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MOBILE COMMERCE

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CONTENTS

MOBILE COMMERCE

1. INTRODUCTION :

Mobile Commerce, also known as m-commerce, is defined as the process of performing business transactions using handheld mobile devices which are connected through wireless networks. The business transactions may range from buying and selling goods, making mobile payments, downloading audio/video contents, playing online games, using numerous software applications or getting mobile tickets. The mobile devices include cellular phones, handheld computers such as palmtops or laptops, pagers, smartphones and Personal Digital Assistants (PDA). The mobile users can access internet through these devices without any wired connection or a computer. Powered with the emerging technology based on Wireless Application Protocol (WAP), m-commerce employs webready micro browsers in these mobile devices to surf through the internet anytime, anywhere on earth.

WAP-enabled smartphones equipped with Bluetooth technology offer fax, e-mail and phone capabilities to the user to facilitate business transactions while in transit. Such smartphones are becoming so popular that most business houses have adopted m-commerce as the more efficient method of reaching to the customers or communicating with other business partners. The content delivery over wireless mobile devices has become much faster, safer as well as cheaper. The reservation of air/rail/bus tickets through mobile devices saves time and offers peace of mind to numerous passengers. Such services are gradually making m-commerce as the method of choice for performing digital business transactions. For these reasons, m-commerce is sometimes referred to as next generation e-commerce.

2. Wireless Communication Technology

Mobile commerce is based on wireless communication technology. The wireless communication technology has emerged as the new choice of modern corporate world. The wireless networking has some distinct advantages over traditional wired networking that employs co-axial, twisted pair or fibre optic cables for physical connection between two or more computing devices. In wireless networking, the data transfer between computers are facilitated by microwaves, radio waves or infrared waves. It eliminates the cumbersome cabling process involving bulky cables with a significant reduction in labour and material cost as well as development time. The wireless networking technology together with wireless application protocol provides the backbone of mobile commerce applications. In various vertical markets, such as retail, health care, manufacturing and warehousing, mobile commerce gained acceptance and provided increased productivity through the usage of mobile devices. The mobile handheld devices are used to transmit data in real time to centralized hosts through wireless networks.

The mobile commerce that employs wireless technology, offers some extra advantage over the internet based e-commerce. In e-commerce, the internet provides information anytime of the day, while in m-commerce, the information is available anytime, anywhere. In e-commerce, the information is available as long as the user is connected with the internet, i.e. connected with the wired network. If the user is involved with some other activities, i.e. travelling or doing some offline job, which forces him/her to become disconnected from the internet, the information becomes unavailable. M-commerce removes such uncertainties. Wireless networking allows the user to be connected with the wireless internet even if he/she is on the move. Thus, in m-commerce, it is possible to stay online anywhere on earth and anytime of the day. The user can

access information instantly even if he/she is engaged in some other activities, such as travelling or shopping, with the help of the mobile device and the wireless network or internet. This helps the employees to make spot decisions, the customers to ask questions spontaneously and business owners to perform transactions anytime regardless of their geographical positions.

3. Scope of Mobile..--Commerce

Mobile commerce provides instant connectivity between mobile users irrespective of their geographical location and time of the day. With enormous growth of wireless and mobile technology and rapid penetration of mobile phones in developing countries worldwide, the scope of m-commerce has increased manifold. With the advent of super fast 3G access technology that' ensures high speed data transfer rates of the order of 20 Mbps, m-commerce is opening up new vistas of digital media applications. 3G technology, equipped with WiMax and UMTS standards for high speed mobile broadband internet connectivity, supports mobile multimedia application delivery at far greater bandwidths. So, it is now possible for mobile users to watch their favourite TV programmes or download and view famous movies in their mobile devices while travelling.

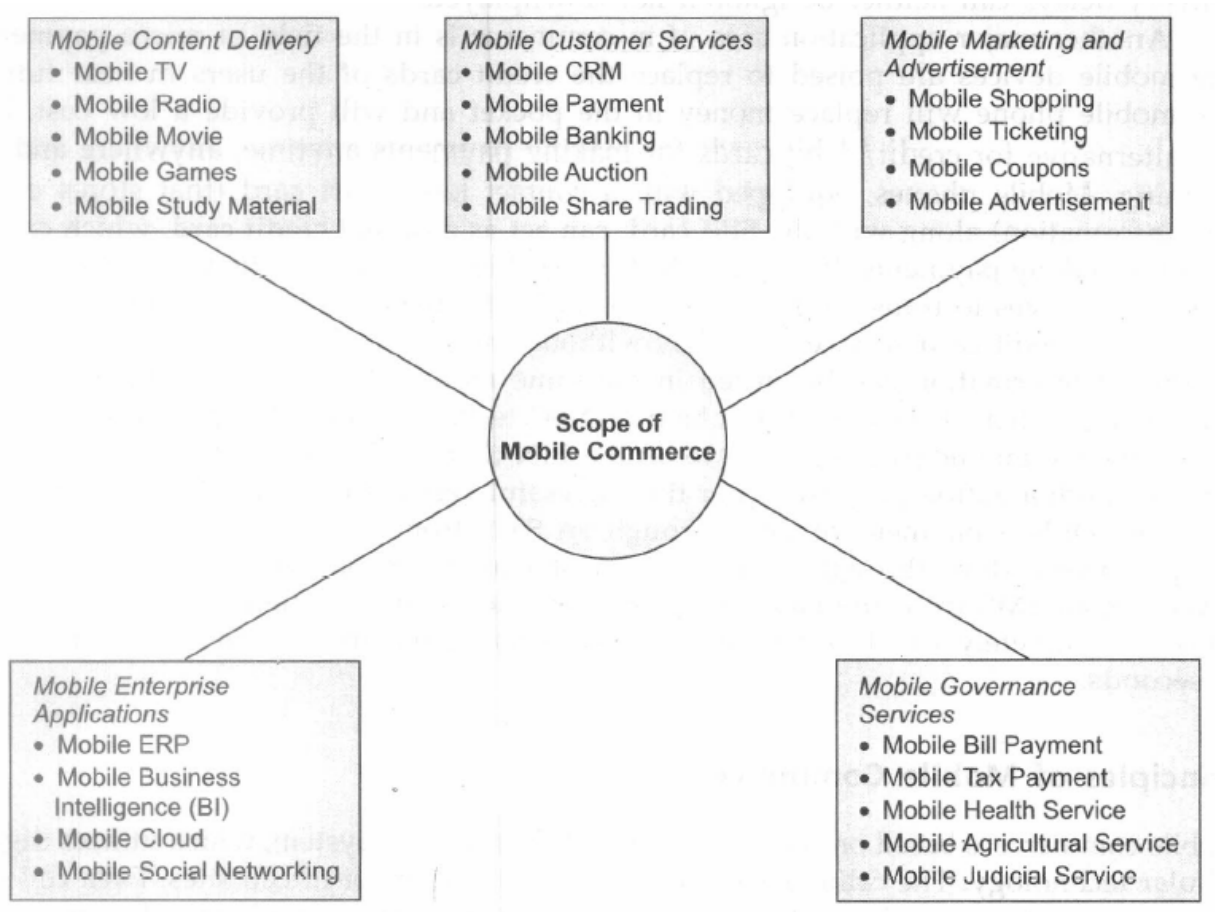

Fig.1 : Scope of Mobile Commerce.

The scope of mobile commerce is all pervasive, and is gradually engulfing all aspects of lives of modern day citizens. Ranging from mobile banking, mobile browsing and mobile ticketing up to mobile marketing, mobile advertising and mobile computing, mobile commerce is gradually

becoming an integral part of both corporate world and common people. With the prices of mobile phone decreasing exponentially and the number of different mobile applications increasing enormously, more and more people will indulge in m-commerce applications and soon it will become the preferred choice of the digital business world.

4. Applications of M-Commerce

Downloading MP3 music, playing online games or participating in live video conferencing while in transit have become a reality now. Apart from such audio/video applications, SMS-based text messaging finds wide acceptance in day-to-day business transactions. Whether to display product promos, to announce new product launches or to give attractive discounts, SMS have become an effective tool for mobile marketing. SMS-based advertisements have become an integral part of m-commerce. The role that SMS play in giving instant support to customers in the event of any kind of product failures or delivery delays can neither be ignored nor downplayed. Another major application area of m-commerce is in the field of micro payments. The mobile devices are poised to replace the credit cards of the users in near future. The mobile phone will replace money in the pocket and will provide a low cost, low risk alternative for credit/ debit cards for making payments anytime, anywhere and for anything. Mobile phones, equipped with a contact less smart card (that stores credit card information) along with the SIM card, can act as a digital credit card, which can be used for making payments. It employs NFC (Near Field Communication) technology that uses radio waves to transmit/receive credit card information from the mobile device to the remote credit card service providers without any physical contact. Multiple credit/debit card information can be stored in the same mobile device and payments can be made using either of these with the help of NFC technique. In SMS-based transactional payments, the mobile phone is used to send a PIN (Personal Identification Number) to a bank for authorization purpose. After the successful verification of the PIN by the bank, the user sends a payment request through an SMS from his/her mobile to the bank. The payment is done through an account transfer by the bank and both-the payer and payee get an SMS from the bank regarding the successful completion of the payment. Thus, a completely cashless payment is made using the mobile phone within 10 to 15 seconds.

5. Principles of Mobile Commerce

Mobile commerce is based on wireless mobile communication system, which utilizes digital cellular technology. The cellular network consists of a number of cell sites. Each cell site consists of a stationary base station (a radio frequency transceiver), an adjacent tower antenna (for transmission and reception of signals) and a surrounding cell (a hexagonal shaped geographical area). Each cell is allotted a band of radio frequencies and provides coverage to any portable mobile device that comes within the geographical range of the cell. Whenever a mobile device such as a mobile phone or a pager, etc., comes inside a cell, it starts communicating with the base station using one of the cell frequencies. The· base station receives the signal from the mobile device and transmits using the tower antenna to a distant base station for call delivery. To distinguish signals received from different mobile devices at the same base station, different access technologies such as Frequency Division Multiple Access (FDMA), Code Division Multiple Access (COMA) or Time Division Multiple Access (TDMA) are used. Whenever a mobile user tends to move away from one cell to another adjacent cell, the cell frequency switching occurs, whereby the old cell frequency is dropped and the mobile device is automatically allotted a new frequency corresponding to the adjacent base station. The mobile

device switches from previous base station frequency to current base station frequency and the communication with the new base station continues without interruption. This is known as cell handover. There are a number of different digital cellular technologies which are used in various mobile phone networks worldwide. These are: Global System for Mobile (GSM) Communication, General Packet Radio Service (GPRS), Enhanced Data Rates for GSM Evolution (EDGE), Digital Enhanced Cordless Telecommunications (DECT), etc.

The geographical location of a base station is fixed, i.e. stationary and the frequency band and location of each base station are registered in the database of a centralized Mobile Telecommunication Switching Office (MTSO). So, whenever a mobile device changes position from one cell site to another, its geographical location can be easily tracked from MTSO. Utilizing this fact, mobile commerce offers a number of location-based services, such as tracking and monitoring of people/vehicles, identifying or discovering nearest ATM machines/banks/hospitals/restaurants and local weather/traffic reports. People tracking can help in criminal investigation where the mobile phone used by a criminal can be tracked and its location is identified. The vehicle tracking is utilized in finding out the actual position of the goods to be delivered and helps in supply chain operation management. The local traffic and weather report can be generated in a local office and delivered to the mobile phone of a user on request. The local bank/ ATM/ hospital/restaurant info can also be delivered to a mobile user at a minimal cost.

6. Benefits of Mobile Commerce

The main advantage of mobile commerce is that it provides instant connectivity to the mobile user, irrespective of his/her geographical location and time of the day. The mobile user can stay connected with his/her business network and gather information even if he/she is in transit and remotely located away from the business installation. The same light weight mobile device can be used for making business transactions or making online payments round-the-clock in a cost-effective way. Highly personalized information can be delivered in the mobile device in an efficient manner to satisfy numerous needs of a large number of customers. The major benefits of mobile commerce are as follows:

Anytime Anywhere

Mobile commerce together with wireless communication technology and wireless broadband internet access, keeps the mobile user connected with the internet while travelling across the globe. The business information is available to the mobile user any time of the day and anywhere around the globe. This anytime/anywhere internet access makes business transactions more flexible and customer communications more efficient, which in turn improves the productivity of the company and increases customer satisfaction. The valuable market information, stock/share prices, inventory position, delivery schedule, etc. are instantly available at the fingertips. Handheld devices, such as Blackberry, etc. work on internet mode and allow users to continuously send/receive electronic mail, download news alerts, stock prices and receive weather updates. The round the clock (24 x 7) internet availability benefits many users to conduct business transactions from their homes or from any other place while on the move and at any convenient time. Thus m-commerce offers greater mobility and flexibility to mobile users in performing business transactions using their handheld mobile devices.

Cost-effective

The costs of transactions using mobile devices are relatively low. The time-critical business data, such as reports, photographs, etc. can be captured and transmitted easily from the mobile devices without involving any bulky expensive equipment. The customer queries can be attended and support provided instantly from the mobile device, thus making customer support more comprehensive. The SMS-based micro payments facilitate bank account transfer within a few seconds and at the cost of an SMS. Contact less smartcard based mobile payments provide a low cost alternative for toll tax payments in mass transit systems. In case of mobile billing, users can pay for electricity bills, telephone bills, petrol, grocery, etc. through their mobile phones. The payments made in the mobile phones for such items will appear as part of their mobile phone bills, thus eliminating the need' for a third party payment mechanism such as, credit cards. This reduces the cost of payment to a large extent.

Personalized Service

Mobile commerce offers a number of personalized services to the mobile users depending on their various requirements and purposes. The digital cellular technology can monitor the location of user performing mobile transactions. Knowledge of the user's location may be used to deliver timely and useful contents such as product availability and discount information to the potential customer. Timely information, such as flight schedules and flight availability can be delivered to the user at the last minute. Delivery of time critical as well as emergency information, SMS-based notifications and alerts can be easily made if the location of the user is tracked. The location tracking is also utilized in offering customized services to the user, such as delivery of discount coupons that can be cashed in and around of the location of the customer. Delivery of regional maps, driving directions and online directories are also possible if the location of the mobile user is known. Another major advantage-of location tracking is that, in criminal investigation, the location of the mobile user can be monitored and recorded as part of the investigation process.

7. Limitations of Mobile Commerce

Although mobile commerce has some distinctive advantages, such as instant connectivity and location and time independence over electronic commerce and offers low cost personalized services to the mobile users, it suffers from some serious limitations which restrict its use in mainstream business world. The mobile device limitations, such as small screen size, small memory capacity and lower processor speed makes it unsuitable for high quality internet graphics applications. The limited availability of bandwidth to various mobile operators imposes a limitation on the speed of operation of different mobile commerce applications. The wireless networks used in mobile commerce are more vulnerable to external hacker attacks compared to wired networks and stringent security arrangements in the form of encryption and authentication should be adopted to prevent unwanted intrusions. The main disadvantages of mobile commerce are explained in detail below.

(1) Mobile Device Limitations

1. Small screen size: Mobile devices have smaller screen size (of the order of 2 by 3 inches) and poor resolution which makes them inconvenient for browsing applications. Data entry can be quite difficult using small combinational keypad that comes with most of the mobile handheld devices. The wide and high resolution screens in conventional desktops or laptops used in e-commerce applications offer ease of use in data entry operations as well as viewing web pages.

These larger screens support 1920 x 1080 resolution and 3D graphics display. Although mobile devices offer greater mobility and flexibility in accessing information, the smaller screen size restricts the amount of information that could be presented and offers a less convenient user interface in the form of menu-based scroll-and-click mode of data entry.

2. Low speed processor: Most mobile devices come with low-powered processors with much lower processing speed compared to sophisticated processors (i.e. core 2 duo or i-core series) used in desktops or laptops. Such low speed processors restrict the download speed in most mobile commerce applications. The applications requiring too much processing power should be avoided as they may become irritably slow due to low speed processors. Also, keeping the low processor speed in mind, the mobile websites must be optimized to ensure customer satisfaction. Unnecessary plug-ins, flash images and animations should be removed to ensure speed of delivery.

3. Small memory capacity: The mobile devices do not have large storage space. The memory capacity in mobile devices is in the order of 5 GB to 10 GB compared to 2 TB or higher used in desktops/laptops. So, it is difficult to store large video files in mobile devices for future use. The mobile application developers must be concerned about the size of their applications during the development phase.

4. low power backup: Mobile devices use batteries as their power supply. Normally, power for a mobile device lasts up to 2-3 days, depending on the size of the device. After this period, the battery should be recharged again, and it adds an additional burden to the user who has to remember every now and then to recharge it.

(2) Wireless Network Limitations

Mobile commerce depends on wireless networks which are usually of lower speed compared to wired networks. In many cases, wireless networks offer one-fourth speed of standard wired network. Also, most wireless networks are more common in urban areas and some of the rural areas might not have wireless communication facilities.

So online mobile services may become unavailable in some rural areas, and thus the popularity of mobile services may be suffered. Unless the mobile device is 2.SG or 3G technology compatible, the applications will become sluggish and unreliable compared to wired network applications. Atmospheric interference and fading of signals transmitted through wireless networks sometimes cause severe data errors and may even lead to disconnections.

(3) Bandwidth Restrictions

A major disadvantage of mobile commerce is the bandwidth limitation, which imposes a limitation on speed of operation in various m-commerce applications. Wireless networks use frequency spectrum to transmit information across the network. Regulatory bodies control the use of available frequency spectrum and allocate the spectrum to various mobile operators. In India, the frequency spectrum were initially allocated and regulated by Department of Telecommunication (DoT). Later, the Telecom Regulatory Authority of India (TRAI) was set up to control the usage of frequency spectrum. The limited availability of bandwidth to various mobile operators in turn restricts the data rate in mobile commerce applications. The GSM technology offers the data rate of the order of 10 Kbps and 3G technology can go up to 10 Mbps.

(4) Security Issues

Another concern that is often raised in connection with mobile commerce is the security issue. Mobile devices are more vulnerable to theft, loss and mishandling. Special care must be taken to ensure that the security and privacy of the mobile customer are not compromised at the event of loss of a mobile device. This includes not storing sensitive information in the mobile devices and changing/locking of PIN (password fast and simple at the time of need.

Mobile commerce employs public wireless networks for transmission of signals which can be easily intercepted by hackers for capturing/ altering stream of data travelling through the wireless medium. In wired networks, in order to gain access, the intruder has to gain physical access to the wired infrastructure. In wireless networks, anyone with the ability to receive signal in a mobile device can gain access to the network. In order to protect the wireless network from unwanted users, various encryption and authentication techniques should be employed. As the handheld devices have limited computing power and storage capacity, it is difficult to employ 256 bit encryption technique that requires enough computing power. However, the SIM cards inside a cell phone can include the digital signatures of PKI system. Thus, the PKI system of digital signatures can be integrated in a mobile device that adds to the security of the mobile application.

Authentication of mobile devices prior to carrying out any financial transaction is another important issue. The Subscriber Identity Module (SIM) stores the subscriber identity in the form of cryptographic keys. The authentication server of the wireless network stores the matching keys and verifies the user identity prior to any transaction. Though it is far easier to intercept signals over wireless networks, the encryption and authentication mechanism makes it harder to decipher by the unwanted user.

8. MOBILE COMMERCE FRAMEWORK

Despite of the described limitations, number of people performing m-commerce transactions are growing exponentially. As in-commerce provides mobility to busy professionals, more and more people tend to access internet through their mobile phones. People find it more convenient to shift from e-commerce to m-commerce. and the projected global revenue from m-commerce is expected to cross 400 billion USD, during 2015. The day-to-day functioning of individuals as well as corporations are being transformed to mobile applications and is embedded in mobile devices. The mobile network operators have started providing value-added services that supports the new concepts of anytime anywhere computing. Accordingly, a new mobile business model has emerged, which is based on shared revenue distribution through sales in respective channels. For example, in mobile retail, a diverse range of mobile applications are developed to enable the multi-channel retailer to perform the key functions, such as mobile promotions, mobile payment, product information display, order management, catalogue management, create and display shopping list, loyalty programmes and other value-added services. Similarly, in travel industry, location-based tourism, mobile ticketing, navigational guidance and local weather/and traffic information delivery results in new revenue generating opportunities.

In order to make these value-added services work efficiently, and in a cost-effective manner, perfect collaboration between various network providers, technology providers and application developers is required. In order to integrate different mobile services, applications and technologies in a well-coordinated and controlled architecture, a mobile commerce framework needs to be developed. The purpose of the framework is to develop a structured integration of mobile services, applications and technology resources so that it will be able to deliver diverse range of value-added services in different industry sectors, and at the same time aim to reduce

operating cost and improve efficiency to attract the end user population. The mobile commerce framework consists of the four basic building blocks as follows:

Content Management

This component deals with the creation, distribution and management of diverse range of media rich digital contents that can be browsed through the small screens of the mobile devices. The digital contents are used in performing various business transactions such as buying and selling of goods, making online payments, product promos and providing on line customer support. An important part of content management is the ability to track different content providers and maintain and manage the relationships among them. The security and authenticity of the contents must be guaranteed and the access control mechanism must be provided to prevent unwanted users from misusing the document. The content distribution, rights management and clearing financial settlements, all come under the purview of content management module .

Technology Infrastructure

This component deals with the distribution of digital contents and transaction details over wireless communication networks to customer locations or other business installations. The wireless network infrastructure provides the very foundation of mobile commerce framework as it fulfills the basic requirements of data transmission between various business partners while performing any business transaction. The technology infrastructure includes wireless communication technology, Wireless Application Protocol (WAP) and mobile security technology. These technologies need to support digital content distribution, mobile application development and distribution and also provide a secure technological platform for mobile billing and prepaid services through the use of mobile Virtual Private Networks (VPN). Figure 2 depicts the Mobile Commerce Framework.

Application Development

The application development component of mobile commerce framework deals with the diverse range of mobile commerce applications. The main purpose of these mobile applications is to provide the product information to the end users, and also to enable them in performing the mobile business transactions. There are four major categories of mobile applications namely the information applications, communication applications, entertainment applications and commerce applications. Several mobile applications, such as mobile ticketing, mobile banking, mobile advertising, mobile office applications, etc. fall under these categories. These applications support key business functionalities in respective verticals and are meant to achieve higher revenue generation as well as cost reduction. Sometimes, more than one application are combined together to deliver an aggregated service, which leads to further cost reduction. With the rapid development in various emerging mobile technologies, the application development is going through an evolutional stage. In order to meet the requirements of today's rapidly evolving markets, the mobile applications must be developed in an innovative manner so that it allows the service provider to quickly address the growing demands of the market and also at the same time offer more profitability and greater cost reduction.

Business Service Infrastructure

The business service infrastructure provides the backbone to the mobile commerce framework. It supports the back office functionalities, such as payment services, location and search facilities

and security arrangements of the mobile commerce systems. Production and fulfillment of these services are beyond the scope of traditional telecom service providers. These services are managed and delivered by some outside vendors, who have the ability and experience to provide such functionalities. They maintain the required infrastructure for supporting secured financial transactions in mobile commerce environments and also provide back-end support for searching and other facilities.

Such back office systems are meant to be flexible enough and also are capable of rapid deployment of new services. They have a direct impact on end user experience, and have the greatest influence on the success or failure of the service provider. With the help of such back office infrastructures, mobile service providers can avoid upfront capital IT expenditure, and also these managed services offer the service providers the ability to quickly upgrade to the newer technological environment without any Significant investment.

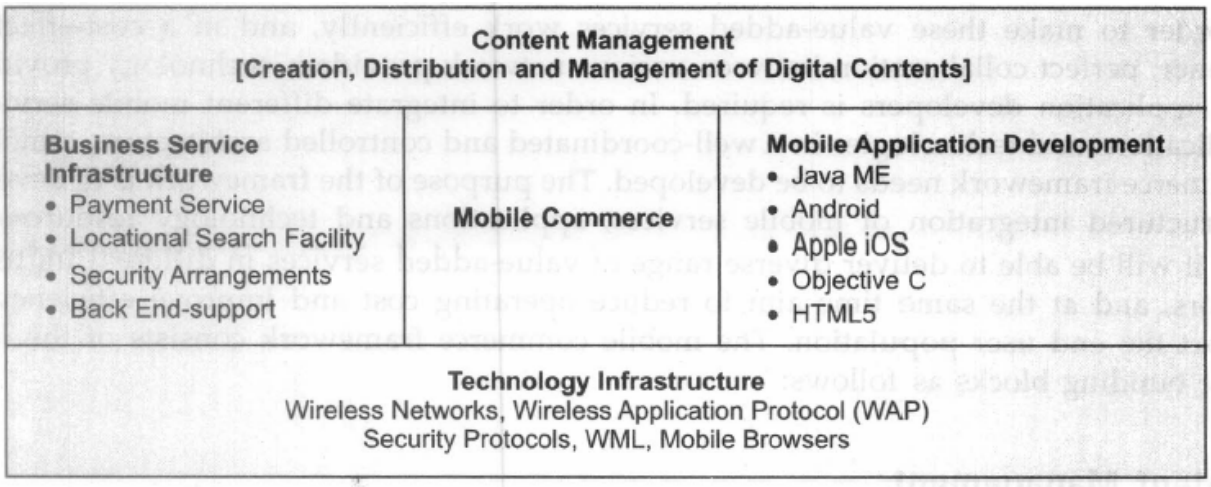

Figure 2 : Mobile Commerce Framework.

Above four components are the four pillars of mobile commerce framework and all m-commerce activities revolve around them. Whenever a mobile user tends to download MP3 music or a latest movie in his/her mobile device, sends an SMS requesting online payment to a bank, submits online order form requesting purchase in a mobile browser or books a mobile airline ticket, he/she is indulging in either or all four of the above mobile commerce framework components e , In order to cope with the dynamic .nature of the modern day lifestyle, people are demanding more mobility in accessing their business applications. A properly integrated and well-coordinated mobile commerce framework needs to be developed in order to provide easy-to-use and secure mobile services to end customers. The main purpose of a structured and balanced mobile commerce framework is to enable the organizations to rapidly adapt to the latest mobile technologies and to ensure customer loyalty by providing them improved and enhanced services in sync with the growing market demands.

9. MOBILE COMMERCE BUSINESS MODELS

A business model determines the path or process through which a business organization can realize some profit. It shows the way by which an organization can make some investment, add some value to the investment, get a finished product or service and generate some revenue

through sales of the product or service. The revenue generated through sales must exceed the operating cost, so that the company gets some profit. Business models specify the mechanism for generating profit margins and to sustain in the value chain. Thus, business models help managers in strategic planning and formulating overall business strategy of the organization. Electronic commerce has some traditional business models that are widely followed by all major e-commerce vendors worldwide.
These include Merchant model, Broker model, Service Provider model, Advertiser model, etc. Mobile commerce business models differ from those of electronic commerce due to their intrinsic difference in operations and technology. As mobile commerce imparts extra mobility to the users, the business models also reflect the mobility in their nature. The four major services offered by mobile commerce are the payment services, mobile advertisements, mobile shopping and mobile entertainment. Accordingly, mobile commerce business models also revolve around these four applications. The four major mobile commerce business models are described below:

(1) Payment Model
In this model, mobile payment service providers offer mobile payment services that allow users to make cashless payment transactions including banking transactions, share trading, tax/bill payments and ticket or other retail purchases using credit/debit card or bank PIN. The payment service providers have collaboration with banks (or other financial institutions) and/ or mobile network operators, and accordingly get bank-controlled mobile payment model or operator controlled mobile payment model. The payment service provider charges a certain percentage fee for each payment transaction made through the payment application. Alternatively, the user can pay a nominal monthly subscription fee to the payment service provider and can use the service as and when required.

(2) Advertiser Model
This model is an extension of traditional e-commerce advertiser model and provides mobile websites which can be viewed by mobile users in their handheld mobile devices. Advertising companies can display their advertising messages in the website and pay a rental fee to the hosting website for displaying their messages. These mobile advertising websites usually offer some basic services such as email service, search engines, news service or social networking service to the users and post advertising messages in these sites to enjoy greater coverage. The advertisements often come with purchase buttons that allow users to purchase the product directly from their mobile devices. The mobile payment service is also provided to facilitate mobile purchase directly from the advertising websites. The advertiser companies pay a fixed fee to the advertising website for displaying their advertising messages. Additional revenue is generated for each purchase transaction made by the user through the website.

(3) Shopping Model
This model is similar to e-commerce merchant model where retailers create mobile websites to display their range of products to the mobile devices of the customers. The mobile users can browse the mobile websites in their WAP enabled mobile screens and select and purchase any product of their choice. Mobile payment option is also provided in the website so that the users can make mobile payment for the purchased product and complete the deal even while in transit or far away from the actual store location. Thus, shopping model allows retailers to generate additional revenues through mobile shopping and can improve their profit margins.

(4) Content Provider Model

In this model, mobile service providers offer a host of entertainment contents, such as breaking news, weather forecast, traffic updates, music, mobile games, TV shows, video content, movies, etc. that could be downloaded to user mobile devices. Network operators have tie-ups with various content providers and offer both subscription-based services as well as pay-per-use services to mobile customers. Location-based services, such as map-based navigational services, discount coupons offered in local retail stores or restaurants, news of local events, etc. are also delivered in customer mobile devices. The revenue is generated through subscription fees (for news, traffic/weather updates, movies, games), usage fees (TV shows, videos, games etc.) or data download fees (for e-mails, e-books, etc.). Various media houses, press agencies or content aggregators follow this model for generating extra revenue through mobile channel.

10. M-COMMERCE APPLICATIONS

The main advantage of mobile commerce is that it offers instant connectivity to mobile users even if they are travelling in remote areas and want to communicate in the wee hours of the day. With the help of digital cellular technology and wireless broadband internet access, the mobile user can browse through websites on the screens of their mobile devices and perform business transactions anytime and from anywhere. Customers can place orders as well as pay their bills through their mobile devices while in transit. As the price of mobile phones are decreasing rapidly, number of mobile phone users are increasing in millions and more and more people resort to m-commerce activities.

With the increased use of mobile devices, mobile marketing and advertising have become an effective tool and all big corporations have started their product campaign through mobile devices. In financial sector, mobile banking allows customers to access their bank accounts and pay their bills from their mobile handheld devices. The same handheld device can be used for viewing the latest stock prices and also for conducting share trading. The service plan details of any mobile service, such as mobile phone service can be accessed, mobile bill payment can be achieved and account updates can be viewed through the mobile devices easily and effectively. In information services, delivery of financial news, sports events, weather reports and traffic updates, all can be achieved with a minimal cost and time. In retail industry, customers can place orders for goods/services from their mobile devices on-the-fly. All these applications (see Figure 3) come as the direct consequences of the instant connectivity feature of mobile commerce.

The four major products of mobile commerce are as follows:

(1) Mobile Banking

Mobile banking is the process of performing banking transactions such as balance checking, account transfer, bill payments, credit card-based payments, etc. through a mobile device, such as a mobile phone or a Personal Digital Assistant (PDA). Such transactions could be performed from any remote locations and at any time of the day irrespective of the normal working hours of the bank. In order to avail the mobile banking facility, the customer must have an account in the bank, the mobile phone number must be preregistered in the bank and also the network service provider (for the mobile device of the customer) must have a tie-up with the bank. When the customer wants to perform a mobile banking transaction, the transaction request from the customer first goes to the premises of the mobile service provider, and from there it is finally

routed to the bank. Depending on the type of transaction, two types of mobile banking are available, namely SMS banking and WAP-based mobile banking. SMS banking is usually used for non-financial transactions, such as viewing of balance statement, requesting for a checkbook, status checking or stopping a check payment although some banks permit financial transactions also through SMS banking. In SMS banking, an SMS code requesting a transaction is sent to a particular number (as directed by the bank) from the mobile device of the customer. As soon as the bank receives the SMS, the required transaction is performed, the information is retrieved (in case of non-financial transaction) and sent back to the customer mobile phone in the form of another SMS. The entire transaction takes only a few seconds and the cost of the transaction is only that of an SMS. For different types of transactions different SMS codes are used.

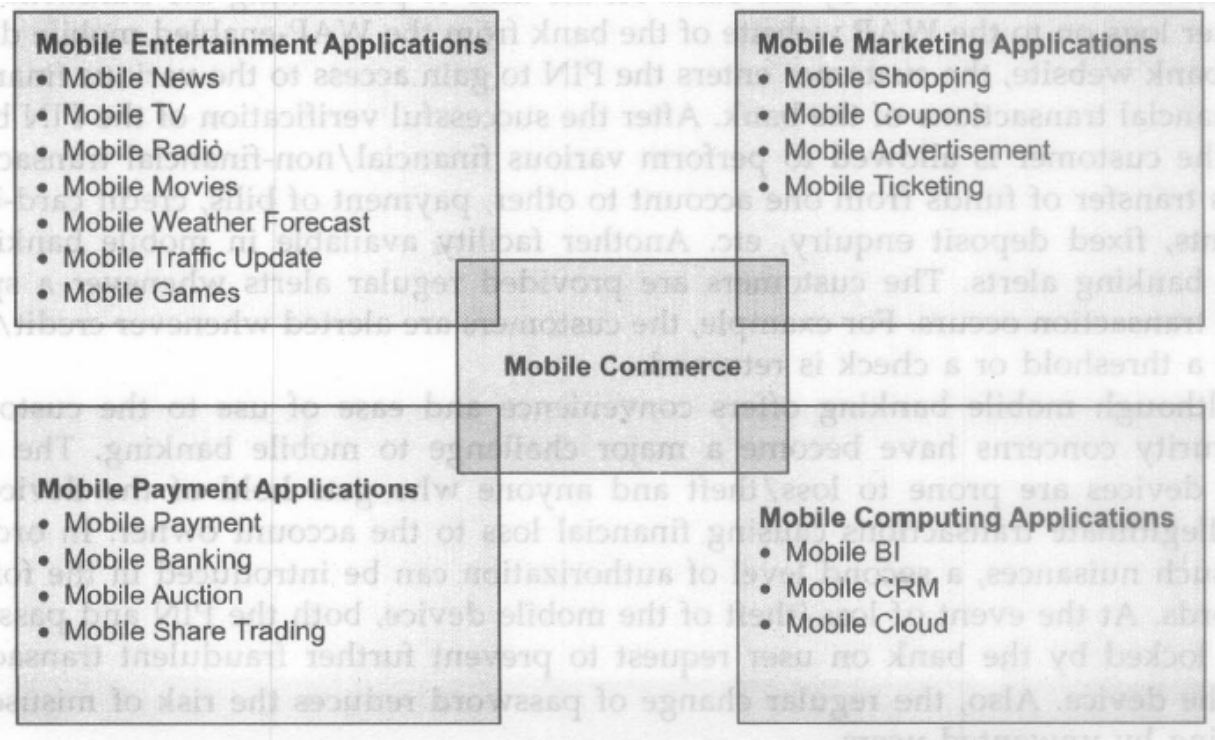

Figure 3 : Mobile Commerce Applications.

In WAP-based mobile banking, the customers are provided with a mobile Personal Identification Number (PIN) by the bank. At the time of performing the transaction, the customer logs on to the WAP website of the bank from the WAP-enabled mobile device. In the bank website, the customer enters the PIN to gain access to the various financial/non-financial transactions of the bank. After the successful verification of the PIN by the bank, the customer is allowed to perform various financial/non-financial transactions, such as transfer of funds from one account to other, payment of bills, credit card-based payments, fixed deposit enquiry, etc. Another facility available in mobile banking is mobile banking alerts. The customers are provided regular alerts whenever a special type of transaction occurs. For example, the customers are alerted whenever credit/ debit crosses a threshold or a check is returned.

Although mobile banking offers convenience and ease of use to the customers, the security concerns have become a major challenge to mobile banking. The small mobile devices are prone

to loss/theft and anyone who gets hold of the device can make illegitimate transactions causing financial loss to the account owner. In order to avoid such nuisances, a second level of authorization can be introduced in the form of passwords. At the event of loss/theft of the mobile device, both the PIN and password can be locked by the bank on user request to prevent further fraudulent transactions using the device. Also, the regular change of password reduces the risk of misuse and tampering by unwanted users.

(2) Mobile Payments

Mobile payment is an alternative payment system where the mobile user makes payment using the mobile device for a wide range of services or goods. Depending on the mode of payments, mobile payments can be broadly classified in the following categories:

Mobile Phone Based Payments :

In this mode, the customer makes payment using the mobile device. In SMS-based payment, the payment is made by sending an SMS to the retailer. Both the customer and the retailer must have a regular credit! debit account in a partner bank. After selecting an item for purchase, the customer sends an SMS 'from his/her mobile device to the retailer requesting the purchase. The retailer responds by sending a payment request through SMS to the customer. The customer keys in the bank PIN number to approve the payment. The bank verifies the PIN and the ~mount is automatically debited from the customer bank account to the retailer's account. Both the retailer and the customer get SMS from the bank indicating the details of the transaction and the entire process takes only 10-15 seconds.

In SIM card based payment, the customer uses the mobile phone for purchase of digitized items such as mobile ringtones, MP3 music, video games, wallpapers, etc. that can be' downloaded in the mobile device itself. The purchase amount is added to the monthly mobile bill of the customer. This offers an alternate cashless payment option that does not require use of credit! debit cards or any other online payment service provider, such as PayPal and thus bypass bank and credit card companies altogether. The payment is either debited from the subscriber's pre-paid. account or added to the standard post-paid invoice of the subscriber as the case may be.

Card based Mobile Payments

In credit card based mobile payments, the mobile handset is used as a credit card for making payments. The credit card issuing bank gives a PIN number to the mobile handset user. At the time of making payments, the mobile user initiates the transaction by entering the PIN from his/her mobile handset. The issuing bank verifies the PIN and authorizes the payment. Next, the customer enters the amount to be paid and the transaction, is completed. The amount is automatically deducted from the credit card account of the mobile user and credited to the bank account of the payee business partner, such as the shop owner.

In smartcard based mobile payments, the SIM (Subscriber Identity Module) card of a mobile handset are equipped with smart card capabilities. Smart cards are plastic cards with embedded integrated circuits. containing microprocessor and memory to store personal data such as credit .card number, PIN,· driving license number, etc. The information stored in a smartcard can be read by a card reader in either contact or contact less mode. The SIM card of a mobile device is also a processor card containing programmable memory to store user information for authentication purpose. If the smartcard capabilities are combined with the SIM card of a mobile

device, it can be used as a contact less .smartcard, and can be used effectively in making mobile payments.

Mobile phones equipped with contact less smartcards employ Near Field Communication (NFC) technology to exchange data between the mobile device and the nearby smartcard .readers. It combines the smartcard interface as well as the reader interface in the mobile device so that the mobile device can communicate with the card readers and other NFC devices/mobile phones, At the time of making payments, the mobile phone user waves his/her mobile phone (equipped with contact less smartcard) near a reader module installed in a store or in a public transport system. In order to make the transaction more secure, a PIN is used for authentication purpose, which is automatically supplied by the smartcard. After successful verification of the PIN, the transaction is completed and the payment is automatically deducted from the pre-paid account of the mobile user or charged to the bank account of the user directly. Such NFC-based contact less mobile payment finds wide application in transportation services, toll-tax collection, transit fare collection in mass transit networks, parking fee collection and other unattended POS terminals, where the users can pay with their smartcard enabled mobile phones sitting inside the car while driving.

Mobile Web Payments through WAP

In this mode of mobile payment, the payment is made through the web pages displayed in the micro browser of the mobile phone. The web page is displayed following Wireless Application Protocol (WAP) and associated technology. At the time of making a purchase, the mobile user types the URL of the website of a merchant in the mobile device. The website containing various product information is displayed in the micro browser of the mobile handset. The user selects a product that he/she intends to buy and places order for the product through the website. The merchant then sends an invoice to the user. If the user intends to pay through a credit card, he/she enters the credit card number, which is transmitted to the partner bank through a secured channel that employs encryption. The partner bank verifies the credit card number, and if found OK, informs the acquirer bank for making the payment. Alternatively, if the user wants to pay directly from the partner bank in the form of account transfer, he/she enters the PIN number, which is sent to the partner bank for verification. After successful verification of the PIN, the partner bank debits the amount from the user's account and credits to the merchant's account. In either case, an SMS is sent to both the user and the merchant confirming the payment. The entire payment process is simple, quick and user-friendly as they have a similarity to the familiar online payment systems.

Above mobile payment systems are emerging as a potential payment mechanism that ensures fast, smooth and transparent micro payment solutions to mobile users. The mobile phones tend to replace the pocket money and provide a low cost alternative to credit/debit cards for cashless payments anytime, anywhere and for anything. However, like all other online payment systems, special care should be taken to secure such mobile payments. Stringent security arrangements in the form of encryption and/or password authentication should be adopted to ensure that the financial transaction performed through the mobile device cannot be duplicated, re-used or counterfeited.

(3) Mobile Ticketing

Mobile ticketing is a special application of m-commerce which allows users to purchase tickets for air/rail/bus travel or for any sports/ entertainment events from any location and at any time

using mobile phones or any mobile device. The users can avoid tedious and time consuming process of getting paper tickets after waiting in a long line and the organizations can reduce production, distribution and infrastructural cost by providing simpler ways to purchase tickets anytime/anywhere. Mobile tickets are available for a number of cases, such as mass transit tickets, airline check-in, movie/theatre shows, sporting events, consumer voucher distribution, and so on. There are a variety of options by which a user can purchase mobile tickets, such as online purchase from merchant website, from WAP page in the mobile handset, purchase via SMS from the mobile handset, over the phone from a voice call or through a secure mobile ticketing application. Due to the convenience it offers to the customers and cost savings it offers to the companies, mobile ticketing is gaining momentum and more and more people are opting for mobile ticketing. Around 6 million mobile tickets were sold during 2012 worldwide, and the number is expected to increase manifold to cope with the ever increasing demand of the mobile users. At the time of purchasing a mobile ticket, the mobile handset owner logs on to the website of the organization (providing the mobile ticket) and choose "Mobile Ticketing" as the delivery option. Alternatively, the user can log on to WAP page of the organization in the mobile handset. Next, the cell phone number, mobile carrier and cell phone model is entered in the website. In another variation, the request for mobile ticket can be sent through an SMS from the mobile handset to the designated organization. After making online/mobile payment for the ticket, the user receives the mobile ticket in the form of a text message in the phone. The text message includes an image (MMS) with a barcode. At the venue of the event/airport/railway station, the text message with the barcode is produced at the gate. The gate is usually equipped with a barcode reader which after successful verification allows the user to pass through. Alternatively, the alphanumeric number in the barcode can be manually entered in a computer at the gate for verification.

With affordable internet services, decline in handset prices, rapid evolution of secured and easy-to-use mobile applications and convenience of mobile usage, more and more people have started purchasing travel tickets through mobile devices. Realizing the potential of mobile ticketing, almost all major travel portals have launched their mobile ticketing applications for booking purpose. People at the time of making last minute changes to their travel plans find mobile ticketing the only option giving surety and security. In India, Indian Railways (website irctc.com), makemytrip.com, cleartrip.com, yatra.com and many more offer mobile ticketing in their travel offerings. Apart from ticket booking, such travel portals also allow other customer support features, such as cancellation of tickets, tracking refunds on cancelled tickets, and so on.

In order to maintain security and integrity of service, special validation techniques have been adopted to avoid reuse of mobile tickets. Such systems employ encryption of barcode data of the mobile ticket, which is decoded at the venue and validated at the centralized server containing ticket database. The mobile ticket once scanned by the barcode reader can never be reused again, thus preventing the fraudulent practice of duplicate tickets.

(4) Mobile Computing

Mobile computing is a technology that allows users to perform normal computing operations, such as internet surfing, document preparation, spread sheeting, preparing PowerPoint presentations, send/receive e-mails or download MP3 audio files using portable computing devices while in transit. The portable computing devices include smart phones, personal digital assistants, laptops, ultra mobile PC or wearable computers. Some of these portable computers have bigger screens compared to mobile phones and hence overcome the small screen

limitations. For example, Apple iPad comes with an 8" x 10" screen, which is suitable for reading e-books as well as viewing websites.

In order to communicate with the external world, mobile computing employs wireless communication technology. For wireless internet access, Wi-Fi or Wi-Max technology is used that utilizes radio waves to broadcast internet signal from a wireless router to the surrounding area. Alternatively, digital cellular technology can be employed that utilizes cellular modem in the form of a data card that connects to nearby cell towers for high speed broadband internet access. The data card fits into the PC card slot of the laptop or the notebook computer. Broadband internet access is also provided to cell phones and PDAs using cellular broadband technology.

Mobile computing uses specially developed software that allows users to perform all the functions that are possible in standard desktop PCs connected under LAN environment. Such software are designed for small-power handheld devices such as Personal Digital Assistants (PDA), enterprise digital assistants or smart phones, and are either pre-loaded in these devices or downloaded by customers from internet. Usually, mobile software is developed by transforming existing software used by computers into software which can be used in any mobile device. Sometimes, new mobile applications are developed for different mobile platforms and programming languages based on the type of mobile device. Different mobile devices use different hardware components, and therefore, the corresponding mobile software needs to be developed using different software architectures and operating systems. Well-known mobile software platforms include Java ME, Symbian OS, Android, Windows mobile, BREW & Palm OS. Each of these platforms supports a development environment that provides tools to allow software developers write numerous mobile applications in these mobile platforms. Apart from normal e-commerce and m-commerce operations, mobile computing finds wide application in transportation industry, manufacturing and mining industry and distribution industry. In transportation industry, mobile computing is used in exact delivery time tracking, consignment tracking, fleet management information gathering and real-time traffic reporting. Mobile networks are employed. to provide' two-way communication between fleet drivers and their dispatch centers. Realtime passenger information can be obtained from kiosks/bus stops/road signs. In mining industries, portable computers are used in mines for in-process monitoring. In manufacturing industry, portable computers fitted in shop floors help in real time asset management, instant purchase verification, delivery confirmation and order tracking. In hospitality industry, guest check-in can be done using handheld devices, such as PDAs, Blackberry and cellular phones. Portable computers can be employed in sales force automation and mobile POS (Point of Sale) applications. Another service associated with mobile computing is cloud computing that allows mobile users to access application software, databases and shared computing resources, such as server spaces through internet from a mobile computer, The application software such as Microsoft Office, databases etc. reside on a remote server and user can access and use the resource through internet as and when required and pay for .exactly what they use. Thus, the company field representatives can utilize company resources, such as, databases or application software from remote locations through internet accessed in their mobile computers, rather than carrying the company resources with themselves in bulky machines. Mobile computing also provides access to company's Virtual Private Network (VPN) by tunnelling through the internet. Mobile computing has become an integral part of corporate world. From Gmail to Twitter, Skype to Linkedin, cloud computing to VPN, it is virtually impossible to do without it just like it is without electricity.

11. MOBILE BUSINESS VALUE CHAIN

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. The transport link maintains and operates the infrastructure and equipment to guarantee data communication between mobile users and application. Basic enabling service link provide services such as server hosting, data backup, and system integration. The Transaction support link provides the mechanism for assisting transactions, for security, and for billing users. The presentation service link converts the content of Internet-based applications to a wireless standard suitable for the screens of mobile devices. The Personalization support link gathers users' personal information, which enables personalized applications for individual users. The Content aggregators link provide information in a category or search facilities to help users find their way around the Internet. Finally the user applications link used to carry out mobile business transactions for mobile consumers. The following sectors will get benefit under m-business transformation :

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 to 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 are 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 & 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 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: Engineering industry with huge annual turnover 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: Chemical and Petro-chemical industries are considered on-line business is 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: 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 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 travelling in an aeroplane.

Mobile positioning services: With mobile positioning services your 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.

12. BENEFITS OF MOBILE BUSINESS FROM CUSTOMERS POINT OF VIEW

The benefit from the customers' point of view is accessing services at anywhere, any time and any extent of time. These features significantly save the valuable time of the customer. The main advantages of m-business services for the customers are listed as follows :

(1) Ubiquity : Through mobile devices, business applications are able to reach customers anywhere at any time. 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 business will be exceptionally important to time-critical applications.

(2) Personalization : An enormous number of business 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 business 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-business success, as it will allow selectively targeted m-business applications. As such, the mobile database becomes a primary factor of m-business 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.

(3) Reduced costs : This is due to availing and using various 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 doing business, conducting transactions, or receiving information through their Internet-enabled mobile devices.

(5) Increased comfort : Many customers secretly hate their business service provider/banks because of punitive charges, inconvenient opening hours and unhelpful branch staff. In mobile business due to quick and continuous access, purchases and transactions can be made 24 hours a day, without requiring the physical interaction with the service provider.

(6) Time saving : The main benefit from the mobile business customers' point of view is significant saving of time by the automation of purchasing & 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 purchasing and concluding a fund transfer.

(7) Convenience : The ability and accessibility provided from wireless devices will further allow m-business to differentiate its abilities from conventional business and e-business. People will no longer be constrained by time or place in conducting 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 handle daily transactions/purchases through m-business applications. Consumers may recognize a special comfort which could translate into an improved quality of life.

(8) Better cash management : Mobile business 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 business, customers can download the features of product/services or 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.

13. E-COMMERCE vs. M-COMMERCE

Electronic Commerce (E-Commerce) is the process of conducting business transactions through internet using personal computers or laptops. It employs wired Local Area Networks and cable

internet to perform an array of operations, such as online purchase, online payment, online banking, online share trading or online marketing and advertising. People get the freedom of conducting business from their home or making online payments from their offices without travelling to the shop location. However, in order to perform e-commerce transactions, wired internet connectivity as well as personal computers or laptops having internet facility is essential. Thus, in remote areas with limited or no internet facility as well as areas without electricity, e-commerce becomes completely ineffective.

Table 1: Comparison of E-commerce and M-commerce

Factors	E-commerce	M-commerce
Mobility	E-commerce employs wired networks for internet connectivity and hence is restricted inside a building. It offers anytime connectivity.	M-commerce employs high frequency wireless networks for providing wireless internet and is completely ubiquitous in nature. It offers anytime anywhere connectivity.
Reliability	Wired networks are more reliable and suffer less interference and noise. Quality of data transmitted is better as there is little or no cross-talk.	Wireless networks suffer from interference from adjacent channel frequencies or reflected waves that tend to reduce the intensity and quality of transmission. Special error detection techniques are employed to eliminate errors in transmission and improve signal quality.
Speed	The transmission speed of wired networks are much higher (of the order of 1000 Mbps)	The transmission speed of modern wireless networks are usually of the order of 100 Mbps.
Security	E-commerce transactions are more secured as the networks remain well-protected inside campus buildings. Firewalls and proxy servers are used to keep confidential business data secured in the central server.	M-commerce transactions through wireless networks are more vulnerable to hacker and other security attacks and require stringent security arrangements in the form of encryption and firewalls to prevent damage or misuse of private data during transmission.
Cost	The initial network set-up cost is high and periodic maintenance is mandatory.	The initial set-up cost is much lower and maintenance cost is minimal.
Usability	E-commerce is performed through personal computers or laptops having larger screens, which are more convenient and user-friendly.	M-commerce is performed through handheld mobile devices having smaller screens and lower battery life. Also, the small devices have higher chance of getting lost or stolen, thus resulting to data loss.

Mobile commerce, on the other hand, allows mobile users to conduct business transactions through their internet enabled mobile devices, such as smartphones, tablets, digital assistants or PDAs. It employs high frequency radio waves for providing wireless internet connectivity and allows mobile users to perform mobile shopping, mobile payments, mobile auctions or mobile ticketing through their mobile devices even when they are out in the field or are travelling. Thus, mobile commerce offers freedom from wired internet connectivity, and supports critical business transactions under completely mobile environment. People can perform share transactions, make

tax or bill payments or perform fund transfers through mobile banking, even if they are travelling in remote areas far from their home or office. In other words, mobile commerce aptly fits into the extremely mobile lifestyle of modern day business executives and has become an integral part of daily lives of billions of mobile users.

Difference between E-commerce and M-commerce

The fundamental difference of e-commerce and in-commerce lies on the fact that the former uses wired networks and the latter uses wireless networks for internet connectivity. Although wired networks require cumbersome cabling and switching operations to provide connectivity to each and every computer and other peripheral devices, they offer better performance and better speed as compared to the wireless networks. A wired network can offer data rate of the order of 1000 Mbps, whereas a wireless network usually offers data rate of the order of 100 Mbps. A wired network is much more secure than wireless networks, as it is much more difficult to gain access to the internal wired network inside a protected building without breaking in. On the other hand, it is much easier to break the security barrier of a wireless network and gain access to private and confidential data stored (or in transit) inside the wireless network. Proper security arrangements in the form of encryption are employed in order to make wireless networks as secure as their wired counterparts. The comparison between e-commerce and m-commerce is given in Table 1.

In spite of above disadvantages, mobile commerce is fast becoming the preferred choice of numerous mobile users for making online transactions during travel or while outside the range of conventional wired networks in their home or office buildings. They prefer to watch their favorite TV shows, play online games, connect with friends through mobile social networking sites or purchase train/bus/event tickets, while travelling inside a bus or while waiting inside an airport. The ubiquitous nature of mobile devices adds extra mobility to the mobile users worldwide, and as a result there is an exponential growth in the mobile online transactions across all industry sectors and verticals.

14. IMPACT OF M-COMMERCE

Advent of wireless and mobile technology and rapid penetration of mobile devices in modern society have created new opportunities for the corporate world: In general, mobile commerce is considered as an extension of conventional internet based e-commerce. However, as the number of mobile device owners is far greater than that of internet users, mobile commerce creates a huge impact on day-to-day activities of both customers as well as business owners. By providing instant internet connectivity and greater mobility to billions of mobile users, m-commerce is redefining the relationship between customers and goods and service providers. It is predicted that in near future, mobile commerce will largely influence the marketing orientation of almost all the major industry sectors, and hence, will alter the general dynamics of the market. In addition to providing the users with mobility and location tracking, m-commerce applications are capable of achieving a high level of personalization and offer interactability with the individual customer.

In a highly interactive environment, personal profiles, product preferences, home office locations, payment details, etc. can be collected directly from the customer from their mobile devices to generate an accurate and personalized database. Conversational advertising can be delivered directly to the mobile handset by a brand to describe the benefits of the product. This is an emerging concept whereby the mobile user can opt in to receive product information from a

brand by giving the mobile number to the company. By utilizing the location tracking facility of m-commerce, special customer zones can be created which will be characterized by specific customers with different product preferences. The customers in a zone can be dynamically informed about various discounts and deals available in the local stores. Knowledge of customer numbers and preferences in a zone will help the suppliers to estimate the demand for a particular product, and also let the customers be informed instantly about any discounts/price reduction offered in nearby stores.

The popularity of mobile entertainment. is growing rapidly. These include mobile phone gambling, mobile collaborative games, mobile sport video and mobile television. With rapid advancements of highly sophisticated mobile applications, mobile gaming business is expanding at a fast rate. Evolutions in technologies like mobile video sequencing, mobile video trans coding and mobile. video communication are playing a key role in the success factor of mobile entertainment industry. Similarly, in healthcare industry, mobile medical imaging is made possible with the use of 3G wireless network. In education industry, mobile learning is introduced in the form of SMS or text messages. With the introduction of newer display technologies, such as electronic paper, liquid crystal display and digital paper, the mobile electronic readers or e-books have become commonplace. A large number of mobile users have started carrying e-readers to download online books or online newspapers while travelling. The impact of m-commerce is all-pervasive and ever-expanding. With the cost of mobile devices going down and introduction of newer and powerful technologies, more and more people are indulging innumerous mobile applications and eventually m-commerce will emerge as the most preferred tool for performing business transactions while in motion.

Assignment Questions :

1. Define mobile commerce. Describe how business transactions are performed through mobile devices.
2. What is mobile payment? Describe SMS-based transactional payment.
3. What is a cell site in a cellular network? What are the components of a cell site?
3. What is MTSO? How does it help in people tracking and other location-based services?
5. What is TRAI? How does it control the use of available frequency spectrum to mobile operators?
6. What are the benefits of mobile commerce? Describe in detail.
7. Describe the limitations of mobile commerce and suggest possible remedies.
8. Describe the features of mobile banking. What are the security challenges of mobile banking ?
9. What are the various categories of mobile payment? Describe card-based mobile payment.
10. Describe mobile ticketing process. What are the challenges faced by mobile ticketing?

15. MOBILE SECURITY CONCEPTS

Mobile commerce is defined as performing online business transactions through mobile handheld devices. It allows buying and selling of commodities, services or information over internet with the help of mobile devices. With the advent of superfast mobile internet technology, sophisticated mobile devices and a host of powerful mobile applications, mobile commerce is emerging as a hottest trend in business transactions. With rapid penetration of ubiquitous mobile devices in developing countries, future of mobile commerce seems promising as more and more people are indulging in mobile commerce transactions, such as mobile payments, mobile

advertisements, mobile ticketing or mobile banking. However, each of these mobile commerce applications requires adequate security arrangements so that private and confidential customer data are not compromised leading to financial loss to the customer. The prosperity and success of mobile commerce largely depends on the security and safety of the transactions performed over wireless mobile networks.

The mobile commerce security model (see Figure 4) must be able to build trust in the minds of millions of mobile users who will feel free to use their mobile handheld devices for performing financial or other important business transactions without any fear of being mishandled by fraudsters. The major security challenges of mobile commerce systems come from four areas, namely the mobile devices, the radio interface, wireless network infrastructure and mobile applications. The mobile devices store confidential user data and due to their small size can easily get lost or stolen. In order to protect user data from being misused, security arrangements in the form of password authentication must be adopted. The device operating system must me made secured enough so that hackers cannot break in and capture confidential user data. The access to the device through the telecommunication network must be protected from eavesdropping so that the confidentiality and integrity of the data is maintained during transmission. The network infrastructure of the mobile operator determines the security of user data within and beyond the access network.

Security loopholes in the network infrastructure may lead to termination, rerouting or mishandling of calls which may cause false billing to the customer. Another security threat comes from different types of mobile applications that the users use during mobile commerce transactions. Mobile payments or mobile banking applications involving customers, merchants, financial institutions and network operators must be secured enough to prevent any type of financial malpractices. Both the payer and payee must authenticate each other before making any payment transaction. The customer must get assurance from the merchant about the delivery of goods or services purchased through mobile devices.

In order to secure any mobile commerce system from the above-mentioned security threats, six key factors are considered. These are as follows:

1. Authentication: Authentication is the process to verify the identity of a person entitled to perform mobile commerce transactions. The authenticity is verified with the help of multilevel passwords to ensure that the transaction is performed by the authorized person and not by some unwanted intruder.

2. Integrity: Integrity ensures that the transaction data exchanged through mobile internet among trading partners are original and are not altered by some unauthorized person. If the data is altered en route to the receiver during the transmission process, the integrity of the data is compromised and it fails to represent the original purpose of the sender.

3. Confidentiality: Confidentiality is the ability to ensure that the transaction data is available only to the intended person. If a hacker tends to break in a mobile commerce site and gain access to the credit card details of a customer, he not only violates the confidentiality of the data but also the privacy of the credit card holder.

4. Non-repudiation: Non-repudiation ensures that a user cannot deny he/she performed a mobile transaction. The user is provided with a proof of the transaction and the recipient is assured of the user's identity.

5. Availability: The mobile commerce website must be available always so that the user can have reliable and timely access to perform a transaction.

6. Privacy: Privacy refers to the ability to control the use of personal information of the customer that is provided at the time of making mobile transactions. The customer identity and other confidential information must be protected from misuse or tampering by unwanted intruders who utilize the data for their own business purpose.

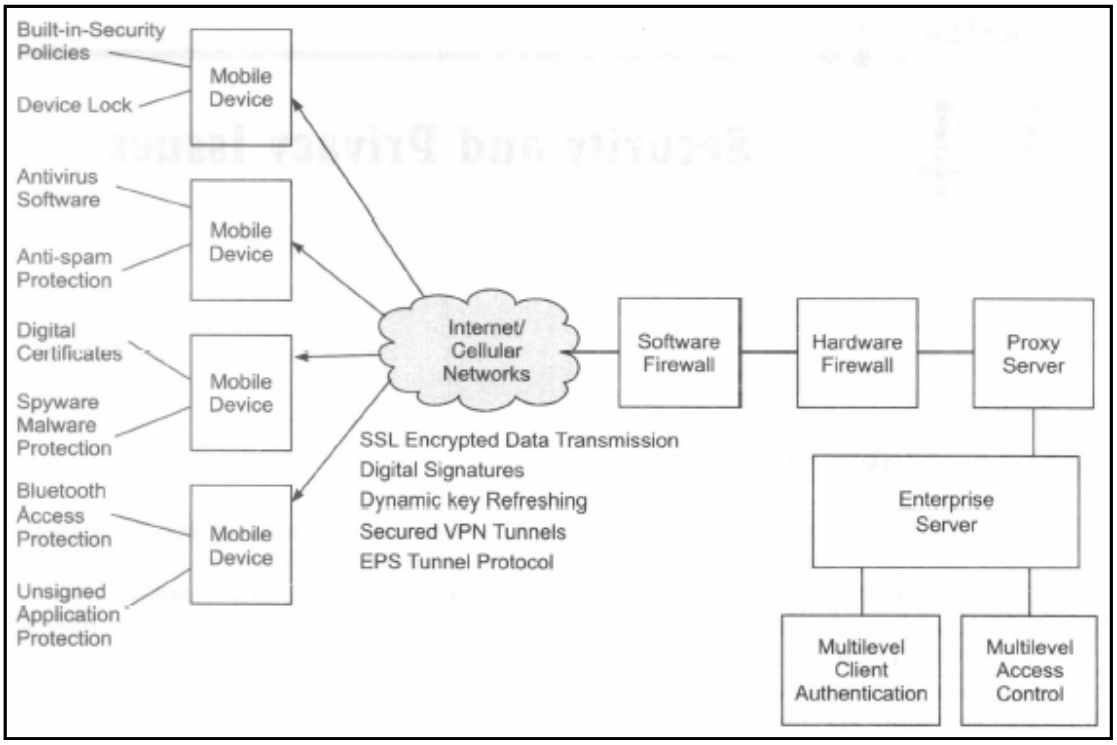

Figure 4 : Mobile Commerce-Security Architecture.

16. GROWTH OF MOBILE VALUE ADDED SERVICES

In Telecommunication industry, Value Added Service or VAS is defined as special noncore services offered to customers in addition to normal telephonic services, such as making/receiving calls.' The Value Added Services are usually offered free or at little extra cost and their main purpose is to promote the core business by offering some extra benefits that core service cannot provide. Mobile Value added Service or MVAS are services offered by mobile network operators to mobile subscribers that allow users to get some extra non-voice services, such as sending receiving SMS/MMS and mobile internet access through GPRS/WAP technology. Apart from these, some MVAS include mobile gaming services, mobile instant messaging services, mobile news services, etc., to enhance 'the core mobile phone service and attract customers. Basic characteristics of MVAS must be to increase the profitability of the core business by adding value to the total service offering, and thus, causing incremental demand to the service. They can be offered as an add-on to the basic service or in some cases, can be sold as a premium price, thus generating extra revenue and profit. Some MVAS, such as internet data access may require additional operational control, and hence, they can be offered independently and need not be coupled with other services. However, there should not be any conflict between MVAS and core phone service offerings and MVAS should never over-shadow core services, thus hampering core business prospects.

Mobile Value Added Services have the capacity to provide access to essential information and services to mobile users, and in that sense, they can digitally empower citizens residing in remote areas who are usually deprived of mainstream benefits and opportunities. At the same time they offer tremendous growth opportunities to mobile service providers as they provide low cost digital information access to a vast population of rural poor people having very limited or no information facilities. A number of mobile service providers have started offering MVAS by delivering information and other services in health, education, governance and banking sectors. Such Mobile Value Added Services will improve the quality of life of poor rural people in backward areas of the country, enhance the pace of economic development, in general, and will ensure tremendous growth in mobile service industry (see Figure 5).

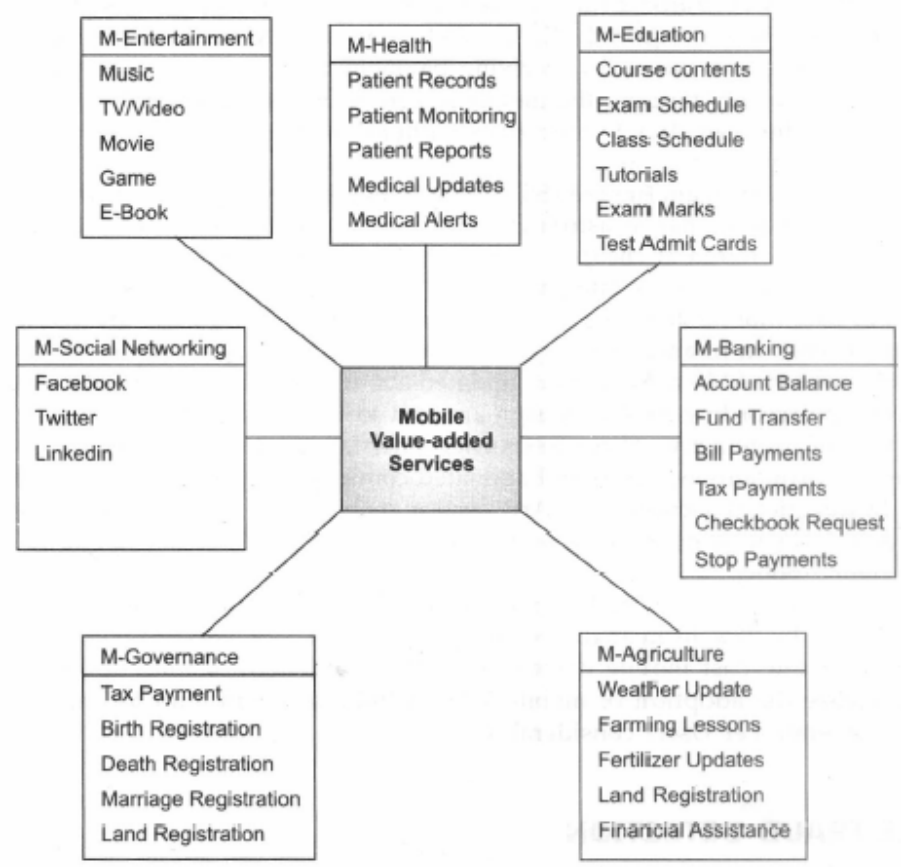

Figure 5 : Mobile Value Added Service.

The main categories of Mobile Value Added Services are as follows:

1. M-Health: Mobile Health or M-Health provides various health related information, such as patient records, patient monitoring and reporting, medical updates and alerts through mobile devices.

2. M-Education: Mobile education provides training and learning related materials, such as course content, exam schedule, class schedule, tutorials, etc. from educational institutions to students through SMS or WAP technology.

3. M-Banking: Mobile banking services allow retail banking transactions (such as checking of account balance, fund transfer, bill payment, tax payment, new checkbook request, etc.) through mobile devices using , USSD or WAP technology.

4. M-Agriculture: Mobile agriculture provides agriculture assistance services to rural areas by providing valuable information to farmers that help them take proper decisions to aid their farming process.
5. M-Governance: Mobile governance services ensure proper delivery of important government services, such as tax payment, birth/ death/ marriage registration, land registration, etc., through mobile devices.
6. M-Social-Networking: Mobile social networking services integrate various social networking sites, such as Facebook, Twitter, LinkedIn, etc., to mobile networks so that users get connected with their friends through their mobile devices.
7. M-Entertainment: Mobile entertainment services offer various entertainment contents such as music, TV shows, video games, digital books delivered to the mobile devices either through SMS/WAP or by direct downloads.

All above Mobile Value Added Services serve the common purpose of offering some additional benefits to innumerable mobile users across the world and have become part of their daily activities and enhancing their lives to a great extent.

17. MOBILE BUSINESS AS IDEAL BUSINESS :

17.1 INTRODUCTION :

The word 'Ideal system' refer to the system which has ideal characteristics i.e., perfect in every way. It is what the mind pictures as being perfect. The concept of ideal engine, ideal switch, ideal voltage source, ideal current source, ideal semiconductor devices like ideal diodes, transistors, etc. have been defined and taken as standards to improve the quality and performance of such practical devices or systems. It is found that, by keeping such hypothetical device or systems in mind, researchers have continuously improving the characteristics/properties of practical devices / systems to upgrade their performances. Hence ideal properties of a device or a system can be used to upgrade or improve its properties towards reaching 100% efficiency. By comparing the properties/characteristics of a practical device/system with its ideal counterpart, one can find out the possible modifications in that device /system towards reaching the objective of achieving such an ideal system.

The simple definition of Business is a system of doing any activity with a profit motivation. This includes selling and/or purchasing any products/services with an objective of usually long term profit. A sustainable successful business involves 'Ease of Use'. Some of the characteristics of a business are :
(1) **Creation of utilities :** Business makes goods more useful to satisfy human wants. It adds time, place, form and possession utilities to various types of goods. In the words of Roger, "a business exists to create and deliver value satisfaction to customers at a profit". Business enables people to satisfy their wants more effectively and economically. It carries goods from place of surplus to the place of scarcity (place utility). It makes goods available for use in future through storage (time utility).
(2) **Dealings in goods and services:** Every business enterprise produces and/or buys goods and services for selling them to others. Goods may be consumer goods or producer goods. Consumer goods are meant for direct use by the ultimate consumers, e.g., bread, tea, shoes, etc. Producer goods are used for the production of consumer or capital goods like raw materials, machinery,

etc. Services like transport, warehousing, banking, insurance, etc. may be considered as intangible and invisible goods. Services facilitate buying and selling of goods by overcoming various hindrances in trade.

(3) **Continuity in dealings:**

Dealings in goods and services become business only if undertaken on a regular basis. For instance, if a person sells his old scooter or car it is not business though the seller gets money in exchange. But if he opens a shop and sells scooters or cars regularly, it will become business. Therefore, regularity of dealings is an essential feature of business.

(4) **Sale, transfer or exchange:**

All business activities involve transfer or exchange of goods and services for some consideration. The consideration called price is usually expressed in terms of money. Business delivers goods and services to those who need them and are able and willing to pay for them. For example, if a person cooks and serves food to his family, it is not business. But when he cooks food and sells it to others for a price, it becomes business. According to Peter Drucker "any organisation that fulfils itself through marketing a product or service is a business".

(5) **Profit motive:**

The primary aim of business is to earn profits. Profits are essential for the survival as well as growth of business. Profits must, however, be earned through legal and fair means. Business should never exploit society to make money.

(6) **Element of risk:**

Profit is the reward for assuming risk. Risk implies the uncertainty of profit or the possibility of loss. Risk is a part and parcel of business. Business enterprises function in uncertain and uncontrollable environment. Changes in customers' tastes and fashions, demand, competition, Government policies, etc. create risk. Food, fire, earthquake, strike by employees, theft, etc. also cause loss. A businessman can reduce risks through correct forecasting and insurance. But all risks cannot be eliminated.

(7) **Economic activity:**

Business is primarily an economic activity as it involves production and distribution of goods and services for earning money. However, business is also a social institution because it helps to improve the living standards of people through effective utilisation of scarce resources of the society. Only economic activities are included in business. Non-economic activities do not form a part of business.

(8) **Art as well as science:**

Business is an art because it requires personal skills and experience. It is also a science because it is based on certain principles and laws. The above mentioned characteristics are common to all business enterprises irrespective of their nature, size and form of ownership.

17.2 CHARACTERISTICS OF IDIAL BUSINESS :

Ideal Business properties can be predicted and classified based on the system requirements, market conditions, input conditions, output conditions of a business and is shown in Fig. 6.

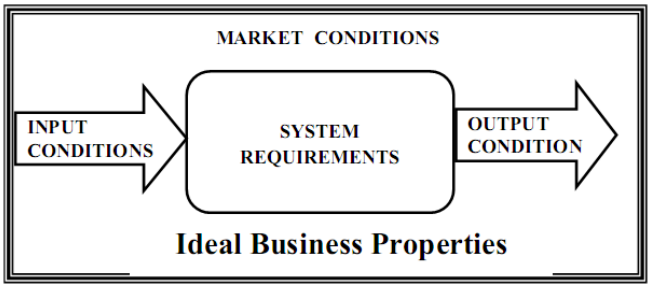

Figure 6. Classifications of Ideal Business Properties.

A. Market Conditions

(1) The Ideal Business sells its products/services to the entire world rather than a single neighbourhood and hence it has an unlimited global market.

(2) The Ideal Business offers a product/service, which enjoys an inelastic demand in the market. (inelastic refers to a product that people need or desire almost at any price.)

(3) The Ideal Business markets a product/service that cannot be easily copied. This means that the product/service is an original or, at least, it is something that can be copyrighted or patented.

B. Input Conditions

(4) The Ideal Business has minimal labor requirements. The fewer personnel, the better is the business.

(5) The Ideal Business operates on a low overhead. It does not need an expensive location. It does not need large amounts of electricity, or advertising, or legal advice, or high-priced employees, or a large inventory.

(6) The Ideal Business does not require big cash outlays or major investments in equipment or product. In other words, it does not require huge capital.

C. System Requirements

(7) The Ideal Business is relatively free of all kinds of government regulations or restrictions.

(8) The Ideal Business is portable or easily moveable. This means one can take his business and himself anywhere he wants to.

(9) The Ideal Business satisfies its owner's intellectual needs. There is nothing like being fascinated with what he does.

(10) The Ideal Business leaves enough free time to its owner. In other words, it doesn't require his labor and attention of 12, 16, or 18 hours a day.

(11) The Ideal Business is one in which the income is not limited by personal output (Leverage). In the Ideal-Business, one can have 10,000 customers as easily as can have one."

(12) The ideal Business will not have any liability after sales.

(13) The ideal Business will not have problems like seasonality, perishability and price drop.

D. Output Conditions

(14) In ideal Business the demand is always very high than supply and the efficiency of production is always 100%.

(15) The ideal Business will be sustainable for long time.

Any business which has the above properties is considered as ideal business and the conventional business called brick and mortar business has serious drawbacks/limitations in terms of the above properties.

17.3 ANALYSIS OF IDEAL BUSINESS CHARACTERISTICS :

Ideal Business characteristics can be explained based on their effectiveness in improving the qualities and benefits of the business. The characteristics mentioned in ideal business model are further discussed below :

(1) Unlimited Global Market :

Any business will sustain for long period by providing service to larger number of customers. Ideal business model eyeing at global market can sell its products/services to the global market rather than selling to a single neighbourhood market which has only limited customers.

(2) Inelastic demand :

The products/services are chosen in such a way that they can be killer application products/services. Such monopoly products/services available to the global market enjoys inelastic demand so that the service provider can sell them almost at any prize.

(3) Monopoly nature :

The product/service in ideal business environment is developed in such a way that it has unique features in terms of its technology, usability, innovativeness, cost/price or any other advantages. Also, the ideal business product/service that cannot be easily copied. This means that the product/service is an original or, at least, it is something that can be copyrighted or patented.

(4) Minimum Labour requirement :

Any business can sustain for longer period by decreasing the cost. By decreasing the cost of various resources used in the business, the organization can increase its profit. Ideal business, through its characteristics, should decrease its expenditure to minimum level and one of such possibility is minimum Labour dependent. The fewer personnel, the better is the business.

(5) Low overhead :

The total cost of any business is the sum of Fixed cost and Variable cost. The fixed cost involves initial investment on the business and maintenance cost. By decreasing initial investment without compromising with quality, the business can decrease its overall cost. As per our definition, the Ideal Business operates on a low overhead. It does not need an expensive location. It does not need large amounts of electricity, or advertising, or legal advice, or high-priced employees, or a large inventory.

(6) Low cash outflows :

Out of various resources used in any business capital investment like investment on machinery, buildings, equipments and other infrastructures which need huge capital. On the other hand the Ideal Business does not require big cash outlays or major investments in equipment, buildings or product based on the nature of its products/services. In other words, it does not require huge capital.

(7) Free of Government Regulations :

Many business firms are facing problems due to Government regulations based on the nature on business, the environmental issues and the neighbouring community issues. These regulations sometime makes the business organisation as nonprofit or to shut down. The Ideal Business is relatively free of all kinds of government regulations or restrictions so that can do sustainable business operations for longer period.

(8) Portability :

The conventional business models have uncertainty in their efforts of providing continued service to the customers due to various reasons including natural calamities. This problem can be

solved in Ideal Business model due to its portability or easily moveability. This means one can take his business and himself anywhere he wants to.

(9) Satisfying intellectual needs :

In conventional business, the organization grows due to the collective efforts of the executive team and it may not satisfy the intellectual needs of the individual executive. However, Ideal Business satisfies its owner's intellectual needs. There is nothing like being fascinated with what he does.

(10) Less time consumption :

The conventional business practices are engaging the owner with busy schedules. Usually, the business owners hardly gets time for their leisure. On other hand, Ideal Business leaves enough free time to its owner. In other words, it doesn't require his labor and attention of 12, 16, or 18 hours a day.

(11) Potential opportunity for high income :

The primary objective of any business is large profit. There is nothing wrong in expecting huge profit for honest efforts. One of the advantages of Ideal Business is possibility of ensuring large profits. In Ideal Business the income is not limited by personal output (Leverage) and one can have 10,000 customers as easily as can have one. This is mainly due to intangible nature of products/services.

(12) No liability after sales :

Since the products/services in ideal business enjoys monopoly, and they are mostly being intangible, there is nothing like providing after sales service and assuring warranty for service. If the delivered product/service is non-functional, immediately it can be replaced. Hence the ideal Business will not have any liability after sales.

(13) Low risk on price variation :

All conventional business have uncertainty due to competition, non-availability of various resources used or fluctuations in their prices due to environmental factors like seasonality, perishability and price drop. Ideal Business will not have such problems.

(14) Hundred percent efficiency :

Efficiency of a system is defined as the ratio of output to input of the system. It can be also be defined based on the ability of the system to balance demand and supply. In conventional systems, as demand increases, it is difficult to balance the supply. But in Ideal Business the demand is always very high and the supply can be increased easily for suitable types of products/services to maintain the efficiency of production is always 100%.

(15) Longer Sustainability :

One of the challenges of any practical business is long time sustainability. Most of the products/services follows shorter life-cycle due to various reasons like changes in technology, invention of new products/services with better features, changes in perception of customers etc. The ideal Business on other hand will be sustainable for long time due to its monopoly nature.

Challenges TO Achieve ideal business

To realize the Ideal Business in practice, we need to identify a product or service which is intangible in nature. The business should be monopoly and controlled by any place in the world. The product/service and the business models should be chosen in such a way as it should have properties, at least close to Ideal Business.

17.4 POSSIBLE SOLUTION THROUGH E-BUSINESS MODEL :

An intangible product/service marketed through E-business model is the possible solution while approaching towards Idealization of the business. A ubiquitous E-Business model using intangible product/service is most suitable for elevation to Ideal business. Most of the properties discussed in Fig. 6 of Ideal business can be compared to the properties of E-business using mobile devices. A block diagram of customer oriented E-business model using mobile device is shown in Fig. 7.

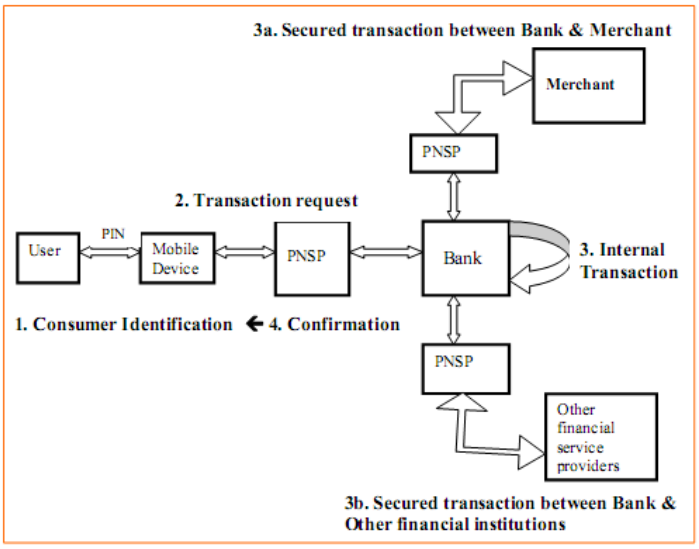

Figure 7. Customer oriented E-business model using mobile device.

In this model, based on user request, the mobile device identifies the user through physical possession of the device, 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 (path3a)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. 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; 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, to extend pair-wise trust relationships into global trust relationships, allowing automated, secure, low-cost universal roaming.

17.5 Comparison of Mobile Business Properties with that of Ideal Business :

The system properties like - free from Government regulations, portability, and satisfying our intellectual needs, availability of free time, independency of income with personal output, no liability after sales, and no headache like problems of seasonality, perishability and price drop; the market conditions like - unlimited global market, inelastic demand, and copyright/patenting opportunities of ideal business also can be realizable using mobile business properties for intangible products/services. The input properties like - minimal labor requirements, low overhead, and low capital requirement; the output conditions like – high efficiency, and sustainable for long time, of ideal business also realizable to certain extent using mobile business properties for intangible products/services as shown in Table 1. Thus e-business using mobile devices called mobile business is a suitable business model for profit maximization and approaches to hypothetical Ideal business model.

TABLE 1 : Comparison of Conventional Business and Mobile Business in terms of Ideal Business Characteristics.

S. No.	Ideal Business Characteristics	Conventional Business	Mobile Business
1	The Ideal Business sells its products/services to the entire world and hence it has an unlimited global market.	No	Yes
2	The Ideal Business offers a product/service, which enjoys an inelastic demand.	No	Yes
3	The Ideal Business sells a product/service that cannot be easily copied. i.e., it is something that can be copyrighted or patented.	No	Yes
4	The Ideal Business has minimal labor requirements.	No	Yes
5	The Ideal Business operates on a low overhead.	No	Yes
6	The Ideal Business does not require big cash outlays or major investments in equipment or product.	No	Yes
7	The Ideal Business is relatively free of all	No	Yes

	kinds of government regulations or restrictions.		
8	The Ideal Business is portable or easily moveable.	No	Yes
9	The Ideal Business satisfies your intellectual needs.	No	Yes
10	The Ideal Business leaves you with free time.	No	Yes
11	The Ideal Business is one in which your income is not limited by your personal output (Leverage).	No	Yes
12	The ideal Business will not have any liability after sales.	No	Yes
13	The ideal Business will not have problems like seasonality, perishablity and price drop	No	Yes
14	In ideal Business the demand is always very high than supply and the efficiency of production is always 100%.	No	Yes
15	The ideal Business will be sustainable for long time.	No	Yes

17.6 Analysis of some possible Products/ Services for Ideal Business :

Mobile business using various mobile devices for some of the products/services is suitable candidate for having ideal business characteristics. The products/services which are intangibles in nature used in mobile business transactions are most suitable candidates to follow almost all the characteristics of an ideal business model. Small business of selling the software products, e-books, e-music or any similar product/service will give the advantages of the Ideal Business properties.

18. INFORMATION TECHNOLOGY ACT 2000 OF INDIA

Information Technology Act 2000 (ITA-2000) is an important Indian law related to electronic commerce and other cyber operations. It was passed in Indian Parliament in October 2000, and is meant for providing a legal infrastructure to e-commerce activities in India. In 1997, a resolution was passed in United Nations General Assembly that has adopted the model law on electronic commerce introduced by United Nations Commission on International Trade Law. Following this UN Resolution, IT Act..2000 was introduced in Indian Parliament as a bill in May 2000, and received the assent of the President of India to become IT Act 2000 in October, 2000. In 2008, IT Act 2000 was substantially amended through the IT Amendment Act 2008, got the President's assent; and subsequently was notified on October, 2009.

The main objective of IT Act 2000 is to provide legal recognition to any business transaction performed through electronic media, such as internet. It also made provisions for filing online documents relating to admission in educational institutions or registrations in various government or non-government agencies, such as employment exchange. It allows banks and other business organizations to store books of accounts and other important business data in

electronic form. It makes various cyber crimes, such as hacking, damage/alteration of computer software with malicious intent, publishing of pornographic content on internet or making illegal copies of copyrighted material, a punishable offence. The main purpose of IT Act 2000 is to safeguard the interests of internet users from cyber criminals, and to protect the privacy and security of important business data transmitted through internet during e-commerce transactions.
IT Act 2000 specifically mentions the rules that indicate the manner in which digital signatures should be used for authentication purposes. Digital signatures are electronic documents that are used to verify the authenticity of electronic documents used in e-commerce or m-commerce transactions. The Certification Authorities (CA) that create and distribute. digital signatures to business organizations must follow stipulated security guidelines for generation, verification, licensing and revocation of digital signatures. It is made mandatory for CAs to maintain databases to store classified information related to digital signatures and to perform periodic audit of their operations.

Some Important Features of IT Act 2000

IT Act 2000 consists of 13 chapters each of which are divided into several sections. In addition to these, there are four schedules that state various amendments and additions.

• **Chapter 1** is the preliminary chapter that discusses the title, commencement and scope of the act in general. It also provides definitions of some key terms that are frequently used in IT world.

• **Chapter** 2 is about Digital Signature. The importance and relevance of digital signatures for authentication of digital documents are indicated. Users can attach digital signatures with digital documents at the time of sending through internet so that anyone can verify the authenticity of the document with the help of cryptographic keys (public key) that are publicly available.

• **Chapter** 3 is all about Electronic Governance and talks about the legal recognition of electronic records. It states that all the government documents that are electronically generated and electronically stored (in a computer) are perfectly legal and acceptable, unless restricted by any other laws regarding written or printed documents. Publication of government rules and regulation in electronic gazette is also permitted. The legal recognition of digital signatures are discussed in this chapter.

• **Chapter** 4 discusses the attribution, acknowledgment and dispatch of electronic records. All electronic documents, transmitted through electronic media must provide some sort of acknowledgment receipts which prove that the document is received by the desired person.

• **Chapter** 5 is about secure electronic records and secure digital signatures. Whenever any security procedures are adopted to a digital document, the time duration during which the document will remain secured must be clearly mentioned. Various aspects of securing a digital signature and rules related to the security procedures are discussed.

• **Chapter** 6 is about the regulations of certifying authorities. It discusses the appointment of Controller and other officers, functions of the Controller and recognition of foreign certifying authorities. Issuing of licenses to digital signature certificates, renewal and revocation of licenses and suspension of licenses are discussed. Various procedures to be followed by certifying authorities are also discussed.

• **Chapter** 7 details on the issuing of digital signature certificates by certifying authorities. It also discusses the suspension, revocation and notice of suspension or revocation of digital signature certificates.

• **Chapter 8** is about the duties of subscribers regarding usage of digital signature certificates. It states that it is the duty of the subscriber to ensure that all the information provided in the digital

certificate are true to his/her knowledge. The rules related to the generation of private/public key pairs and control of private key are discussed.

• **Chapter** 9 is about Penalties and Adjudication. It discusses the penalty for damage to computer and computer systems, penalty for failure to furnish information return, residuary penalty and power to adjudicate .

• **Chapter 10** discusses the establishment of Cyber Regulations Appellate Tribunal that can solve the cases relating to orders of the adjudicating officers. It mentions the composition of Cyber Appellate Tribunal, procedure, power and limitations of the tribunal, qualification for appointment of presiding officers, term of office, salary and allowances, resignation and removal and other important issues.

• Chapter 11 describes various cyber offences, such as Tampering with computer source documents, hacking with computer systems, publication of obscene contents in electronic form, etc. It mentions the power of controller to direct a certifying authority to take measures to prevent such activities. It also mentions various penalties, such as penalty for misrepresentation, penalty for breach of confidentiality and privacy, penalty for publishing false digital signature certificates as well as confiscation of computer systems engaged in any type of unlawful activities.

• Chapter 12 clearly states that the network service providers will not be liable under this act for any third party information or data made available by their network if they can prove that the offence was committed without their knowledge. However, they must prove that they have exercised all precautions to prevent such offence.

• Chapter 13 discusses the role and power of police officers in investigating cyber crimes. It describes the power of central government to make rules, power of controller to make regulations, power of state governments to make rule and constitution of advisory committee.

The Act concludes with four amendments namely Amendment of Act 45 of 1860, Amendment of Act 1 of 1872, Amendment of Act 18 of 1891 and Amendment of Act 2 of 1834.

19. CASE STUDIES :

CASE STUDY 1: MOBILE SHOPPING

Mobile shopping allows consumers to select and purchase various items from their mobile devices such as smartphones, laptops or tablets. Payment is made by various mobile payment options, such as SMS payment, direct mobile billing or SIM card based credit payment. Due to the ubiquitous nature of mobile devices, mobile shopping offers freedom from space and time constraints as the consumers can shop anytime and anywhere irrespective of store operating hours or store locations. Discount coupons and other lucrative offers are sent directly to user mobile devices by the retailers for redemption at the time of purchase. Various location based services, such as the news of various events or shows in the nearby localities are delivered in the mobile devices to motivate the user for purchasing tickets for the shows. With over 5 billion mobile devices, mobile shopping is gradually becoming one of the most preferred mobile commerce transactions and around 25% of mobile commerce transactions are contributed by mobile shopping. Various aspects of mobile shopping are discussed in the following case study.

Stop-n-Shop is a hypothetical multi-brand retail store that sells various household items, such as kitchen utensils, electronic appliances, furniture, crockery and furnishings. It has 10 branches located at various parts of the city and maintains its own warehouses and supply chain

operations. In the year 2010, it decided to launch its mobile shopping operations in order to increase its sales revenue as well as net profit.

In the initial phase, a team of qualified software engineers are engaged to develop an attractive mobile shopping website using Java ME (for Android devices), Objective C (for iPhone and iPad), Ajax and HTML5. The mobile website had all the functionalities that were available in the store's e-commerce website, but special care had been taken so that the users would not face any difficulty while browsing in their small mobile screens. Special arrangements are made so that the website is visible in all types of mobile browsers, such as Safari Mobile (for Apple devices), Opera Mobile, Mozilla Mobile, Google Chrome, BlackBerry Browser, Mozilla Mobile, Internet Explorer Mobile, etc.

In the next phase, mobile advertisements in the form of SMS and MMS are sent to user mobile devices in order to make them aware of the newly launched mobile shopping service of Stop-n-Shop. Special mobile applications are developed to send bulk SMS to website as well as the launching news of mobile shopping service. In addition to the SMS, multimedia clips in the form of MMS displaying various products available in the store are also sent to customer mobile devices.

The customers on getting the SMS and MMS started visiting the mobile shopping website and browsing through the wide variety of products available in the store for mobile purchase. The products were categorized- in five sections, namely the kitchen utensils, electronic appliances, furniture, crockery and furnishings. extensive search facility is provided in the online product catalogue so that the customers can determine the availability and check current stock status of the particular product. Each product comes with brief description, unit price, photo, availability and a button for placing order online. If the customer presses the 'Order Online' button, an online order 'form will be displayed where the customer will be asked to enter some personal details, such as name, delivery address and quantity . ..Next customer will have to press 'Pay Online' button, which allows paying through the mobile device. The users will be provided three modes of mobile payment, namely SMS payment, card based payment or direct mobile billing. In SMS payment, the user will have to send the bank PIN (through SMS) to the partner bank in which the customer has an account. The bank, after successful verification of the PIN, will transfer the payment amount from customer account to Stop-n-Shop account. A prior arrangement with the bank and the retailer is made beforehand to enable this type of mobile payment. In card based mobile payment, the user enters the credit card details in the mobile website of Stop-n-Shop and the payment is made by the credit card issuing bank. Prior agreement between the credit card issuing bank and Stop-n-Shop is made beforehand to activate credit card based mobile payment. The direct mobile billing option adds the payment amount to the monthly mobile bill of the customer and a prior arrangement with the network provider is made beforehand by Stop-n-Shop. After making online payment, customers are provided with the facility for tracking the order delivery status and also can find out the approximate time of delivery. The purchased item will be delivered to the customer address by courier within 2-3 working days.

In order to attract customers in mobile shopping, Stop-n-Shop provides a number of discount offers in the form of mobile coupons. The mobile discount coupons come with a barcode which can be scanned and redeemed at the time of purchase. Customers who want to shop from the physical store can produce the coupon (in their mobile handsets) at the cash counter to get the discount. Mobile coupons are directly sent to the customer mobile devices through SMS, and can be of two types, namely, discount coupons and free offers. Discount coupons offer a certain percentage as a discount which will be deducted from the purchase price of the item. The free

coupons offer another item. totally free of cost along with the purchased item. Also the customers gain a reward point each time they visit the mobile website of Stop-n-Shop and the reward points can be utilized at the time of purchase from the store.

In order to serve the customers better, Stop-n-Shop offers a number of location based services, such as local news delivery, news of occurrence of local events, fairs and shows along with ticket booking facilities for these events. Local weather forecast and real time local traffic updates are also provided with navigational maps. Such location based services are provided in the mobile website of Stop-n-Shop so that more and more customers are attracted to the mobile website, and the probability of mobile shopping is increased. The website provides link to popular social networking sites, such as Facebook, Twitter, Orkut, etc. The customers, after getting some attractive discount offers or some exciting news may share with their friends through the social networking sites and the news will spread rapidly in the local community, thus increasing the chance of mobile purchase manifold.

In order to gain customer confidence, special security arrangements are incorporated so that the privacy and confidentiality of the mobile purchase process in maintained. In order to make the mobile website reliable and available round-the-clock, special backup server system is arranged. To protect mobile payment system from fraudsters, 256 bit encryption technique is implemented along with password-based access control mechanism. All the financial data sent to and from the website are first encrypted with the pubic key of the bank, and then is sent along with the digital signature in order to make it authentic and trustworthy. To protect the website from virus and hacker attacks, both hardware firewalls in the form of proxy servers and software firewalls in the form of antivirus software are implemented. The mobile website is authenticated with a digital certificate from Verisign-Norton so that the customers become confident while performing mobile purchasing transactions.

In 2012, Stop-n-Shop mobile shopping service completed two years, and it has become widely popular among the citizens of the city. Even outsiders, who come to visit the city from outside either for official purpose or for leisure, utilize mobile shopping option of Stop-n-Shop for quick purchase of gifts and other items for their friends and relatives. This helped Stop-n-Shop to increase sales revenue manifold, and thus, increase net profit to desired level.

Case Questions

1. What are the advantages of mobile shopping? How location based services help mobile shopping experience?
2. How discount coupons are offered to attract more and more customers in mobile shopping?
3. What security arrangements are undertaken to secure mobile shopping applications?
4. Describe mobile shopping process and mobile payment process.

CASE STUDY 2: MOBILE BANKING

Study mobile Banking facilities provided by HDFC & ICICI Banks from their website.

CASE STUDY 3: MOBILE BANKING

Study mobile retail purchasing facilities provided by Flipkart from their website.

CASE STUDY 4: MOBILE BANKING SOFTWARE

Study mobile Banking software provided by Infosys - Pinnacle

CASE STUDY 5: MOBILE CRM CASE STUDY

Customer Relationship Management or CRM is a technique to maintain and enhance relationship with customers of any business organization. Its main purpose is to retain old customers and attract new customers through a series of interaction, sales and support activities. Principal activities of CRM include establishing customer contacts, product campaigning, sales and support, customer service and various marketing activities. CRM is often considered as a part of the marketing strategy of the company with an ultimate goal to gain bigger market share and at the same time reducing marketing and customer service cost. In order. to better organize various CRM business processes, technology is adopted that combines people with processes and delivers an integrated business environment. It closely couples customers and sales and service people of the organization so as to provide an opportunity to better serve the customers. Sales force automation is the process of employing software to automate all business processes of CRM, thus simplifying the operations and minimizing the time taken by sales representatives to complete each step. The software basically consists of contact management software that is capable of tracking and recording of each phase of the sales process for each client, starting from initial sales enquiry till the order delivery and installation. In order to reduce implementation and operational cost, the CRM software is often deployed in cloud so that the sales personnel can access and use it from anywhere through internet.

Mobile CRM is the process of accessing CRM system through mobile devices. Smartphones, equipped with internet can access the CRM system from central enterprise servers or from cloud servers and offer customer service anytime irrespective of the physical location of the client or the organization. Thus, companies can create a mobile workforce who can have the entire customer database and other information at their fingertips and can offer instant support and service to clients anytime and from anywhere on earth. Thus, mobile CRM improves sales effectiveness, provides timely follow-up of client requests, improves customer satisfaction and gains competitive advantage. Salesforce.com is a company based in San Francisco, USA that offers CRM, and Mobile CRM software solutions, which are widely used by renowned corporations, banks and other enterprises across the globe. Its CRM software consists of four parts, namely Sales Cloud, Service Cloud, Marketing Cloud and Chatter Cloud. All the components are deployed in cloud and supports mobile access. Sales cloud is a sales platform that enables sales representatives to establish contact with customers, maintain key contact database, track communication history, and collect valuable customer information through collaboration. It offers Jigsaw business database containing millions of business contacts and other information. It integrates social networking sites, such as Facebook, Twitter or LinkedIn, so that sales 'people can collaborate with the customers and share important updates regarding the sales process in real time. Service cloud is used to receive service calls from customers through a service portal and automatically assigns the job to sales personnel for immediate action. It includes chatting facility, social networking plugin, Google search facility and e-mailing option to enhance communication with client round-the-clock. Marketing cloud is a social marketing platform that allows companies to collect important marketing information, such as customer sentiment, intent and influence and other demographics from a large number of social networking websites, such as Facebook, Twitter, LinkedIn, blogs, etc. Such marketing information are utilized in making better marketing decisions as they help in feeling the pulse of the market and help judging the prospect of the brand. Sales Chatter is a collaborative platform that sends various news updates related to the sales process in real time to various sales personnel of the organization. Users can form groups among themselves and share messages and info regarding the customer status and project situation as and when required. Apart from these,

there are two more modules available, namely Salesforce Platform that helps developing customized CRM applications and Salesforce Work.com that is a sales management platform that helps managers to control the sales and marketing activities of the organization in an integrated manner.

CLB bank is a hypothetical/bank having a large customer base in several countries spanning three continents. It offers various banking options, such as personal banking, priority banking, NRI banking, corporate banking and regional banking. Clients can have various types of accounts, such as current account, savings account, demat account, corporate salary account as well as public provident fund account. It supports internet banking, mobile banking, ATM counters, credit/debit card payments and international money transfers. It offers a number of loans and mortgages to its customers at easy installments and affordable interest rates. A number of investment and insurance options are offered to customers with suggestions and consultation by experienced financial consultants as and when required. All the bank branches are connected through a high speed optical fiber network which is highly secured from external disturbances and fraudulent activities. The centralized server stores all customer and transaction data in the form of huge databases, which are continuously accessed by both customers and bank employees from all of the bank branches located in different countries.

The main challenge faced by the bank management was to harmonize the communication among the customers and the bank employees. With hundreds of bank branches in different countries and millions of customers, it was really difficult to provide customized support to each individual customer. In order to meet the growing demand of ever expanding customers, it was really necessary that the bank employees remain well-connected with each of the customers which were practically impossible through e-mails, In order to handle such a voluminous job, CLB bank decided to introduce Salesforce CRM solution that will enable the bank staff to offer customized support to the customers, and also to approach new customers with the available banking offers and services. The growing popularity of mobile banking forced the management to introduce mobile CRM option of Salesforce so that bank employees are able to contact customers whenever required, irrespective of the location of the customer or the employees. It surely added a new dimension in the customer service of the bank and greatly improved customer satisfaction.

Sales cloud was used in order to explore new client contacts by establishing contacts with prospective clients through social networking platform of sales cloud. Using data.com, the Salesforce corporate database containing millions of corporate contacts and other information, new client lists were created and approached. Using Marketing cloud, important customer information were extracted from social marketing platforms and used in building effective market expansion strategy. Service cloud was used for providing world class service to existing customers. Through mobile service cloud platform, bank staffs were in constant touch with the customers and could respond to their queries and requirements. Customer database were uploaded in service cloud and could be accessed by each bank employee whenever required. This empowered them to offer on the spot service to customers and sky-rocketed customer satisfaction. With the help of Google search engine and chatting facility, in-built in the Service cloud, it became easy for employees to find quick answers to customer queries, thus improving quality and efficiency of their service manifold.

Another problem area was to instantly find a knowledgeable employee who will be able to handle the requirements of a particular customer as and when required. From the huge number of employees, it was really difficult to find an appropriate employee who will be able to solve the

customer problems. With the help of Chatter, the collaboration platform offered by Salesforce, it was possible to create groups of employees having related experience, and whenever required message could be posted to a particular group mentioning the customer problems, and hence, getting a quick response from any of the group members. Thus, with Chatter, the employees could operate in groups and could collaborate and contribute to customer care as and when required.

The quality of service and overall performance of CLB bank improved dramatically after the employment of Salesforce.com CRM solution. Sales of new products increased as more and more customers started investing in various services offered by the bank. At the same time, newer customers were attracted towards different banking options and as a result both sales revenue as well as the net profit margin improved significantly.

Case Questions

1. What is CRM? What are the principal activities performed by a CRM software? What is mobile CRM?
2. What is Salesforce.com? Describe Sales Cloud, Service Cloud, Marketing Cloud and Chatter.
3. What were the main challenges faced by CLB bank?
4. How did Sales Cloud, Service Cloud and Chatter solve above problems?
5. What were the benefits achieved by implementation of Salesforce.com mobile CRM in CLB bank?

CASE STUDY 6: MOBILE EDUCATION

Mobile education is the process of providing educational services through mobile devices. Both formal education as well as vocational training can be delivered through mobile devices using WAP, SMS and IVR (Interactive Voice Response) technology. In formal education, study materials, course contents and other teaching materials can be sent to student mobile devices in the form of SMS or word/PDF files through mobile WAP browsers. SMS alerts can be sent in order to notify examination dates or schedules, examination results, student registration IDs, etc. In vocational training, language training lessons can be delivered through IVR to user mobile devices. Farmer training programme can be conducted using a combination of SMS and IVR to educate farmers residing in remote villages about farming, fertilizing and other related processes. Special mobile educational programmes can be launched in backward areas with large population of illiterate people in order to improve adult literacy rate. Health educational programmes can be arranged in order to educate health workers working in remote villages in various health related issues through their mobile devices. Role of mobile education in economically backward countries, such as Bangladesh, Kenya, Nigeria, Tanzania, etc., is enormous as it provides a cost-effective way to offer basic education to majority of population having limited or zero access to education. With rapid penetration of mobile technology and availability of low-cost mobile devices, mobile education has become an effective means to conduct educational programmes in underdeveloped countries. In countries like India, China and South Africa, having large illiterate population, various government-aided and subsidized mobile educational programmes are launched in order to provide low-cost or sometimes absolutely free education to under-privileged citizens.

Sunshine is a Non-Government organization that offers various mobile educational programmes to different sections of the society. It offers basic educational services through mobile devices to rural schools in remote areas having limited educational facilities. The services are divided in

two parts, one for the students and the other for the teachers. For the students, it organizes subject teaching programmes conducted by volunteer students of local universities, who teach through interactive voice tutorials, delivered to the mobile devices of the students. Thus, basic courses in mathematics, science or humanities are organized in order to provide quality teaching to the students. Similarly, Spoken English courses are conducted by qualified professionals who teach through mobile devices from different city locations. Story telling classes are conducted through IVR so that school children can listen to .good short stories written by well-known authors.

For teachers, a number of useful training programmes are launched that imparts adequate knowledge in the field of education. The teachers are provided with internet enabled tablets with 7" /8" screen, so that they can download comprehensive teaching material including teacher's guide and lesson plans. This enables teachers to improve quality 'of classroom teaching that in turn results in improved student performance. The teachers often download educational 'videos in their tablets and display it in classroom television sets so that the students can watch and learn from it.

In vocational training area, Sunshine offers a number of mobile training programmes for different occupations, such as farmers, health workers, insurance workers, sharebrokers and traders. For farmers, useful voice training sessions are conducted through mobile devices regarding the farming process, utility and types of fertilizers available in the market, market price, weather updates and irrigation tips. For health workers periodic health trainings, medicine lists, first-aid service tips, symptoms and cause of various epidemic diseases, prevention tips, etc., are sent through voice prompts to mobile devices of the individual workers. For sharebrokers, live stock updates are provided in the mobile devices along with predictions and suggestions by qualified financial consultants as and when required. Traders and Insurance workers also get requisite guidance and training in respective areas through voice messages in their mobile devices.

Above mentioned training programmes have become immensely popular as they provide quality education to a large number' of people across the country: The field workers are benefitted by the adequate training and useful information they receive in respective areas. Sunshine has tie-ups with a number of mobile device manufacturers who provide low-cost cell phones, smartphones and tablets at subsidized rate to teachers, students and field workers who are the end users of the system.

Case Questions

1. What is mobile education? Describe various features of mobile education that are deployed in various areas of society.
2. What mobile education services are offered by Sunshine to students?
3. How can teachers be benefitted by the mobile educational services offered by Sunshine?
4. Describe the mobile vocational training programmes offered by Sunshine.
5. Describe the benefits of Sunshine mobile education programmes.

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