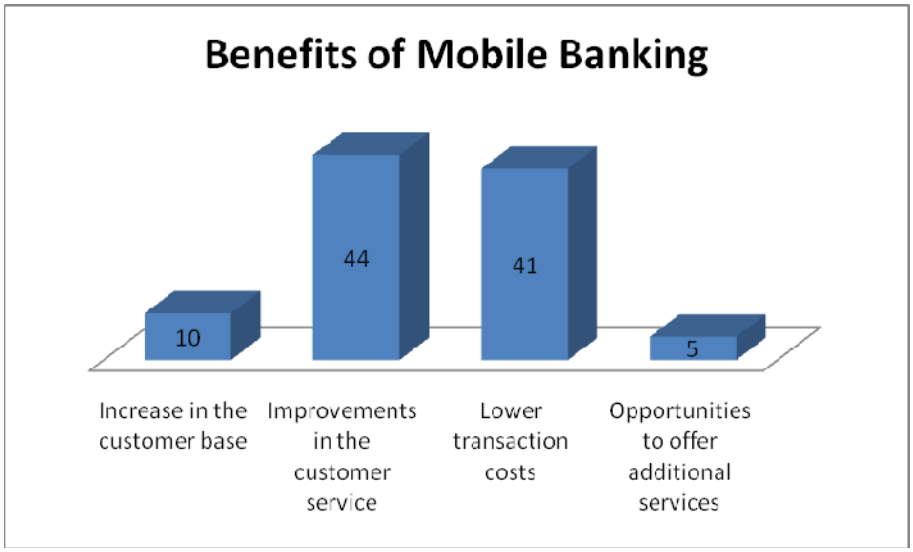


Figure 4.4 : Respondents and identified benefits.

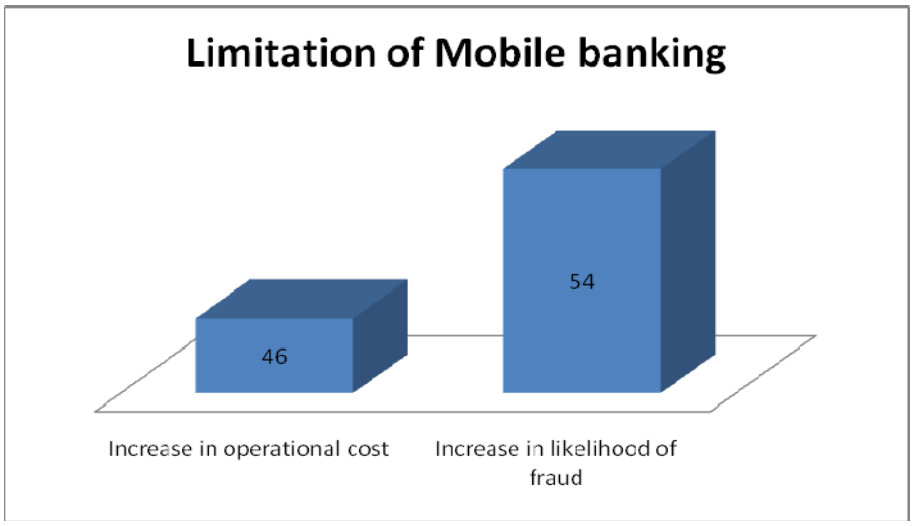


Figure 4.5 : Respondents and identified Limitations.

Table 4.1 : Observed frequencies of variables in bankers perspective study :

Table 4.1.(a) : Frequency of Bankers Experience

	Observed N	Expected N	Residual
Less than 10 years	22	33.3	-11.3
10 - 20 years	43	33.3	9.7
More than 20 years	35	33.3	1.7
Total	100		

Table 4.1.(b) : Frequency of Bank Type

	Observed N	Expected N	Residual
Public	62	33.3	28.7
Private	28	33.3	-5.3
Foreign	10	33.3	-23.3
Total	100		

Table 4.1.(c) : Frequency of Mobile Banking

	Observed N	Expected N	Residual
Yes	48	50.0	-2.0
No	52	50.0	2.0
Total	100		

Table 4.1.(d) : Frequency of Benefit of mobile banking channel

	Observed N	Expected N	Residual
Increase in the customer base	10	25.0	-15.0
Improvements in the customer service	44	25.0	19.0
Lower transaction costs	41	25.0	16.0
Opportunities to offer additional services	5	25.0	-20.0
Total	100		

Table 4.1.(e) : Frequency of Limitation of Mobile banking channel

	Observed N	Expected N	Residual
Increase in operational cost	46	50.0	-4.0
Increase in likelihood of fraud	54	50.0	4.0
Total	100		

Table 4.2 : Standard deviation

	N	Mean	Std. Deviation	Std. Error Mean
Bankers Experience	100	2.13	.747	.075
Bank Type	100	1.48	.674	.067
Mobile Banking	100	1.52	.502	.050
Benefit of mobile banking channel	100	2.41	.740	.074
Limitation of Mobile banking channel	100	1.54	.501	.050

Table 4.3 : Results of t Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Bankers Experience	28.497	99	.000	2.130	1.98	2.28
Bank Type	21.962	99	.000	1.480	1.35	1.61
Mobile Banking	30.272	99	.000	1.520	1.42	1.62
Benefit of mobile banking channel	32.574	99	.000	2.410	2.26	2.56
Limitation of Mobile banking channel	30.744	99	.000	1.540	1.44	1.64

The scores and the results of organizational issues are given in Table 4.4 and Table 4.5 respectively. The scores and the results of empirical study of operational issues are given in Table 4.6 and Table 4.7 respectively. Similarly the scores and the results of customer focused issues, competitors focused issues, technology focused issues, strategic focused issues, and society focused issues are given between Table 4.8 and Table 4.17 respectively. Based on the average score on a given issue, the hypothesis is accepted/rejected.

Table 4.4. Scores on empirical study of Organization Focused Issues :

Statements	Strongly agree (per	Agree (per cent	Neither agree or disagree	Disagree (per cent and	Strongly Disagree (per cent

	cent and Score)	and Score)		Score)	and Score)
1. Decision on going for new distribution channels like online mobile banking requires willingness to cannibalize.	46 230	35 140	10 30	07 14	02 02
2. Decision on going for new distribution channels like online mobile banking requires Channel specific infrastructural investments.	49 245	33 132	12 36	04 08	02 02
3. Decision on going for new distribution channels like online mobile banking depends on organizational infrastructure Investment.	26 130	38 152	14 42	12 24	10 10
4. Decision on going for new distribution channels like online mobile banking requires support from senior management.	38 190	37 148	11 33	08 16	06 06
5. Decision on going for new distribution channels like online mobile banking requires employees view on new channel.	15% 75	18 72	14 42	24 48	29 29
6. Decision on going for new distribution channels like online mobile banking depends on organizational size.	12 60	17 68	10 30	27 54	31 31
7. Decision on going for new distribution channels should be a win-win situation for both banker and the customers.	41% 205	34 136	12 36	07 14	06 6
8. Decision on going for new distribution channels like online mobile banking depends on organizational view on loyal customers.	22% 110	32 128	15 45	13 26	18 18
9. Decision to go for online banking services depends on the number of branches.	11 55	12 48	11 33	35 70	31 31
10. Decision on going for new distribution channels like online mobile banking depends on organizational view on cost saving.	18 90	36 144	16 48	18 36	12 12

Table 4.5 : Results of Empirical study on Organizational Issues

Decision on going for mobile banking as new distribution channels

	Statement	Score	Response
1	Willingness to cannibalize	416	Most favorable
2	Channel specific infrastructural investments	423	Most favorable
3	Organizational infrastructure Investment	358	Favorable
4	Support from senior management	393	Favorable
5	Employees view on new channel	266	Unfavorable
6	Organizational size	243	Unfavorable
7	Win-win situation for both banker and the customers	397	Favorable
8	Organizational view on loyal customers	327	Favorable
9	Number of branches	237	Unfavorable
10	Organizational view on cost saving	330	Favorable
	Average score	**339**	**H1 is accepted**

Table 4.6 : Scores of empirical study on Operational Issues :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly disagree (per cent and Score)
1. Decision on going for new distribution channels like online mobile banking depends on easy operation of the system.	31 155	39 156	12 36	12 24	06 06
2. Mobile banking facilitates boundary less operations and widens the network.	42 210	39 156	08 24	06 12	05 5
3. Decision on going for new distribution channels like online mobile banking improves efficiency of banking system.	29% 145	34 136	18 54	13 26	06 06
4. Larger the revenue of the bank, more likely it is an innovator of new channel.	18 90	24 96	26 78	18 36	1 4 14
5. Introduction of mobile banking channel increases the security threat to the banks.	12 60	14 56	24 72	32 64	18 18
6. Introduction of mobile banking channel decreases the cost of operation and hence bank can offer higher interest rate for deposits.	23% 115	22 88	15 45	21 42	19 19

Table 4.7 : Results of Empirical study on Operational Issues :
Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Easy operation of the system	377	Favorable
2	Boundary less operations and widens the network	407	Most favorable
3	Improves efficiency of banking system	367	Favorable
4	It is innovator of new channel	314	Favorable
5	Increases the security threat to the banks	270	Unfavorable
6	Bank can offer higher interest rate for deposits	309	Favorable
	Average score	**340.6**	**H2 is accepted**

Table 4.8 : Scores of empirical study on Customer Focused Issues :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly disagree (per cent and Score)
1. Decision on going for new distribution channels like online mobile banking depends on banks view on perceived advantages to its customers.	14 70	29 116	30 90	14 28	13 13
2. Decision on new distribution channel depends upon customers' willingness to adopt it.	20 100	36 144	22 66	15 30	07 07
3. Decision on going for new distribution channels like online mobile banking depends on banks view on value of customer time.	20 100	34 136	22 66	14 28	08 08
4. Decision on going for new distribution channels like online mobile banking depends on banks view on value for customer money.	28 140	21 84	26 78	18 36	07 07
5. Decision on going for new distribution channels like online mobile banking depends on banks view on support for high profit customers.	16 80	23 92	40 120	13 26	08 08

6. Introduction of new channels like mobile banking supports to enhance the customer base.	22 110	35 140	14 42	13 26	06 06
7. New distribution channels like mobile banking increases customers' loyalty.	8 40	18 72	12 36	32 64	30 30
8. Decision on going for new distribution channels like online mobile banking decreases customer-banker relationship.	30 150	27 108	14 42	17 34	12 12
9. New distribution channels like online mobile banking reduce frequency of customer to visit banks.	35 175	40 160	10 30	08 16	7 7
10. Decision on going for new distribution channels like online mobile banking depends on banks view on customer satisfaction.	14 70	29 116	30 90	20 40	07 07

Table 4.9 : Results of Empirical study on Customer Focused Issues :

Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Banks view on perceived advantages to its customers	317	Favorable
2	Customers' willingness to adopt it	347	Favorable
3	Banks view on value of customer time	338	Favorable
4	Banks view on value for customer money	345	Favorable
5	Banks view on support for high profit customers	326	Favorable
6	Supports to enhance the customer base	324	Favorable
7	Increases customers' loyalty	242	Unfavorable
8	Mobile banking decreases customer-banker relationship	346	Favorable
9	Reduce frequency of customer to visit banks	388	Favorable
10	Depends on banks view on customer satisfaction	323	Favorable
	Average score	**329.6**	**H3 is accepted**

Table 4.10 : Scores of empirical study on Competitors Focused Issues :

Statements	Strongly agree (Per cent and	Agree (Per cent and	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent &

	Score)	Score)			Score)
1. Decision on going for new distribution channels like online mobile banking depends on banks view on facing external competition.	32 160	40 160	12 36	09 18	07 7
2. Decision on going for new distribution channels like online mobile banking depends on banks view on Better service.	26 130	28 112	26 78	12 24	08 08
3. Decision on going for new distribution channels depends on competitors plans for adopting mobile technology.	22 110	36 144	12 36	14 28	6 06
4. Decision on going for new distribution channels like online mobile banking depends on banks view on Bundled services.	18 90	26 104	25 75	18 36	13 13

Table 4.11 : Results of Empirical study on Competitors Focused Issues :

Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Banks view on facing external competition	381	Favorable
2	Banks view on Better service	352	Favorable
3	Competitors plans for adopting mobile technology	324	Favorable
4	Banks view on Bundled services.	318	Favorable
	Average score	**343.75**	**H4 is accepted**

Table 4.12 : Scores of empirical study on Technology Focused Issues :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly Disagree (Per cent and Score)
1. Decision on going for new distribution channels like online mobile banking depends on banks vision on technology innovations.	34 170	29 116	14 42	18 36	15 15
2. Decision on going for new distribution channels like online mobile banking mainly depends on availability of resources in the form of technically qualified man	21 105	40 160	12 36	16 32	11 11

power.					
3. Decision on going for new distribution channels like online mobile banking mainly depends on banks view on early adapting advantage.	17 85	22 88	16 48	24 48	21 21
4. Decision on going for new distribution channels like online mobile banking mainly depends on technology penetration in the bank branches.	30 150	37 148	12 36	12 24	09 09
5. Decision on going for new distribution channels like online mobile banking depends on growth of mobile phone penetration in the country.	13 65	18 72	34 102	26 52	09 9
6. Decision on going for new distribution channels like online mobile banking depends on technology penetration in that bank and possibility of using e-cash.	32 160	34 136	8 24	14 28	12 12

Table 4.13 : Results of Empirical study on Technology Focused Issues :
Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Banks vision on technology innovations	379	Favorable
2	Availability of resources in the form of technically qualified man power	344	Favorable
3	Banks view on early adapting advantage	290	Unfavorable
4	Technology penetration in the bank branches	367	Favorable
5	Growth of mobile phone penetration in the country	300	Neutral Attitude
6	Technology penetration in that bank and possibility of using e-cash	360	Favorable
	Average score	**340**	**H5 is accepted**

Table 4.14 : Scores of empirical study on Strategic Focused Issues :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. Decision on going for new distribution channels like online	34	31	11	13	11

mobile banking depends on bank's ability to foresee the future of banking.	170	124	33	26	11
2. Decision on going for new distribution channels like online mobile banking mainly depends on the availability of challenge seeking top management.	27 135	32 128	18 54	20 40	3 3
3. Decision on going for new distribution channels like online mobile banking depends on banks strategy on Additional & Bundled services.	19 95	27 108	21 63	14 28	19 19
4. Decision on going for new distribution channels like online mobile banking depends on banks strategy on profit generation.	11 55	18 72	29 87	23 46	19 19
5. Cost saving strategy of the bank would stimulate the bank to adapt the mobile banking channel.	24 120	26 104	12 36	20 40	18 18
6. Success for new distribution channels like online mobile banking depends on banks strategy on Customer education and training.	33 165	31 124	12 36	11 22	13 13

Table 4.15 : Results of Empirical study on Strategic Focused Issues :
Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Bank's ability to foresee the future of banking	364	Favorable
2	The availability of challenge seeking top management.	360	Favorable
3	Banks strategy on Additional & Bundled services	313	Favorable
4	Banks strategy on profit generation	279	Unfavorable
5	Cost saving strategy of the bank would stimulate the bank to adapt the mobile banking channel	318	Favorable
6	Customer education and training	360	Favorable
	Average score	**332.33**	**H6 is accepted**

Table 4.16 : Scores of empirical study on Society Focused Issues :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. Decision on going for new distribution channels like online mobile banking depends on banks view on dissemination of information to the community.	09 45	14 56	32 96	22 44	23 23
2. Decision on going for new distribution channels like online mobile banking mainly depends on the banks intension to provide better service to the community.	17 85	22 88	28 84	19 38	14 14
3. Decision on going for new distribution channels like online mobile banking depends on banks view on social status of the bank in the society.	21 105	33 132	16 48	18 36	12 12

Table 4.17 : Results of Empirical study on Society Focused Issues :
Decision on going for mobile banking as new distribution channels

S. N.	Statement	Score	Response
1	Dissemination of information to the community	264	Unfavorable
2	The banks intension to provide better service to the community	309	Favorable
3	Banks view on social status of the bank in the society	333	Favorable
	Average score	**302**	**H7 is accepted**

4.3. Discussion on Bankers perspective on Determinants of Mobile Banking

Organizational Issues :

Organization Focused Issues like Willingness to cannibalize, Channel specific investments, Infrastructure investment, Support from senior management, Employees view on new channel, Organizational size, Cost savings, and Loyal customer requirement has shown positive effect on decision for adoption of new distribution channel. 81 per cent respondents believe that decision on going for new distribution channels like online mobile banking requires willingness to cannibalize

and 82 per cent respondents argues that such decision requires Channel specific infrastructural investments. 64 per cent respondents supports that such distribution channels need organizational infrastructure Investment and 75 per cent seeks support from senior management. Only 33 per cent respondents believe that employees support on new channel plays important role in new distribution channel decision. It is found that increase in size of organizations in terms of number of branches and in terms of their annual transaction has no significance effect on decision for mobile banking channel. 75 per cent respondents believe that new distribution channels like mobile banking should be a win-win situation for both banker and the customers. 54 per cent respondents agrees that decision on going for new distribution channels like online mobile banking depends on organizational view on retaining loyal customers. Only 23 per cent respondents agrees that decision to go for online banking services depends on the number of branches the bank has in the countries and 54 per cent respondents believes that such a decision supports organizational cost saving.

It is also found that willingness to cannibalize, support from senior management, cost savings, organizational size and loyal customer requirements are driving factors for adoption of mobile banking channel and issues like channel specific investments, infrastructure investment, employee view on new channel are organizational constraints for adoption of mobile banking channel.

Strategic Issues

Strategic Focused Issues like Future market focus, Challenge seeking top management, Additional & Bundled services, Profit generation, Organizational strategy, and Customer education and training have shown positive effect on decision for adoption of new distribution channel. 65 per cent respondents feel that decision on going for new distribution channels like online mobile banking depends on bank's ability to foresee the future of banking. 59 per cent respondents believe that decision on going for new distribution channels like online mobile banking mainly depends on the availability of challenge seeking top management. Only 46

per cent respondents feel that banks strategy on Additional & Bundled services affects the decision for adopting mobile banking channel. Only 29per cent respondents argues that decision on going for new distribution channels like online mobile banking depends on banks strategy on profit generation. 51 per cent respondents suggested that Cost saving strategy of the bank would stimulate the bank to adapt the mobile banking channel. 64 per cent respondents believes that success of new distribution channels like online mobile banking depends on banks strategy on Customer education and training. 62 per cent of the respondents reported that large banks prefer their customers to use mobile banking. This affinity is reasonable in light of the fact that, for the bank, the cost of a customer transaction on the Internet or mobile network is significantly lower than the cost of the same transaction through an ATM or in person (DiDio, 1998).

It is also found that all the strategic issues like Future market focus, Challenge seeking top management, Additional & Bundled services, and Organizational strategy, are driving forces for adoption of mobile banking distribution channel where as Customer education and training is an issue to attract more customers to such channel.

Operational Issues

Operational Issues like Easy operation, Boundary-less operation, Improved efficiency and improved security have positive effect on decision for adoption of new distribution channel. Slightly more than half (56 per cent) of the banks reported that the benefits of mobile banking outweigh the associated costs. Also, banks reported benefits in the following areas: increases in the customer base (76 per cent), improvements in customer service (58 per cent), lower transaction costs (59 per cent), and opportunities to offer additional services (e.g. insurance, brokerage services, credit card applications) (54 per cent). Clearly, banks offering mobile banking were much more "gung-ho" (as evidenced by significantly higher mean) regarding the advantages of mobile banking compared to their counterparts who do not offer mobile banking. Sixty-six percent agreed that the likelihood of fraud increases with

mobile banking. 70 per cent respondent identified that decision on going for new distribution channels like online mobile banking supports easy operation of the system and 63 per cent believes that it improves efficiency of banking system. 42 per cent respondents felt that larger the revenue of the bank, more likely it is an innovator of new channel. Only 45 per cent respondents felt that mobile banking channel decreases the cost of operation and hence bank can offer higher interest rate for deposits.

Customer-Related Issues

Customer Focused Issues like Predicted advantages for the customers, Value for customer time, Value for customers money, Additional support for high profit customers, Reduced/enhanced customer relationship have shown positive effect on decision for adoption of new distribution channel. The instrument contained several items geared towards assessing bankers view on customer relationship and satisfaction. First, surprisingly only 53 per cent of the banks thought that mobile banking would significantly benefit their customers. However, 75 per cent believed that it would reduce the frequency of customer visits to a physical bank. The percentage of respondents who agreed that mobile banking would lead to a reduction in customer's loyalty and customer- banker relationship were 62 per cent and 57 per cent respectively. These findings seem to contradict the notion advocated by many that mobile banking can create more loyal customers by offering multiple financial services through a bank's web site. One explanation for this could be that mobile banking is still in its nascent stage and its full benefits will take time to materialize. 56 per cent respondents believes that decision on new distribution channel depends upon customers' willingness to adopt it and 54 per cent and 48 per cent respondents believes that decision on going for new distribution channels like online mobile banking depends on banks view on value of customer time and customer money respectively. Only 39 per cent respondents supports the decision on going for new distribution channels like online mobile banking depends on banks view on support for high profit customers. 57 per cent respondents believe that

introduction of new channels like mobile banking supports to enhance the customer base.

It is also found that the customer related issues like Predicted advantages for the customers, Value for customer time, Value for customers money, Additional support for high profit customers, are driving forces for adoption of mobile banking distribution channel where as reduced customer relationship and reduced loyalty are considered as constrains to adopt such a channel.

Technology Considerations

Technology Focused Issues like Technological innovations, Early adapting advantage, Technology penetration and Possibility of using e-cash have positive effect on decision for adoption of new distribution channel. Only a small per cent of banks (20 per cent) agreed that it would be easy to get started in mobile banking indicating that offering banking is not as trivial as some have claimed. In addition, only 18 per cent agreed that maintaining such a system would be easy. Also, 71 per cent noted that such systems are expensive to implement. This problem of developing, implementing, and maintaining mobile banking is further exasperated by the fact that there is a shortage of talented employees in the information technology and specifically in the e-commerce area. Thirty percent of the banks reported difficulties in finding talented individuals to run mobile banking. However, banks not offering mobile banking perceived having more difficulty finding personnel capable of running mobile banking. Furthermore, these banks thought that it would be expensive to launch these services. 63 per cent people believe that decision on going for new distribution channels like online mobile banking depends on banks vision on technology innovations. 61 per cent respondents felt that decision on going for new distribution channels like online mobile banking mainly depends on availability of resources in the form of man power. Only 39 per cent respondents felt that decision on going for new distribution channels like online mobile banking mainly depends on banks view on early adapting advantage. 67 per

cent respondents felt that decision on going for new distribution channels like online mobile banking mainly depends on technology penetration in the bank branches.

It is also found that the technology related issues like Technological innovations, Early adapting advantage, Technology penetration and Possibility of using e-cash are identified driving forces for adoption of mobile banking distribution channel where as shortage of technically qualified man power and difficulty in implementation and maintenance are considered as constrains to adopt such a channel.

Competitors Focused Issues :

Competitors Focused Issues like external competition, better service, bundled services have positive effect on decision for adoption of new distribution channel. 72 per cent respondents felt that decision on going for new distribution channels like online mobile banking depends on banks view on facing external competition. 54 per cent respondents felt that decision on going for new distribution channels like online mobile banking depends on banks view on Better service and 58 per cent respondents believes that decision on going for new distribution channels depends on competitors plans for adopting mobile technology. Only 44 per cent respondents felt that decision on going for new distribution channels like online mobile banking depends on banks view on Bundled services.

Society Focused Issues :

Society Focused Issues like dissemination of information to the community, and better service for the community, general education level in the society, have positive effect on decision for adoption of new distribution channel. Only 33 per cent respondents believed that decision on going for new distribution channels like online mobile banking depends on banks view on dissemination of information to the community and only 49 per cent respondents supported that decision on going for new distribution channels like online mobile banking mainly depends on the banks intension to provide better service to the community. 64 per cent respondents

felt that decision on going for new distribution channels like online mobile banking depends on banks view on social status, general education level of the existing and potential customers in the society.

One of the challenges facing bank management is to develop creative marketing strategies for reluctant mobile banking customers. Management's marketing strategy needs collectively to condition consumer expectations, train and educate consumers, and interact with consumers in a positive, constructive fashion. Further more banks can promote this channel by improving marketing strategies like providing education & training to the existing customers and offer additional insurance covering fraudulent transactions and identity theft. Credit card companies advertise these policies and offers as part of their marketing strategies. It is clear that marketing strategies could substantially improve consumers' overall understanding of their exposure at the usage stage.

Table 4.18 : Ranking of Bankers view on Mobile Banking :

Hypothesis No.	Hypothesis	Score	Rank/Importance
H4	Competitors Focused Issues	343.75	First
H2	Operational Issues	340.6	Second
H5	Technology Focused Issues	340	Third
H1	Organizational Issues	339	Fourth
H6	Strategic Focused Issues	332.3	Fifth
H3	Customer Focused Issues	329.6	Six
H7	Society Focused Issues	302	Seventh

As shown in the table 4.18, the competitors focused issues plays a major role in taking decision to go for mobile banking as new distribution channel. Because of competition in doing business by providing value added services to the customers, banks are so aggressive in improving the services and adopting the technological innovations.

4.4. Results of Customers Perspectives on Mobile banking

4.4.1. Results of Developed TCSET model on m-banking

The results of the empirical study of developed TCSET model are depicted in Table 4.19 to Table 4.26. The scores of supporting statements are measured using Likert's

scale and the total score for each statement by all the respondents are calculated and average score for each hypothesis is obtained. The hypothesis is accepted based on the value of average score (more than 300).

Table 4.19 : Scores of Awareness & training of mobile banking :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly Disagree (per cent and Score)
1. I am not aware of mobile banking services.	62 310	16 64	1 3	7 14	14 14
2. I would use mobile banking if I know how to use such channel.	43 215	41 164	8 24	2 4	6 6
3. I would use mobile banking if it is better than conventional banking.	40 200	42 168	10 30	3 6	4 4
4. I would use mobile banking if I can get better service from the bank.	45 225	39 156	9 27	3 6	4 4
5. I do not use mobile banking due to security threat.	18 90	30 120	11 33	29 58	12 12
6. I can use mobile banking channel only if it is cheaper than traditional banking.	54 270	28 112	7 21	6 12	5 5

Table 4.20 : Results of Awareness & training of mobile banking

S. N.	Statement	Score	Response
1	Not aware of mobile banking services	405	Most favorable
2	Use mobile banking if I know how to use such channel	413	Most favorable
3	Use mobile banking if it is better than conventional banking.	408	Most favorable
4	Use mobile banking if I can get better service from the bank.	418	Most favorable
5	Not use mobile banking due to security threat.	313	Most favorable
6	Use mobile banking channel only if it is cheaper than traditional banking	420	Most favorable
	Average Score	**396**	**H1 is Accepted**

Table 4.21 : Scores of Usefulness of mobile banking :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly disagree (per cent and Score)

1. The ability of Ubiquitous service	37 185	32 128	8 24	14 28	9 9
2. Cost effective banking service	29 145	42 168	9 27	12 24	8 8
3. Time saving in overall banking transactions	38% 190	29 116	10 30	15 30	8 8
4. Opportunity to get better service.	36 180	26 104	14 42	16 32	8 8
5. Status in the society	2 10	18 72	42 126	28 56	9 9
6. Transaction using mobile device is challenging	18 90	25 100	22 66	23 46	12 12
7. Mobile banking transactions are more secured	21 105	24 96	28 84	22 44	5 5
8. Mobile banking transactions are more reliable.	20 100	21 84	41 123	10 20	8 8

Table 4.22 : Results of Usefulness of mobile banking :

S. N.	Statement	Score	Response
1	Ability of Ubiquitous service	374	Favorable
2	Cost effective banking service	372	Favorable
3	Time saving in overall banking transactions	374	Favorable
4	Opportunity to get better service.	366	Favorable
5	Status in the society	273	Unfavorable
6	Transaction using mobile device is challenging	314	Favorable
7	Mobile banking transactions are more secured	334	Favorable
8	Mobile banking transactions are more reliable.	335	Favorable
	Average Score	**343**	**H2 is accepted**

Table 4.23 : Scores of Perceived ease of use of mobile banking :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly disagree (per cent and Score)
1. Availability of mobile banking and mobile networking services	12 60	54 216	18 54	08 16	08 8
2. Ease of switching between new and old models	18 90	25 100	31 93	16 32	10 10
3. Ease of making corrections	16 80	26 104	42 126	12 24	4 4
4. Ease of opening bank accounts	08 40	28 112	34 102	18 36	12 12
5. Ease of deposits and withdrawals	14 70	31 124	34 102	14 28	07 07
6. Ease in requesting for cheque	29	34	24	09	04

books	145	136	72	18	04
7. Ease in funds transfer	08 40	24 96	32 96	18 36	18 18
8. Ease in obtaining value added services	12 60	28 112	24 72	20 40	16 16
9. Ease in knowing the balance of money in the account	48 240	31 124	15 45	04 8	02 2

Table 4.24 : Results of Perceived ease of use of mobile banking :

S. N.	Statement	Score	Response
1	Availability of mobile banking and mobile networking services	354	Favorable
2	Ease of switching between new and old models	325	Favorable
3	Ease of making corrections	338	Favorable
4	Ease of opening bank accounts	302	Favorable
5	Ease of deposits and withdrawals	331	Favorable
6	Ease in requesting for cheque books	375	Favorable
7	Ease in funds transfer	286	Unfavorable
8	Ease in obtaining value added services	300	Neutral
9	Ease in knowing the balance of money in the account	419	Most favorable
	Average Score	**336.6**	**H3 is accepted**

Table 4.25 : Scores of Perceived cost of use of mobile banking :

Statements	Strongly agree (per cent and Score)	Agree (per cent and Score)	Neither agree or disagree	Disagree (per cent and Score)	Strongly disagree (per cent and Score)
1. I will use mobile banking only if the effective cost of mobile device is low.	42 210	21 84	08 24	15 30	04 4
2. I will use mobile banking channel if the cost of getting service is low	52 260	21 84	08 24	07 14	02 2
3. The cost of mobile service will become low if the bank avoids intermediatories	28 140	35 140	16 48	14 28	7 7
4. I will use mobile banking channel if the cost of financial transaction is low	24 120	22 88	32 96	18 36	04 04
5. I will use mobile banking channel if it has low registration cost	28 140	30 120	20 60	17 34	05 5

6. I will use mobile banking channel if it has zero hidden cost	48 240	36 144	08 24	05 10	03 3

Table 4.26 : Results of Perceived cost of use of mobile banking :

S. N.	Statement	Score	Response
1	Only if the effective cost of mobile device is low	352	Favorable
2	If the cost of getting service is low	384	Favorable
3	The cost of mobile service will become low if the bank avoids intermediatories	363	Favorable
4	If the cost of financial transaction is low	344	Favorable
5	If it has low registration cost	359	Favorable
6	If it has zero hidden cost	421	Most favorable
	Average Score	**370**	**H4 is accepted**

4.4.2. Results on Factors affecting the Actual Usage model

Demographic Factors :

Table 4.27 contains the demographic profile of the respondents used in customers perception study. Figure 4.6 corresponds to the type of banks used by the respondents for their banking account. The figure 4.7 gives an idea on the mobile banking facility provided by these banks and figure 4.8 gives an idea about the usage of mobile banking facility for carrying out banking transactions by the respondents. Figure 4.9 gives an idea about how the respondents who are using mobile banking channel came to know about it. The initial influence on mobile banking usage is shown in Figure 4.10.

The effect of gender on adoption of mobile banking is found to be marginally significant as seen in Fig. 4. 11 (a). Males were slightly more adopted mobile banking than females. The adoption of mobile banking is found to be highest among middle adulthood and lower for younger or older customers [Fig. 4.11 (b)]. The plot on Occupation and m-banking adoption [Fig. 4. 11 (c)] shows that occupation of customers is significantly associated with the usage of m-banking. Fig. 4. 11 (d) is a plot of various education levels of respondents with mobile banking adoption. Fig. 4. 11(e) is a plot of respondents monthly income with m-banking adoption.

Table 4.27 : Demographic profile of the respondents

Demographic characteristics		Frequency	Percentage	Cumulative percentage
Gender :				
	Male	264	66	66
	Female	136	34	100
	Missing	00	00	100
Age :				
	18 - 24	128	32	32
	25- 34	144	36	68
	35 - 49	84	21	89
	50 - 64	32	08	97
	More than 64	12	03	100
	Missing	00	00	100
Occupation :				
	Student	100	25	25
	Employed	164	41	66
	Self Employed	64	19	85
	Others	60	15	100
	Missing	00	00	100
Education :				
	Graduation	144	36	36
	Post Graduation	44	11	47
	Professional	96	24	71
	Others	116	29	100
Household Income :				
	Less than Rs. 5000	12	03	03
	Rs. 5001 – 10,000	32	09	12
	Rs. 10,001 – 15,000	48	12	24
	Rs. 15,001 – 20,000	116	29	53
	Rs. 20,001 – 25,000	88	22	75
	Rs. 25,001 – 30,000	36	09	84
	Rs. 30,001 – 40,000	24	06	90
	Rs. 40,001 – 50,000	24	06	96
	Above Rs. 50,000	16	04	100

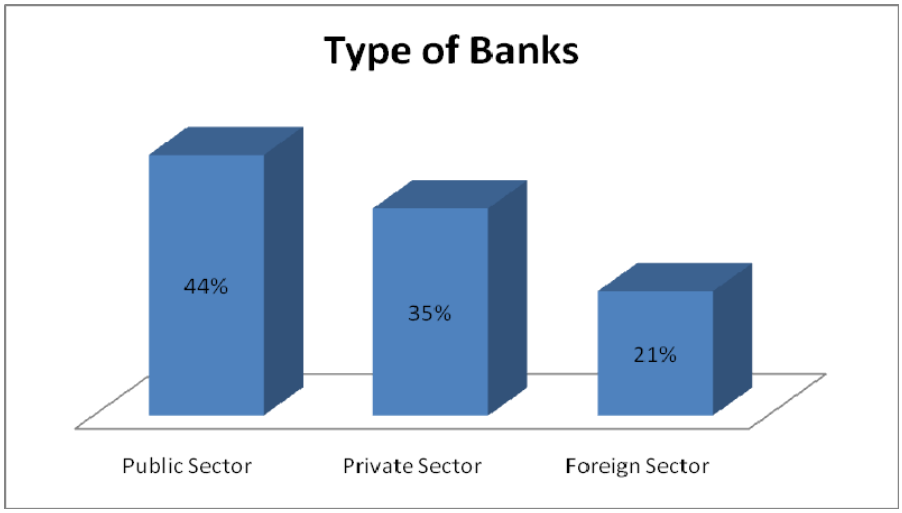


Figure 4.6 : Customers Bank type.

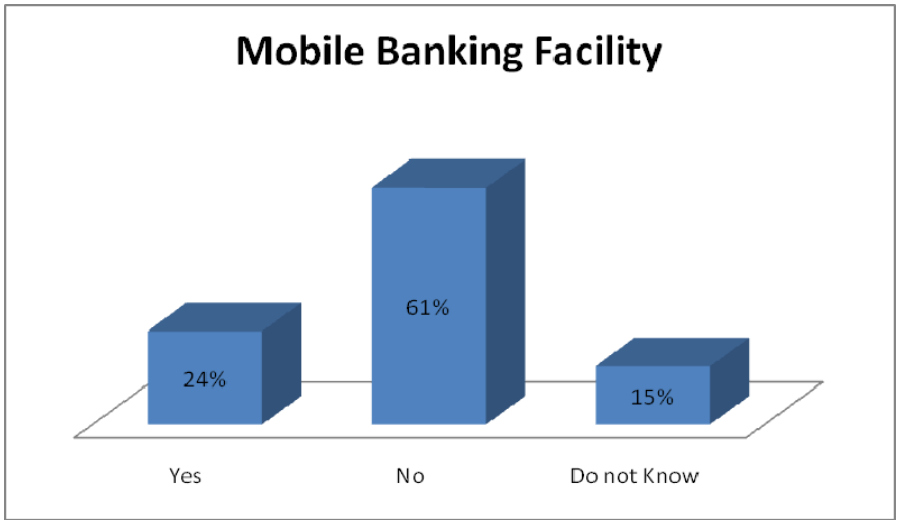


Figure 4.7 : Mobile banking facility from the bank

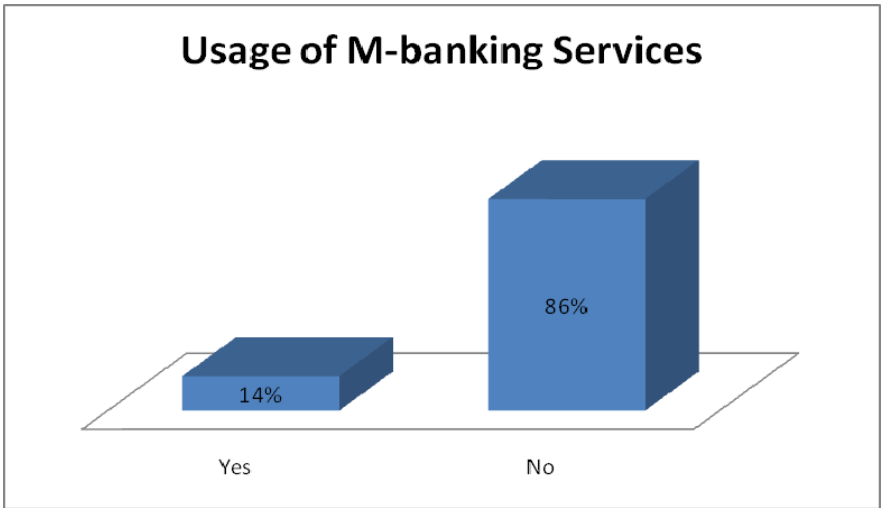


Figure 4.8 : Customers' usage of m-banking facility.

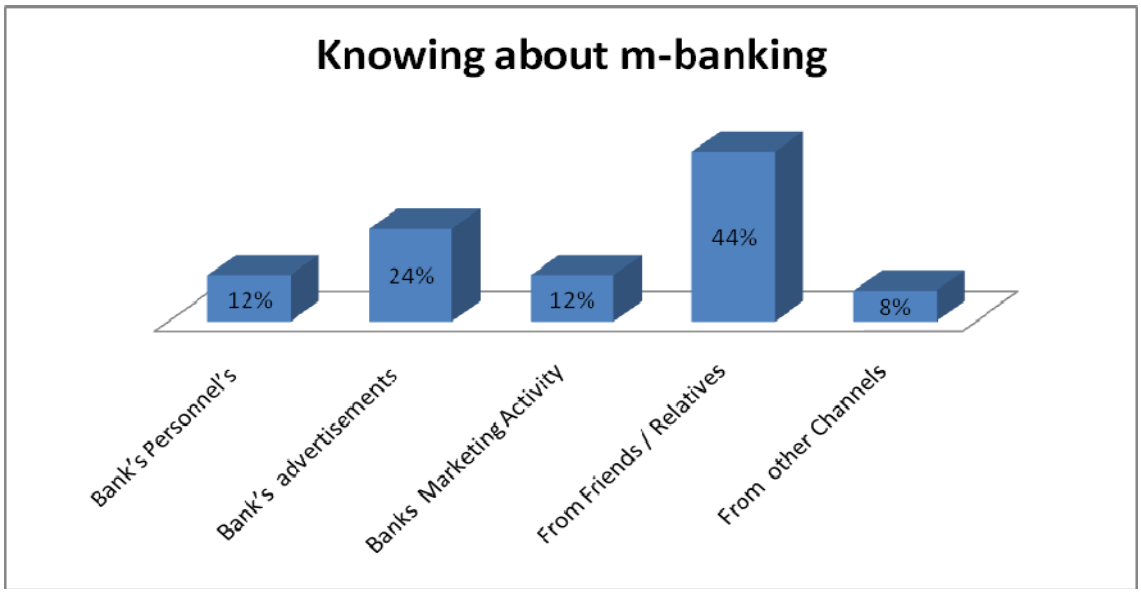


Figure 4.9 : Knowing about the banking transactions using mobile phone.

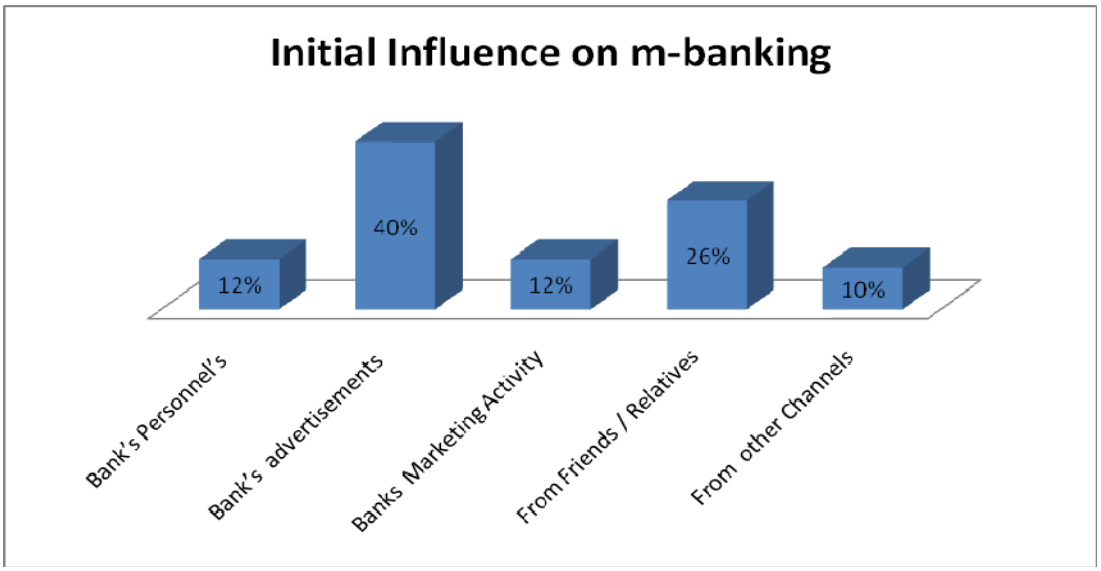


Figure 4.10 : Initial Influence to start mobile banking transactions.

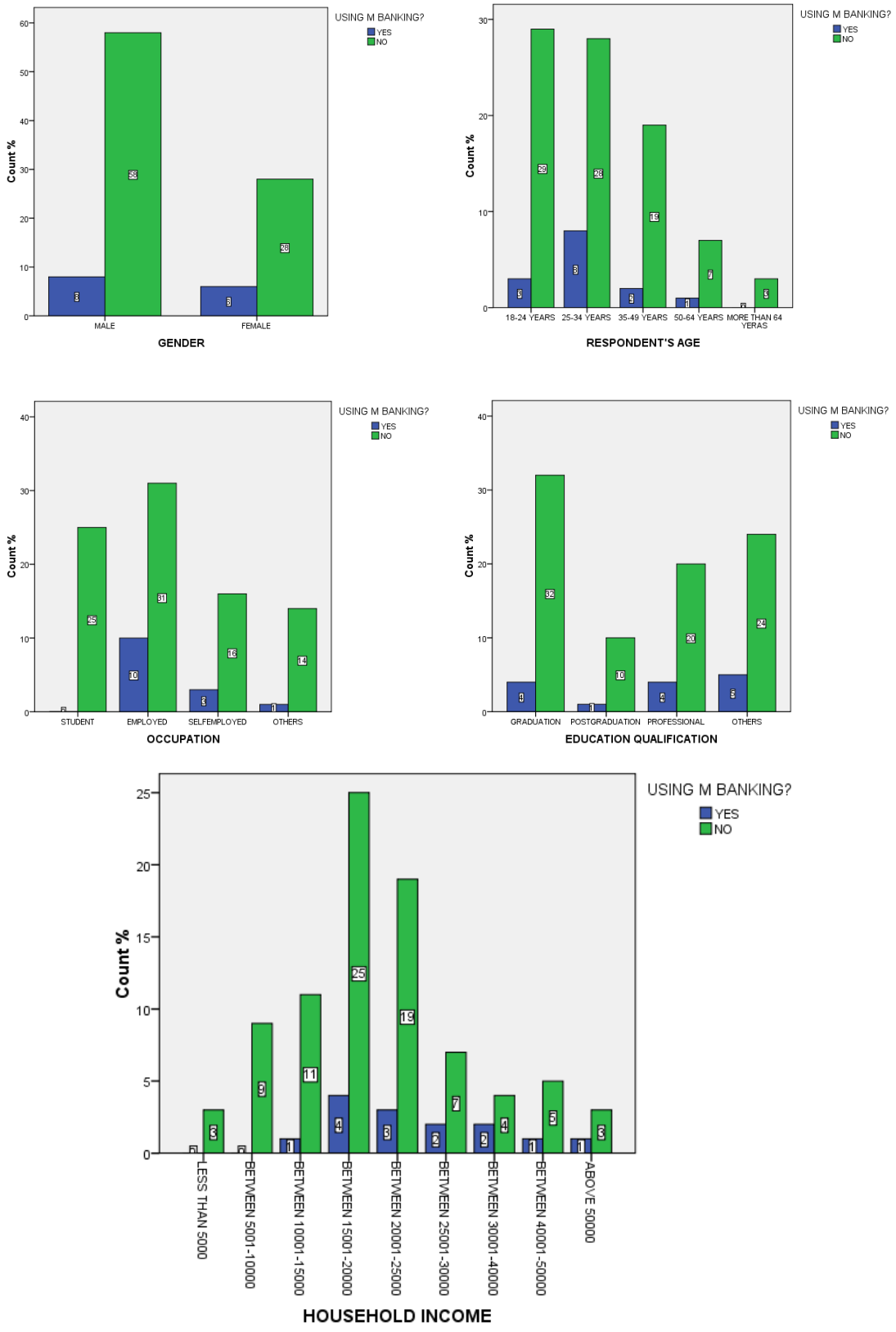


Fig. 4.11: Graphs representing relations between Usage of m-banking with demographic factors.

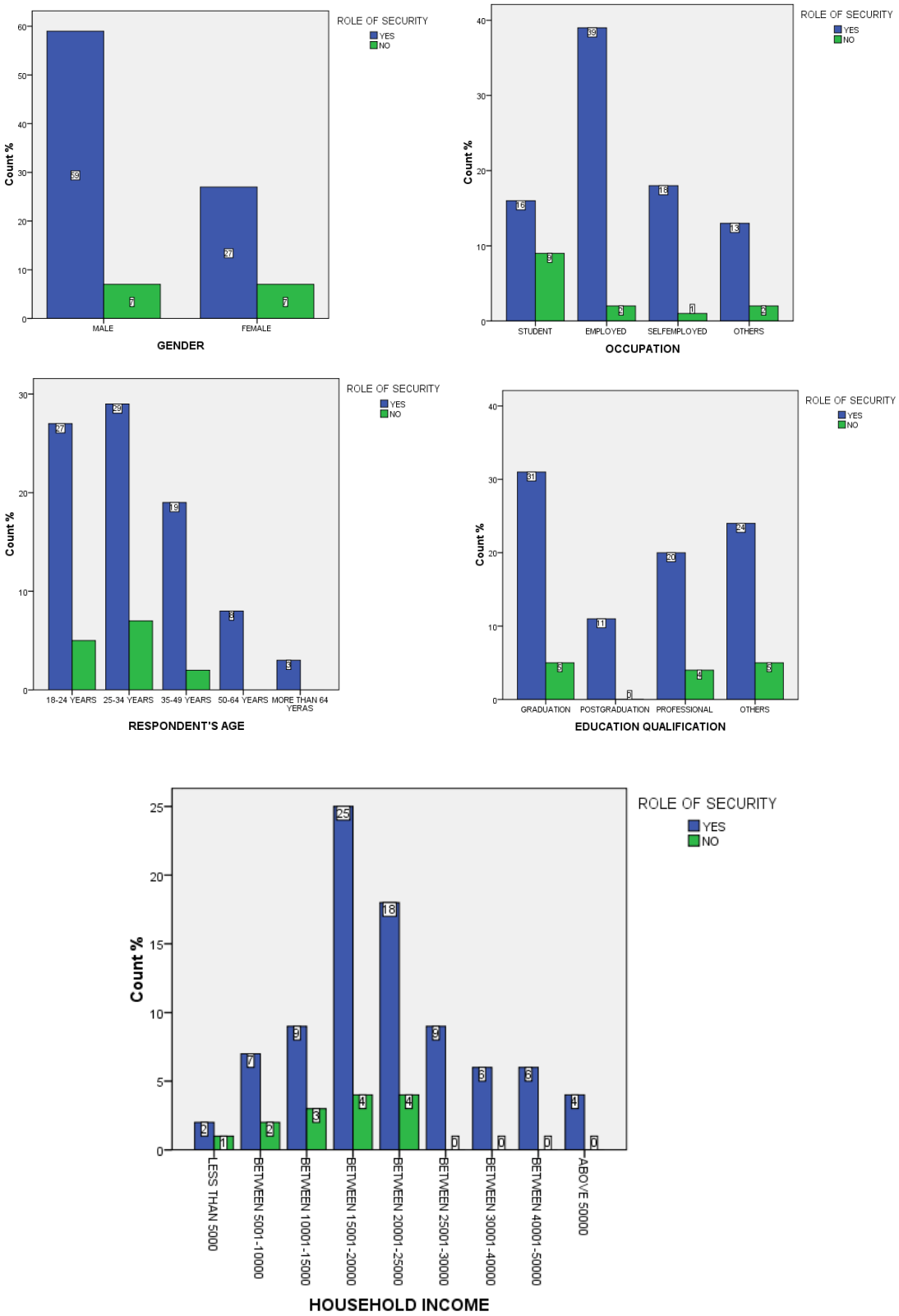


Fig. 4.12 : Graphs representing relations between Role of security with demographic factors.

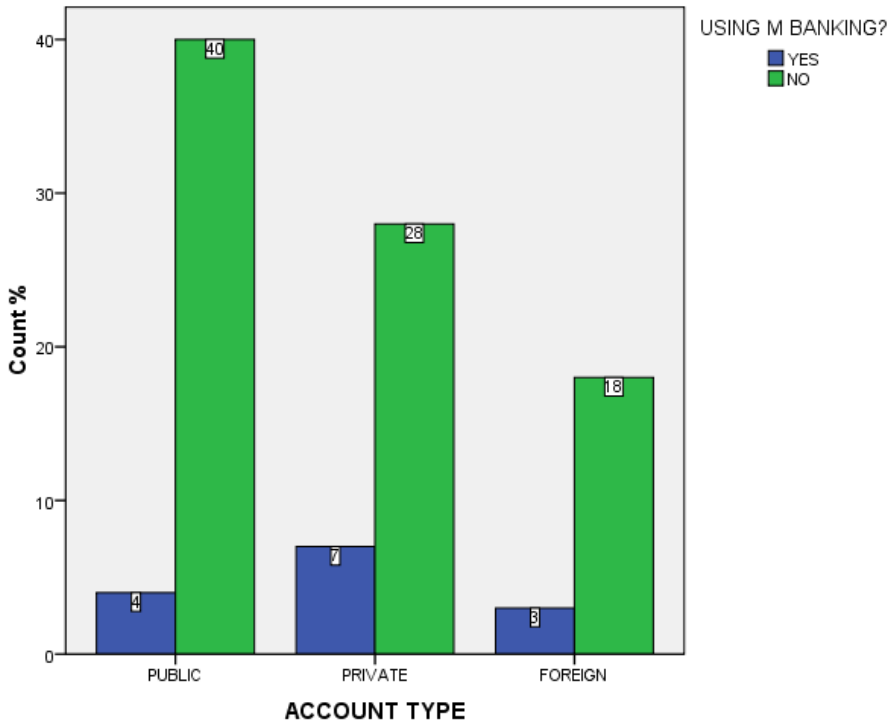


Fig. 4.13 : Graph representing relations between Using m-banking with Account type.

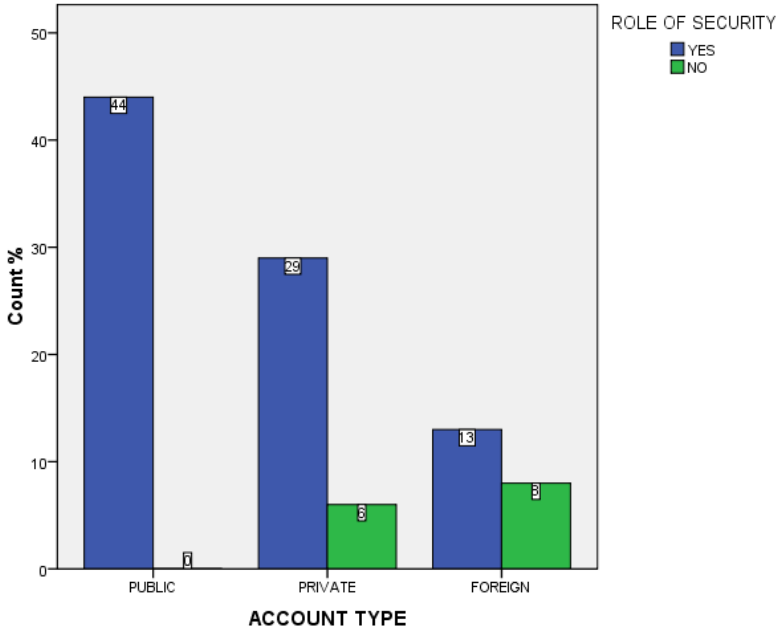


Fig. 4.14: Graph representing relations between Role of security with Account type.

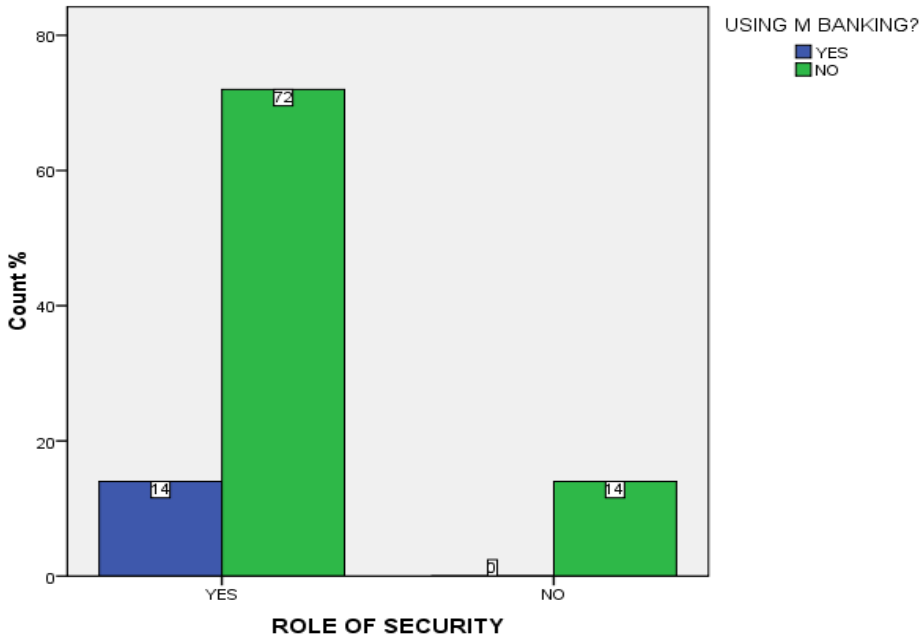


Fig. 4.15 : Graph representing view of role of security in terms of m-banking users.

Table 4. 28 : Correlations of using m-banking with demographic factors :

(a) Correlations

		RESPONDENT'S AGE	USING M BANKING?
RESPONDENT'S AGE	Pearson Correlation	1	.026
	Sig. (2-tailed)		.794
	N	400	400
USING M BANKING?	Pearson Correlation	.026	1
	Sig. (2-tailed)	.794	
	N	400	400

(b) Correlations

		USING M BANKING?	OCCUPATION
USING M BANKING?	Pearson Correlation	1	-.048
	Sig. (2-tailed)		.638
	N	400	400
OCCUPATION	Pearson Correlation	-.048	1
	Sig. (2-tailed)	.638	
	N	400	400

(c) Correlations

		USING M BANKING?	GENDER
USING M BANKING?	Pearson Correlation	1	-.075
	Sig. (2-tailed)		.456
	N	400	400
GENDER	Pearson Correlation	-.075	1
	Sig. (2-tailed)	.456	
	N	400	400

(d) Correlations

		USING M BANKING?	EDUCATION QUALIFICATION
USING M BANKING?	Pearson Correlation	1	-.082
	Sig. (2-tailed)		.415
	N	400	400
EDUCATION QUALIFICATION	Pearson Correlation	-.082	1
	Sig. (2-tailed)	.415	
	N	400	400

(e) Correlations

		USING M BANKING?	HOUSEHOLD INCOME
USING M BANKING?	Pearson Correlation	1	-.189
	Sig. (2-tailed)		.059
	N	400	400
HOUSEHOLD INCOME	Pearson Correlation	-.189	1
	Sig. (2-tailed)	.059	
	N	400	400

(f) Correlations

		USING M BANKING?	ACCOUNT TYPE
USING M BANKING?	Pearson Correlation	1	-.083
	Sig. (2-tailed)		.413
	N	400	400
ACCOUNT TYPE	Pearson Correlation	-.083	1
	Sig. (2-tailed)	.413	
	N	400	400

The Correlation analysis enables us to have an idea about the degree and direction of the relationship between mobile banking with various demographic factors. Since the calculated age coefficient value is lesser than the tabulated value, it is less significant and hence the correlation is accepted (Table 4.28a). Since the calculated occupation coefficient value is lesser than the tabulated value, it is less significance and hence the correlation is accepted (Table 4.28 b). The calculated value of gender coefficient is lesser than the tabulated value, it is less significant and hence the correlation between gender and the use of mobile banking is accepted (Table 4.28c). Since the calculated education coefficient value is lesser than the tabulated value, it is less significant and hence the correlation is accepted (Table 4.28d). Since the calculated household income coefficient value is lesser than tabulated value, it is less significant and hence the correlation id accepted (Table 4.28e). Since the calculated account type co-efficient value is lesser than the tabulated value, it is less significant and hence the correlation is accepted (Table 4.28f).

The questions no. 11 to 15 in Questionnaire 3 (Appendix-1) are asked only to the respondents who are actually using mobile banking facility and the results are depicted between Tables 4.29 to Table 4.32.

Table 4. 29 : Details of mobile banking service used :

S.N.	Mobile banking service	Score	Rank
1	Checking Balance	430	I
2	Cheque Book Requisition	385	II
3	Payment of utility bills	375	III
4	Funds transfer	286	IV
5	Online investments	267	V

Table 4. 30 : Details of Effect of Technology :

S.N.	Usage of Mobile Phone	Score	Rank
1	Telephone Communication	483	I
2	SMS Communication	302	II
3	Internet downloading	129	III
4	Mobile games	113	IV

Table 4. 31 : Details of Psychology and Culture :

S.N.	Influence of reference groups	Score	Rank
1	Influenced by media	278	I
2	Influenced by friends	205	II

3	Influenced by relatives	187	III
4	Influenced by social community	178	IV
5	Influenced by Bank employee	168	V

Table 4. 32 : Details of Security Challenges & Trust :

S.N.	Security & Trust	Score	Rank
1	Multiple level passwords provides better security.	359	I
2	Reputed banks provides better security.	353	II
3	Online mobile banking has better security than traditional banking.	314	III
4	Data encryption provides better security.	312	IV

The results of the empirical test on factors affecting the customers view and actual experience of mobile banking is shown in Table 4.33 to Table 4.42, and the Ranking of Customers view on mobile banking usage is depicted in Table 4.43.

Table 4.33 : Scores of Personal profile of the users :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. Gender of the customer has substantial affect on adoption and usage of mobile banking channel.	08 40	21 84	12 36	35 70	24 24
2. Age of the customer has substantial affect on adoption and usage of mobile banking channel.	42 210	34 136	07 21	11 22	06 6
3. More the Education level of the customer more possibility of using new online mobile banking channel.	34 170	19 76	09 27	21 42	17 17
4. The tendency of using online mobile banking has directly related with the income level of the customer	10 50	36 144	18 54	24 48	12 12

Table 4.34 : Results of Personal profile of the users :

S. N.	Statement	Score	Response
1	Gender of the customer has substantial affect on adoption and usage of mobile banking channel.	254	Unfavorable
2	Age of the customer has substantial affect on adoption and usage of mobile banking channel.	395	Favorable

3	More the Education level of the customer more possibility of using new online mobile banking channel.	332	Favorable
4	The tendency of using online mobile banking has directly related with the income level of the customer	308	Favorable
	Average Score	**322**	**H1 is accepted**

Table 4.35 : Scores of Personal banking experience of the customer :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. Adoption & Usage of mobile banking services need prior banking experience	21 105	28 112	14 42	25 50	12 12
2. Adoption and Usage of banking services depends on the type of bank	22 110	29 116	18 54	21 42	10 10
3. Bundled financial services provided by the bank through online mobile banking has direct influence on Adoption & Usage of mobile banking services.	21 105	32 128	14 42	24 48	09 9
4. Adoption and usage of mobile banking depends upon the awareness on usage of mobile banking services.	34 170	37 148	08 24	12 24	09 9

Table 4.36 : Results of Personal banking experience of the customer :

S. N.	Statement	Score	Response
1	Adoption & Usage of mobile banking services need prior banking experience	321	Favorable
2	Adoption and Usage of banking services depends on the type of bank	332	Favorable
3	Bundled financial services provided by the bank through online mobile banking has direct influence	332	Favorable
4	Adoption and usage of mobile banking depends upon the awareness on usage of mobile banking services.	375	Favorable
	Average Score	**340**	**H2 is accepted**

Table 4.37 : Scores of Technology experience of the users :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. Adoption and usage of mobile banking services is influenced by prior mobile phone usage experience for communication.	32 160	50 200	07 21	07 14	04 4
2. Computer knowledge of customers have direct influence on adoption and usage of mobile banking services	31 155	48 192	08 24	08 16	05 5
3. Internet knowledge of customer has direct influence on adoption and usage of mobile banking services.	30 150	50 200	07 21	09 18	04 4
4. Customers attitude of downloading and using different mobile services has direct influence on usage of mobile banking services.	32 160	50 200	07 21	07 14	05 5
5. Customers attitude of Frequent usage of ATM and credit cards has positive role on usage of online mobile banking services.	32 160	52 208	06 18	06 12	05 5

Table 4.38 : Results of Technology experience of the users :

S. N.	Statement	Score	Response
1	Adoption and usage of mobile banking services is influenced by prior mobile phone usage experience for communication.	399	Favorable
2	Computer knowledge of customers have direct influence on adoption and usage of mobile banking services	392	Favorable
3	Internet knowledge of customer has direct influence on adoption and usage of mobile banking services.	393	Favorable
4	Customers attitude of downloading and using different mobile services has direct influence on usage of mobile banking services.	400	Most favorable
5	Customers attitude of Frequent usage of ATM and credit cards has positive role on usage of online mobile banking services.	403	Most favorable
	Average Score	**397**	**H3 is accepted**

Table 4.39 : Scores of Psychology & Culture :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. The human nature of testing new innovation has positive influence on usage of new online mobile banking channel.	28 140	49 196	09 27	10 20	4 4
2. The reference group influence has positive effect on usage of new online mobile banking channel.	21 105	48 192	10 30	12 24	09 9
3. Mobile banking usage will uplift the status of the customers in the society.	18 90	32 128	22 66	16 32	12 12
4. Adoption and usage of online mobile banking services depends on the availability of such services from the service provider.	34 170	48 192	08 24	06 12	04 4
5. Adoption and usage of online mobile banking services depends on the availability of mobile communication in the geographical region of the customer.	18 90	38 152	14 42	18 36	12 12

Table 4.40 : Results of Psychology & Culture :

S. N.	Statement	Score	Response
1	The human nature of testing new innovation has positive influence on usage of new online mobile banking channel.	387	Favorable
2	The reference group influence has positive effect on usage of new online mobile banking channel.	360	Favorable
3	Mobile banking usage will uplift the status of the customers in the society.	328	Favorable
4	Adoption and usage of online mobile banking services depends on the availability of such services from the service provider.	402	Most favorable
5	Adoption and usage of online mobile banking services depends on the availability of mobile communication in the geographical region of the customer.	332	Favorable
	Average Score	**361**	**H4 is accepted**

Table 4.41 : Scores of Security challenges & Trust :

Statements	Strongly agree (Per cent and Score)	Agree (Per cent and Score)	Neither agree or disagree	Disagree (Per cent and Score)	Strongly disagree (Per cent and Score)
1. The security of financial transactions has positive affect on user attitude of switching to new online banking channel.	41 205	38 152	07 21	12 24	02 2
2. The reputation of the bank have positive affect on user attitude of switching to new online banking channel.	38 190	33 132	14 42	10 20	8 8
3. Usage of mobile banking is more if it is reliable	34 170	39 156	12 36	08 16	07 7
4. Security relating to mobile banking should be fool proof.	38 190	46 184	08 24	06 12	02 2

Table 4.42 : Results of Security challenges & Trust :

S. N.	Statement	Score	Response
1	The security of financial transactions has positive affect on user attitude of switching to new online banking channel.	404	Most favorable
2	The reputation of the bank have positive affect on user attitude of switching to new online banking channel.	392	Favorable
3	Usage of mobile banking is more if it is reliable	385	Favorable
4	Security relating to mobile banking should be fool proof.	412	Most favorable
	Average Score	**398**	**H5 is accepted**

Table 4.43 : Ranking of respondents view on actual usage :

Hypothesis No.	Hypothesis	Score	Rank/Importance
H5	**Security challenges & Trust**	398	First
H3	**Technology experience of the users**	397	Second
H4	**Psychology and Culture**	361	Third
H2	**Banking experience of the customers**	340	Fourth
H1	**Personal profile of the users**	322	Fifth

4.5. Discussion on Customers Perspectives on Mobile Banking

4.5.1 Discussion on Developed TCSET model on M-banking :

The results shown that most of the non-users of mobile banking are not at all aware of this service (highest score), This seems to suggest that mobile banking share the low level of awareness. Also it is found that the awareness on usage of mobile banking services using mobile device, and the advantages of it like better services (Table 4.20), moderate security (Table 4.22), ease of usage (Table 4.24) and lower cost (Table 4.26) enhances the usage of this delivery channel. Therefore, the study strongly suggests that banks should provide proper education on mobile banking facility to their customers as well as to potential customers through advertisement, and training them on how to use the services. It is also found that the cost of using new channel play an important role than usefulness and ease of use. Hence the bank customers who have mobile device have to be educated towards the advantages of this channel, get trained to reduce the hesitation of usage of mobile banking channel, which stimulate the customers intention to use, by knowing the usefulness and assurance. The training will also stimulate the customers behavior by understanding the ease of operation and cost-effectiveness. This leads to actual usage of this new distribution channel. All the hypothesis developed to support TCSET model are accepted based on the empirical study.

4.5.2. Discussion on Factors affecting the Customers view and Actual Usage :

1. Demographic profile of the Users :

In the study, it is found that there is a significance association between adoption and usage of mobile banking and the personal profile of the users. The survey on customers view shows that the Gender has no substantial effect on adoption and usage of mobile banking (Table 4.34). However, in actual usage study, the gender has shown marginal effect and males are little dominated over females (Fig. 4.11 (a)). In China and South Africa, it is found that the mobile banking/internet banking users were predominantly male. (Sylvie et al., (2005); and Singh, 2004) found that more males used internet banking. The study reveal that the younger generation has more inclination towards adopting mobile banking than elders and the occupation of

the respondent has shown significant effect on decision for adoption. Students have not shown interest in adoption of mobile banking. Only responsible youngsters who are employed or self-employed have shown more interest on usage. It is also found that the customers education has slight effect on adoption of mobile banking. This is in contrary to some of the results obtained from developing countries. Finally the adoption of mobile banking has very slight effect on house hold income of the customers. It is found that the middle income people have shown much interest compared to high income and low income people.

In the literature, it has been found that age is a demographic variable that is a strong indicator of innovativeness. The elderly customer segment has traditionally been considered resistant to change and to have negative attitudes to technology (Oumlil et al., 2000). This is found true in India also. Internet banking surveys state that wealthier customers are more willing to adopt and use technology-based services. Traditional literature suggests that wealthier people are more likely to adopt innovations earlier (Rogers, 1995). In this survey the clear indication was that wealthier respondents were less willing to adopt the new mobile banking services.

With regard to demographics factor, Howcroft et al. (2002) revealed that younger consumers value the convenience or time saving potential of online and mobile banking more than older consumers. Younger consumers also regarded the lack of face-to-face contact as less important than older consumers. These authors further found the educational levels of respondents did not affect the use of telephone or online banking. However, Karjaluoto et al. (2002) found a typical user of online banking in Finnish market highly educated, relatively young and wealthy person with good knowledge of computers and, especially, the internet. The results of their study proposed that, demographic factors have an impact on online banking behavior. Consistently with past studies (Daniel, 1999; Sathye, 1999) and the Electronic Banking Market Assessment Report showing a clear-cut division between the rich, who would use online banking and the poor, who would possibly prefer traditional banking. However, the wide use of geographic, demographic, socio-

economic and psychographic variables have not always been accepted as good predictors in predicting buying behavior in financial services by past and recent studies, which claimed that, the benefits customers seek for in banking services and/or the product attributes should be identified instead (Minhas and Jacobs, 1996; Lockett and Littler, 1997; Machauer and Morgner, 2001). But this argument contradicts again with a recent study by Sarel and Marmorstein (2003 a, b), showing that household income and education had a significant effect on the adoption of electronic banking among mature Finnish consumers.

Demographic factors influencing banking channel adoptions are found to be considerably powerful in explaining the adoption of mobile banking channel. Perhaps different demographic segments have their own behavioral tendencies that are quite habitual. Thus, it is very important to know what behavioral tendencies are dominant in what demographic segments.

2. Personal Banking Experience of the Customers :

The results of this study show that the past banking experience has a positive effect on adoption of mobile banking channel (Table 4.36). In the past, Lewis (1991) pointed out that the reasons consumers switched delivery channel from traditional to electronic self-service was the dissatisfaction with their present services. These might include the slow speed of service in branches, inconvenient branch opening hours or places and the small number of branch staff available to serve customers, etc. However, Sylvie et al., (2005) found that the past banking experience had no effects on online and mobile banking adoption in China.

3. Technology experience of the users :

Prior general computing experience, internet usage and usage of mobile phone for personal communication has found to be having substantial effect on adoption and usage of mobile banking after security related issues (Table 4.38). Fazio and Zanna (1981) found that direct experience led to formulate attitude object and predicted behaviour better than attitudes founded on indirect experience. It has been argued that users' prior general computing experience with computers affects their

perceptions of usefulness and ease of use of specific systems positively (Ndubisi et al., 2003). Prior general computing experience refers to the hands-on experience with systems that may or may not include coaching provided by experts. Venkatesh and Davis (1996) found that before a direct experience with systems, system characteristics did not play a significant role in the formation of early ease of use perceptions. Moreover, the ease of use of two different systems did not differ significantly before direct experience, but after direct experience, system characteristics became significant determinants of ease of use perceptions. In addition to the theoretical and intuitive basis to believe that computing experience might have relationship with perceived usefulness, ease of use and credibility, there is empirical support in Malaysia (e.g. Ndubisi et al., 2003) to suggest that prior general computing experience determines perceptions.

Karjaluoto et al. (2002) showed that prior experience with computers and technologies and attitudes towards computers influence both attitudes towards online banking and actual behaviors. Their study revealed among these factors, prior computer experience had a significant impact on online banking usage while positive personal banking experience seemed to have had an effect on both attitudes and usage and satisfied customers tent to keep up with their current delivery channel.

4. Psychology & Culture :

We believe that consideration of social influences and resulting psychological attachment of the user to system use can facilitate better understanding of this issue by accounting for the variance in attitude. Applied to use of a new information system, the social influence processes determine the individual user's *commitment*, or more specifically, *psychological attachment* [O'Reilly, C (1986)], to the use of any new information technology. It is also clear that culture makes a difference to the consumer's behaviour and therefore has an impact on penetration of mobile banking adoption. Hofstede's (1991) "value system" of national cultures represented by four dimensions have some relevance in the context of India and can help in

understanding the consumer's behavior of new technology-based financial services channels, such as online and mobile banking. Based on the culture analysis Indians tend to have strong uncertainty avoidances, which mean there is a great need for strict regulation and legislation to ensure limited uncertainties. However, the lack of proper regulation on secured mobile banking transactions, Indian customers have not shown much interest on usage of this new distribution channel. Therefore, Indian consumers might be more concerned about the risks of new and unfamiliar technology-based financial services, such as online and mobile banking. In addition, Indians tend to have relatively weak time perspective. Since Indian customers tend to be more resistant to change, they might prefer and keep on using the familiar branch banking services. Group influences as mentioned above, are also very important as Indians are highly collectivists. Despite the national culture and subculture, there are always some individuals who are more inclined to adopt new ways of thinking and behaving than others. The Indian habit of cash & carry banking is also one of the inhibitor of penetration of mobile banking usage in the Country. The results showed reference group's have positive influence on adoption and usage of mobile banking (Table 4.40) in India however, such group do not have any impact on online and mobile banking adoption in China (Sylvie et al., 2005). Indian tradition and culture on cash and carry also has substantial effect on decision of mobile banking adoption.

5. Security & Privacy :

The results also indicate that security and privacy issues are important concerns for consumers in using m-banking service (Table 4.42). Although a mobile device is less susceptible to attack by malicious code, this does not mean that m-banking service is more secure than wire-based e-commerce (Turban *et al*., 2004). By their very nature, mobile devices and mobile transactions produce some unique security challenges (Raina & Harsh, 2002), including physical security, transactional issues and post-transaction issues. Many of the processes, procedures and technologies used to secure e-commerce transactions can also be applied in m-banking service environment because m-banking service transactions eventually end up on the wired internet (Turban *et al*., 2004). In addition to the development of secure m-banking

service systems, such as establishment of an authentication mechanism, implementation of a public key infrastructure, and provision of online certification services, telecommunication companies need to increase individuals' perception of security and privacy protection of m-banking service through appropriate education and propaganda strategies.

Perceived Cost :

Most consumers in India have wrong perception that using mobile banking services is much more expensive than using wire-based e-commerce. Therefore, telecommunication companies need to ease this perception by the consumer of high financial costs associated with using m-service, through promotions and pricing strategies. In order to reduce the financial barrier facing potential consumers, a telecommunication company can attract new customers by enticing them to use one or two popular m-services through special discounts or free-of-charge strategies. Once customers start using and get used to the m-banking service, they may be inclined to continue using it and begin to adopt other m-banking services provided by the same financial institution because of habit or switching cost. On the other hand, prior research indicates that those that currently have adopted the internet and transaction-based e-commerce are much more willing to embrace m-banking than those that have not yet adopted the system (Anckar & D'Incau, 2002). Thus, mobile communication service providers can also use market segmentation and positioning strategy to attract targeted customers, who are willing to pay for time-critical and/or location-based mobile financial services, to use their mobile communication service systems.

4.6. Findings of Bankers Perspective Study

1. It is found that the factors like competitors focused issues, operational focused issues, technology focused issues, organizational issues, strategic focused issues, customer focused issues and society focused issues of financial institutions have substantial affect on deciding and providing the mobile banking as new distribution channel.

2. It is also found that the advantages and the value additions to the banking organizations due to adoption of mobile banking as new distribution channel overtake its limitations.

3. Banks can promote mobile banking channel by improving their marketing strategies like providing education and training on availability and usage of mobile banking.

4. By providing free online services, offering incentives, and bundled services, banks can further enhance the popularity of m-banking distribution channel.

5. In banker's perspective, the possibility of increase in fraud in banking transactions is found to be major limitation while adopting m-banking channel.

6. It is also found in the study that for the financial institutions, the competitors focused issue is major factor while making decision on providing mobile banking as new distribution channel.

7. In the study, it is also found that the banks have to encash the technological innovation like mobile banking as competitive advantage to expand their business.

8. The study also identified the banker's perspective on various benefits and limitations of mobile banking as new distribution channel.

4.7. Findings of Customers Perspective Study

1. Based on Focus group interaction, a new conceptual model on penetration of new technological innovation to the society is developed and is named as Theory of Customers Stimulation through Education and Training (TCSET).

2. The TCSET model is applied to customer's perspective on adoption of mobile banking service and the model is tested by means of empirical study.

3. A conceptual model is developed to determine the factors affecting the customer's decision on adoption of mobile banking. The model is tested using empirical study.

4. It is found that the awareness and training on mobile banking usage based on usefulness, cost of transaction, and easy of use, changes the customers attitude and view on usage of mobile banking services.

5. It is also found that the security aspects of financial transaction have major roll in customer's perceived decision on adopting mobile banking for actual use.

6. The various factors such as demographical profile of users, earlier banking experience, technology experience, psychology and culture, and the security challenges and trust have substantial role in customers view while adopting mobile banking channel.

7. The study identified that the enhanced security and banks actions to improve the customers trust on this channel encourages the adoptability.

4.8. Conclusion

This study investigated evaluated factors that are significant in determining the satisfaction of customers using mobile banking. Banks in India do not use their websites strategically to improve customer relationship or to add real value. For instance, if banks want more of their customers to use mobile banking, they will need to provide more value add services than the ones provided by ATMs or phone banking. The study identified the factors that are significant for internet banking customer satisfaction. Security of transactions and convenience contribute significantly to satisfaction of internet banking customers. Banks while advertising their mobile banking services should emphasize these points. In the case of new users of the mobile banking service, banks should also concentrate on the independence aspect of this service. Customers can be encouraged to take advantage of online banking by providing them with incentives. For example, successful online applications of frequent flyer programs in the airline industry may be a useful benchmarking exercise for mobile banking.

The study identified the factors that are significance for mobile banking penetration and customer acceptance. It is observed that the prior banking experience, education & training on usage, and benefits of mobile banking have substantial effect on acceptance of mobile banking transactions by Indian customers. In addition, the security and incentives by the banks have also significant affect on acceptance & usage of banking services over mobile phone. The concern of customers on security of banking transaction is supported by the figures given in response to a question in Parliament of India on March 4, 2008, the total number of Banking frauds have gone up from 12,374 in 2005 (amounting Rs. 1,385.91 crores) to 21,687 in 2006(amounting

Rs. 1,200.87 crores) in 2006, and to 22,280 in 2007 (amounting Rs. 1,077.84 crores). These studies reveals that proper education and training on availability and usage of mobile banking services channel is required in India to attract more customers towards usage of this new channel for their financial transactions along with other factors like technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks, studies in the model. The study also points out the requirement of new, comprehensive mobile business model for secured payment from the customers bank accounts.

In the study, it is found that the proper education and training on usage of mobile banking services has substantial effect on attracting more customers to use this new distribution channel. The study comes to the conclusion that Mobile Banking, as an interesting application in Mobile business, is winning the acceptance of the customers and enjoys sufficient demand in future days. Banks are seeing themselves increasingly forced to include Mobile Banking in their product portfolios to avoid negative differentiation against their competitors. Apart from this strategic relevance, there are other financial incentives, too. Their actual scope however depends, amongst others, on the product portfolio and the customer structure of individual banks. The study also reveal that proper education and training should be provided on availability and usage of mobile banking services to the Customers by the banks in terms of its importance, convenience and negligible cost.

CHAPTER FIVE

Managerial Implications and New Payment Model

CONTENTS **PAGE No.**

5.1. Introduction

The two prevalent online models in the banking industry are e-banks and e-branches. An e-bank is a banking institution that exists only on the Internet/mobile technology, with no bricks-and- mortar branch access. This framework gives a bank the opportunity to exist without paper, without geographical limitations, and without ever closing the doors to customers. The e-branch model is where a traditional bricks-and-mortar bank offers online banking to its customers. Some analysts believe that though e-banks are beginning to gain traction, it is still easier for a traditional bank to get existing customers to try online banking than e-banks to steal customers from bricks-and-mortar banks (Senior, 1999). In response to the increasing pressure by e-banks, many bricks-and-mortar banks have created independent e-bank subsidiaries. They have compelling reasons in support of creating independent e-banking units. First, in separating a online bank from the traditional structure, the slow moving corporate structure is replaced with an entrepreneurial one. Second, this approach gives the new unit much needed freedom from the traditional bureaucracy. Creating an autonomous online banking unit is in line with what many experts recommend when establishing business operations on the Internet. Success requires giving the electronic banking division independence, with separate management from the bricks- and-mortar part of the business. Third, this approach most effectively allows a so called "skunk-works" team to manage online banking by creating a group of innovative thinkers from existing business lines that report directly to the CEO (Leuchter, 1999).

This chapter initially discusses the benefits of adoption of mobile banking as a new distribution channel by Indian Banks and a study on business perspective of mobile banking is made by means of SWOT analysis. Various benefits of mobile banking from customer's point of view are also discussed. This Chapter also deals with various mobile banking models and securities in financial transactions. Online business financial models are discussed based on the basis of variations in dimensions, and technological knowledge. The existing three mobile business models viz., Core capabilities model, Disruptive innovation model and Self-service

models are discussed along with their limitations. In order to provide better security for financial transactions, a new mobile banking payment model called "Consumer oriented mobile business model" is proposed and discussed. The consumer oriented model allows customers to pay online for their shopping from their bank account using mobile devices. In this chapter a brief survey on security issues in mobile banking scenario is also discussed along with possible frauds and causes of the frauds. A need for National organization for controlling the frauds in financial sector is discussed and the managerial implications & advantages of "consumer oriented mobile business model" to decrease the possible frauds are also discussed and demonstrated for secured financial payment for online purchase. The model is compared with other existing mobile business models.

5.2. Managerial Implications

The managerial implications of mobile banking can be analyzed by knowing the benefits from bank's point of view, customer's point of view and by means of SWOT analysis of mobile banking. The driving force for online banking, in addition to convenience, is the low cost efficiency.

5.2.1. Benefits of online mobile banking from Banks' Point of view :

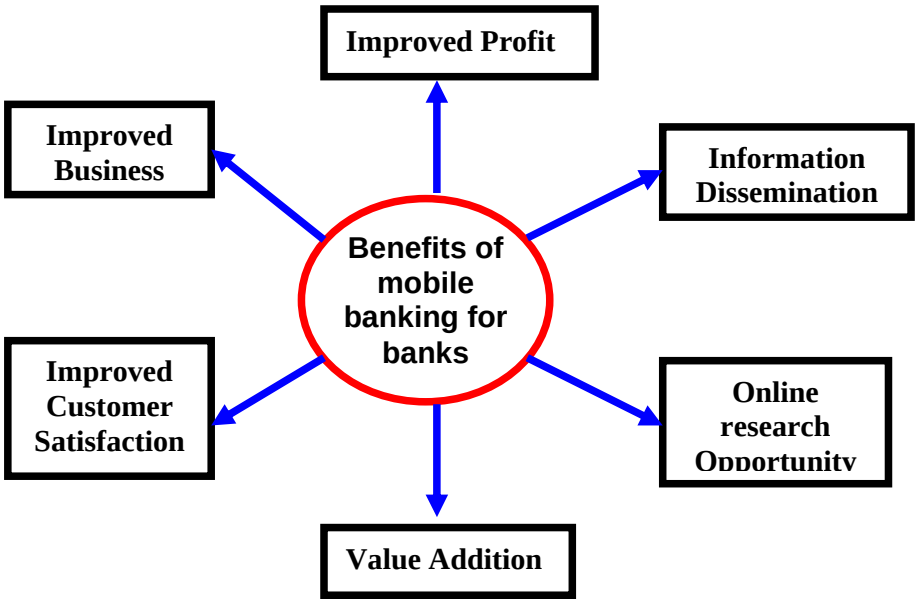


Fig. 5.1 : Benefits of mobile banking from bank's point of view

1. Improved Business :

The first benefits for the banks offering mobile banking services is better advertisement, better branding and better responsiveness to the market. The banks which offer such services would be perceived as leaders in technology implementation and would enjoy a better brand image. It seems clear that partnerships between banks and service providers will become more common as different parties seek to develop cutting-edge abilities and services. Online mobile banking channel provides banks to adapt new technology and opportunity to new & innovative way of doing business. Cross selling using new online mobile banking is another opportunity to improves bank business.

2. Improved Profit :

The second benefits is in monetary terms. The main objective of every bank is to maximize profits and automated m-banking services from virtual office certainly offer a perfect opportunity for maximizing profits. Compared to the cost of setting up of branch offices in every city and every corners of the city and their maintenance, setting up of ATM's, the mobile banking services through virtual offices will be several thousand times profitable to the banks. On the fee side for different services, average payment in mobile bank costs 5 to 10 times less than payment in branch or using a teller machine. On the actual cost side, for the bank point of view, payment in online mobile bank cost 8 times less than payment in the branch due to improved operational effectiveness. Banks will also save a great deal of expense by reducing the number of employees in the bank and in closing some of the bank branches.

3. Value addition :

The third benefit is in terms of customer care and providing advertising information about value added services to the customers. Providing multiple distribution channels increases the value of the bank and its services in customers frame of reference and provides an opportunity to differentiate their products/services. Adapting new service distributing channel like online mobile banking improves the image of the bank in the industry sector. This will also improve the competitive edge

of the bank and opportunity for global business expansion. The impact of information & mobile communication technology on value creation in any organization can happen either through increasing revenues at marginal cost, or through reducing costs at marginal changes in revenue, and thus enhancing operating profits.

4. Improved customer satisfaction :

By providing brick and mortar services at ubiquitous click and mortar, the customers can enjoy the advantage of technology innovations, the cost benefits of financial transactions and the quality of the services. This will improve the customer satisfaction and helps to retain the existing customers and attracts new customers towards the bank. Customer retention becomes ever more important. Research shows that the more services of his or her bank the customer uses, the higher the real and psychological switching costs will be. Also, the more services the customer uses, the greater are the bank's expected profits. Customer loyalty, therefore, gains importance over customer acquisition, and the value of customer relationship management becomes apparent.

5. Information dissemination :

Another important benefit is information dissemination. Some wireless infrastructures support simultaneous delivery of data to all mobile users within a specific geographical region. This functionality offers an efficient means to disseminate information to a large consumer population.

6. Online Research Opportunity :

Online Mobile banking facility provides considerable research opportunity to the customers before making financial decisions. They shop around for financial products, and make their own investment decisions – in part without consultants. Based on the data collected on customers decisions and other IT tools on data mining, banks can also do research on consumer behavior. This will help banks to

take decision about various services. In developing countries, Researching via the financial services via mobile device is gaining importance.

5.2.2. Business Perspective of Mobile banking - SWOT ANALYSIS :

Managerial implications of mobile banking can be analyzed by SWOT analysis. A SWOT Analysis is an effective tool which can be used to examine the issues which will directly affect the success of alternative delivery mechanisms. For mobile banking transactions, the SWOT analysis is as follows :

Strengths :

- Customer access to information 24 hours per day.
- Timely access to information.
- The ability to offer a customer more than one method of retrieving information.
- Sophisticated technology systems will help to make a banking institute "future-proof."
- Diversity helps to capture different types of markets.
- The ability to cut internal costs due to advanced technology.
- Increased efficiency due to automation.
- Increased accuracy of banking transactions.
- Increased attractiveness due to new and convenient way of banking.

Weaknesses :

- High price of service.
- Continual altering of customer wants and needs.
- Hostile feelings of employees due to possible pending lay-offs due to automation.
- Multiple options for the customer.
- Initial investment in technology will be expensive.

Opportunities :

- The ability to obtain a larger customer base.
- Global expansion. This is an enormous market, which will be a great opportunity in the future.
- The ability to take advantage of the growing popularity of the mobile banking.

The future of m-banking and m-payments can be seen through three sets of eyes : the service providers, the retail consumers, and merchants.

Service providers

The key for service providers must be found in the business model. Banks do not want to be in a position of building systems to make the wireless operator rich through download fees of data supplied by the banks, whether this data originates from traditional banking or new products and services not yet invented. Telecommunication carriers do not want to be forced into the position of delivering low margin, price-sensitive commodity products. Mobile data services will be a viable and profitable business, and one day it will include mobile banking, but it will likely require the collaboration of both industries.

The business model could be based on a number of different approaches: transaction based, content based either by premium or by data volume, advertising, mobile spam, commission based, or part bundled. Whatever the case, one can expect that there will be many permutations and combinations before the various players find out what works. It can be also expect that what works will depend on the culture in which the service is imbedded.

Retail customers

When it comes to the Internet/mobile communication, what counts for users is speed, accessibility, reliability, desirable content, and effective services. It is expected that users will look to mobile data services for the same attributes. Mobile banking and mobile payment contribute very little to this equation, so the rollout of these services will depend on the evolution of other wireless products. The major short-term opportunities in m-commerce will be in compressing the supply chain and reducing administrative overheads in industry. Automating business-to business payment processes and integrating mobile technologies have direct cost-benefit potential and indirect potential to act as a pathfinder for retail m-banking.

Merchants

Obviously mobile payment and mobile banking have to be enabled on both sides of the transaction, including the merchant. In the short to medium term, credit/debit cards will prevail certainly in the country. As for the use of the mobile device to pay for vending machines purchases, this holds little attraction since vending machines typically deal with low volume sales of low value goods (Peffers, 2001) and the

penetration would have to be very widespread for this to work. It will be a long time before these organizations have to think about adapting their systems to accommodate more sophisticated mobile devices in the hands of consumers.

Threats :

- Continual changing technology.
- Uncertainty of the banking industry.
- Competition from "lower price" operations.
- Possible failure of products due to non-acceptance of customer.
- General competitiveness of the banking industry.
- Enhanced competition due to new entrants from mobile communication service industry.
- The fear of a lack of security is a higher hurdle to those mobile device users who do not use online banking than missing monetary incentives or insufficient comfort or functionality.

After reviewing this internal analysis, based on SWOT analysis, it can be suggested that the retail banking industry should diversity by adding this new technology. In the quantitative part of the study these propositions are tested through the focus groups and the general survey carried on bank managers and other employees.

Challenges

The key challenge for success will be aligning each of the following contributing factors until there is enough synergy to warrant m-banking :

- wireless access to compelling content;
- content evolution, including and especially premium material;
- communication technology, especially in terms of communication speeds and security;
- the device technology, especially the screen size and data interface; and
- the business model with better security for financial transactions and payment.

For those who have hopes of marrying m-commerce with marketing and merchandising, wireless will continue to leave a lot to be desired as a consumer experience. In the financial service industry, technology should not be confused with

strategy. Leading-edge technology is one way to differentiate one organization from another, but implementing the technology in the absence of a clear business model is particularly risky. The early adopters of ATM technology certainly had a competitive advantage, but a competitive advantage based on technology is very difficult to sustain. Managers in virtually all industries understand that providing quality customer service is a key strategic component in firm profitability. The importance of service delivery and its impact on improving satisfaction and retention of customers, improving sales and market share, and improving corporate image can not be overstated (Lewis et al., 1994). Increasingly, one of the principal methods for making improvements in level of service individual firms provide their customers includes increased capital expenditures on service delivery technology. As with most other service providers, banks have moved quickly to invest in technology as a way of controlling costs, attracting new customers, and meeting the convenience and technical innovation expectations of their existing customers (Pyun et al., 2002).

5. 2.3. Benefit from Customers Point of view

The benefit from the bank customers' point of view is accessing banking services at any where, any time and any extent of time. These features significantly save the valuable time of the customer. The main advantages of m-banking services for the Indian customers are as follows :

(1) Ubiquity : Through mobile devices, banking applications are able to reach customers anywhere at anytime. On the other hand, users can also get any information they are interested in, whenever they want regardless of where they are, through Internet-enabled mobile devices. In this sense, mobile business makes a service or an application available wherever and whenever such a need arises. Communication can take place independent of the users location. The advantages presented from the omnipresence of information and continual access to banking will be exceptionally important to time-critical applications.

Mobile banking, for example, can leverage this value proposition by providing alert notifications, such as for auctions, betting, and stock price changes, which are

specified by the user as an important part of relevant personal content. As such, the real-time, everywhere presence of m-banking will offer capabilities uniquely beneficial to users. Banking services that are time and location sensitive, are likely to benefit from businesses exploiting this value-added feature of mobile banking.

(2) Personalization : An enormous number of banking information, services, and applications are currently available on the Internet, and the relevance of information users receive is of great importance. Since owners of mobile devices often require different sets of applications and services, mobile banking applications can be personalized to represent information or provide services in ways appropriate to the specific user. Additionally, personalized content is paramount in operating mobile devices because of the limitation of the user interface. Relevant information must always be only a single "click" away, since web access with any existing wireless device is not comparable to a PC screen either by size, resolution or "surfability". Therefore, subscriber profile ownerships is a key element in m-banking success, as it will allow selectively targeted m-banking applications. As such, the mobile database becomes a primary factor of m-banking success by compiling personalized data bases and providing personalized services. One example, is the SIM (Subscriber Identification Module) smartcards which serve as a mobile database allowing the user to run applications and operate secure transactions. Such personalized information and transaction feeds, via mobile devices, offer the greatest potential for the customization necessary for long-term success.

A value proposition is developed as superior consumer value is created through an increasingly targeted Internet experience for mobile users. For m-banking, the technological limitations magnify these value-for-time propositions. It has been estimated that every additional click-through, which a user needs to make in navigating through a commercial online environment with a mobile device, reduces the possibility of a transaction by 50%. Providing the user with the desired, most relevant information without forcing a complex click-through sequence will significantly improve the effectiveness of any mobile banking strategy. Value-for

time propositions become maximized for those business strategies best able to implement m-banking distinguishing capabilities. M-banking will become differentiated from traditional e-banking based upon their abilities to integrate and actuate the advantages germane to mobile devices. Various applications may provide differing value for mobile Internet users.

(3) Reduced costs : This is due to availing and using various banking products and services by number of customers online. The transaction fee charged by banking service providers for financial services is much cheaper than conventional retail banking transaction fees. The heavy competition and the price war between mobile service providers also reduced mobile service usage cost.

(4) Flexibility : Because mobile devices are inherently portable, mobile users may be engaged in activities, such as meeting people or traveling, while conducting transactions or receiving information through their Internet-enabled mobile devices.

(5) Increased comfort : Many customers secretly hate their banks because of punitive charges, inconvenient opening hours and unhelpful branch staff. In mobile banking due to quick and continuous access, transactions can be made 24 hours a day, without requiring the physical interaction with the bank.

(6) Time saving : The main benefit from the bank customers' point of view is significant saving of time by the automation of banking services processing and introduction of an easy maintenance tools for managing customer's money. Since the response of the medium is very fast, the customer can wait till the last minute before concluding a fund transfer.

(7) Convenience : The ability and accessibility provided from wireless devices will further allow m-banking to differentiate its abilities from conventional banking and e-banking. People will no longer be constrained by time or place in accessing banking activities. Rather, m-banking could be accessed in a manner which may

eliminate some of the labor of life's activities. For example, consumers waiting in line or stuck in traffic will be able to handle daily transactions through m-banking applications. Consumers may recognize a special comfort which could translate into an improved quality of life.

One opportunity to increase value lies in m-banking capabilities that allow consumers to use banking services where they are not located. This ability to obtain information and conduct transactions from any location is inherently valuable to consumers. As such, m-banking offers tremendous opportunities to expand a client-base by providing value-added services to customers which is difficult to reach. By making services more convenient the customer may actually become more loyal. Consequently, communication facilities within m-banking are key applications for the delivery of convenience. Consumers will be looking for m-banking applications which can deliver functions like : sending and receiving e-mail, voice mail forwarding, document sharing, instant messaging; as well as transactional based activities.

(8) Better cash management : Mobile banking facilities speed-up cash cycle and increases efficiency of business processes as large variety of cash management instruments are available on internet sites of banks. For example, it is possible to manage companies short term cash via online or mobile banking like investments in over-night, short and long term deposits, in commercial papers, in bonds and equities, in money market funds etc. In mobile banking, customers can download their history of different accounts and do a what –if analysis on their own mobile device, before affecting any transaction on the web or through mobile service providers. This will lead to better funds management.

5. 3. Online Banking Financial Model

5.3.1. Difference between Traditional & Mobile Banking

Compared to a brick-and-mortar bank, the comparative advantage for a virtual bank is significantly lower operating costs, and hence lower burden. The cost of operation for a virtual operation was expected at 10% of revenue, as compared with 60% for brick-and-mortar banks, due to lack of investment in physical infrastructure. This was to be the driving force in ensuring profitability, and if all factors remain unaltered, represents a value proposition for investors. This value proposition never materialized. Initially, less than 15% of the pure play(physical branch), new entrant banks were profitable, which was expected to change as the online model became the prevalent mode of banking. However, intense competition necessitated changes in the business model. Lack of name recognition forced virtual banks to pay significantly higher interest rates on deposits, substantially increasing their funding costs. This interest rate differential averaged 1% higher for online customers, limiting profitability.

Additionally, the lack of established lending relationships forced virtual banks to invest in lower-yielding secondary markers, further eroding their return. On average, the net interest margin for virtual operations has been at 1% of assets, as compared with 4% for brick-and-mortar operations. The concomitant increases in funding costs, and lower yields, were not offset by the lower burden. Hence, many Web-based banks were unprofitable and subsequently folded.

Understanding the nature of innovation is a crucial first step in managing the changes associated with any innovation (Afuah, 2003). One can analyze the differences between Bricks-and-Mortar Banking and E-Banking in the dimension of technological knowledge and of business model, and then to examine the possible impact of e-banking on the incumbent banks.

1. Variations in Technological Knowledge

To investigate the changes from traditional bricks-and-mortar banking to e-banking in terms of technological knowledge, one can analyze the key differences in the IT-infrastructure, transaction, and service dimensions (Jen-Her Wu et al., 2006). The history of automation of banking records the shifts in the IT-infrastructure from mainframe, to PCs, to client/server, before the emergence of the Internet. These IT-architectures are embodied in desktop computing and wired networking architecture, which is supported by proprietary electronic network implemented by banks or private third party. In the past, the networking of branches is largely based on the wide area network (WAN) architecture. Traditional banking systems, conducted with the use of information technologies centering on electronic data interchange (EDI) over proprietary value-added networks (VANs) that are established by vendors to deliver services over and above those of common carriers that are licensed by governments to provide financial services to the public. The EDI provided the computer-to-computer exchange of standardized electronic transaction documents and data. In contrast with the Internet, the VANs provide higher security features and quarantined bandwidth. However, the centralized control architecture limits the interoperability of linking additional networks and integration of heterogeneous applications. Moreover, the vast majority of traditional banking applications are based on mainframes and terminals. They are meant to support transaction functions within banks and do not provide much information because of limited bandwidth, platform dependency, and multiple software licenses (Standing, 2002).

An important aspect of banking system is the mechanisms for conducting secure transactions. Until the reorganizations of the mid-1990s, the conventional mechanism for conducting financial transactions in retail banking was via local branches or ATM (Liao and Cheung, 2003). Bricks-and-mortar banking requires a maximum of interaction with physical facilities, processes, and payments. In the context, customers and banks usually need to establish a physical presence in a geographical location in order to carry out transactions there. The mediums of exchange mainly include cash, check, bank cards, etc. Moreover, bricks-and-mortar

banking frequently used bank-self audit systems, database access control, over-the-counter contract, and face-to-face or paper-based confirmation to minimize the risk of fraud, misappropriation, security vulnerability, etc. The typical security schema consists of the combination of user-id, password, stamp and autography.

In contrast, e-banking is a way of on-line transaction via the Internet/mobile network. It constructs an alternative channel by which customers can easily make a transaction anywhere-anytime and reduce their needs for financial intermediaries. Given the open nature of e-banking, security is likely to emerge as the biggest concern among the customers (Cheung and Liao, 2003). Thus far, several well-developed digital transaction mechanisms and online payment systems have been developed to support the new channel. For instance, the new generation of payment systems (e.g. electronic funds transfer networks) based on smart card technology (for use in credit cards, smart cards, electronic cash and electronic purses) with embedded digital identifications (IDs) can be introduced to simplify use of cross-border transactions by global standardization (Sannes, 2000). The typical security schema of e-banking includes the encryption, firewall, and a certification of the bank's server to prevent another masquerading. Now, the popular security protocols include Secure Socket Layer (SSL), Secure Electronic Transaction (SET), Wireless Transport Layer (WTL), and wireless Public Key Security (PKS) (Zhu, 2002).

Over the past years, banking service delivery has already been migrating customers from branch-based operations to online self-services (Simposon, 2002). The nature of the former mainly focuses on internal services such as transactional and administrative functions that allow bank customers to perform routine financial activities and to conduct standardized business transactions by using branch counters. In contrast, an e-banking channel is an internal resource whose utilization must be maximized, and is an interface to the bank's customer base whose usage should enable customer relationship management (Stamoulis et al. 2002). Thus, e-banking should be utilized as an integrated delivery channel that not only focuses on transactional and administrative services but also supports more informational,

financial portal, and self-help services (Sannes 2000, Southard and Siau 2004). For instance, banks could provide additional industrial and financial information, market research reports, financial planning software, and other value-added services. In addition, banks can use collaborative filtering to offer recommendations based on past transaction profile or customer interaction and tailor the services to the customers. Therefore, in the e-banking environment, the customer can have full access to relevant financial information, and needs no longer to rely on the service personnel at the branch office. It also allows customers to do more self-service for themselves, providing greater satisfaction.

2. Variations in Business Model

The term *business model* is used to describe the key components of a given banking business. Bricks-and-mortar banking needs to establish a physical presence in a geographical location in order to serve local customers there. The physical outlet is a most comfortable way of handling money. It can more effectively serve customers with lower IT awareness and acceptance (Liao and Cheung, 2002). Therefore, traditional banks are better able to build customer trust because of their physical presence in the markets they serve. Consumers perceive less risk because there is an accessible location where they can perform transactions, particularly risky trades or register complaints. The over-the-counter operations also help to overcome concerns about the security of on-line payment. Additionally, banks situated in a community can participate in local social networks that enhance trust and brand impression (Stenifield et al., 2003). Traditional banking has realized the value arising out of reduced risk, improved trust and brand embeddedness.

E-banking is driven largely by the prospects of operating costs minimization and operating revenue maximization (Sannes, 2001). Simpson (2002) indicated that e-banking is likely to be implemented where the operating overheads of e-banking delivery of bank services are less than the operating costs of delivery of financial services through branch network. In contrast to traditional banking, e-banking is cheaper and it handles transaction process automatically, without being weighed

down by bulky documents. Thus, use of e-banking has the potential for order-of-magnitude reductions to the cost of processing and transmitting information (Emmon and Greenbaum, 1998). In addition, the mobile communication has low networking fees, application development costs, and overhead costs. E-banking also provides more self-services. It means that the bank requires few resources, resulting in lower transaction and production costs (Southard and Siau, 2004). Due to the electronic channel, the investments in IT and the costs of security management and financial content creation are higher than that in bricks-and-mortar banking. Nevertheless, as e-banking is a new marketspace, to attract potential customers and actually build a brand requires extra marketing investment. On the other hand, because of the bricks-and-mortar banking is rooted in branch-based networking and paid-for infrastructure provided by third-party vendors, high entry and start-up costs are the most prominent barriers for entrants. Thus, the cost structure of both banking models is different.

Now, mobile e-banking also offers tremendous profit potential by providing mobile financial services to attract the mobile consumers. In fact, it is apparent that many banks are motivated to implement e-banking by forces relating to the maximization of the earning through increased market scope and improved customer relationship due to product delivery convenience and service customization (Wind, 2001; and Simposon, 2002). In short, e-banking could reap profits from the successful exploitation of the synergies of innovative financial services and appropriate marketing and pricing strategies via virtual channel. The value network describes the position of a bank within the business linking suppliers and customers, identifying potential complementors and competitors (Afuah and Tucci, 2003). The position of banks is mainly an intermediary in the value network of the banking and financial industry. The role of mediator brings debit and credit sides together and makes financial transactions. In the past, the value network mainly involves the consumers and financial institutions relating to the bank's branch network. In contrast, e-banking has blurred the boundaries between banks and other industries (Liao and Cheung, 2003). The expansion of financial market will intensify the scope

of competitive environments and the complexity of inter-organizational banking involving various stakeholders such as mobile service providers, content providers, financial portal, online stores, retail outlets, etc. Banks have an opportunity for "reintermediation" by developing e-banking (Altinkermer, 2001). The new opportunities brings new challenges - the branch network has been downsized, the traditional value network has been broken up, the competition among banks has intensified, and non-financial companies have introduced financial functions as part of their online offerings (Holland and Westwood, 2001). For example, insurance companies diversify into banking, and retail e-commerce companies provide banking products. Consequently, the arrival of e-banking has accelerated the reconfiguration of the value network in banking and financial industry.

5.3.2. Impact of M-Banking :

The impact of m-banking involves two aspects: the change of technological knowledge and reconfiguration of the business model. Firstly, mobile technology has overturned the IT-infrastructure of branch-based networking and triggered changes in the knowledge about networking, data transmission, computing platform, interoperability, and system design. Next, the m-banking has also changed traditional payment mediums, physical transaction processes, service delivery channels, and security schema into a virtual environment. Finally, the informational, customized, and self-service offerings enhance the existing functions of bricks-and-mortar banking. These novel online services are likely to be significant in differentiating m-banking from traditional retail banking. M-banking makes obsolete the technological knowledge of bricks-and-mortar banking. In addition, the new value propositions of m-banking will trigger the fundamental changes in business model dimensions such as customer value, market segment, customer base, cost structure, revenue sources, and the pattern of banking and financial value network. According to the Abernathy and Clark's (1985) model, both technological knowledge and business model dimensions between bricks-and-mortar banking and e-banking are indeed different. One can therefore classify the innovation from bricks-and-mortar banking to m-banking as disruptive innovation. It implies that m-banking

will change the trajectory of the IT application for the Banking and Financial Industry and evolve a different business model and will strongly influence the existing technological and business capabilities of the incumbent bricks-and-mortar banks along with the progress of m-banking.

5. 3.3. M-banking Models

The business models for mobile banking may be based on Consolidation, Location based services, Immediate product payment, Bill payment, Systematic interoperability, and Non-credit card users. These models are based on specific applications. In consolidation model, the applications that provide consolidated financial views across institutions have value for those people who have banking relationships with more than one financial institution. Such an application would be able to consolidate all assets and liabilities in one view. Visual confirmation of such transactions is one of the attractive features of mobile banking and trading, as the user sees the complete transaction all at once. The restricted screen size of mobile devices is a challenge for this type of visibility, certainly in the near future. In Location-based services model the mobile technology is adopted for identifying and using the actual physical location of the user. This provides an opportunity to customize both data and services by taking into account personal factors and location-related factors (Hightower & Borriello, 2001). Currently, providing and using location-specific information is possible with a wireless device. The costs and benefits of this functionality to all of the parties involved and the risk that users may be reluctant to have their movements recorded in this way. In Immediate product/service payment model, mobile devices afford the opportunity for consumers to purchase goods or services and draw the payment directly from their bank accounts in a manner similar to the debit card. Bill payment model allows payment bills online. One of the arguments that favor the use of a wireless device in many situations is to satisfy the need for urgency. A cell phone is often invaluable in the case of emergency, which is by definition urgent and time sensitive. Generally, there is not much urgency or time sensitivity to bill payment transactions or most other bank transactions, with the possible exception of the minority of investors who

are active traders (Kiesnoski, 2000). Consumers always look for uninterrupted service with an uncomplicated interface between the customer, the device, the wireless service, the network, the merchant, and the bank. This systemic interoperability is a key user consideration in systematic interoperability model. M-banking does offer the potential for a portable payment/banking system that provides systemic interoperability. Presently in most of the countries, the payment mechanism of choice for medium-sized payments is the credit card. Under Non-credit card users model, Mobile banking and mobile payment schemes would have value for those people who do not have a credit card, such as the teenagers, children, or poor credit risks. If this functionality is delivered through facilities developed by the telephone companies, which will aggregate charges onto the telephone bill, the technology could actually contribute to the disintermediation of the banking industry. Banks could, of course, offer a similar micropayment aggregation function. There is some question of which industry is best positioned to do this. Is it the organization with the close connection to the customer's bank account or the organization with the close connection to the communication network ?

5.3.4. Consumer Oriented New Model :

(Our Model on Secured Transaction for Ubiquitous Banking)

The emergence of mobile banking will increasingly be intertwined with the emergence of mobile commerce and mobile payments. M-banking, rather than driving m-commerce, will in fact be driven by the increasing availability of mobile-focused, user-friendly content. And because the rise of m-business will be based on the inclusion of a strong payments engine, which can provide better payment transaction processing services.

Regardless of the bright future of mobile banking, its prosperity and popularity will be brought to a higher level only if information can be securely and safely exchanged among end systems (mobile users and banking service providers). Online banking through mobile service providers is more secure than online banking through internet because of the usage of private network of the service provider (PNSP) and

the users' personal mobile device. The existing electronic authorizations for mobile payment security are based on account - holder authentication by the payment system. The use of secure and convenient mobile personal devices through PNSP could revolutionize the payment, banking and investment industries worldwide.

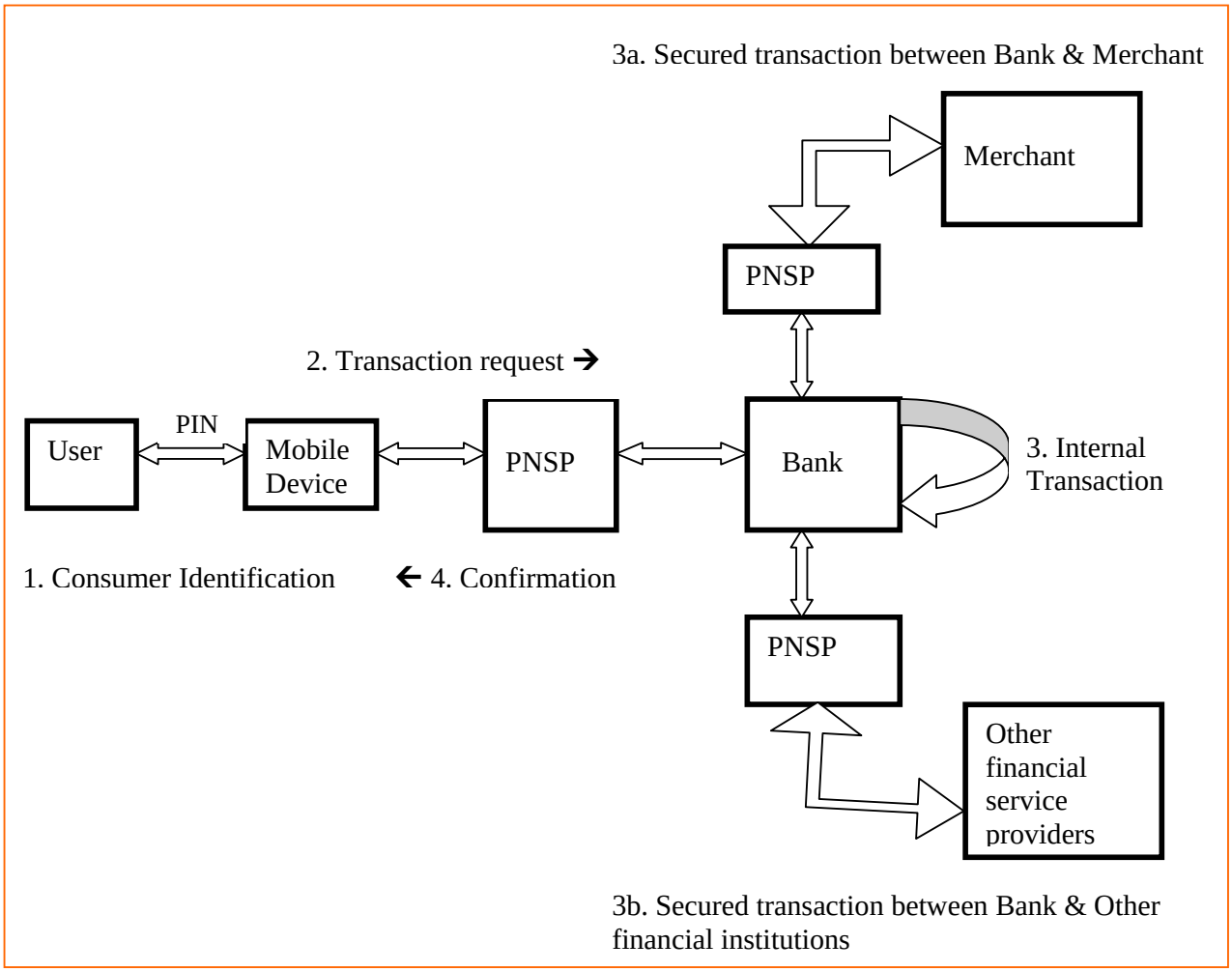


Fig. 5.2 : Consumer oriented model - uses Private Network Service Provider for enhanced security.

In consumer oriented model proposed in this paper (Fig. 5.2), the mobile banking services are provided through mobile network service provider PNSP, either by collaboration or by strategic alliance. A consumer can use any private mobile network to access a particular real or virtual bank. The consumers and businesses in emerging markets are likely to find mobile financial services more attractive than do

their counterparts in developed markets, because they have fewer alternatives. For many remote or low-income consumers, mobile handsets and the mobile Internet could for the first time provide access to financial services such as basic banking and electronic payments; otherwise financial-services providers find such segments impossible to serve cost-effectively. Mobile networks are cheaper to build than fixed-line networks, and mobile services are generally cheaper to roll out than their precursors. A mobile-payments network, for example, can cost less to create and operate than an electronic point-of-sale (POS) merchant network. This means that some countries will be able to leapfrog over intermediate technologies and move directly from a paper-based payments system to a mobile one, without ever having to build an extensive wired POS or automated-teller-machine network.

In this model, based on user request, the device identifies the user through physical possession of mobile phones, passwords, or biometrics such as voice recognition (path 1). The mobile banking service provider authenticates the transaction request from the device via either subscriber identification (as with existing phones) or cryptographic mechanisms such as digital signatures or secure protocols, like the Wireless Transport Layer Security Specification through private network service provider PNSP (path 2). The users can perform secured operations on account balance or loan account statement, transfer money between two accounts in the same bank (internal transaction), loan payment, or payment of electricity, water, phone, credit card and cellular phone/pager bills, through the bank (path 3). The financial transaction can be also performed between the mobile banking service provider, and the merchant for m-commerce payment through PNSP (Path 3a) and/or other financial institution(s) for bill payments or interbank transfer through PNSP (path 3b) and may involve secure payment protocols such as Internet Keyed Payments/Secure Electronic Transactions, or iKP/SET (MacGregor, 1997). After completion of requested transaction, the mobile banking service provider delivers a confirmation of transaction to the user (path 4).

In today's mobile phones, authorization is via subscriber identification mechanisms, which do not provide non-repudiation. However, in future, mobile consumers might also use a secure mobile signing device, to avoid disputes. This device may allow high-value transactions, as well as paying mobile operators who are not completely trusted (such as when roaming). Mobile communication mechanisms (such as GSM) allow the foreign (visited) network to authenticate the user with information from the home network. Charging requires prior agreements between the visited and the home networks. Designers of the Universal Mobile Telecommunications System (UMTS) recognized the difficulty of establishing agreements in advance among visited networks and all home networks (Horn, and Preneel, 1998); thus, UMTS includes mechanisms for dynamic negotiation and setup of roaming agreements between a visited network and a home network. Roaming agreements seek to establish fees and ensure operator trustworthiness.

Operators are trusted to deliver payments in time; foreign (remote) operators are also trusted to not overcharge visiting customers. A secure signing mobile device can prevent fraud (overcharging) by foreign network providers, thereby allowing more automated and variable roaming agreements. Operators can also use the Final Payments protocol, (Herzberg, 2003) to extend pair-wise trust relationships into global trust relationships, allowing automated, secure, low-cost universal roaming.

Other payment scenarios involve mobile service providers participating in the payment transaction itself, not just in its authorization. One motivation is to establish new payment networks, possibly involving mobile operators and financial institutions as providers of mobile payment services. Motivations for establishing new payment networks include the exploitation of business opportunities inherent in the billing, customer-service, and technical relationships among mobile users (and devices) and mobile operators. Another is support for low-value payments (micropayments) and final (irreversible) payments, each possibly yielding additional mobile communication services. Micropayments and final payments using mobile devices may enable the purchase of content and services delivered via the network,

as well as person-to-person payments and money transfers; the latter represents a substantial opportunity, especially in light of the millions of overseas employees worldwide. Moreover, due to their ability to allocate responsibility for fraud, these new payment networks may lower the cost of transactions (as a percentage of the transaction) for large-value payments and money transfers. In other case, the mobile service provider is part of an existing payment network. In either case, the mobile provider acts on behalf of the user as a wallet server, as it is located along the route between mobile device and bank. The mobile service provider may implement a variety of payment protocols, ranging from the complex (such as iKP/SET) to the simple (such as SSL/TLS transmission of credit card numbers). The mobile network service provider may securely inform the bank of any pending transaction, allowing them to reject fraudulent transactions.

To avoid lack of security and a high level of fraud which is a major obstacle to people embracing the possibilities and advantages of using internet based online banking services, in this model, it is proposed to use the secured network provided by mobile network service providers. The integration of present mobile communication technology with banks is an ideal solution to increase the potential customers trust towards ubiquitous financial transactions using mobile devices. This model supports the user identification through physical possession of mobile device, passwords, or biometrics and authenticates the transaction request from the device by mobile banking service provider through mobile network service provider via either subscriber identification or secure protocols, like the Wireless Transport Layer Security Specification. The secured financial transaction is performed by the mobile banking service provider, with the help of the network service provider(s) for financial transactions as well as for bill payments. The transaction process is completed by delivering a confirmation of transaction to the user. Such consumer oriented model changes the attitude of customers towards using m-banking services due to the advantages of convenience, low cost, any where, any time banking and increases trust on online financial transaction.

How much value a mobile-financial-services business can create depends largely on its relevance to a given market. But in any market, a business can create value in two ways: directly, by enhancing benefits to customers or reducing costs for participants, or indirectly, by increasing cross-selling, cutting the cost of acquiring customers, or reducing customer churn. Indirect benefits are available only to the provider that comes first to market with a given service or that has assets or capabilities distinctive enough to retain share once competitors have entered the market.

The low-cost mobile banking can bring into the fold a considerable group of consumers who formerly could be served only at too high a cost. It replaces the most costly elements of a basic banking service (ATMs and tellers) with a deposit and withdrawal process that relies on much cheaper mobile communications and "franchised" (merchant-based) tellers. But the mixing of brand names, distribution networks, and financial services is leading to complex ownership and alliance structures, and extensive vertical integration could undermine competition. Links can lead to fewer benefits for consumers when they exploit reputation or involve sunk-cost investment to reduce competition on price. Mixed conglomerate structures can also challenge a basic principle of competition policy, the separation of content and carriage. Some mixed conglomerates-such as a telecom company merged with a financial service provider-will be able to control content and carriage and can limit access to networks by buyers of services, or to suppliers that wish to access potential customers. Lack of competition may not result in higher prices for financial services, but it could reduce product and process innovation. To ensure competition and innovation, restrictions may be called for on such vertical or horizontal links. In considering such restrictions, authorities will have to balance many issues, including the potential risk diversification benefits of mixed conglomerates and the benefits for competition of entry by non-financial entities in the financial service sector.

At present, banks, for the most part, are watching from the sidelines while their primary role as the premier financial intermediary is being diminished by online

brokers and other financial service providers. As recently as two years ago, many leading banks were preoccupied with merger and acquisition aimed at expanding networks of brick-and-mortar branches rather than creating or pursuing virtual branches in cyberspace. In truth, bankers' main motive to implement Internet banking was, and still is, to prevent the defection of their customers to other electronic banks or other financial service providers. Such consumer oriented model changes the attitude of customers towards using m-banking services due to the advantages of convenience, low cost, any where, any time banking and increases trust on online financial transaction.

5. 3.5. Other m-business Models

1. Core Capabilities Model :

The banking and financial industry (BFI) is transforming itself in unpredictable ways (Crane and Bodie, 1996), powered in an important way by advances in information technology (Holland and Westwood, 2001). Since the 1980s, commercial banking has continuously innovated through technology-enhanced products and services, such as multi-function ATM, tele-banking, electronic transfers, and electronic cash cards. Over the past decade, the Internet has clearly played a critical role in providing online services and giving rise to a completely new channel. In the Internet age, the extension of commercial banking to the cyberspace is an inevitable development (Liao and Cheung, 2003). Both researchers and practitioners in the BFI have highlighted the need for banks to broaden their branch-based delivery channels by embracing electronic banking (e-banking).

E-banking creates unprecedented opportunities for the banks in the ways they organize financial product development, delivery, and marketing via the Internet. While it offers new opportunities to banks, it also poses many challenges such as the innovation of IT applications, the blurring of market boundaries, the breaching of industrial barriers, the entrance of new competitors, and the emergence of new business models (Saatcioglu et al., 2001). Now, the speed and scale of the challenge are rapidly increasing with the pervasiveness of the Internet and the extension of

information economy. However, to successfully cope with the challenge of the e-banking innovation, the incumbent banks must understand the nature of the change and capability barriers that it presents (Southard and Siau, 2004). Without this understanding, attempts to migrate to e-banking may be doomed to failure. Banks that are equipped with a good grasp of the e-banking phenomenon will be more able to make informed decisions on how to transform them into e-banks and to exploit the e-banking to survive in the new economy. Given the e-banking is a financial innovation (Liao and Cheung, 2003), the change may render the organizational capabilities of the traditional banks obsolete. From the resource-based view (Grant, 1991; Mahoney and Pandian, 1992), in such a context, the banks must constantly reconfigure, renew, or gain organizational capabilities and resources to meet the demands of the dynamic environment. Developing core capabilities can help the banks redeploy their resources and renew their competences to sustain competitive advantages and to achieve congruence with the shifting business environment.

Categories of Innovation

Broadly speaking, an innovation is the use of new technological and business-related knowledge to offer new products or services that customers want (Afuah, 2003). To comprehend the scope and impact of an innovation, it is necessary to organize them systematically and to understand them fully (Zwass, 2003). Abernathy and Clark's (1985) innovation model classifies innovations based on the impact on the existing technological and business capabilities of the adopting firm. E-banking is essentially a financial innovation that is enabled by creative use of emerging IT and other business forces (Stamoulis et al., 2002). Accordingly, the innovation encompasses a set of aspects: IT, customer, finance, marketing, and strategy. These aspects can be classified into two major domains: technology and business model that underpin a bank's capabilities (Holland and Westwood, 2001; Wu and Hsia, 2004). A two-dimensional model, adopted from Abernathy and Clark, to analyze the e-banking innovation as shown in Figure 5.5.

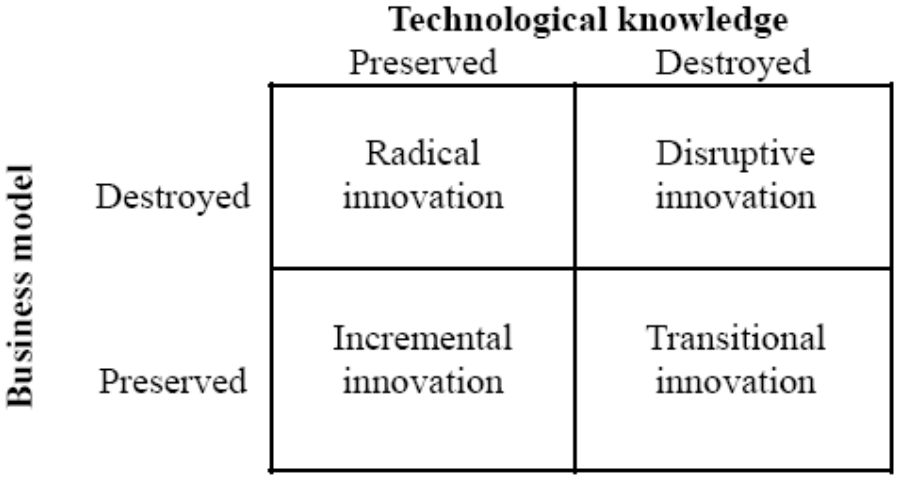


Figure 5.3 : Changes in technological knowledge and business model

The taxonomic model indicates that the subject of innovation can be described in terms of its technological knowledge and business model. An innovation can be placed anywhere on a continuum from *incremental*, *transitional*, *radical*, to *disruptive* depending on the extent to which the innovation impacts the technological knowledge and business model of an organization. An innovation is incremental if it preserves the existing technological knowledge and business model; transitional if it destroys technological knowledge but preserves the business model, radical if it destroys the business model but preserves the technological knowledge and disruptive if both the technological knowledge and business model become obsolete. Technological knowledge here refers to the technical capabilities to mobilize and deploy the new information and communication technologies that help maintain an e-banking environment within and across the organizations.

Core Capabilities

A firm's ability to embrace and exploit an innovation is a function of the extent to which the innovation renders the firm's existing capabilities obsolete (Afuah 2003). The foregoing discussions show that e-banking is a disruptive innovation that will render the incumbent banks' established capabilities obsolete. In other words, e-banking will overturn the existing technical knowledge related to network infrastructure, service offerings, and transaction security mechanisms and will lead

to a radical overhaul of the way of doing business for the traditional banks. In facing the change, the incumbent banks need to undergo business transformation in order to exploit e-banking. To do this, banks have to change their conventional mindsets and reconfigure their capabilities around the needs of e-banking. It requires careful coordination with the development of core capabilities in order to successfully respond to the technological and business changes (Wheeler, 2002; Daniel and Wilson, 2003).

2. Disruptive Innovation Model :

Clayton Christensen's Disruptive Innovation Theory (DIT) is one of the most influential theories in the recent academic and management literature. This is reflected not only in his best selling books "The Innovator's Dilemma" and "The Innovator's Solution", but also in the discussion and follow-up work that his theory created among academics and managers alike.

Christensen suggests a broad definition of the concept of innovation. To him, innovation refers to all changes of "processes by which an organization transforms labor, capital, materials and information into products or services of greater value" (Christensen 1997/2002). Thus, in addition to creating new processes and products, innovation also includes new types of business models. The DIT recognizes two types of innovation: on the one hand, sustaining innovations generate growth by offering a better performance in existing markets. Usually, regardless of whether they are incremental or radical, these innovations are exploited successfully by the established players in an industry and do not lead to revolutionary changes in an industry's landscape. On the other hand, compared to existing products and business models, disruptive innovations initially have a lower performance in the traditionally most important performance criterion (such as functionality, speed, or size).

Even though, in most cases, disruptive innovations are less complex from a technological viewpoint, they are usually brought to the markets successfully by new entrants. Christensen posits that this is due to the behaviour that incumbents and new entrants typically display. Managers in incumbent firms are unwilling to support disruptive innovations because: (1) they usually do not fulfil the needs of the firm's existing and most profitable customers and (2) they offer a much lower profit margin than sustaining innovations do (Enders et al., 2006).

The fundamental assumption of DIT is that in most cases, technological progress evolves faster than customers' demand for better performance. This means that technologies that do not fulfill during their early development stages customer's performance requirements continue to evolve and, at one point in time, overshoot the performance that customers can absorb (see Figure 5.4).

To illustrate this type of evolution, let us consider for example the PC industry. During the 1980s, desktop PCs were not good enough for many business applications. As a result, private and corporate users frequently upgraded their PC equipment and, in order to succeed, PC manufacturers had to provide higher performance. Nowadays, however, the PC processing power and functionalities have improved beyond the point where most users could utilize them. Using the DIT terminology, PC customers have become *overserved*. The driving force behind the above development is called *Resource Dependence*. Its theory states that it is actually customers and investors – not managers – who control the allocation of resources in an enterprise. It is so because companies that invest in projects that do not satisfy the needs of their best customers and do not suit the risk structure of their investors over the long run will not receive the necessary funding. This is also due to the fact that companies generally generate most of their profits with their most demanding customers who are willing to pay premium prices for more sophisticated products. At the same time, profit margins with customers in lower segments are generally much lower. Consequently, innovation efforts tend to revolve around the improvement of products in the high end.

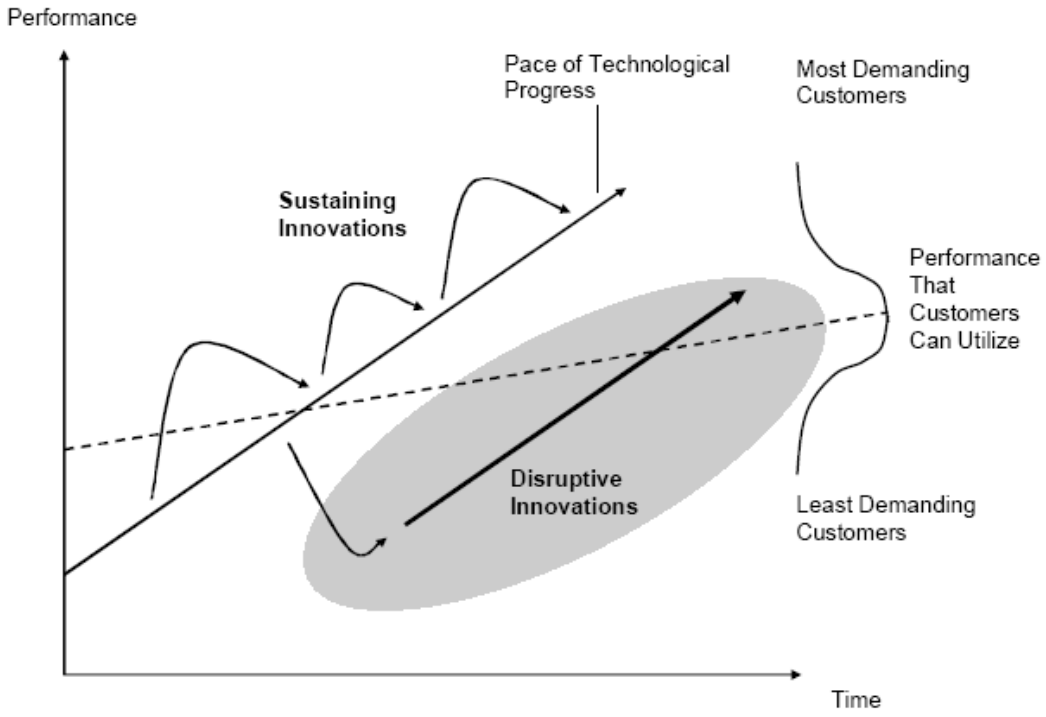


Figure 5.4 : Disruption diagram (Enders et al., 2006)

In contrast to sustaining innovations, *disruptive innovations* originate in segments that are unattractive for the incumbents; i.e., customers with the lowest demands. The key characteristic of disruptive innovations is that they are located in a different *value-network than sustaining innovations.* A Value Network is "the specific context within which a firm identifies and responds to customers' needs, solves problems, procures inputs, reacts to competitors, and strives for profit" (Christensen 1997/2002). They show a lower performance in the dimensions that were valued in the old network, while at the same time offering performance value most important in a different value network.

There are two potential markets for disruptive innovations. First, they can address those customers who are overserved by the functionality of their current provider. In the DIT terminology, this is called a *low-end disruption* and illustrative examples include low-cost airlines, online book resellers (such as Amazon.com) or discount department stores (such as Wal-Mart or Target). Second, a disruptive innovation can

address those customers who have hitherto been *non-served*; i.e., unable to use the product. For instance, the online auction place e-bay allowed Internet users to auction off personal belongings to geographically dispersed groups of customers. Previously, this type of auction had been impossible to conduct. In the DIT terminology, this is called a *new-market disruption*.

In summary, there are two important factors, which together may lead to disruptive innovations. These are (1) overlapping value networks, and (2) disruptive circumstances:

Overlapping value-networks. Disruptive innovations are located in a different value-network, where other performance criteria are the most important purchasing criteria for customers. However, the value-network of a disruptive innovation has a growing overlap with the traditional value-network (Adner, 2002). This means that even though in the beginning, disruptive innovations only satisfy the low-end customers of the traditional value-network, they become attractive for more and more customers in the old value-network who ultimately switch over to the new value-network.

Disruptive circumstances. Disruptive innovations only happen in disruptive circumstances. Either customers are overserved by established technologies or they are non-served customers, i.e., "people who lack the ability, wealth, or access to conveniently and easily accomplish an important job for themselves" (Christensen et al., 2003).

A large fraction of the DIT-literature discusses the question how incumbents can react successfully if they concluded that a specific innovation has disruptive potential. Throughout his publications, Christensen (Christensen, 1997/2002) suggests to consider the following strategic dimensions when deciding how to respond to a disruptive innovation: (1) Organizational design, (2) structure of teams, (3) framing of the situation vis-à-vis the employees, (4) the strategy process and (5) the design of the value chain.

3. Self –Service Model :

Self-service technologies are technological interfaces that enable customers to produce a service independent of direct service employee involvement (Meuter et. al., 2000), i.e. person-to-technology service delivery (Dabholkar, 1994). Self-service technologies are viable for banks and other financial intermediaries because information processing is essential to their services. Automation of standard services is expected to reduce the need for financial intermediaries while there will be continued demand for nonstandard, differentiated transactions and services (Emmons & Greenbaum, 1998).

The current consolidation in banking (Davis, 2000; Mishkin, 1998), together with an expected technology driven globalization of banking infrastructure, threaten to marginalize the parties who choose not to participate in the game. Use of information technology and self-service has the potential for order-of-magnitude reductions to the cost of processing and transmitting information (Emmons & Greenbaum, 1998). *Self-service banking* is the use of selfservice technologies in banking. Examples of self-service banking include banking by telephone and the Internet, EFTPOS (Electronic Funds Transfer at Point Of Sale) terminals, automated teller machines and other interactive kiosks.

The review of literature includes three main areas that are deemed important in conceptualizing a framework of selfservice banking. First, literature in strategy, particularly about firm level value creation (e.g. Stabell & Fjeldstad, 1998) combined with bank specific issues (e.g. Crane & Bodie, 1996) provides a basic understanding of bank strategic issues. Second, literature on information exchange (e.g. Grover, Ramanlal, & Segars, 1999) enables us to discuss the implications of self-service banking on information asymmetry and its implications on the customer relationship. Third, literature on self-service technology (e.g. Meuter et al., 2000) add to a principal understanding of technology-based service encounters in a customer viewpoint.

A bank can be thought of as a mediator in a network of customers that are best modeled by the value network configuration (Stabell & Fjeldstad, 1998). However, implementation of self-service banking differs in scale and scope (e.g. Furst et al., 2000; Sannes & Kyvik, 2000), and we will discuss below how the three configurations can be applied to self-service banking. An online replica of the traditional full-service bank is best viewed as a *value network* since the Internet does not alter any of the basic characteristics of this value configuration. The implication for self-service banking is that the site must support the primary activities of a value network. Network promotion and contract management are necessary in order to recruit new customers into the network and to maintain the relationship with existing customers. Network promotion may include placing banner ads on websites that reach your target groups with links to automated processing of new customers. Contract management applies to changes and renewals of existing contracts. Service provisioning is offering self-service technology that enables customers to perform banking services as selfservice.

Viewing banks as *value shops* implies that banks solve problems for their customers – and that these problems are unique to each customer. We will argue that the advisory services for investments, as well as to a certain extent loans, and financial planning share the characteristics of problem solving as defined in the value shop model. Selfservice in a value shop model is a demanding concept because the customers will be their own experts. As a consequence a bank has to give up its information asymmetry relative to its customers to enable them to give themselves expert advice. The following is a scheme of how the primary activities of a value shop can be supported by selfservice.

A Framework for Self-service Banking

A framework for analysis of self-service banking based on the theoretical background consists of following : First, self-service banking models for the value network and the value shop configurations are presented. Second, these models are compared. The building blocks of the models are the primary activities of the value

configuration, the role of information exchange and service frequency and complexity, and the three purposes of self-service technology.

Self-help is also necessary for standard services. There is no such thing as self-explaining services. Intuitive interface design that is consistent with previous experiences and knowledge will promote adoption and use (Carlson & Zmud, 1999). A major functional requirement is that self-service technology must enable the customer to complete a transaction or service function without help. Information exchange between the customer and the self-service solution must be interactive with easy access to search functions. The more complex service, the larger is the requirements for information content, its organization, and availability. Table 1 summarizes the main issues for self-service banking based on a value network configuration.

5.4. Mobile Payment Methods

Present mobile payment methods are divided into two classes as "out-of-band" payment method and "in-band" payment method. In the "out-of-band" model, content and operation signals are transmitted in separate channels. This model usually involves a system controlled by a financial institution like bank. In this case, payments involved in the financial transaction are usually macro-payments. Various methods can be deployed to ensure the authentication of payment transaction. In credit card payments, dual slot phone is usually adopted. Other approaches include PIN authentication via a SIM toolkit application and the use of a digital signature based on a public key infrastructure (PKI) mechanism that demand the 2.5G (or higher) technology. Another payment model allows consumers to use SMS text messages to pay for access to digital entertainment and content without being identified. In this application, however, it is the SMS message receiver who is charged, instead of the sender of the SMS message. There are a considerable number of vendors who offer this kind of the reverse-charge/billed SMS service payment models.

In in-band payment method, a single channel is deployed for the transfer of both content and operation signals. A chargeable WAP service over GPRS is of this kind. Two models of this in-bank payment are in use, namely, subscription models and per usage payment models, with the amount of the payment usually being small, that is, micro-payments.

M-payments could be made secure using similar technology to that used in ATM or credit cards, which require a password. Mobile dial-up payments substitute a mobile handset for the merchant's point-of-sale (POS) terminal. The merchant takes the customer's telephone number and telephones a payment request--comprising the telephone number and the amount of the transaction--into the payments platform. When the platform receives confirmation through a call or a Short Message Service (SMS) communication to the customer, the sum is transferred to the merchant's account. To access the server that records and processes transactions, the customer needs no debit or credit card (not always available in emerging markets), only a handset loaded with his or her security-identity-module (SIM) card. The merchant's mobile handset plays the role of POS terminal, but far more cheaply than the real thing.

Mobile scan payments enable customers to pay a merchant directly by scanning their mobile handsets against the merchant's POS reader. The reader uses a radio frequency or Bluetooth (a short-distance, high-frequency radio medium) to communicate with a chip in the handset that authorizes and effects the transaction. If the amount is large, the customer gives a personal identification number (PIN) for authentication. The customer's payments platform will either settle the payment from a "stored-value" account, which the customer can top up by mobile (a prepaid option), or pay on the customer's behalf and send out regular bills (a postpaid option). The transaction time is one or two seconds without PIN authorization and four to seven seconds with it--much faster and more convenient than cash or card transactions.

Remote payments, using a process similar to that for mobile dial-up payments, let the customer pay without being present at the point of sale. A bank would make money from merchants using its mobile-payments system much as it does from "fixed"-payments systems. Telecom companies would gain revenue from the airtime used and from whatever share of the spoils their joint-venture agreement with the partner bank allotted to them. Their core business would also benefit from the indirect value of lower customer churn and cheaper customer acquisition costs.

5.5. Security Issues in Mobile Banking

Mobile personal devices, usually with a built-in display and keyboard, are well-positioned to provide a technical solution for reducing fraud and allowing the fair allocation of responsibility for damages from fraud. Some amount of security is already part of the authentication mechanism of existing mobile phones as a way to prevent call theft. Moreover, it is relatively easy and inexpensive for device manufacturers to incorporate additional mechanisms to ensure secure transaction authorization. These mechanisms help prevent most fraud and allocate responsibility fairly for any remaining fraud. For users, their value far outweighs their relatively modest cost (Arumuga perumal, 2006).

Secure transactions using mobile phones consist of four independent processes :

1. Identification process : The device identifies the user through physical possession (as with regular mobile phones), passwords, or biometrics (such as voice recognition);
2. Authentication process : The mobile banking service provider authenticates the transaction request from the device via either subscriber identification (as with existing phones) or cryptographic mechanisms such as digital signatures or secure protocols, like the Wireless Transport Layer Security Specification;
3. Secure performance : The financial transaction is performed by the mobile banking service provider, possibly with the help of the merchant and/or other transaction provider(s) for bill payments and may involve secure payment protocols (such as

Internet Keyed Payments/Secure Electronic Transactions, or iKP/SET) (MacGregor, 1997).

4. Confirmation : A confirmation of the completed transaction is delivered to the user.

Mobile phone devices should incorporate mechanisms to securely authenticate transaction requests that can be used by multiple transactions and scenarios. To allocate responsibility, transaction requests should be digitally signed by the device using a private key (not known to the providers) kept in the device. The user does not have to obtain a public-key certificate from a trusted certificate authority; it suffices that the agreement between the user and the provider states the public key and the algorithm. To reduce hardware costs, designers may prefer public-key signature algorithms (such as the Digital Signature Algorithm, or DSA (Digital Signature Standard, 1994), so most of the computations are done offline, and online signing is efficient.

The device displays the transaction details to the user and asks his or her consent for each transaction request. The device should ensure the user is aware of the entire request, possibly by limiting the request format. For example, payment transactions may display the amount and other transaction details related to that particular financial service.

The security of this design depends on the secure operation of the mobile personal device, including its user identification. Some current mobile devices, including phones, use only simple, preprogrammed processors, and therefore can be trusted to operate securely. However, some devices support downloaded, general-purpose applications and like computers, may be vulnerable, as with viruses.

Secure transaction authorization may, therefore, involve a secure coprocessor, used only to authorize transactions and possibly to view confidential data. There should be visible indication when the display and keyboard are controlled by the secure co-

processor, allowing the user to securely identify (such as by password) and authorize transactions. The co-processor is invoked by the main processor to authorize transactions, providing the raw request in shared memory. If authorized, the co-processor returns the signed transaction request in the shared memory.

The simplest secure transaction architecture involves only the user, the device, and a single transactions provider (such as a bank, brokerage, or insurance company). The user identifies to the mobile device, possibly through secure identification mechanisms (such as a PIN, voice identification, or fingerprint); the device then authorizes a transaction to the provider (such as money transfers and investments). Authorization is preferably through some secure public-key signature process, allowing precise allocation of responsibility for fraud (disputed transactions). However, less secure forms of authorization (such as relying on subscriber identification and/or encrypted passwords) may suffice for some applications, as in e-banking and mobile commerce solutions.

More complex payment transactions such as mobile purchasing typically involve at least one additional party, the merchant. In the simplest case, the merchant receives payment from external payment/transaction provider (such as a bank or credit card company); the mobile transaction provider authorizes the transaction.

Wireless communication capability supports mobility for end users in mobile banking systems. Wireless LAN and WAN are major components used to provide radio communication channels so that mobile service is possible. In the WLAN category, the Wi-Fi standard with 11 Mbps throughput dominates the current market. It is expected that standards with much higher transmission speeds, such as IEEE 802.11a and 802.11g, will replace Wi-Fi in the near future. Cellular networking technologies are advancing at a tremendous pace and each represents a solution for a certain phase, such as 1G, 2G, and 3G, in a particular geographical area, such as the United States, Europe, or Japan.

Compared to WLANs, cellular systems can provide longer transmission distances and greater radio coverage, but suffer from the drawback of much lower bandwidth (less than 1 Mbps). In the latest trend for cellular systems, 3G standards supporting wireless multimedia and high-bandwidth services are beginning to be deployed. WCDMA and CDMA2000 are likely to dominate the market in the future.

Frauds in Present Technology Environment

With banks deciding on setting up networks and computerize the whole banking process, to offer their services on multiple channels, they now face risks both from inside and outside. This section describes the kind of frauds that can happen in this environment.

Some more avenues for frauds in this emerging banking scenario :

- **Mail Spoofing –** E-Mail Forgery: sending wrong information to bank customers as if its from authentic bank sources
- **Web Spoofing –** Web Site Forgery: Diverting the customers of a bank to an exactly duplicated forged web site and impersonating those customers on real bank site
- **Attacking the User Computer**: To take control of that machine
- **Attacking a Bank's Server**: To take control of that machine
- **Media Tapping –** recording the whole transactions of a bank, or customer etc and replaying the same for their advantage
- **Denying Service**: Though the server is available, making it not able to render service, by poisoning the Network Infrastructure.

Prevention

A close observation reveals that all frauds happen due to impersonation, sniffing information on its travel and hacking into the computer. The impersonation can be for an individual, a web site, a computer, a router etc. The frauds due to impersonation, sniffing can be minimized by adopting PKI – Public Key Infrastructure. Frauds due to hacking and not able to deploy PKI, etc. can be minimized by firewalls, IDS – Intrusion Detection System.

Biometrics Authentication :

Biometrics is one approach to the authentication of an individuals claimed identity. Recognizing individuals through observation of particular physical characteristics is known as biometrics. A biometrics authentication is a two-stage process. During the first stage, some sort of capture device is used to take a measurement of particular physiological or behavioral characteristics and in the second stage; the measurement is compared to a stored value. Based on the comparison result the system makes an authentication decision. Biometric technologies do not actually compare the physical traits that they are designed to use as a unique identifier, rather, they create templates for comparison. This enrollment process may require the individual to provide multiple instances of the biometric trait. The initial comparison templates are created during an enrollment process. Figure 5.5 shows the diagrammatic representation of a biometric authentication system (Arumuga perumal, 2006).

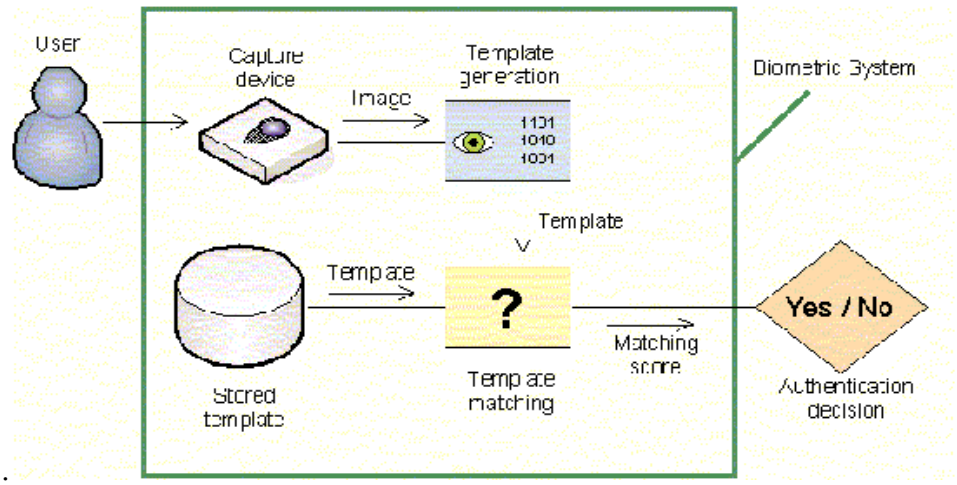


Figure 5.5 : Biometric authentication system

One way to increase the strength of an authentication mechanism is to use multiple factors of authentication. In the case of biometrics, this could involve requiring the user to input a password or PIN (Personal Identification Number) or to produce some sort of authentication token such as smart card that contains both the PIN and any one of the biometric systems with 1:1 matching. The advantage of such is that many are designed to operate with biometric systems and have sufficient space for

storage of biometric templates with them. However, assessing the extent to which an additional authentication factor can increase the overall strength of the authentication services. When passwords are used for authentication, the decision is made relatively straightforward- if correct password is supplied the result is positive authentication, otherwise the individual is rejected. A biometric authentication is conceptually different, in that the decision is based on a probability. Any organization considering the use of biometrics needs to understand the impact of this when reaching a trust decision.

Biometrics is a measurable physical characteristics or personal behavioral trait used to recognize the identity or verify the claimed identity of an enrollee. Examples of physiological characteristics that are used in biometric device include fingerprints, the geometry of the face or hand and patterns within the iris or retina or in the layout of veins. Behavioral characteristics include voice pattern, gait and the dynamics of handwriting or keystrokes. For the authentication process the chosen characteristics must be unique to each individual. Also it is possible to measure the characteristics with the reasonable degree of accuracy. Once the measurement has been taken the data is converted into a biometric template. A template is a representation of the measurement that retains all the relevant information but takes up far less space than the original. It is this template that is compared to a template generated in the same manner during the initial enrolment procedure and based on the similarity of the two, a decision is made whether the user should be granted access.

Physical Biometrics are :

- Finger print -Analyzing fingertip patterns
- Facial recognition location - Measuring facial characteristics
- Hand geometry - Measuring the shape of the hand
- Iris Scan -Analyzing features of colored ring of the eye
- Retinal scan -Analyzing blood vessels in the eye
- Vascular patterns -Analyzing vein patterns

- DNA -Analyzing genetic makeup
- Biometric data watermarking is used to store/hide biometric information

Behavioral biometrics are :

- Speaker/Voice recognition system -Analyzing vocal behavior
- Signature/handwriting -Analyzing signature dynamics
- Keystroke/patterning -Measuring the time spacing of typed words

There are various biometric products and you'll encounter a plethora of fingerprint scanners, voice and facial recognition system, retina/iris scanners, hand geometry devices and signature verification systems.

Need for National Organizations for Financial Sector

From the above discussions, it is clear that 100% preventions are impossible. Internet and its technology with in Intranets grew to such an extent that it is highly difficult to close the holes that it left.

There is a need for an authority, which authorizes any electronic services by specifying norms, standards and business practices for conducting business online. No one should set up a service or server for business purposes, without taking permission from this authority, just like Registrar of Companies. Separate organizations can be thought of, for different functionalities like – Certifying Authority, Security Audit, Incident Response, Information Sharing, Consultancy and Training etc, which help the banks in their ongoing efforts to adopt the technology and live with the technology.

The software and hardware used by (business) service provider should be verified by the authority and the integration of software and hardware devices through the APIs provided by both the sides, should be checked and disclosed, in such a way that the service provider can no way tamper with the information of the user while rendering the service. This is needed not only to protect the privacy of the user, but also to help fair on-line transactions without allowing any fraud to take place.

5.6. Conclusion

The managerial implications of benefits of adoption of mobile banking as a new distribution channel by Indian Banks, business perspective of mobile banking by means of SWOT analysis, and various benefits of mobile banking from customer's point of view are discussed. Various mobile banking models and securities in financial transactions are discussed based on the basis of variations in dimensions, and technological knowledge. The existing three mobile business models viz., Core capabilities model, Disruptive innovation model and Self-service models are discussed along with their limitations. In order to provide better security for financial transactions, a new mobile banking payment model called "Consumer oriented mobile business model" is proposed and discussed. The consumer oriented model allows customers to pay online for their shopping from their bank account using mobile devices. In this chapter a brief survey on security issues in mobile banking scenario is also discussed along with possible frauds and causes of the frauds. A need for National organization for controlling the frauds in financial sector is discussed and the managerial implications & advantages of "consumer oriented mobile business model" to decrease the possible frauds are also discussed and demonstrated for secured financial payment for online purchase. The model is compared with other existing mobile business models. The managerial implications on banker's perspectives and customers perspectives on mobile banking adoption are discussed.

CHAPTER SIX

Suggestions for Suitable Policy and Regulatory Guidelines for Mobile Banking in India

CONTENTS **PAGE No.**

6.1. Introduction

Mobile banking requires transparent and clear policy and regulations in order to provide privacy and safety on personal data and about the precision of the transmitted data and its potential misuse while carrying out mobile electronic financial transactions. The contracting parties, therefore, should be able to count upon the law to enforce the provisions of contracts that are concluded using (mobile) electronic devices, if required. Further, the customer should be able to trust the privacy of his personal sphere. A clearly defined regulatory framework is, hence, indispensable to boost consumer confidence and increase acceptance amongst broad sections of the society as well as to ensure smooth functioning of Mobile business.

The legal regulations imposed by the lawmaker, thus, intend to safeguard and balance both consumer- and business interests by setting rules and regulating the market as well as the usage of existing and emerging technologies. They impose the highest level of restrictions that govern legally carried-out transactions (Veijalainen et al., 2003). Regulations applicable to Mobile banking are generally guided by five principles (Heinemann et al., 2004):

1. Legal enforceability of contracts
2. Consumer protection
3. Privacy of data (no unnecessary, unauthorized data collection)
4. Confidentiality of data (protecting authorized data from misuse)
5. Right of self-determination (to carry out or reject a communication)

In this chapter, we have discussed the various legal factors and regulatory challenges which affects secure electronic financial transactions, Existing Guidelines of Indian IT Act 2000, Recommendations based on present study on Policy and Regulatory Guidelines to Indian Government for Mobile Banking, Suggested Recommendations & Guidelines to Indian Banks while providing mobile banking Services to their customers, and certain guidelines to the customers while using mobile banking services.

6.2 Policy on M-banking

6.2. 1. Legal Factors Affecting Secure electronic Financial Transactions :

1. The Issue of 'Signature'

Although the growth of online transactions (particularly credit-based) has relied to some extent on trust, it has however, raised the issue of the legality of electronic transactions. Like e-consumers, legal authorities also equate digital signatures with manual signatures in the traditional contracting contexts. In reality, although the word 'signature' connotes letters and writing, and the term "digital signature" has been conceived in a generic and technology-neutral way, it has been argued that, to apply the term "signature" to what can be performed using (asymmetric) cryptography technology is "simply inappropriate and misleading" (Wind, 2001). But although digital signatures have acquired legal status, the legal definition of "digital signatures" is proving very difficult to map onto online security technology functions.

2. Model Law on Electronic Signatures

In an attempt to bring additional legal certainty regarding the use of digital signatures, the United Nations Commission on International Trade Law (UNCITRAL) adopted a Model Law on Electronic Signatures in 2001. Based on Article 7 of the UNCITRAL Model Law on Electronic Commerce (1996), it inferred that subject to certain criteria of technical reliability, electronic signatures will be treated as equivalent to hand-written signatures. The Model Law thus adheres to a technology-neutral approach and avoids any bias toward the use of any specific technical product.

3. The Indian Situation

3.1 Current Legal Infrastructure

In any e-commerce transaction, it is important to guarantee that a valid contract has been entered between the parties especially since the contracts are paperless. Hence many developed countries have enacted legislation to this effect. However, in some nations, there is an absence of legislation on electronic transactions, and hence assessing the validity of electronic contracts and other electronic documents becomes complicated as existing legislation is inappropriate in dealing with online business

transactions. This puts Indian businesses at a greater risk than businesses in developed countries when engaging in e-commerce transactions.

3.2 Mobile Services Access and Cost

Although there is emphasis on security in the developed world, other major problems to the expansion of mobile financial transactions in the developing world are the lack of telecommunications and mobile phone connectivity.

3.3 Increased Security

Further, since September 11, 2001, issues of authentication have now become extremely important. Many US web sites now only cater for US customers while former international customers, who were previously issued international visa cards, are debarred from engaging in online purchases. This has negative connotations for both local businesses and consumers to buy-in into global mobile banking. Consequently, there is a lack of confidence in digital signatures and a general reluctance to engage in mobile banking.

6.3. The Regulatory Challenges

At the national level, the Indian government and the relevant regulatory agencies have strived to match the rapidly changing online banking environment with necessary regulations and institutional frameworks. Earlier efforts made to this effect included the enactment of the Failed Banks (Recovery of Debts) and Malpractices in Banks Decree No.18 of 1994, and the Money Laundering Decree of 1995. However, as noted above, poor enforcement procedure rendered these instruments very inactive. By the late 1990s, following record growth in Internet and computer usage in the country, almost all the regulations guiding the banking industry, including the *Banks and Other Institutions Act*, were lacking adequate provisions to accommodate the emerging trend. Not even a mention of electronic banking or any manner of its application was mentioned in any of those prevailing regulatory documents. The situation created a lot of gaps between the levels of regulatory tools and the advances in information technology. This at the same time made the banks vulnerable to all kinds of risks, including transaction, strategic, reputation and

foreign exchange risks. This deficiency notwithstanding, it was not until 2003 when the maiden guidelines on electronic banking came into force.

Despite its numerous technical specifications, the Guidelines have been widely criticized as not being enough to check the growing popularity of Internet banking against the backdrop of growing sophistication in technology related crimes and frauds. Closer examination of the contents of the Guidelines equally shows that the document fails to meet up with the four key areas where Internet banking may have regulatory impact – changing the traditional lines upon which existing regulatory structures are laid; handling concerns about existing public policy issues; changing the nature and scope of existing risks; and rebalancing regulatory rules and industry discretion. Part of the criticisms is that the recent guidelines that are capable of constraining the practice and development of mobile banking in India. One of such areas, for instance, is the requirement on electronic banking product development. While acknowledging that the existing regulations would apply wholly on electronic banking, The Guidelines also gives indications that the products/services can only be offered to residents of India with a verifiable address within the geographic boundary of the country; any person residing physically in the country as a citizen, under a resident permit or other legal residency designation under the Indian Immigration Act;. The Guidelines go further to indicate that the e-banking service should be offered in India only; and that where such a service is to be provided in foreign currency, it should be to only the holders of ordinary domiciliary accounts, and conform with all other foreign exchange regulations. On some other aspects, the Guidelines have also been criticized for not addressing adequately the critical issues concerning online security. It failed to explicitly recommend a standard that allows banks to examine potential threats that may already be in existence in each individual financial institution's current network.

In addition to this array of criticisms, the workability of proper wireless technology framework is also queried amidst the poor state of basic information technological infrastructure in the country. This is essentially necessary since e-banking generally

relies on the existence of adequate operational infrastructure like telecommunications and power to function effective. It is expected of the m-Banking Guidelines to provide procedures not only for banks' investment in Internet facilities, but also in promoting customers' access to such. Unfortunately, none of such is contained in the document.

6.4 Existing Guidelines of IT Act 2000

1. Technology and Security Standards:

1.1 The role of the network and database administrator is pivotal in securing the information system of any organization. Some of the important functions of the administrator via-a-vis system security are to ensure that only the latest versions of the licensed software with latest patches are installed in the system, proper user groups with access privileges are created and users are assigned to appropriate groups as per their business roles, a proper system of back up of data and software is in place and is strictly adhered to, business continuity plan is in place and frequently tested and there is a robust system of keeping log of all network activity and analyzing the same. (Para 6.2.4)

1.2 Organizations should make explicit security plan and document it. There should be a separate Security Officer / Group dealing exclusively with information systems security. The Information Technology Division will actually implement the computer systems while the Computer Security Officer will deal with its security. The Information Systems Auditor will audit the information systems. (Para 6.3.10, 6.4.1)

1.3 *Access Control:* Logical access controls should be implemented on data, systems, application software, utilities, telecommunication lines, libraries, system software, etc. Logical access control techniques may include user-ids, passwords, smart cards or other biometric technologies. (Para 6.4.2)

1.4 *Firewalls:* At the minimum, banks should use the proxy server type of firewall so that there is no direct connection between the Internet and the bank's system. It facilitates a high level of control and in-depth monitoring using logging and auditing tools. For sensitive systems, a stateful inspection firewall is recommended which

thoroughly inspects all packets of information, and past and present transactions are compared. These generally include a real-time security alert. (Para 6.4.3)

1.5 *Security Infrastructure:* PKI is the most favoured technology for secure Internet banking services. However, it is not yet commonly available. While PKI infrastructure is strongly recommended, during the transition period, until IDRBT or Government puts in place the PKI infrastructure, the following options are recommended

1. Usage of SSL, which ensures server authentication and the use of client side certificates issued by the banks themselves using a Certificate Server.
2. The use of at least 128-bit SSL for securing browser to web server communications and, in addition, encryption of sensitive data like passwords in transit within the enterprise itself. (Para 6.4.5)

1.6 *Penetration Testing:* The information security officer and the information system auditor should undertake periodic penetration tests of the system, which should include:

- Attempting to guess passwords using password-cracking tools.
- Search for back door traps in the programs.
- Attempt to overload the system using DdoS (Distributed Denial of Service) & DoS (Denial of Service) attacks.
- Check if commonly known holes in the software, especially the browser and the e-mail software exist.
- The penetration testing may also be carried out by engaging outside experts (often called 'Ethical Hackers'). (Para 6.4.8)

1.7 *Physical Access Controls:* Though generally overlooked, physical access controls should be strictly enforced. The physical security should cover all the information systems and sites where they are housed both against internal and external threats. (Para 6.4.9)

1.8 *Monitoring against threats:* The banks should acquire tools for monitoring systems and the networks against intrusions and attacks. These tools should be used regularly to avoid security breaches. (Para 6.4.11)

1.9 *Education & Review:* The banks should review their security infrastructure and security policies regularly and optimize them in the light of their own experiences and changing technologies. They should educate on a continuous basis their security personnel and also the end-users. (Para 6.4.12)

1.10 *Approval for I-banking:* All banks having operations in India and intending to offer Internet banking services to public must obtain an approval for the same from RBI. The application for approval should clearly cover the systems and products that the bank plans to use as well as the security plans and infrastructure. It should include sufficient details for RBI to evaluate security, reliability, availability, auditability, recoverability, and other important aspects of the services. RBI may provide model documents for Security Policy, Security Architecture, and Operations Manual. (Para 6.4.16)

2. Regulatory and Supervisory Issues

2.1 All banks, which propose to offer transactional services on the Internet should obtain approval from RBI prior to commencing these services. Bank's application for such permission should indicate its business plan, analysis of cost and benefit, operational arrangements like technology adopted, business partners and third party service providers and systems and control procedures the bank proposes to adopt for managing risks, etc. The bank should also submit a security policy covering recommendations made in chapter-6 of this report and a certificate from an independent auditor that the minimum requirements prescribed there have been met. After the initial approval the banks will be obliged to inform RBI any material changes in the services / products offered by them. (Para 8.4.1, 8.4.2)

2.2 RBI may require banks to periodically obtain certificates from specialist external auditors certifying their security control and procedures. The banks will report to RBI every breach or failure of security systems and procedure and the latter, at its discretion, may decide to commission special audit / inspection of such banks. (Para 8.4.3)

2.3 With the increasing popularity of e-commerce, i.e, buying and selling over the Internet, it has become imperative to set up 'Inter-bank Payment Gateways' for

settlement of such transactions. The Group have suggested a protocol for transactions between the customer, the bank and the portal and have recommended a framework for setting up of payment gateways. In their capacity as regulator of banks and payment systems of the country, the RBI should formulate norms for eligibility of an institution to set up a payment gateway and the eligible institution should seek RBI's approval for setting up the same. (Para 8.4.7, 8.4.9.1 – 8.4.9.5)

3.8 Inter-bank payment gateways must have capabilities for both net and gross settlement. All settlement should be intra-day and as far as possible, in real time. It must be obligatory for payment gateways to maintain complete trace of any payment transaction covering such details like date and time of origin of transaction, payee, payer and a unique transaction reference number (TRN). (Para 8.4.7)

2.4 On the question of additional capital charge on banks, which undertake Internet banking, the group held the view that standards have not yet been developed for measuring additional capital charge for operational risk. However, this requirement could be covered as the RBI moves towards risk based supervision. (Para 8.5)

2.5 The applicability of various existing laws and banking practices to e-banking is not tested and is still in the process of evolving, both in India and abroad. With rapid changes in technology and innovation in the field of e-banking, there is a need for constant review of different laws relating to banking and commerce. The Group, therefore, recommends that the Reserve Bank of India may constitute a multi disciplinary high level standing committee to review the legal and technological requirements of e-banking on continual basis and recommend appropriate measures as and when necessary. (Para 7.11.3, 6.4.17)

2.6. The regulatory and supervisory framework for e-banking is continuing to evolve and the regulatory authorities all over the world recognize the need for cooperative approach in this area. The Basle Committee for Banking Supervision (BCBS) has constituted an Electronic Banking Group (EBG) to develop guiding principles for the prudent risk management of e-banking activities. This Working Group, therefore, recommends that the Reserve Bank of India should maintain close contact with regulating / supervisory authorities of different countries as well as with the

Electronic Banking Group of BCBS and review its regulatory framework in keeping with developments elsewhere in the world.

6.5. Recommendation

Generally, credit card customers have complete legal protection for online purchases and aren't liable if the card is stolen or used without their authorization (Wolverton, 2002). However, the development of new technologies is rarely affected by law. Yet, as societal use of wireless technologies for online financial transactions becomes increasingly ubiquitous, the issue of the legality of these transactions arises since customers may even be at risk with the use of mobile technologies than they are with credit cards online. That is to say, in an online financial transaction, both parties usually want to be certain of the (a) origin, receipt and integrity of information they receive, and (b) authenticity and identity of each party. Thus, the enactment of laws recognizing the use of digital signatures is an exception to the above generality, given that m-banking needs "standards, regulations, and law to create an environment of certainty, trust and security" (Mann, 2000).

For developing countries to actively engage in mobile banking activities, it is necessary that an information infrastructure be initially developed and supported by the appropriate legislation. This can be achieved by promoting the development, expansion and operation of mobile telecommunication networks and services'. As it stands, mobile banking might take a reasonably long time to fully become of economic relevance in the country's banking practice. Even amidst the regulatory deficiencies identified above, the rising cases of online related frauds originating from different countries have made the online banking environment very complex. The banking industry in the country does not also at present enjoy that level of global integration that may allow for full benefits of mobile banking system. Even at home, the level of public confidence in the banks is not such that can guarantee effective customer patronage of mobile Banking services. Hence in addition to the cases of poor access to the requisite facilities, very few customers actually transact businesses through the wireless technology. This explains why the development of

banks' web sites has not gone beyond information purposes. A situation where banks would have to invest much on acquiring information technology software without attracting enough customer patronage necessary to justify the huge expenditure does not make for a progressive chance for rapid growth in mobile banking in India. With the deficiencies in the existing electronic banking guidelines, and the seemingly lack of proactive measures in other banking regulations in the country, the right environment for mobile banking remains presently not in existence.

6.5. 1. Recommended Policy and Regulatory Guidelines to Indian Government for Mobile Banking :

1. Improve system infrastructure environment for online mobile banking :

◆ Strengthen the mobile network infrastructure of the country to access the mobile banking services anywhere in the country.

◆ Improve the utility bill payment service system.

◆ Improve the settlement system for electronic online transactions.

◆ Improve the collaboration between mobile network service providers and financial service providers to use private network for online mobile financial transactions. This will improve the security of financial transaction compare to usage of open network like internet.

◆ Build-up transaction reporting and reconciliation services.

◆ Establish credit information registry and disseminating system. Credit information system can reduce the extent of asymmetric information by making a borrower's credit history available to potential lenders.

2. Create an enabling policy and regulatory environment for online mobile banking :

◆ Create an enabling policy to strengthen the protection of financial service providers rights and financial contracts by means of suitable laws and regulations.

◆ Improve the judiciary and contract enforcement system.

◆ Both private and public banks should have collaborative groups with mobile network providers in identifying risk management guidance and industry standards that can facilitate the development of online mobile banking within prudent risk parameters without unduly constraining its innovation.

3. Build up a comprehensive online security public policy framework :

The regulation of online mobile banking by government in terms of security is very important for public interest purpose.

◆ Both internet based transactions and transactions through private mobile network require their own security measures for which Government actions and controls are needed to set up a framework for digital signatures and to designate agencies or processes to authenticate public keys associated with transactions.

◆ Mobile communication industry and financial services sectors are crucial components of the online mobile financial services framework.

◆ The transaction through mobile network or internet implies that financial services are increasingly borderless and global. Hence mitigating electronic security risks requires unprecedented efforts to promote collective action within countries like inter-agency and public –private sector co-operation as well as across countries by market participants, regulators, and law enforcements.

◆ The security for online mobile financial transition is a risk management problem and proper regulations is required for balancing safety and privacy protection.

The historical role of governments in ensuring the orderly implementation of broad, general purpose technologies which are enabling and transformative in nature is well-known. One need only consider the extensive frameworks of legislation and ways of behaving that surround railroads, electricity, the telephone and the automobile. *For the mobile business to achieve its maximum social and political potential there will have to agreed upon and effective rules of the road, both nationally and globally.*

Government can play a critical role in developing and determining marketplace rules for the digital economy. Such rules can affect the foundation for the

development of a high level of trust and confidence which is necessary for the successful operation of electronic marketplaces. Data protection and privacy, electronic signatures and authentication, spam and cyber-crime, including the threat of identity theft, have emerged as important areas where governments need to be either directly or indirectly involved in establishing such rules of the road. The Indian government has played a significant role in fostering the development of network infrastructure for today's information economy, as well as the ground rules that will be needed for an increasingly network-based economy. Such rules must not only adapt to new technologies, but also reflect the global, borderless nature of modern trade and commerce. Future economic growth, moreover, relies on a set of rules which are consistent and apply marketplace-wide. Accordingly, in order to maintain India's competitive position internationally, the government has acted to make India a world leader in the adoption and use of electronic commerce, by creating a predictable and supportive environment that would ensure consumers and businesses feel comfortable, secure and confident in conducting commerce online.

Traditional policy and regulatory instruments are usually limited in their application to national or sub-national jurisdictions. In the absence of complementary actions in other jurisdictions, however, domestic rule-making for marketplaces which are defined by the conduct of mobile-based business, will have limited effectiveness. Thus, in order to meet national policy objectives effectively in areas such as data protection and privacy, electronic signatures, the regulation of spam and other offensive online content, and consumer protection measures, governments need to coordinate and align their domestic regimes with those in force outside their own jurisdictions, both bilaterally and on a multilateral basis. The public policy challenge for governments rests on their ability to redesign the ground rules for the conduct of international business - first, by adapting the traditional trade rules and disciplines developed through bodies such as the World Trade Organization (WTO) to the realities of a networked international economy dominated by m-business, and

secondly, to harmonize the operation of domestic legal, policy and regulatory frameworks with international norms.

6. 5. 2. Suggested Recommendation & Guidelines to Banks to Provide mobile banking Services :

Recommendations :

The study revealed that "Proper Education & Training" and "Perceived Usefulness" were the most significant factors in encouraging online mobile banking adoption, and "External Environment" was the most significant factor to impede mobile banking adoption in India. It is essential for banks to facilitate encouragement and restrict impediment factors. Therefore, in addition to the direct "push" from banks (in respect of the encouragement factors), indirect persuasion should be carried out as a "pull" mechanism (in respect of the impediment factors).

"Push" strategies for encouragement factors :

Awareness of online mobile banking services is essential in the early adoption stages. As mobile banking services are still new in India, effective presentations using all forms of media advertising such as leaflets, brochures, web pages, etc., will be useful to introduce the services to a wider audience and educate potential customers about the benefits of online mobile banking. To access more potential adopters, information about mobile banking should be provided by bank tellers and bank assistants at branches. The information should include references to "time saving", "convenience" at anywhere any time, "low costs", and "information availability". In addition, banks should design their web sites as effective delivery channels and offer information beyond banking services. Applying the notion of segmentation is also useful in this context; disseminating information through the right channel and the right mode of communication for different consumer segments is likely to increase each segment's probability to adopt technological innovations.

It is essential to provide a well-designed and user-friendly web site to attract potential adopters' attention. The customer should not be required to expend a lot of

effort or time, or undergo too great a change in behavior, to adopt mobile banking services. Information and instructions for SMS banking or WAP banking should be provided in both local languages and English in order to make the adopter comfortable. Wide publicity underscoring the benefits and ease of use by demonstrating mobile banking services should be provided. This could be implemented by providing personal training at bank branches accompanied by good documentation and bank assistance. Regular surveying of customers' responses and opinions of the services should be conducted to ensure continuous improvement.

Reliability of access when needed is one of the key encouragement factors. Although this "reliability" partly depends on customers' mobile networks. Bank should also separate internal and external uses and give priority to external uses. While reliability is a key element from a customer's perspective, so is the security system. It must be enhanced continuously to guarantee integrity of online transactions as this will build customer confidence. Security provisions should be posted on banks' web sites clearly and understandably to create customer confidence and improve the trustworthiness reputation of banks. Security information should be provided in non-technical terms, and be accompanied by standard security statements.

A perception of quality service will increase the bank's image for good services, accuracy and effectiveness. Failure of execution not only causes dissatisfaction and uncertainty to the customer but also makes the whole mobile banking process more complex and less comprehensible. Offering incentives in the form of accumulated points or little increased interest rate for deposits or providing loan for purchasing mobile phones at subsidized rate or having collaboration with mobile phone service providers to give free accessibility for online banking operations are other effective strategy to encourage online mobile banking adoption by Indian customers.

In summary, recommendations for "supplier push" strategies are as follows :

(1) Build customers' recognition of online mobile banking by

- emphasize the advantages of online mobile banking services, i.e. time saving, low

cost services, convenience and information availability; and

☛ provide various types of information both financial and non-financial through proper education on this channel and training on usage.

(2) Attract customers to the mobile banking distribution channel :

☛ provide a well-designed and user-friendly mobile banking model;

☛ provide information in both Local and English languages;

☛ provide demonstrations in public places, e.g. bank branches, department stores, colleges etc.;

☛ provide both electronic and documentary demonstrations of online services; and

☛ regularly survey customers' responses to online mobile banking procedures and further develop the web site.

(3) Attract customers by ease of access:

☛ regularly monitor customers' access;

☛ implement traffic management systems for internal and external users;

☛ co-ordinate services with mobile communication service providers.

(4) Build customers' confidence:

☛ present the security used in both technical and non-technical terms;

☛ outline the procedure and information on how to cope with problems if they occur; and

☛ provide instructions on how to use online mobile banking services safely.

(5) Other strategies:

☛ offer incentives such as free service usage, frequent user benefits (like points), member rewards, etc.; and

☛ provide free access to banks' networks with out any mobile network usage charges, etc.

"Pull" strategies for impediment factor

Banks should develop online mobile banking diffusion strategies by adopting "pull" strategies. Increased diffusion will increase the number of mobile banking adopters since they are likely to come from the mobile phone users population. Furthermore, support from the government and the industry regulator will positively affect online

mobile banking services by increasing the confidence of the adopters. Effective co-operation among banks has to be developed. The value of online mobile banking is increased by linking one activity with both within banks and with outside suppliers, channels and customers (Porter, 2001). Furthermore, banks should collaborate with mobile network service providers because it will enable banks to better control quality of services as well as enhance adopters' accessibility. In addition, a high quality mobile infrastructure should be provided since it is one of the primary requirements for mobile banking channel usage. In order to improve the authenticity and security of the financial transactions, banks should support to produce & purchase mobile phones with bio-metric identification technology.

Support from the government and industry regulator should be effective to increase the growth of online mobile banking services. The Indian government should be encouraged to initiate suitable steps to remove legal and regulatory barriers to mobile-business in general and mobile banking in particular. In addition to lobbying the Indian government, TROI and the RBI, banks should also proactively participate in improving mobile banking services in order to increase online banking. For example, IT 2000 laws should be promoted by the banks in order to reduce customers' perceptions of risks. Current co-operation has been for commercial purposes, rather than for mutual benefit of the industry. This may need the industry regulator, i.e. the RBI, to act as the central authority to improve the external environment.

In summary, recommendations for "market pull" strategies are as follows:

(1) Increase service value by collaboration:

- collaborate with mobile service providers;
- offer free mobile service access;
- expand banking service across banks; and
- increase linkages to suppliers and merchants.

(2) Be proactive:

- support the government to enact mobile business laws (IT 2000) ;

☛ work with the industrial regulator; and

☛ provide education on the uses of the mobile communication and online mobile banking.

Customer-targeting strategies

Banks should focus on people with high purchasing power as the first priority and attempt to shift them online. This requires extensive analyses of customers' needs and the provision of customized services that are of value to them. In summary, recommendations for moderating factors are as follows:

(1) Target right customers:

☛ persuade people who use mobile phone, people have education, people in good positions and appropriate income to adopt the services.

(2) Provide value to customers:

☛ monitor the historical bank usage of customers to know their needs;

☛ provide customized services to customers;

☛ Provide incentives to the customers for usage of mobile banking distribution channel.

Suggested Guidelines :

Users' main reason for using banking online is the speed of the service

☛ Allow users quick access to the information they want. Avoid delaying users by stringing them along over a series of pages with 'teaser' marketing strategies. Also be aware that the use of pop-up windows will disorientate and annoy some users.

☛ Graphics must add value to your site, particularly if they have long download times otherwise users may become frustrated with waiting.

☛ Keep the length of application forms to a minimum - users do not like to spend too long inputting information unless it is absolutely necessary. Ideally, only ask for the mandatory information, particularly for speculative insurance quotations. Otherwise, mark critical fields.

☛ Ensure that progress through multiple screens of forms is made clear by providing orientation cues, e.g. 1of 4. Users are less likely to become frustrated and leave the site if they feel more in control.

Avoid the Use of Ambiguous Terminology

☛ Use the company logo as a link to the homepage, rather than duplicating the word 'home' especially in contexts where 'home' could relate to various things e.g. home insurance or home loans.

☛ Use key words that are clear to users. For example when looking for mortgages, many users did not associate this with "Borrowing" and therefore had difficulty finding the right page.

Provide interactive features that add value

☛ Offer interactive features on the site – make these relevant to the goals and concerns of your customers. Consider features such as loan and mortgage calculators, so that users can input their own details and see how the products on offer fit with their own unique circumstances.

Users must have confidence in your service

☛ Keep all product information up to date. Clearly indicate how recently the site has been updated – customers expect up-to-date information and their confidence in the site can be damaged by the presence of outdated links or references to obsolete information.

☛ Insurance and banking is perceived as a serious business and users do not visit these sites for entertainment. Features of sites such as "fun" areas, for example, may decrease users' confidence.

☛ Logos of your strategic partners can increase user confidence in your site if the company in question is well known and has a good reputation.

☛ Provide alternative points of contact like telephone numbers and address details – on-line customers may require a personal point of contact so that they can telephone,

visit or write to your organization. This is particularly important for customers making significant financial decisions, such as choosing a mortgage.

☛ Avoid the use of small font sizes – visitors to your site can find it difficult to read and it can give the impression that there is too much information, or that they are being presented with the 'small print'.

Users expect to find more than an online leaflet

☛ Users have high expectations of online banking and insurance sites and therefore do not like to have to call up for further information. Ensure that your site provides as much functionality as possible to enable users to find all the information they require and complete their enquiries online.

Online Transactions

☛Offer clear feedback on transactions that have been carried out on-line – users require confirmation that any details they have supplied have been received and acted on accordingly.

☛ Provide clear cues on the security measures taken on the site – customers are often concerned about the privacy of information they enter on-line, and may need reassurance before they proceed. Too much emphasis on security measures may alarm users, so strike the right balance.

Know your target audience

☛ Use a writing style that is appropriate for your target audience - potential customers can be alienated by a presentation style that they feel is targeted at a different group of people.

☛ Ensure graphics and pictures suit the branding and target audience for the site – users may find large images imposing, particularly images of faces. 'Young' faces can also alienate older customers, so consider the message conveyed by your graphics.

Provide incentives and bundled services through mobile banking

☛ Banks should provide incentives in the form of accumulated points or enhanced interest rates or preference in loans to the customers for usage of mobile banking services.

☛ Banks should promote online mobile banking through bundled services like providing insurance support, payment of utility bills, or providing customized services for interested customers in chosen area of customer interest.

6.5.3. Recommendation to the Customers :

Customers should make use of the new ubiquitous mobile banking distribution channel by knowing the advantages of such services. Customers should ignore fear on security of their banking account and fraudulent transactions. Customers should educate themselves to maintain the secrecy of their passwords and pin numbers to maintain secured mobile banking usage. The following are some recommendations to the customers based on present study :

Usage of Technology :

☛ Identify the communication technology and the device technology to be used/required for optimum financial information transformation with your bank.

☛ Study the online transaction instructions from the website/brochure of the bank to avoid confusion while performing on-move transactions.

☛ Identify additional technological requirement/up-gradation to enhance security & user authentication.

Know your banks Services :

☛ Identify the various services available and their advantages/limitations from the bank personnel.

☛ Pursue the bank personnel to give training for how to use various mobile banking services using your mobile phone.

☛ Identify the service charge and incentives offered by the banks for usage of various services through your mobile device.

☛ If your bank is not providing advanced mobile banking services like utility bill payment, micro payment for retailing at shops, find out from when it will be provided.

☛ Identify the bundled services provided by the bank through mobile banking as new distribution channel.

Know your banks & mobile service providers security :

☛ Security is an important aspect of online mobile banking transactions and the usage of this channel depends on how secured the transactions are with that particular bank. The usage of mobile banking services by the customers depends on how best security is provided by the banks and the network service providers.

☛ Customers have to opt for maximum security for their transactions by means of multiple level passwords/PIN and/or voice based or bio-metric based security levels. This provides fraud less transactions of their financial information.

☛ Customers should identify the technology used by both the banks and the mobile network service providers and compare it with National leaders in the industry. If the security part of the technology is convinced, then only the customers should try for mobile banking business.

Maintenance of better security :

☛ By keeping both mobile device and the password/PIN secretly, and using the services of private network providers, the customers can avoid any fraudulent transactions from their banking account.

☛ Using 3G technology enabled mobile devices, using network of such high tech service providers, and choosing the high secured server adopted banks, customers can get better security for long term without any risk.

Better models :

☛ The new models of online banking and payment with proper research and development on improving security will certainly improve customer's confidence on adoption of this new distribution channel.

☛ Financial payment both micro and macro level using mobile device will simplify and integrate the communication, entertainment and financial transactions so that customers can eliminate credit/debit cards.

☛ Ubiquitous financial payment through bank using mobile device allows customers to make efficient and timely decision on their investment and payments.

Confident in online services :

☛ Based on Govt. regulations and service providers' continuous technology up gradation, customers are getting confidence in online financial transaction using private networked mobile devices. Such success factors certainly improve the confidence in new users to use this new distribution channel.

☛ Since online financial services available 24 hours/365 days, and providing better convenience for customers to carryout their financial transactions, customers can enjoy the benefits of online services.

☛ By means of getting proper education and training on awareness & usage of mobile financial services available by the banks, users can definitely improve their confidence on such services.

Encash advantages :

☛ The customers should encash the advantages of mobile financial services such as anytime, anywhere, any amount of time, low cost, and moderately secured.

☛ The customers can encash the opportunity of doing cashless business/purchases/transactions using mobile device.

☛ The advantages like ubiquity, personalization, reduced cost, flexibility, increased comfort, time saving, convenience, and better cash management opportunity makes the mobile banking service as a killer application.

6. 6. General Discussion & Findings

Based on the results obtained in this study, a suitable policy & regulatory guidelines are suggested to the financial institutions to strengthen the mobile business framework in financial sector in India. The chapter includes the summery of existing policy on e-banking with legal factors affecting secure electronic financial transactions, current legal infrastructure in India, mobile services access & cost, increased security and regulatory challenges. The existing guidelines of Indian IT act 2000 in the area of technology & security standards, legal issues, regulatory and supervisory issues are discussed. Finally recommendations have been made on regulatory guidelines to Indian Government for mobile banking. Guidelines are also

suggested to Indian banks to provide mobile banking services and customers to encash the opportunity.

In the study it is found that proper education and training (awareness) on mobile banking services and their security will certainly enhance the usage of mobile banking facility by banking customers. Banks have to plan proper strategy to provide mobile banking distribution channel, to attract existing and new customers to this new distribution channel, to decrease the cost of their business and to provide better service at low cost to the customers along with other advantages. Three conceptual models, i.e., Factors affecting banker's perspective on mobile banking, TSCET model on mobile banking, and Factors affecting the customers view and actual usage of mobile banking, are developed through Focus group interaction and the models are tested by empirical method. A new business model is developed in order to accelerate the financial transaction process and to provide Value added Services to the customers. This consumer oriented model allows customers to pay online for their shopping from their bank account using mobile device. To enhance the security for financial transaction a biometric authentication system is proposed.

6.7. Limitations and Scope for Future Research

In as much as this research meets the desired objectives, it suffers from one setback. The relatively small size of the sample limits generalization of the research outcomes. Relative to the number of mobile phone users in Karnataka and India in general, the sample size achieved in the present study is small. Nevertheless, since this research is exploratory and research in this area inconclusive, this limitation creates an opportunity for future research. By increasing the sample size, and testing this model more extensively, future research would be more generalizable. Future research could redesign the model by treating the independent dimensions as moderators of the relationship of perceived usefulness, ease of use and credibility with behavioral intention. By regarding computer self-efficacy and prior banking experience as moderators, one can better understand the level or extent of influence that perceived usefulness, ease of use, and credibility respectively have on

behavioral intention at different level of self-efficacy and prior banking experience of customers.

The research perspective is focused only on customers and on a certain, limited number of adopter characteristics. These elements narrow the scope of generalization of the findings. The method of analysis used in this work is limited to presenting percentages and proportional scores; implementing more advanced techniques possibly would have given more detailed information. This understanding will assist in developing design and marketing interventions useful in reaching different groups of potential adopters.

6.8. General Conclusion

As the brand new banking distribution channels to Indian consumers, online and mobile banking are still at early stages in India. The current target market for online and mobile banking is relatively small due to its low level of awareness nevertheless, this should not be underestimated. There is good potential for introducing mobile banking services since, mobile banking adoption is not far behind.

In the study, it is found that the proper education and training on usage (awareness) of mobile banking services has substantial effect on attracting more customers to use this new distribution channel. With the objectives : to analyze the significance of mobile business activity in terms of their usability, opportunities, and challenges in financial sector with special emphasis on banking activities in chosen cities in Karnataka State of India, to study the present situation of mobile banking scenario in the country, to identify the gap between mobile communication technology innovations, their penetration in banking industry as a new distribution channel and the customer acceptance of this new distribution channel, to study present m-business models and their limitations, to propose new business model in order to accelerate the financial transaction process and to provide Value added Services to the customers, and to provide suitable policy & regulatory guidelines to strengthen the mobile business framework in the country and the sub-objectives like to

investigate the market status for mobile banking in India, to identify the target customers for mobile banking based on the demographic characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks, the research work come to following conclusion :

1. Penetration of mobile phone usage in India : The accelerated growth of mobile phone usage in India during the last ten years and the expected reach to 500 millions by the year 2010 promises the possibility of customer acceptance of mobile banking service in near future.

2. Growth of mobile banking service providers in India : The qualitative survey shows that banks are realizing the importance of providing mobile banking as new distribution channel to face competition within the industry.

3. Improved mobile banking facilities in India : Due to availability of improved technology and increased high quality mobile service providers, banks are trying to provide basic and transactional and advanced mobile banking services.

4. User satisfaction on mobile banking services (WAP) : The qualitative study on user satisfaction survey on WAP banking is made and it is found that WAP users use this technology in a positive way which reduces their time, and mostly WAP is reliable and comfortable for them. All these points emphasized that the advantages outweigh the disadvantages for WAP customers.

5. Understanding of various mobile communication technology and their penetration in banking sector : An overview of past, present, and future mobile banking technologies is presented. This includes review on mobile communication technology, wireless operating systems, alternative and complementary technologies, information exchange technology, location identification technology, and security considerations. An overview of wireless data services, and mobile communication devices is elaborated.

6. Bankers perspective on providing mobile banking as new distribution channel : The results of the study on Indian bankers perspectives on introducing mobile banking as new distribution channel and evaluation of banks strategy to provide

and to maintain this new channel, Factors determining the adoption of mobile banking by financial services institutions such as organizational issues, strategic issues, operational issues, customer related issues, technological issues, competitors focused issues, and society focused issues have studied and it is found that these factors have substantial effect on the decision of providing online mobile banking as a new distribution channel by Indian banks.

7. Customers intension and behavior to adopt mobile banking distribution channel : A conceptual model on customer acceptance of new distribution channel is tested to gain insight into how customers value and evaluate the mobile banking as a channel of financial transaction and as a source of banking information. The model is tested by formulating suitable hypotheses and through a questionnaire survey conducted at two places in Karnataka state, the relationship in the variables are studies and analyzed through statistical techniques like mean, standard deviation, and t-test. The study identified the factors that are significance for mobile banking penetration and customer acceptance. It is observed that the prior banking experience, education & training on usage, and benefits of mobile banking have substantial effect on acceptance of mobile banking transactions by Indian customers.

8. Customers perspective on mobile banking usage : The security and incentives by the banks have also significant affect on acceptance & usage of banking services over mobile phone. Security factor is found the most important attribute that could motivate consumers' attitudes towards online banking in India. The present study also reveals that proper education and training (awareness) on availability and usage of mobile banking services channel is required in India to attract more customers towards usage of this new channel for their financial transactions along with other factors like technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks, studies in the model. Advertising messages could emphasize security for online banking and novelty for mobile banking.

9. Various m-business models and their limitations : The study also points out the requirement of new, comprehensive mobile business model for secured payment from the customers bank accounts.

10. New business model in order to accelerate the financial transaction process and to provide Value added Services to the customers : The consumer oriented model allows customers to pay online for their shopping from their bank account using mobile devices. A brief survey on security issues in mobile banking scenario is also discussed along with possible frauds and causes of the frauds.

11. Suitable policy & regulatory guidelines to strengthen the mobile business framework in the country : The summery of existing policy on e-banking with legal factors affecting secure electronic financial transactions, current legal infrastructure in India, mobile services access & cost, increased security and regulatory challenges is provided. The existing guidelines of Indian IT act 2000 in the area of technology & security standards, legal issues, regulatory and supervisory issues are discussed. Finally recommendations have been made on regulatory guidelines to Indian Government for mobile banking. Guidelines are also suggested to Indian banks to provide mobile banking services and Indian customers to use such services.

The study comes to the conclusion that Mobile Banking, as an interesting application in Mobile business, is winning the acceptance of the customers and enjoys sufficient demand in future days. Banks are seeing themselves increasingly forced to include Mobile Banking in their product portfolios to avoid negative differentiation against their competitors. Apart from this strategic relevance, there are other financial incentives, too. Their actual scope however depends, amongst others, on the product portfolio and the customer structure of individual banks. This study gave an insight into mobile banking in India, which had not previously been investigated. The study also reveal that proper education and training should be provided on availability and usage of mobile banking services to the Customers by the banks in terms of its importance, convenience, security and negligible cost.

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Appendix

Questionnaire 1

Bankers perspective on Mobile banking adoption as new distribution channel.

1. What is the experience of the manager/employee ?
(a) Less than 10 years (b) 10 – 20 years, (c) More than 20 years.
2. What type of Bank is yours ?
(a) Public sector (b) Private sector (c) Foreign sector
3. Whether your bank provides mobile banking facility ?
(a) Yes (b) No
4. Which of the following is considered as benefit due to mobile banking adoption. (Please tick):
(1) increase in the customer base (2) improvements in customer service, (3) lower transaction costs, and (4) opportunities to offer additional services.
5. Which of the following is considered as limitation for mobile banking adoption. (Please tick):
(1) increase in operational cost (2) increase in likelihood of fraud.

H1: Organization Focused Issues :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree
1. Decision on going for new distribution channels like online mobile banking requires willingness to cannibalize.					
2. Decision on going for new distribution channels like online mobile banking requires Channel specific infrastructural investments.					
3. Decision on going for new distribution channels like online mobile banking depends on organizational infrastructure Investment.					
4. Decision on going for new distribution channels like online mobile banking requires support from senior management.					
5. Decision on going for new distribution channels like online mobile banking requires employees view on new channel.					
6. Decision on going for new distribution channels like online mobile banking depends on organizational size.					
7. Decision on going for new distribution channels should be a win-win situation for both banker and the customers.					
8. Decision on going for new distribution channels like online mobile banking depends on organizational view on loyal customers.					
9. Decision to go for online banking services depends on the number of branches.					
10. Decision on going for new distribution channels like online mobile banking depends on organizational view on cost saving.					

H2: Operational Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Decision on going for new distribution channels like online mobile banking depends on easy operation of the system.					
2. Mobile banking facilitates boundary less operations and widens the network.					
3. Decision on going for new distribution channels like online mobile banking improves efficiency of banking system.					
4. Larger the revenue of the bank, more likely it is an innovator of new channel.					
5. Introduction of mobile banking channel increases the security threat to the banks.					
6. Introduction of mobile banking channel decreases the cost of operation and hence bank can offer higher interest rate for deposits.					

H3: Customer Focused Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Decision on going for new distribution channels like online mobile banking depends on banks view on perceived advantages to its customers.					
2. Decision on new distribution channel depends upon customers' willingness to adopt it.					
3. Decision on going for new distribution channels like online mobile banking depends on banks view on value of customer time.					
4. Decision on going for new distribution channels like online mobile banking depends on banks view on value for customer money.					
5. Decision on going for new distribution channels like online mobile banking depends on banks view on support for high profit customers.					

6. Introduction of new channels like mobile banking supports to enhance the customer base.					
7. New distribution channels like mobile banking increases customers' loyalty.					
8. Decision on going for new distribution channels like online mobile banking decreases customer-banker relationship.					
9. New distribution channels like online mobile banking reduce frequency of customer to visit banks.					
10. Decision on going for new distribution channels like online mobile banking depends on banks view on customer satisfaction.					

H4: Competitors Focused Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Decision on going for new distribution channels like online mobile banking depends on banks view on facing external competition.					
2. Decision on going for new distribution channels like online mobile banking depends on banks view on Better service.					
3. Decision on going for new distribution channels depends on competitors plans for adopting mobile technology.					
4. Decision on going for new distribution channels like online mobile banking depends on banks view on Bundled services.					

H5: Technology Focused Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree
1. Decision on going for new distribution channels like online mobile banking depends on banks vision on technology innovations.					
2. Decision on going for new distribution channels like online mobile banking mainly depends on availability of resources in the form of technically qualified man power.					
3. Decision on going for new distribution channels like online mobile banking mainly depends on banks view on early adapting advantage.					
4. Decision on going for new distribution channels like online mobile banking mainly depends on technology penetration in the					

bank branches.					
5. Decision on going for new distribution channels like online mobile banking depends on growth of mobile phone penetration in the country.					
6. Decision on going for new distribution channels like online mobile banking depends on technology penetration in that bank and possibility of using e-cash.					

H6: Strategic Focused Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Decision on going for new distribution channels like online mobile banking depends on bank's ability to foresee the future of banking.					
2. Decision on going for new distribution channels like online mobile banking mainly depends on the availability of challenge seeking top management.					
3. Decision on going for new distribution channels like online mobile banking depends on banks strategy on Additional & Bundled services.					
4. Decision on going for new distribution channels like online mobile banking depends on banks strategy on profit generation.					
5. Cost saving strategy of the bank would stimulate the bank to adapt the mobile banking channel.					
6. Success for new distribution channels like online mobile banking depends on banks strategy on Customer education and training.					

H7: Society Focused Issues:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Decision on going for new distribution channels like online mobile banking depends on banks view on dissemination of information to the community.					
2. Decision on going for new distribution channels like online mobile banking mainly depends on the banks intension to provide better service to the community.					
3. Decision on going for new distribution channels like online mobile banking depends on banks view on social status of the bank in					

the society.					

Questionnaire 2

(Respondents who have both bank account & mobile phone)

1. Please rate the following statements on awareness & training of mobile banking :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly Disagree
1. I am not aware of mobile banking services.					
2. I would use mobile banking if I know how to use such channel.					
3. I would use mobile banking if it is better than conventional banking.					
4. I would use mobile banking if I can get better service from the bank.					
5. I do not use mobile banking due to security threat.					
6. I can use mobile banking channel only if it is cheaper than traditional banking.					

2. Rate the following perceived usefulness of mobile banking :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. The ability of Ubiquitous service					
2. Cost effective banking service					
3. Time saving in overall banking transactions					
4. Opportunity to get better service.					
5. Status in the society					
6. Transaction using mobile device is challenging					
7. Mobile banking transactions are more secured					
8. Mobile banking transactions are more reliable.					

3. Rate the following perceived ease of use of mobile banking :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Availability of mobile banking and mobile networking services					
2. Ease of switching between new and old models					
3. Ease of making corrections					
4. Ease of opening bank accounts					
5. Ease of deposits and withdrawals					

6. Ease in requesting for cheque books					
7. Ease in funds transfer					
8. Ease in obtaining value added services					
9. Ease in knowing the balance of money in the account					

4. Rate the following perceived cost of use of mobile banking :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. I will use mobile banking only if the effective cost of mobile device is low.					
2. I will use mobile banking channel if the cost of getting service is low					
3. The cost of mobile service will become low if the bank avoids intermediatories					
4. I will use mobile banking channel if the cost of financial transaction is low					
5. I will use mobile banking channel if it has low registration cost					
6. I will use mobile banking channel if it has zero hidden cost					

Questionnaire 3

I Respondents Profile :

1. Gender : ⦿ Male ⦿ Female
2. Age : ⦿ 18 – 24 years ⦿ 25 - 34 years ⦿ 35 - 49 years ⦿ 50 - 64 years ⦿ More than 64
3. Occupation : ⦿ Students ⦿ Employed ⦿ Self employed ⦿ Others
4. Education : ⦿ Graduation ⦿ Post graduation ⦿ Professional ⦿ Others
5. House hold Income : ⦿ Less than Rs. 5,000 ⦿ Rs. 5001 - 10,000 ⦿ Rs. 10,001 - 15,000 ⦿ Rs. 15,001 - 20,000 ⦿ 20,001 - 25,000 ⦿ 25,001 - 30,000 ⦿ 30,001 - 40,000 ⦿ Rs. 40,001 - 50,000 ⦿ Above 50,000

II Banking Details :

6. In What type of following Bank you have account ?

⦿ Public ⦿ Private ⦿ Foreign

7. Are you provided with mobile banking facility from your bank?

⦿ Yes ⦿ No ⦿ Do not know

8. Do you use Mobile Banking Facility?

⦿ Yes ⦿ No

9. Do you use Internet Banking Facility ?

⦿ Yes ⦿ No

10. If you are knowing about banking transactions using mobile phone, how you came to know about it ?

⦿ Bank's Personnel's ⦿ Bank's advertisements ⦿ Banks Direct Marketing Activity (letter) ⦿ From Friends / Relatives ⦿ From other Channels

11. If you are using mobile banking, Rank the following based on the usage

	1	2	3	4	5
Funds transfer					
Checking Balance					
Cheque Book Requisition					

Payment of utility bills	
Online investments	

(1-highest usage, 5-lowest usage)

III Effect of Technology :

12. If you are using mobile banking, rank the following based on the usage of your mobile phone ?

	1	2	3	4	5
Telephone Communication					
SMS Communication					
Internet downloading					
Mobile games					

(1-highest usage, 5-lowest usage)

13. If you are using mobile banking, how you were influenced initially to start it ?

⦿ Bank's Personnel's ⦿ Bank's advertisements ⦿ Banks Direct Marketing Activity (letter)
⦿ From Friends / Relatives ⦿ From other Channels

IV Psychology and Culture :

14. If you are using mobile banking, do you think that the decision of usage of online mobile banking is influenced by reference groups

⦿ Yes ⦿ No If Yes, rate the following ?

	1	2	3	4	5
1. Influenced by Bank employee					
2. Influenced by friends					
3. Influenced by media					
4. Influenced by relatives					
5. Influenced by social community					

(1-highest usage, 5-lowest usage)

V Security Challenges & Trust :

15. If you are using mobile banking, do you think that the security of online mobile banking transaction has a major role on decision for its usage.

⦿ Yes ⦿ No If Yes, rate the following ?

	1	2	3	4	5
1. Reputed banks provides better security.					
2. Multiple level passwords provides better security.					
3. Data encryption provides better security.					
4. Online mobile banking has better security than traditional banking.					

(1-highest usage, 5-lowest)

16. Answer the following based on your view

1. Personal profile of the users :

Please rate the following statements :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Gender of the customer has substantial affect on adoption and usage of mobile banking channel.					
2. Age of the customer has substantial affect on adoption and usage of mobile banking channel.					
3. More the Education level of the					

customer more possibility of using new online mobile banking channel.					
4. The tendency of using online mobile banking has directly related with the income level of the customer					

2. Personal banking experience of the customer :
Please rate the following statements :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Adoption & Usage of mobile banking services need prior banking experience					
2. Adoption and Usage of banking services depends on the type of bank					
3. Bundled financial services provided by the bank through online mobile banking has direct influence on Adoption & Usage of mobile banking services.					
4. Adoption and usage of mobile banking depends upon the awareness on usage of mobile banking services.					

3. Technology experience of the users :
Please rate the following statements:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. Adoption and usage of mobile banking services is influenced by prior mobile phone usage experience for communication.					
2. Computer knowledge of customers have direct influence on adoption and usage of mobile banking services					
3. Internet knowledge of customer has direct influence on adoption and usage of mobile banking services.					
4. Customers attitude of downloading and using different mobile services has direct influence on usage of mobile banking services.					
5. Customers attitude of Frequent usage of ATM and credit cards has positive role on usage of online mobile banking services.					

4. Psychology & Culture :
Please rate the following statements:

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. The human nature of testing new innovation has positive influence on usage of new online mobile banking channel.					
2. The reference group influence has positive effect on usage of new online mobile banking channel.					
3. Mobile banking usage will uplift the status of the customers in the society.					
4. Adoption and usage of online mobile banking services depends on the availability of such services from the service provider.					
5. Adoption and usage of online mobile banking services depends on the availability of mobile communication in the geographical region of the customer.					

5. Security challenges & Trust :

Please rate the following statements :

Statements	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
1. The security of financial transactions has positive affect on user attitude of switching to new online banking channel.					
2. The reputation of the bank have positive affect on user attitude of switching to new online banking channel.					
3. Usage of mobile banking is more if it is reliable					
4. Security relating to mobile banking should be fool proof.					

List of Publications

1. "Promises, Challenges, and Research Opportunities for Mobile Business Activity in India" is presented at National Conference on Infrastructure Management : Emerging Issues, Manipal Institute of Management, Manipal, 16 – 18 May 2003.

2. "Challenges in Emerging Mobile Business Services in India" published in Proceedings of two days workshop on Emerging Management Issues in Service Industry - Manegma 2004, Vol. 2, Page 41 – 49, held at Srinivas Institute of Management Studies, Mangalore.

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Mobile Business Services in Karnataka with special reference to Financial Sector

Final Synopsis of the Thesis

to be Submitted to

MANIPAL UNIVERSITY
Manipal

For Ph.D. Degree

Under the Guidance of
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1. Introduction :

The convergence of the Internet and mobile networks has created new opportunities and applications. Considering mobile business only as an extension of the traditional internet can lead to missing out on unique and differentiable qualities for new value-added opportunities. Mobile banking is considered as potentially one of the most value-added and important mobile services available. The technological changes in mobile networks, mobile devices, and the innovative attributes of mobile internet, advances in the theoretical framework of innovation in services allowed to develop a customer centric analysis of m-banking value proposition. The critical factors in the diffusion/penetration of m-Banking, reasons for failure, and further prospects of success depends on various factors and are different for different countries. Recently, some of the Indian banks started online mobile banking channel as new distribution channel, but the acceptance of mobile banking services by the customers is not encouraging. It is necessary to find the reason for slow penetration of this value added financial service in India.

The entire Thesis is divided into six chapters. The First chapter discusses the opportunity and challenges for mobile business and its adoption in banking sectors in India and also makes a survey on the adoption of mobile banking facility in Indian banks. The Second chapter contains a review on technological aspects of mobile banking, various Technology Acceptance Theories, and bankers and customer's perspective on mobile banking adoption in different countries. This also includes a survey on WAP technology adoption in one of the new generation private sector bank

in India. In Chapter Three, the objectives and the methodology of the quantitative research on Bankers Perspective on providing mobile banking as new distribution channel and Customers perspective on acceptance of mobile banking services are discussed. The findings of research are given in the form of tables, graphs, figures and the results are discussed and interpreted in chapter 4. In the fifth chapter, the managerial implication on quantitative study is discussed and a new mobile business model is proposed for financial sector and is compared with the existing models. The final chapter contains discussion on policy, regulatory guidelines, observations and conclusions made in this study.

In the introductory Chapter of the Thesis, an overview of opportunities and challenges for mobile business is given. This includes various value propositions, implications of mobile devices, implications of mobile networks, mobile business value chain, advantages of mobile business over e-business, mobile business activity including value added applications, types of mobile business markets, legal concerns and implications to applications and service providers. The **chapter 1** also emphasizes the Indian scenario on mobile business and various business sectors which can benefit under m-business transformation. Various research agendas including application level issues, mobile service providers, and Indian traditional and cultural issues are discussed. An overview of Cellular service penetration and usage of mobile phone in India as well as in Karnataka State during 1997 to 2007 are discussed. The chapter also contains information about various easy banking service channels like ATM, phone banking, internet banking and mobile banking. A qualitative survey of adoption of mobile banking facility as new distribution channel in public, private and foreign banks in India is made and various facilities under mobile banking services are identified.

The objectives of this study are to analyze the significance of mobile business activity in terms of their usability, opportunities, and challenges in financial sector with special

emphasis on banking activities in chosen cities in Karnataka State of India, to study the present situation of mobile banking scenario in the country, to identify the gap between mobile communication technology innovations, their penetration in banking industry as a new distribution channel and the customer acceptance of this new distribution channel, to study present m-business models and their limitations, to propose new business model in order to accelerate the financial transaction process and to provide Value added Services to the customers, and to provide suitable policy & regulatory guidelines to strengthen the mobile business framework in the country. The sub-objectives are to investigate the market status for mobile banking in India, to identify the target customers for mobile banking based on the demographic characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks.

The scope of the proposal is to explore the mobile business financial services in B-2-C sector. As for the success factors, this study mainly concentrates on business-related success factors for financial institutions and success factors from the customers point-of-view.

2. Review of the Literature :

An overview of the past, present, and future mobile banking technologies is presented in **chapter 2**. This includes review on mobile communication technology, wireless operating systems, alternative and complementary technologies, information exchange technology, location identification technology, and security considerations. The chapter also contains an overview of wireless data services, and mobile communication devices. Technological aspects of SMS banking and WAP banking, and various mobile payment technologies are also discussed with their advantages and limitations. Since, mobile banking channel is a technological advent, various technology acceptance and

penetration models like Technology Acceptance Model (TAM) originally proposed by Davis, Theory of Reasoned Action (TRA) originally proposed by Fishbein and Ajzen, and Theory of Planned Behavior (TPB) are reviewed.

Literature review on the various research issues like Opportunities and challenges for mobile business in India, Significance of mobile business activity in financial sector with special emphasis in banking sector, and Study and analysis of the mobile banking facilities like SMS banking and WAP banking are also included. Finally a qualitative survey on WAP technology adopted in a new generation private sector bank - HDFC bank and user awareness study is made and the results are discussed.

The qualitative study on comparison of mobile banking services in Public, Private and Foreign banks in India, and User awareness on WAP technology used in HDFC bank is made in Chapter 1 and Chapter 2 respectively as shown in Fig. 1.

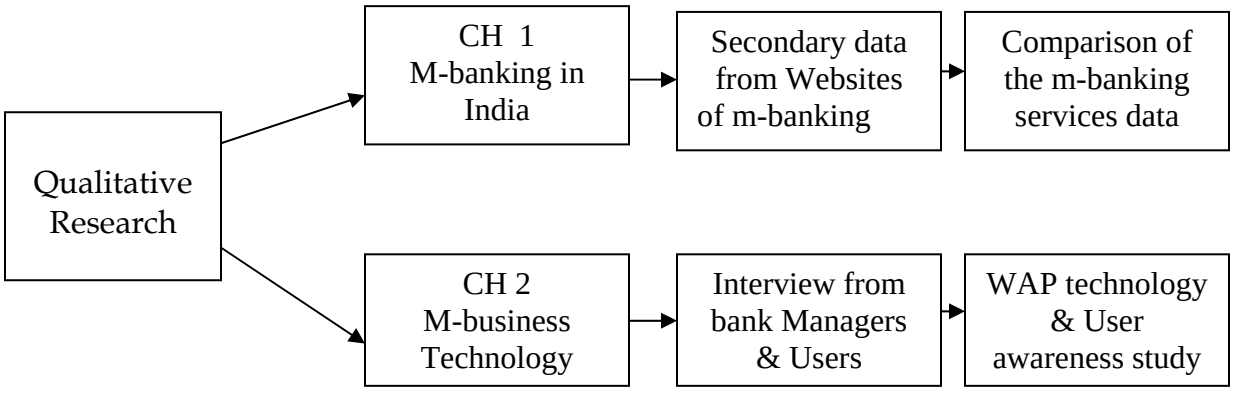

Figure 1 : Block diagram representing Qualitative Research in this Thesis.

3. Research Objectives & Methodology :

The rapid increase in the usage of mobile phones in the Country and their ability to deliver financial services as new distribution channel is the motivator of this study. In

spite of considerable advantages of providing mobile banking facility as a new distribution channel, only few banks in India are provided this facility to their customers. The acceptance of mobile banking services by the customers is also not encouraging. It is necessary to find the reason for slow penetration of this value added service in India. The literature suggests that the customer's behavior, attitude and motivation are the key factors in influencing customer's acceptance of new technology based banking distribution channel. The objectives of the research are :

- To study the mobile banking services available in public, private and foreign sector banks in India through status, facility, and content analysis;
- To elicit Indian bankers perspectives to introduce mobile banking as new distribution channel and evaluation of banks strategy to provide and to maintain this new channel;
- To understand the factors determining adoption of mobile banking by financial services institutions;
- To examine the customers perspective on mobile banking adoption and its effect on intention and behavior of users of mobile banking services;
- To identify the target customers for mobile banking based on the demographic characteristics of users, and to compare attitudes of users and non-users with respect to factors such as technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks;
- To study various mobile banking business models, their suitability to Indian scenario and to propose a suitable business model for mobile business through mobile payment to take care of security and authentication problems;
- To provide suitable policy & regulatory guidelines to strengthen the mobile business framework in the country.

The focus of the present study is to explore the bankers perspectives to introduce mobile banking as new distribution channel and Customers perspectives on mobile

banking adoption. Hence, exploratory research design is identified as appropriate for the study. A quantitative study on Banker's perspective of mobile banking adoption for improving operational effectiveness and service differentiation, and the Customer's perspective on acceptance of mobile banking service using mobile devices is presented in **chapter 3**. The chapter contains an elaborative discussion on responsibility of banks while deploying online banking as new distribution channel through our new "modified customer equity approach model". Through this model another new model for evaluation of banks strategy for online banking is developed in terms of new channel promotion strategy, Fee and incentives strategy, and registration and service strategy and a comparative study is made on adoption of such strategy by Indian banks. The strategy of adapting information technology and hence online banking services by Indian banks is studied by applying "Diniz Model" in terms of informational, transactional and customer relationship functional areas. Various determinants of online mobile banking are identified through Focus group interaction, under the headings : Organizational Focused Issues, Customer Focused Issues, Competitors Focused Issues, Operational Focused Issues, Technological Focused Issues, Strategic Focused Issues and Environmental/society Focused Issues. Based on these constructs, a model on "Determinants of online mobile banking" is developed. Finally a quantitative study on factors determining the adoption of online mobile banking as new distribution channel by financial service providers is carried out through this new developed model. Seven hypotheses are developed for 28 propositions and the hypotheses are tested through questionnaire survey and empirical analysis by collecting data from 100 bank Managers of public sector, private sector and foreign sector banks located in Bangalore and Mangalore of Karnataka State. Before data collection, a pre-test is conducted to test the reliability and validity of the questionnaire. After the pre-test, suitable modifications have been made in the questionnaire.

To study the customer's perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services, two models are described in the present study through focus group interaction. The first model is "Customer acceptance model through Education & Training", and the second model is "conceptual model on customer adoption of online mobile banking".

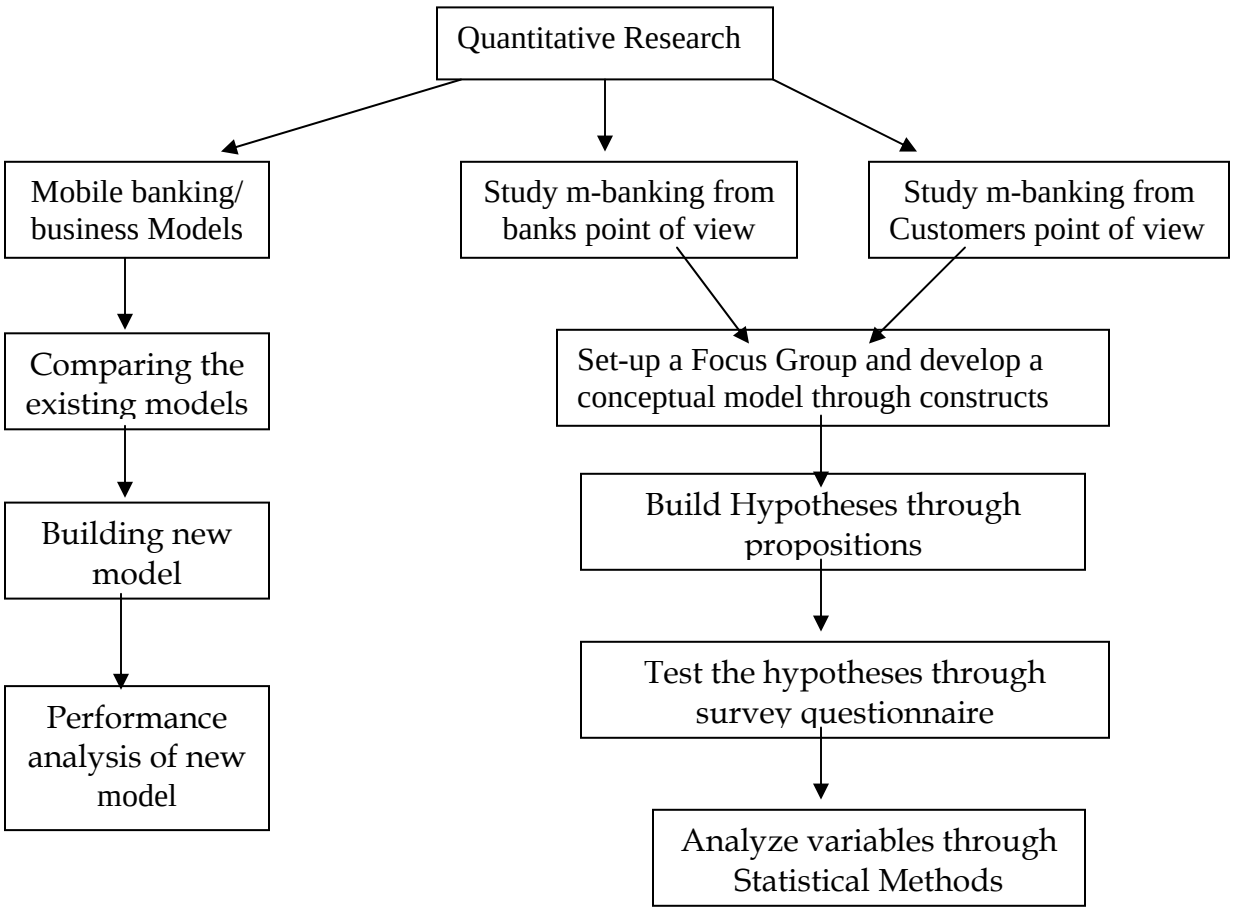

Figure 2 : Block diagram representing Quantitative Research in this Thesis.

In order to explain the customer behavior of adapting mobile banking channel, we have proposed a new model called "Technology Acceptance based on Theory of Customer Stimulation by Education & Training for usage (TCSET). The new model is based on four constructs – perceived usefulness, perceived assurance, perceived ease of use, and

perceived cost. These constructs stimulates the customers intention and behavior control to use mobile banking services. The various issues under, customer behavior and intention to use mobile banking transactions, like attitude, trust, convenience, perception, loyalty, privacy, security and comfort issues are discussed based on the developed model. Hypotheses are developed on identified constructs and issues under customer behavior and intention through Focus group interaction. The empirical test on the developed model is performed by testing the hypotheses by means of a questionnaire survey. In order to select the samples, systematic random sampling method was adopted. The total number of mobile banking service users is collected from the banks and then the sample is generated. Based on the investigator's pilot study, observations, both Bangalore and Mangalore are identified on potential grounds for mobile banking service. The total number of respondents (customers) is 400, of which, 250 respondents are from Bangalore and 150 respondents are from Mangalore. The questionnaire focused on such important issues as customers' attitudes and reactions to new technology, customers' attitudes to the traditional retail banking distribution channel, customers' perceptions of online and mobile bank product attributes, customers' expectations and major concerns of online and mobile banking, psychological factors, and demographic factors.

Respondents are asked to complete a five point Likert scale on each question or proposition. Scales to measure each of the beliefs and attitudes are developed based on existing scales discussed in relevant methodological literature and in surveys in the research area. This data forms the basis of the whole research. According to the chosen methodological research approach the quantitative data are analyzed using statistical methods such as mean, standard deviation, Chi-square, correlation coefficients, regression analysis, by SPSS-program. To identify a hierarchy of importance concerning the critical factors influencing the adoption of mobile banking services, conjoint analysis is used as the appropriate statistical tool.

4. Results & Discussion :

The results of the study on Indian bankers perspectives on introducing mobile banking as new distribution channel and evaluation of banks strategy to provide and to maintain this new channel, Factors determining the adoption of mobile banking by financial services institutions, Customers perspective on mobile banking adoption and its effect on intention and behavior of usage of mobile banking services, and the target customers for mobile banking based on the demographic characteristics of users, and to compare attitudes of users and non-users with respect to number of factors such as technology experience, security & trust, psychology & culture, prior personal banking experience, incentives from banks etc. are discussed in **chapter 4**.

The results of empirical investigation on determinants of mobile banking channel as new distribution channel are discussed under various issues viz., organizational issues, strategic issues, operational issues, customer related issues, technological issues, competitors focused issues, and society focused issues. It is found that organizational issues like : Willingness to cannibalize, Channel specific investments, Infrastructure investment, Support from senior management, Employees view on new channel, Organizational size, Cost savings, Loyal customer; Operational Issues like : Easy operation, Boundary-less operation, Improved efficiency; Customer Focused Issues like : Predicted advantages for the customers, Value for customer time, Value for customers money, Additional support for high profit customers, Reduced/enhanced customer relationship, customer satisfaction; Competitors Focused Issues like : External competition, Better service, Bundled services; Technology Focused Issues like: Technological innovations, Early adapting advantage, Technology penetration, Lower operating cost, Outsourcing, Possibility of using e-cash; Strategic Focused Issues like : Future market focus, Challenge seeking top management, Additional & Bundled services, Profit generation, Organizational strategy, Customer education and training; and Society Focused Issues like : Dissemination of information to the community,

better service for the community; have substantial effect on the decision of providing online mobile banking as a new distribution channel by Indian banks.

The important factors which affect the customer behavior and intension and their decision of customer on adaption of mobile banking for his/her day to day financial transaction is investigated. The TCSET model developed through focus group interaction is further verified and tested by this empirical study and statistical analysis.

In the study, it is found that the proper education and training on usage of mobile banking services has substantial effect on attracting more customers to use this new distribution channel. In the second part of this chapter, a conceptual model on customer acceptance of new distribution channel is tested to gain insight into how customers value and evaluate the mobile banking as a channel of financial transaction and as a source of banking information. The model is tested by formulating suitable hypotheses and through a questionnaire survey conducted at two places in Karnataka state, the relationship in the variables are studies and analyzed through statistical techniques like mean, standard deviation, and t-test. The study identified the factors that are significant for mobile banking penetration and customer acceptance. It is observed that the prior banking experience, education & training on usage, and benefits of mobile banking have substantial effect on acceptance of mobile banking transactions by Indian customers. In addition, the security and incentives by the banks have also significant affect on acceptance & usage of banking services over mobile phone. The concern of customers on security of banking transaction is supported by the figures given in response to a question in Parliament of India on March 4, 2008, the total number of Banking frauds have gone up from 12,374 in 2005 (amounting Rs. 1,385.91 crores) to 21,687 in 2006(amounting Rs. 1,200.87 crores) in 2006, and to 22,280 in 2007 (amounting Rs. 1,077.84 crores). These studies reveal that proper education and training on availability and usage of mobile banking services channel is required in India to attract

more customers towards usage of this new channel for their financial transactions along with other factors like technology experience, security & trust, psychology & culture, prior personal banking experience, and incentives from banks, studies in the model. The study also points out the requirement of new, comprehensive mobile business model for secured payment from the customers bank accounts.

5. Managerial Implications :

This chapter initially discusses the benefits of adoption of mobile banking as a new distribution channel by Indian Banks and a study on business perspective of mobile banking is made by means of SWOT analysis. Various benefits of mobile banking from customer's point of view are also discussed. **Chapter 5** deals with various mobile banking models and securities in financial transactions. Online business financial models are discussed based on the basis of variations in dimensions, and technological knowledge. The existing three mobile business models viz., Core capabilities model, Disruptive innovation model and Self-service models are discussed along with their limitations. In order to provide better security for financial transactions, a new mobile banking payment model called "Consumer oriented mobile business model" is proposed and discussed. The consumer oriented model allows customers to pay online for their shopping from their bank account using mobile devices. In this chapter a brief survey on security issues in mobile banking scenario is also discussed along with possible frauds and causes of the frauds. A need for National organization for controlling the frauds in financial sector is discussed and the managerial implications & advantages of "consumer oriented mobile business model" to decrease the possible frauds are also discussed and demonstrated for secured financial payment for online purchase. The model is compared with other existing mobile business models. The managerial implications on banker's perspectives and customers perspectives on mobile banking adoption are discussed.

6. Suggestions for Suitable Policy & Regulatory Guidelines :

Based on the results obtained in the previous study, a suitable policy & regulatory guidelines are suggested to the financial institutions in the **Sixth Chapter** to strengthen the mobile business framework in financial sector in India. The chapter includes the summery of existing policy on e-banking with legal factors affecting secure electronic financial transactions, current legal infrastructure in India, mobile services access & cost, increased security and regulatory challenges. The existing guidelines of Indian IT act 2000 in the area of technology & security standards, legal issues, regulatory and supervisory issues are discussed. Finally recommendations have been made on regulatory guidelines to Indian Government for mobile banking. Guidelines are also suggested to Indian banks to provide mobile banking services. The chapter also contains an overview discussion of general findings and the general conclusions on mobile business services in Karnataka and in India with special reference to the financial sector.

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