Value Added Services in India

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VALUE ADDED SERVICES IN INDIA

Master Thesis Report

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Abstract

Value Added Services (VASs) have become one of the major revenue generators in the telecom industry. Most of the telecom subscribers have started using VAS and it has become an important service for the customers. The objective of the project is to evaluate and analyse the need for value added services in India. The report begins with a discussion of existing VAS provided by 2G wide area cellular technologies and how these will change with the introduction of 3G technology. Following this the value chain of VAS is discussed. Next new trends, drivers, and challenges of the VAS are discussed in detail. The impact of content developers and software development on VAS are discussed. Then a method to analyse VAS is discussed, followed by method of analysing the ringback tones with respect to a company is provided followed by the method to analyse the importance of the content providers in the value chain.

Then the Mobile commerce VAS is analysed in detail and ringback tone service provided by OnMobile Company is analysed in detail, followed by an analysis of the role of content providers in value chain. A survey on different services provided through VAS is taken among few of the VASs users in India and the results are included with graphs in the report.

The thesis analysis results are very important in the modern telecommunication industry as VAS plays a major role in generating huge revenue and currently many industries are focusing on to provide mobile commerce services to its customers. The thesis answers various questions like, what are the different M-commerce services that are provided to the customers in the telecom industry. Why OnMobile Company provides different varieties of ringback tones to the user? Why the role of content providers is very important in the Value chain?

The report concludes with conclusions explaining the different insights that are gained from the analysis of the VAS (M-Commerce), Ringback tones provided by OnMobile, role of content providers in the Value chain and the survey results. It is followed by the some suggestions and possible future work concerning Value Added Services in India.

***Keywords**: VAS, M-Commerce, 2G, 3G, Value chain, Ringback tones, Content providers.*

Sammanfattning

Value Added Services (VASs) har blivit en av de största inkomst generatorerna i telekombranschen. De flesta av Telecom abonnenter har börjat använda VAS och det har blivit en viktigare service för kunderna. Målet med projektet är att utvärdera och analysera behovet av mervärdestjänster VAS i Indien. Rapporten inleds med en diskussion av befintliga VAS från 2G stort mobil teknik område och hur dessa kommer att förändras med införandet av 3G-tekniken. Efter detta kommer värdekedjan för VAS att diskuteras. De nästkommande nya trenderna, drivrutiner och utmaningar inom VAS diskuteras mer i detalj. Effekterna från innehållsutvecklare och mjukvaruutvecklingen inom VAS diskuteras också. Sedan kommer metoden för att analysera VAS att diskuteras, följt av en analys av ringsignaltjänsten med avseende på företag och en metod för att analysera betydelsen av innehållsutvecklare inom värdekedjan.

Då mobil handel VAS analyseras i detalj och tillbaka ringningston tillhandahålls av OnMobile företag analyseras i detalj, följt av en analys av den roll som leverantörsrollen av innehåll i värdekedjan. En undersökning om olika tjänster som tillhandahålls via VAS tas bland några av de VASS användare i Indien och resultaten visas i grafer i rapporten.

Avhandlingen analysresultaten är mycket viktiga i den moderna telekomindustrin som VAS spelar en viktig roll i att genererar stora inkomster och för närvarande många branscher fokuserar på att tillhandahålla mobil handel tjänster till sina kunder. Avhandlingen besvarar frågor som: Vilka är de olika mobila-handelstjänster som tillhandahålls inom telekomindustrin, varför OnMobile tillhandahåller olika typer av ringsignaltjänster till användaren? och Varför innehållsutvecklare är viktiga inom värdekedjan?

Rapporten avslutas med slutsatser som förklarar de olika insikter som erhålls från analysen av VAS (M-Commerce), tillbaka ringningstoner från OnMobile, den roll som leverantörer av innehåll i värdekedjan och enkätresultat. Det följs av några förslag och möjliga framtida arbete om Value Added Services i Indien.

Nyckelord: *VAS, M-Commerce, 2G, 3G, värdekedjan, Ringback toner, innehållsleverantörer.*

Acknowledgment

I would like to sincerely thank and express my gratitude whole heartedly to my academic supervisor and examiner Prof. Gerald Q. Maguire Jr. and my industrial advisors Ananth Balasubramanian & Mathesh Alwar for their continuous help and support throughout the whole project. I would not be able to advance with the project without the information and ideas from the advisors and the supervisor. I would not be able to produce such a document without the thorough and clear corrections from the supervisor. I would like to thank the supervisor and examiner for the through correction of the report with loads of questions and criticism every time, which helped me to correct the mistakes and learn about the topic thoroughly. I gained lots of new technical information about VAS during this project. I also understand how important the role of supervisor is, while doing this thesis work.

I would like to thank God for giving me his blessings. I would like to thank all my friends and relatives who helped me by participating in the survey. I thank my parents for their continuous motivation throughout the project. Thank you all.

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List of Acronyms and Abbreviations

2G	Second Generation
3G	Third Generation
Ad-RBT	Ringback Advertising
ARPU	Average Revenue per User
ATM	Automated Teller Machine
BSNL	Bharat Sanchar Nigam Ltd.
CAGR	Compound Annual Growth Rate
CRBT	Caller Ring Back Tone
CUG	Closed User Group
DOT	Department of Telecommunications
EDGE	Enhanced Data rates for GSM
E-mail	Electronic Mail
ETS	Electronic mail to Speech
FAX	Facsimile
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
HD	High Definition
HTC	High Tech Computer Corporation
IT	Information Technology
IVR	Interactive Voice Response
LBS	Location Based Services
MCA	Missed Call Alerts
M-Commerce	Mobile Commerce
MMS	Multimedia Messaging

MTNL	Mahanagar Telephone Nigam Ltd.
MVAS	Mobile Value Added Services
PDA	Personal Digital Assistant
PIN	Personal Identification Number
PVR	Priya Village Roadshows
RBI	Reserve Bank of India
RFID	Radio Frequency Identification
RIL	Reliance Communications
RTMS	Resource Tracking and Management Service
SBI	State bank of India
SIM	Subscriber Identification Module
SLA	Service Level Agreements
SMS	Short Messaging Services
SOAP	Simple Object Access Protocol
STD	Subscribers Trunk Dialling
TRAI	Telecommunications Regulatory Authority of India
TTNL	Tata Teleservices Maharashtra Ltd.
TV	Television
UBI	Union bank of India
WAP	Wireless Application Protocol
VAS	Value Added Services
VC	Venture Capitalists
VMS	Voice mail service
VPN	Virtual Private Network

Definitions

a) *Value added Services* are those extra services which are provided to the customers apart from the basic voice services and mostly based on Data.

b) *2G* Second-generation wireless digital technology, primarily focussed on Voice service

c) *3G* Third-Generation Wireless digital technology, primarily focussed on packet switched data

d) *Average Revenue per User* (ARPU) The revenue generated by a single customer, typically on a monthly basis

e) *Service level agreements* (SLA)*:* An SLA is a document that describes the minimum performance criteria a provider promises to meet while delivering a service.

f) *Content Provider:* Firm which develops and owns the copyrighted contents and provides the contents for value added services.

g) *GPRS* is a packet switched mobile data service provided in the later 2G and 3G cellular communication systems based upon GSM.

h) *EDGE* is a data system used on top of GSM networks, with three time's faster data rates than the GPRS system. Both phone and the network must support EDGE otherwise the phone will automatically revert back to GPRS. EDGE meets all the requirements for a 3G network, but is usually classified as a 2.75G network technology.

i) *Mobile Commerce* is the ability to conduct commerce with the help of mobile devices, such as mobile phones, PDA, or a smart phone.

j) *Wireless Application Protocol (WAP)* is an open technical language, global specification, and set of processing rules that enables mobile phones users to access websites through their mobile device.

k) *Location Based Service (LBS)* is a software application for IP-capable mobile devices that exploits knowledge about where the mobile device is located.

l) *Department of Telecommunication (DOT)* In the Government of India the Department of Telecommunications is a part of the Ministry of Communications and Information Technology in the executive branch.

m) *Advertising RBT (Ad RBT)* is one of the ringback tone service type provided to the customers, where Ads will be played to the customers as ringback tone instead of the ordinary tones or songs.

n) *Reverse RBT* is also one of the ringback tone service provided to the customers in order to attract more customers towards ringtones. With this service the customer can set the ringback tone and whenever the customer calls any subscriber he will hear that song as the ringtone.

o) *Social RBT* is a new type of ringback tone service provided to the customers as the social networking over web has become increasingly popular but there are few people who doesn't use internet still but uses a mobile phone. The customers can update about their tones preference to other customers and can notify them about the current mood of the customers to the other customers.

p) *Content providers* play a major role in VAS and they are the one who provide the contents that are available through the value added services to the customers. The value of the content providers has increased tremendously after the introduction of the 3G services in India.

1. Introduction

India's mobile telephony subscriber base is growing at a faster rate than any other field in India. The total number of mobile subscribers in India as of July 2009 was 325.7 million [12] [56]. By July 2010, the subscriber base had increased to 688.38 million, and currently, at the end of February 2011, there are nearly 752 million mobile subscribers. This is a drastic increase in a course of 10 years, when compared to the roughly 5 million subscribers in 2001. It is projected that India will have around 1.159 billion mobile subscribers in 2013. It is predicted that India will surpass China in the total number of mobile subscribers during 2013.

1.1. Background

The first Indian Telegraph act was passed in 1885 and the Department of Telecommunication (DOT) was created in 1985 for policy, licensing, and coordination matters related to telegraph, telephone, data, facsimile, and telecom services and other similar forms of communications [27]. The first telecom service providers in India, MTNL and VSNL, were set up during 1986. The first cellular phone services opened up to the private sector during 1994 and the National Telecom policy was passed during 1994. In 1997, the Telecom Regulatory Authority of India (TRAI) was set up to regulate the telecommunication business in India. After gradual development of the field of telecommunications, the first broadband policy was passed during the middle of 2004. Today the telecommunication industry in India is undergoing a tremendous change due to the advancement in technology.

The telecommunications sector can be divided into three main areas: Telephony (both wired and wireless), Internet services, and value added services (VASs). Telecommunication services are considered to be the most important tool and also an instrument for developing a nation in both social and economic terms. Telecommunication services have a vital role in building the nation's economy due to the way they contribute to increased efficiency and national revenue. When mobile phones were introduced in 2000, there was only one service, voice calls, provided to the customer and a cellular phone offered no other features. Today people have started using their mobile for more than making voice calls. Handset manufacturers have flooded the market with new handsets offering advanced functions and features in order to attract more customers. These handsets enable new VASs.

With the growing number of mobile subscribers, any successful new additional service can generate at least a small amount of additional revenue. In such a scenario, mobile value added services (MVASs) are a big boon to the field of telecommunications [16]. MVAS is one of the main areas driving additional growth of the market due to the introduction of new products and new companies emerging every day. MVASs are the major source of revenue for mobile network operators in India. For example, Caller Ring Back Tone as a value added service continues to dominate in revenue over all other services. It remains one of the best sources of income for mobile network operators.

1.2. Overview of the planned Master's Thesis

The telecommunication market in India is growing at a tremendous speed due to a large extent the emergence of new value added services. This thesis will evaluate value added

services in the Indian telecommunication sector, while considering different perspectives and changes in market trends. Over the past few years this industry has realized the importance of VAS. Due to the declining Average Revenue per User (ARPU) and increasing competition among operators it is very important to find alternative sources of revenue in addition to the general services that are offered. VASs have proved to be one of the best revenue generators in the telecommunication sector.

The telecom industry is not an independent industry anymore, but it is a combination of several converged industries that provide services for voice and data communication. New operators are developing new VASs in order to attract (more) customers. The introduction of 3G services in India will also play a significant role in what VASs and other new services can be provided to customers. Third party companies and various Information Technology (IT) industries are also developing new VASs to sell to the network operators. There exist a lot of drivers and challenges for MVASs in India. Content developers play an important role in providing contents for the VASs that are made available for customers through 3G services. Software developers are working hard daily to create new applications and they play a major role in future VASs. The future VAS market has huge potential for change when all of these factors are considered.

This master's thesis first discusses about current and future VASs in India with respect to 2G and 3G networks, the VAS value chain, new trends, drivers and challenges for VAS, impact of VAS on content providers and software developers, and the future VAS market and services. Later in the thesis, will try to evaluate and analyse the VASs mainly the Mobile commerce services, then will analyse the different types of ringback tone services that are provided to the customers by OnMobile Company, and finally the role of content providers in the Value chain.

2. What is a Value added Service?

Initially mobile telephony only provided voice based service, although even this caused a revolution in the field of telecommunications. After a period of time, service providers began to transmit data on the same channel as voice, hence better exploiting the available channel resources. As a result any additional non-voice service is called a **Value Added Service (VAS)**. More formally value added services refers to non-core services which are offered to the customers apart from the core or basic services being offered, such as voice calls and fax transmission [27]. MVASs are constantly evolving with the introduction of new mobile applications beyond the basic services, i.e., voice and text messaging (short message service-SMS).

In India's Department of Telecommunications, Unified Access Services License (UASL), VAS is defined as follows- ***"Value Added Services are enhanced services which add value to the basic teleservices and bearer services for which separate license are issued"*** [27].

MVAS are mainly based on three different delivery platforms: SMS, interactive voice response (IVR), and Wireless Application Protocol (WAP) Portals.[1] Each VAS has its own characteristics and relates to other services in a unique way.

The four components of VAS are (1) a content/application owner who develops and owns the original copyrighted contents and applications that are provided to the customers as VASs, (2) aggregators aggregate contents and aggregate the application from the owners (or smaller boutiques) and distribute an application adapted to suit the customer's needs while also managing IVR, quality control, billing, and accounting for the aggregated contents and applications, (3) Software developers develop the applications (including in-house quality checks and integration with third party developers for parts of the complete process), and (4) technology enablers who provide a platform that connects to the network and acts as a bridge between the aggregator and the network operator. These technologies also manage and maintain this platform according to service level agreements (SLAs) and handle integration of diverse applications, reconciliation of accounts, and also provide billing data which is passed on to the network operator. Each of the four main components of VAS has their own major role to play in the industry in order to provide complete VAS solutions to customers.

2.1. How important are Value Added Services?

The VASs provided by operators in the telecom Industry are one of their main sources of income. VASs can increase the ARPU. VAS is one of the major areas where different telecom operators can compete with each other by offering different services in order to attract more customers. VASs are becoming part of the network operator's core business; hence there are increasingly no boundaries between the VASs and the operators.

More and more customers expect services beyond simple voice calls. Customers have started to select their operators based on the type of VASs the operator provides, so it is important for operators around the world to introduce new and innovative value added services in order to

[1] WAP is specialized version of web browsing for mobile handsets.

both attract more customers and retain their market. In summary, VASs are considered the most important area for the operators and the demand for VASs are very high among subscribers.

2.2. How important are Value Added Services in India?

The Indian telecommunication sector is one of the important sectors for Indian economic reforms. The telecommunication sector in India is considered to be the fastest growing telecommunication market in the world with a 17% compound annual growth (CAGR). India has the third largest telecommunication network and the second largest wireless network in the world [58]. The total contribution of the communications sector is around 3% of India's gross domestic product (GDP). India has the second largest population in the world (after China) and more than 50% of the total population in India uses a mobile phone. The first phase of the Indian telecommunications revolution was mainly based on the voice as a service, and in the second phase this revolution is based on data services.

The four main pillars of VAS are: infrastructure, technology, content, and access devices. All of these pillars are interconnected in such a way as to make VAS feature rich. VASs can be provided to customers at good price only if all of these pillars work together. The overall telecommunications sector can be divided in to five different parts [24]: network infrastructure companies, telecommunication equipment manufacturers, telecommunication service providers, telecommunication solution providers, and VAS service providers.

The top network infrastructure companies in India are Nokia Siemens Networks, Ericsson, Alcatel Lucent, Huawei, and Cisco. The top telecommunication equipment manufacturers in India are Nokia, Motorola, LG, Samsung, Micromax, and Sony Ericsson. The major telecommunication solution providers in India are IBM Daksh, Wipro, Spanco, Aricent, and AEGIS. The top ten major telecommunication service providers in India are Bharti(Airtel), BSNL, Vodafone, Reliance, Idea Cellular, Tata Communications, Tata Teleservices, Aircel, MTNL, and TTML. These service providers' growths are based on innovative new products. Each of these network operators comes up with new and innovative services daily and attracts new customers to these new services through the media [1]. Customers choose their service provider based on who provides their required value added service. On-Mobile is the only pure VAS operator in India.

There is a huge difference in the usage of mobile phones by rural and urban users in India. The urban users are quite advanced in using their mobile device whereas rural users only use their phone to make voice calls and they are still learning how to use the mobile handsets and services that are offered to them. According to the statistics of IAMAI [10] [35] four graphs can be plotted to show this difference in VAS usage by rural and urban Indian mobile phone user (see figure one, two, three and four respectively)

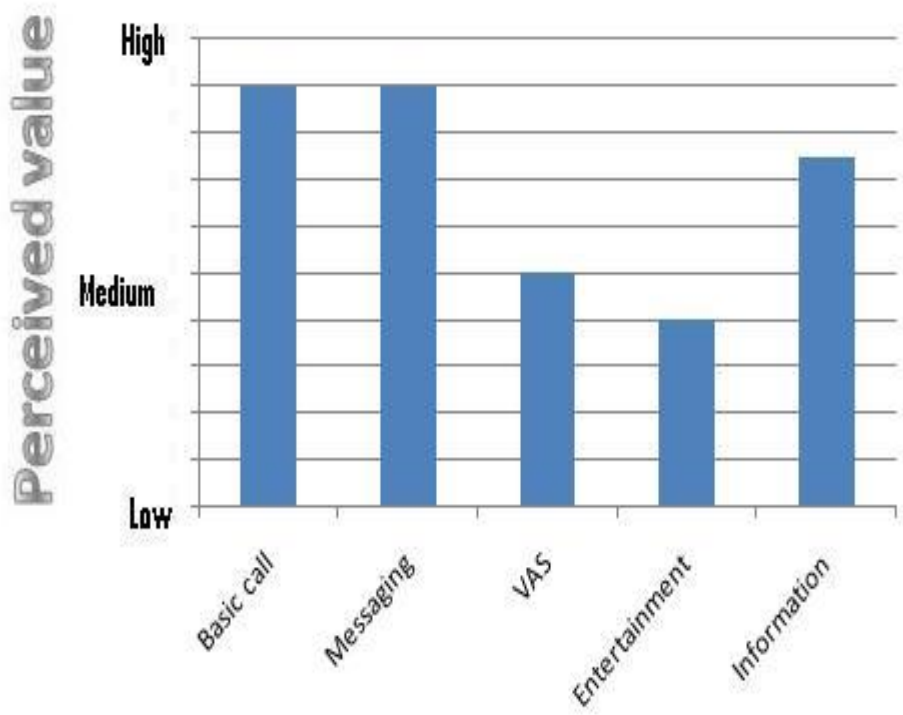

Figure 1*: Mobile VAS scenario: Urban India today*

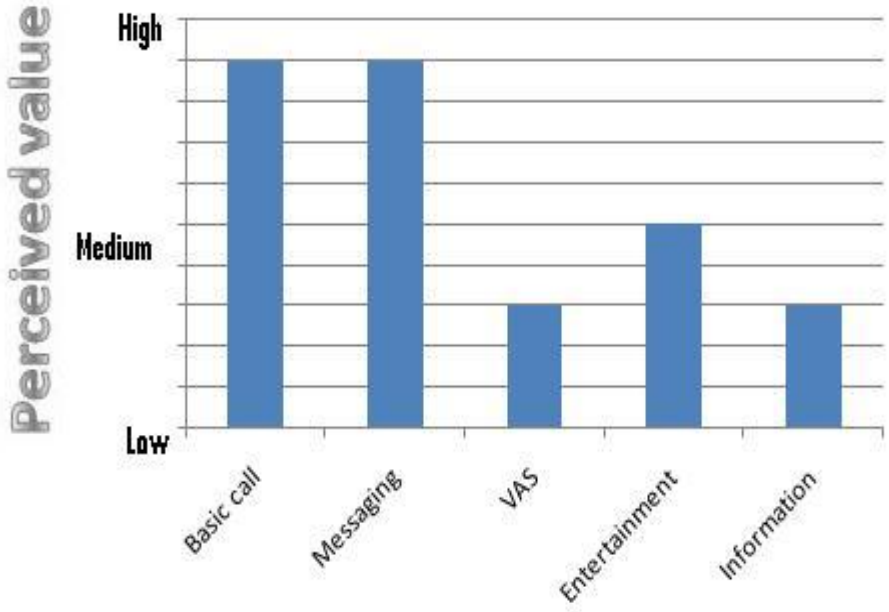

Figure 2: *Mobile VAS scenario: Rural India today*

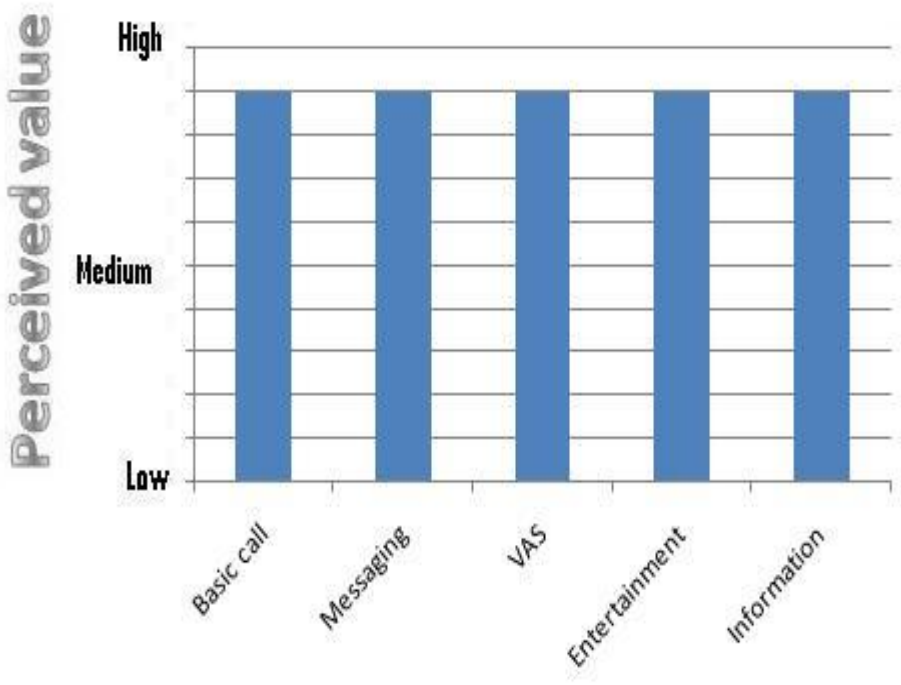

Figure 3: *Mobile Vas scenario: Urban India in future*

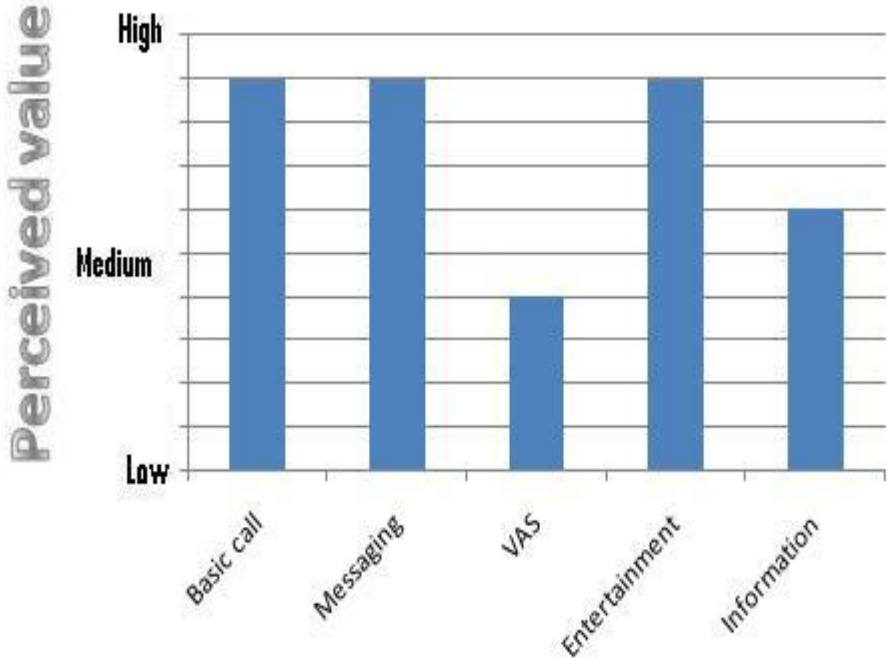

Figure 4: *Mobile VAS scenario rural India in future*

At the time of the introduction of mobile telecom service, in 2001, the person to person voice call rates were around Rupees (Rs) 24 per minute. This has decreased drastically over a period of time to around 1 paisa (1/110 of a rupee) per three seconds for a local call and 1 paisa per two seconds for subscriber trunk dialling (STD) call. These rates were introduced by TATA DOCOMO and are now similar for most of the telecom operators in India. On the other hand, the price for VASs via a voice portal for downloading ringtones, dedicating songs, checking cricket scores, etc. costs about Rs 6 at the time of introduction and does not reduced significantly over a period of time resulting on rates of Rs 3 to Rs 6 per minute. The price for all the VAS services, in India, is still very high and there has been no big reduction in VAS costs.

The tele density (also known as "percentage penetration") has reached over 58% with 15 million new handsets sold every month in India [37] [38]. With the upcoming rollout of 3G services in India, it is expected that both the percentage penetration and absolute number of handsets sold per month will reach historic highs. The VAS market in India is estimated at around Rs 5400 Crore (Cr), and it is likely to exceed Rs 12000 Cr by the end of 2015, with the new opportunities available for VAS after 3G is rolled out in the market [38]. With the growth of MVAS market in India, more rationality will emerge in the revenue structure. The revenue structure should be dependent on the actual value added by the respective stakeholder in delivering a VAS to the end user. This should enable growth of the overall MVAS market in India.

The MVAS market in India is largely dominated by the urban population, with rural subscribers constituting a very small percentage of the total market. However, the rural MVAS market could witness growth at a much higher rate than the total market in the next few years. The growth drivers for this growth might be the availability of entertainment services, content in the local language(s), and in increased number of voice based services [59].

Figures 5&6 shows India's population in Millions [28] and the wireless mobile penetration in India according to Gartner's statistics up to April 2008.

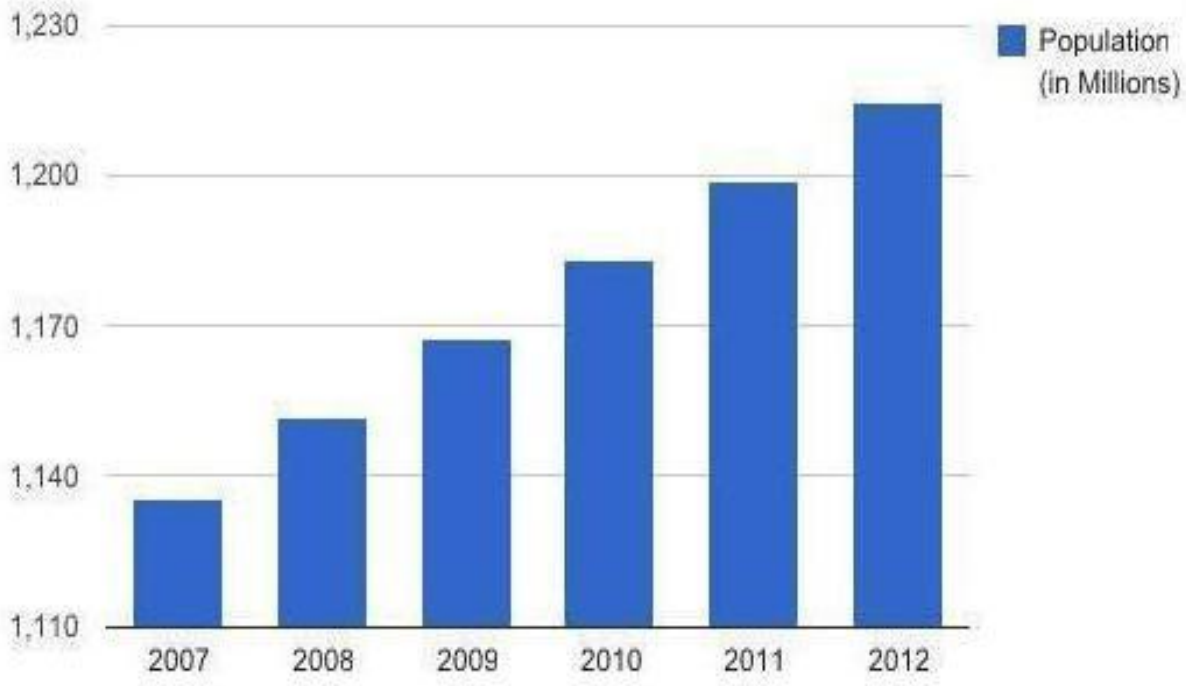

Figure 5: *India's Population in Million [28]*

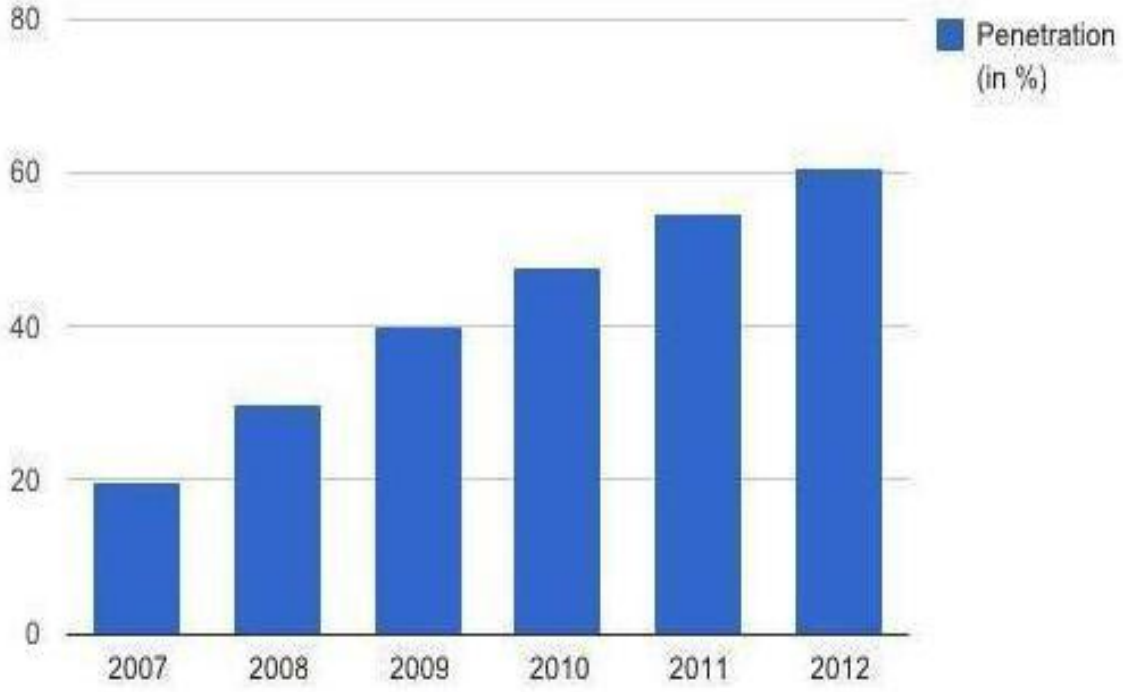

Figure 6: *Wireless Mobile penetration in India [28]*

***Table 1**: India's Population and cellular market penetration [28]*

India: Population and cellular market penetration, 2007-2012

	2007	2008	2009	2010	2011	2012
Penetration (in %)	19.8	29.7	40.0	47.8	54.8	60.7
Population (in Millions)	1,135.6	1,151.6	1,167.5	1,183.3	1,199.0	1,214.5

3. Value Added Services offered to Customers

As noted earlier MVAS services that are offered to customers are mainly based on the three different delivery platforms (mainly SMS, IVR, and WAP portals). There are many value added services to be offered via all the three platforms. Some of the important areas in which value added services are offered to the customers with these three delivery platforms are: entertainment, alerts and news, commerce, social VAS, and Enterprise VAS.

Some of the important value added services [36] that are currently offered to telecom customers in India are listed below. Following this each of them will be described in detail.

a) Voice mail services
b) Short message services
c) Roaming (National, International)
d) Call forwarding
e) Call conferencing
f) Call waiting and call holding facility
g) Wireless application protocol(WAP)
h) Unified messaging services
   (FAX message, Voice mail services (VMS), E-Mail, E-Mail to speech (ETS))
i) Corporate virtual private networking (VPN)
j) Friend and Family talk
k) Caller Ring Back Tone(CRBT)
l) Missed call alerts
m) E-top up
n) Welcome SMS
o) Preferred roaming
p) USSD portal
q) Call filtering
r) Background music

a) Voice mail service

With a voice mail service activated the customer can receive or send voice mail. If the called customer is busy, this customer can still receive the voice of the caller customer by listening to it whenever the callee is free. The customer can also send voice mail to another customer who has activated their voice mail service.

b) Short Message Services

With the short message service activated, the customer can send and receive short messages up to roughly 160 characters (The exact number depends upon the alphabet that is used) to/from any other customer who has activated SMS.

c) Roaming(National/International):

By activating roaming, a customer can roam around within the country. Activating international roaming enables the customer to roam around the world while still maintaining the same number. Few of the mobile operators give this roaming service by default to their customers.

d) Call Forwarding

By activating the call forwarding service a customer can forward incoming calls to another number of his choice. The call can even be forwarded to a landline number.

e) Call Conferencing

By activating the conferencing call service the customer can make a conference call in which the customer can include up to six contacts. However each call will be billed separately according to the usage of airtime associated with each individual user.

f) Call waiting and Call holding facility

The customer can activate the call waiting facility in order to receive a second call during a call. With the call holding facility activated the customer can place the current call on hold and receive the second call. The customer can also switch between the two calls, by holding one call and continuing with the other call.

g) WAP (Wireless Application protocol)

WAP is used for transmission and presentation of information from the World Wide Web (WWW) when using a wireless handset.

h) Unified Messaging service

A unified messaging service can replace a voicemail service. The different forms of unified messaging services are FAX message, voice mail service, E-mail, and E-mail to speech. The goal is that the user should be able to get a message in the medium of their choice.

i) Corporate VPN

A corporate virtual private network (VPN) enables subscribers to access their corporate local area network from their handset – just as if they were connected directly to the corporate network.

j) Friend and family talk

This service is similar to a corporate VPN service, but for the subscriber's family and friends. With the friend and family talk service activated customers can enjoy free calls or calls at a much lower rate than normal calls to a pre-defined set of subscribers.

k) Caller Ring Back Tone (CRBT)

With CRBT activated the customer can choose a ring back tone of their own choice from a wide variety of choices available in a database. The customer can also have a particular ring back tone for each particular caller. The customer can also have a group of ringtones which are shuffled for every call. CRBT tones are large revenue generators for operators.

Currently a *Subscription model* is the only available business model for CRBT service, thus customers pay a monthly rental in advance to the operator but can change their ringtones to any tone in the current database [7].

l) Missed Call Alerts

The missed call alert VAS can be used by subscribers who do not want to miss any incoming calls. With this facility activated, the identity (mobile number) of the calling customer is stored in a database; even if the called customer's mobile is currently switched off, the information about missed calls can be retrieved by the subscriber whenever the subscriber switches on their mobile.

m) E-top up

The e-top up service enables the customer to top up (i.e., add funds) their prepaid card online from anywhere in the world. This service is very useful for customers while they are roaming.

n) Welcome SMS

The welcome SMS service tells customers about the available operator and rates (tariff changes) when the customer roams to a new operator.

o) Preferred roaming

Preferred roaming enables the customer to choose the operator and service while roaming. When this service is activated the system automatically chooses the best operator with whom the home operator has an agreement. In this case calling rates will be less than the other operators available in the same place.

p) USSD Portal

USSD portals provide various services such as a call me service; balance enquiry Service; ringtones downloading and other content management; and access to a self care application related to billing enquiry, activation, or deactivation of a network service.

q) Call Filtering

The customer can enable this service if the customer does not want to answer all the calls. When the call filtering service is enabled for a customer it allows him to choose which calls are to be answered and which calls can be left unattended. Those calls which are unattended

can be forwarded to a voice mail box, to a different number, or to a network operator's message without the phone even ringing. This service increases privacy and satisfaction of the customers.

This service works even when the calling party has blocked their number display while calling a number. This service mainly helps the customers to enjoy a peaceful holiday or vacation or can be used when is in an important meeting or seminar. The network message can explain why the customer does not want to attend the call at the moment.

r) Background Music

The customer can activate a background music service to personalise conversations according to the mood of the customers in the call. The customer can select the type of music according to his/her choice during the call. This background song can be selected with the press of a button while in a call if the service is activated.

s) Other Services

In addition to these basic services there are several other VAS categories available to customers. They range from entertainment which includes ringtones, CRBT, and games to Wallpaper. M-Commerce is another value added service which allows customers to do online transactions with their mobile phone. For example, customer can pay bills online, or book train and air plane tickets using their mobile phones. The mobile phone can also be used for a bank balance enquiry, check on a ticket's status, receive News alerts, or receive current stock prices.

3.1. Short codes

Short codes or short numbers are a special form of telephone numbers which are shorter than ordinary telephone numbers. There are two types of short codes available in the industry and they are for dialling and messaging. These short codes can be used to address SMS and MMS messages from certain service provider's mobile phone or fixed phone. These short codes are unique to each operator at the technological level and the different providers have a common understanding to avoid clashing or overlapping of the short codes.[2]

These short codes are mainly used for value added services such as voting during television (TV) programs, to answer questions and win prizes through TV or radio, ordering ringtones, to apply for jobs and for few other purposes. This interactive participation for TV shows through the SMS has formed a new concept for TV programming.

The telecom companies in India rent these short codes on monthly basis. These short codes in India are five digits in length and always start with the digit '5'. Some of the short codes can be extended with three more digits further representing three additional characters. The message sent to these short codes are called a premium rate short message and the cost varies

[2] The clashing and overlapping should not happen between two different operators as one operator should not define the same range which is used by any another operator. If the same operator is defining the same range then it will be interpreted by the MSC.

from Rs0.10 to Rs 5.00 per message. In some cases the message sent to these short codes can be toll free, but in most cases these messages are much costlier than the ordinary messages.

There are some alpha-numeric short codes as well in India and these short codes are formed by the combination of the Service provider codes(X) and Service Area codes(Y). As per the TRAI guidelines, SMS are sent according to the alphanumeric format XY-Sender Name.

The main purpose of using these short codes by the telecom operators, VAS service providers, and TV channels is to generate more revenue.

3.1.1. Standardization of short codes

The short codes are generally owned by the mobile operators and each operator can use only the licensed short code. The standardization of short codes is done in India, and according to this standard all the short codes that are provided by the operators should start with the number '5'.

3.2. Standardization of promotion SMS with operator prefix

The latest, most effective, and increasingly popular way of marketing is through text messaging and these short messages are called promotional SMS. This method guarantees that the messages are sent to the intended customers. There was no standard to send promotional SMS, but now the operators are working to standardise these promotional SMS by prefixing the short promotional messages with the prefix of that operator.

These promotional SMS are sent by almost all operators today. This not only helps them market (promote) their products to the end customers easily, but it also helps the mobile operators to increase their revenue.[3]

3.3. Banking alert services

The customer can use his or her mobile phone in order to enquire and receive information through short message for balance enquiries, cheque status etc. The customer can activate the service in order to receive an instant alert when a transaction is made against their account. When the customer deposits or withdraws (credit/debit) money from the account the customer immediately gets an alert about the transaction. This service can also help the customer to block his account when he gets a transaction alert that the customer had not done.

3.4. Mobile booking

The mobile booking service also comes under the mobile commerce services that are provided to subscribers. The customer can user his or her mobile phone in order to book various tickets such as railway tickets, airline tickets, and movie tickets instead of waiting in a queue for a long time and to avoid the last minute rush. This service makes it very easy for customers to book the different tickets through their phone at the click of a button. The customer uses the short codes in order to do such bookings.[4]

[3] This increases the revenue of the operator as the advertiser pays a bulk amount of money to the operator.
[4] Mobile booking is an additional feature in mobile phones and people uses this service instead of the web browser as it is much easier to book it through mobile phones with short codes. It doesn't require internet.

4. New Services that are emerging

At present 2.5 G subscribers have low and medium speed mobile broadband access enabling them to watch short video clips, perform transactions, and use low end services and basic information services. 3G technology will revolutionize mobile communications by introducing high speed data connectivity and infotainment to subscribers in India [11].

New VASs are being developed in order to bring the whole social networking phenomena that we see in the internet to mobile phones. Various applications such as mobile banking, web browsing, mobile games, video conferencing, e-commerce, and access to other data services will become very easy to use for the common man via 3G.

Because customers will be provided with higher maximum data rates, this will enable them to download high quality games easily and also enabling a large number of customers to quickly access various online games in fraction of a second and also play online multiplayer games easily with family, friend's or a stranger. Only if the customers are able to browse through the game catalogue quickly the customers can see the different options and play as many games as possible and in return it increases the revenue for the providers. The end customers can be satisfied only if these games work with low latency.

Currently the handset manufacturing companies are developing new mobile handsets with more processing power, larger amounts of memory, and larger screens. These features will help customers enjoy the mobile games available over 3G. 3G users are also expected to spend at least three to four times more money on online gaming than normal users [39].

Number portability is also one of the major new Value added Service that operators are working on to provide for the customers. Mobile Number Portability allows the user to shift from one operator to another operator without changing their phone number. The operators are following various guidelines from TRAI [23]. According to these guidelines, customers are expected to retain a new operator for 90 days before moving to another operator. This restriction is to minimize the exploitation of the mobile number portability services provided by the service provider.

In Europe there are businesses models such as the *advertising model* available for customers. In this business model the user can make free calls or send an SMS after listening to an advertisement. Calls and SMS are free while the customer has a positive credit balance [7]. Operators in India are trying to introduce such services for their customers.

We are witnessing a new change in the telecommunication sector where users not only buy mobile handsets to be in touch with their friends and family, but also to express themselves, their attitude, feelings, and interests. Daily usage of mobile phones by Indian mobile phone subscribers to check their astrology chart, bank balance, reading news headline, and surfing the internet has created a very high growth for the VAS market.

LoCation Services (LCS) is a new VAS which makes use of the user's location [2] [3] [5]. In a location based service where the current location of the mobile terminal is reported in a standard format (e.g. Geo-graphical coordinate) to the user, the network operator, value added

service provider, or PLMN internal operations. This location is used as an index into a database of geo-located information, services, etc.

Some of the new VASs that were recently added by service providers are [19]:

1) Airtel launches speech recognition service with Nuance Communications for Rs 2 per minute. When this service is activated the customer can call a single number to access a host of services including hello tunes and news.
2) Tanla (Next Generation Telecom solutions) powers 3G video portals for Reliance and MVAS 3G video platform with a suite of content services including the ongoing Cricket World cup coverage.

   Reliance can deliver multimedia content to their subscribers including Fashion, Regional, Hollywood and Bollywood services, Devotional Videos, sports, lifestyle and animation. They also provide rich features and personalized video interactivity.
3) Uninor introduced "Talk time transfer facility" in Karnataka. With this VAS a customer can borrow or transfer talk time to/from family and friends. The transfer amount can range from Rs 5 to Rs 50. A customer is allowed to do up to seven transactions per day.
4) Uninor launched a new service called "Cricket Unlimited" to enable subscribers to listen to and browse cricket related content through the mobile network, get live match coverage, or participate in a cricket opinion poll through their mobile phone.
5) Nokia launched the Ovi (Nokia) store with Reliance in India. Ovi is the Nokia mobile application store and Reliance (RIL) is the first service provider to offer integrated operator billing for a host of paid content on the Ovi store. The payment can be made either as part of the subscriber's monthly mobile bill or deducted from a prepaid balance

   This type of payment eliminates the need to have a credit card in order to pay bills online when buying applications. The sales model supports applications, games, videos, podcasts, productivity tools, web, location based services, and more.
6) Samsung Mobile introduced a new application called "Rocke Talk" that enables customers to generate voice and video blogs, send photos and video clips, and participate in live multimedia discussions.
7) Tata DOCOMO introduced cricket recharge vouchers such as "57 not out" and "103 not out". When the subscriber recharges with this plan, the customer receives VAS cricket content which includes games, goodies, alerts and trivia, and bundled talk time.
8) Tata DOCOMO also launched various VAS services for Valentine's Day. Where the customers can use the service for various love related queries and love tunes.
9) TATA DOCOMO launched a new service called "Name Tunes". This service greets callers with his/her name and allows personalized messages for the callee.
10) Tata DOCOMO has also launched a new service for GSM post-paid subscribers called 'My family'. With this service all the members of the family can communicate with each other via a single plan. With this service plan there is no worry for post-paid customers to manage multiple bills, multiple plans, and multiple payment dates. The

subscribers can select from three available plans under this scheme: Rs 999 (up to 3 connections), Rs 1,999 (up to 4 connections) and Rs 2,999 (up to 5 connections).

11) Tata DOCOMO announced a free incoming roaming plan for its postpaid subscribers called "Roam Free". This service provides a good benefit for the subscribers by providing free incoming calls to those who roam around the country for various purposes and access the network with Docomo Network.
12) Tata Indicom together with Handygo Inks have created a new MVAS to empower rural users by providing them the latest information regarding health, education, finance, weather information, mandi (wholesale) rates for (livestock's, agriculture, and fisheries) based on IVR.
13) Idea cellular has launched a new service for its post-paid customers, where the subscriber who roams to 12 most frequently visited countries by Indians (USA, UAE, Singapore, UK, Thailand, China, Germany, France, Switzerland, Sri Lanka, Hong Kong, and Italy) with a flat 25% discount on their mobile phone usage while roaming in these destinations. The subscribers can use this discount when using different services such as incoming Calls, outgoing Calls, SMS, and GPRS.
14) Reliance Communications (RIL) has launched a new MVAS called "Mobile Banking" in partnership with the State Bank of India (SBI). This service provides various services to its subscribers.
15) Reliance Communications has introduced two new services to attract subscribers, mainly targeted at youth subscribers called 'Music Mania' and 'Full2Music'. Subscribers can listen to songs, share their favourite songs with their friends on Face book or Twitter, and download full songs through the Web, Voice Portal, and R-World.
16) Union Bank of India (UBI) in collaboration with Nokia has launched a new mobile payment service called 'Union Bank Money powered by Nokia' across the country.

There are various new VAS emerging day to day as the customers are in the lookout for difference and improvement in the services [60].

5. Value Added Services with 3G

The introduction of 3G will not only redefine the way people communicate, but also open wide a variety of doors for service providers VAS providers, and will foster the development of innovative value added services for the mobile users.[5] The 3G mobile subscriber base in India is expected to reach 90 million by 2013 [29]. According to Vikas Thapar, chief financial officer (CFO) of One97 Communications Ltd., who plans to raise capital from equity markets, the introduction of 3G is likely to increase ARPU by up to 18-19 percent from around 13 percent in 2011.[6] [7]

In the telecommunication industry 3G is the latest buzzword. Once 3G is deployed on a large scale, the data transfer rates to and from mobile devices will be very high even over long distances, bandwidth can be used more efficiently, gaming will be improved due to lower delays in multi player games, and map of location based services will be introduced.[8][9] Introduction of 3G will improve the Tele-Density in a big way and broadband penetration which will in turn have a direct effect on the overall economic growth of the country [4]. Mobile devices will become essential resources for every individual and these devices will be the user's local storage device for carrying data and for viewing, editing, and sharing the documents while on the go.

With the introduction of 3G services the VAS market will continue to introduce VASs, although most of the services are currently in place, some of these services will be upgraded to a great extent or to a different level [31] [57]. VAS providers in India are ready to raise money from the primary market as they get ready to support India's plan to launch 3G services.[10] These services are expected to boost profits by a large amount [39].

The business model used in 3G is mainly a *co-operative business model* where operators partner with third party content providers, application developers, and service providers to offer value added services to their consumers. Some of the other business models available with 3G VASs are *the network operator centric model, the service or content Aggregator Centric Model, and the service or content provider centric model* [48].

There will be set of new VASs, such as video streaming to enable the subscriber to see high definition (HD) videos on their mobile phone. As only few handsets support HD video, the

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[5] http://telecom-yatra.blogspot.com/2010/11/3g-set-to-redefine-face-of-mobile.html

[6] http://www.ibtimes.com/articles/46785/20100827/india-s-value-added-vas-telecom-service-providers-initial-ipo-3g-bharti-airtel-reliance-communicatio.htm

[7] http://www.learntelecom.com/statistics/telephone-subscriber-base-reaches-688-38-million-in-india

[8] http://www.ciol.com/Technology/Mobility/Feature/3G-enabled-India-Whats-in-store/26609121576/0/

[9] http://www.indiainfoline.com/Research/Articles/3G-in-the-fast-lane/24637536

[10] http://teck.in/3g-india-2010-on-sep-24-in-mumbai.html

subscriber needs to have a suitable handset to view such videos. Online social multiplayer gaming is also another VAS that 3G users will enjoy [31]. With this service the user can create online profiles, profile images, do private messaging, and participate in public and private chat, friendship management, access free content, and shop.

Multiplayer mobile game development is one of the major VAS arenas where customers interact with other customers or players compete against each other using their mobile device. Additionally, localization of content and new payment mechanisms with various business models will be available in 3G; these models will change the future trends in mobile gaming.

The existing CRBT can be improved in a major way. Currently, Ring Back Tones are a song or tone that is played when another customer is called. With the introduction of 3G the Ring Back Tone can become a Video Ring Back Tone, where the caller can see a video instead of just listen to audio [14].

5.1. Analyses of Strength and Weakness

When we consider 3G, it is a very cost effective tool to transmit voice because the 3G spectrum allocation offers four to five times more voice capacity than that of 2G spectrums [10][49]. 3G enables video on demand service and facilitates high speed data transfer, including high quality video. The introduction of 3G in rural India will enable telemedicine, virtual market space, and e-learning [17]. Quality of service can be guaranteed to the customers by the operators with the introduction of 3G services [10] [50]. It is also possible to reduce the congestion in the network with the introduction of the 3G services [10]. Upgrading to 3G from 2.5G and CDMA is simpler than adopting Wi-Max. When compared to Wi-Max and 4G, 3G technology is much more effective and mature, and has much wider deployment [10].

The cost of 3G spectrum and licenses are very high when compared to the 2G, this may negatively affect the customers as the cost of 3G services will be very high [10]. To use 3G services the customers need to have the latest handsets and such handsets are very expensive when compared to ordinary 2G phones [10]. When we consider the growth of 3G in Europe it has not fully justified the investments of the customers [10]. 3G adoptions will be slow due to the cost of 3G technologies and the cost of 3G handsets, so the initial adoption will be limited to upper class customers [10]. Various other technologies such as Wi-Max and 4G can give 3G a run for its money. In order for 3G to enter the rural market, first it has to incorporate local content and the content providers have to provide such contents [10].

6. Value Added Services Value chain

Current telecommunications VAS operating modes can be divided into three different types based on the degree to which operators are independently providing, cooperatively operating, and fully outsourcing a VAS [6]. All of these operating modes are based on a common value chain.

The VAS value chain consists of a number of different stake holders [19] [21]. The main stake holders are content copyright owners, customized content creators, content portals/aggregators, mobile operators, technology enablers, and handset manufacturers. These are discussed in detail below.

Content copyright owners: Content copyright owners are the first link in the value chain of MVAS as they develop the original contents. Examples of content copyright owners include music production houses (SaReGaMa, Sony), Bollywood production houses (Yash Raj Films), and media houses (Sony, Star, Zee, etc.).

Customized content creators: Customized content creators generate customized content for users through their own portals. Examples include Mauj, One 97, and Hungama Mobile.

Content Portals/Aggregators: Content portals or aggregators gather web contents and in some cases distribute content to suit their customer's needs. Examples include Indiatimes and Hungama mobiles.

Mobile Operators: The transport and support mechanisms for the delivery of mobile contents are provided by the mobile operators. Mobile operators in India include Airtel, Reliance, Vodafone, BSNL, MTNL, and Idea Cellular.

Technology Enablers: The technology enablers provide the underlying platforms that enable access to MVASs. Examples of technology enablers in India include OnMobile, Bharti Telesoft, and Webaroo.

Handset Manufacturers: Mobile handset manufacturers play a very important role across the value chain as they continuously interact with all the stakeholders. The handset manufacturers have different activities in various fields, such as embedding software links in their handsets, allowing direct access to content portals, creating services customized to the need of certain regions, etc. The main players in the Indian handset manufacturing market include Nokia, Motorola, LG, Samsung, and Micromax.

Software developers: Software developers also play a major role in the value chain of the MVAS industry which develops most of the VAS applications used in the modern handsets.

Figure 7 depicts a diagrammatic representation of the players in the MVAS value chain. It represents all the major players in the value chain described above (specifically the Content owner / provider, content aggregator, Technology enablers, Mobile operators, Handset Manufacturers and the software developers)

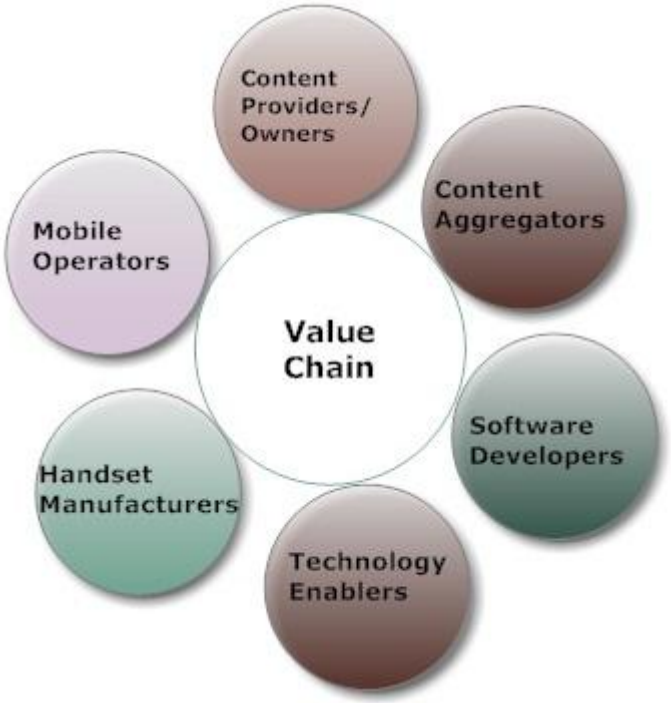

Figure 7: *Mobile Value chain players*

7. Value Added Service drivers

The number of mobile users in India and the usage of mobile phones (with the tremendous increase in the mobile Tele-Density) are both very high [10]. There is also a very high usage of mobile phones for mobile entertainment. For example, getting cricket scores, Bollywood news, downloading wall papers, ringtones, etc. [26] [27] [18] [19]. As stated previously, with the growth in penetration there has been a decrease in ARPU, hence one of the major drivers for VAS is to increase the ARPU to a better level.

The introduction of 3G is another major driver for VASs as new services need to be rolled out in the market, which will hopefully attract more customers to the operator. The key drivers for MVAS in India with the introduction of 3G will be content providers offering new and innovative content which attracts customers, improved customer service, and the increased affordability of handsets and VAS. The growing rural market, with an increase in demand for regional content and as a growing medium for advertising is additional major drivers for VAS in India.

Additional drivers for mobile value added services are discussed below.

Technology innovation – Networks

The maturity of the standards proposed by industry organizations such as 3GPP and OMA (Open Mobile Alliance) for the evolving GSM and CDMA standards has lead to 3G and 3.5G (HSPDA) networks and the integration of intelligent network (IN) & IP Multimedia Subsystem (IMS) on the network side. These standards and initiatives are paving the way for offering VAS solutions that were not possible earlier.

Technology innovation – Mobile Computing

Advanced mobile computing platforms enable applications to be built using J2ME, mobile Linux, Advanced Java, and mobile applications platforms include Android, I-phone, Symbian OS platforms, Windows Mobile, Samsung BADA, BREW, various streaming technologies (such as ATOM, XML, RSS, News ML) and integration concepts such as Simple Object Access Protocol (SOAP). Advanced handsets make use of very power efficient processors and aggressive power management, leading to enhanced battery life. The latest handset technologies are fostering the adoption of new and advanced mobile entertainment services.

Market Transition

The basic sources of revenue of the telecommunications industry have been declining due to increased competition among the different players and in some markets the cessation of monopolies leading to a new competitive and complex market space.

Contribution of VAS

When the key differentiators between the different providers in terms of increasing customer loyalty, market share of the provider, and boosting of ARPU are considered,

provisioning of creative and innovative VAS services are considered to be the key differentiator. All the major analysts (including IDC, Gartner group, and various others) are predicting that VAS revenues would reach 30% of telecommunications revenues worldwide.

Device Independence

The delivery of VAS whether the terminal is residing in a GSM or hybrid or 3G networks is a current trend. Device independent VAS is necessary to leverage the investments in the operator's existing GSM, hybrid, or 3G networks and to maximize VAS revenues. Meeting the content requirements of all the subscribers belonging to diverse cultures in India is very important. Therefore while device independence is desirable, local language and dialect dependence for content is essential.

Support all Subscribers

Despite the delivery platforms of USSD, SMS, WAP gateways, WAP push, and MMS Gateways via GSM, Hybrid, or pure 3G Networks for content the operators continue to look for new solutions to distribute content.

Most of the 3G services need a suitable browser to view contents and there is a need for a branded and customized browser for mobile phones to view the contents provided over 3G or over internet so that the subscribers will be able to view the contents over MVAS properly,[11] otherwise the contents may not be visible to the customers in proper way and many end customers would stop using these services as they experience poor browsing experience when viewing the content for the first time ultimately leading to lower profits for the telecom carriers as there will be no repeated purchasing of content.

Alternate content delivery channels

There is a sea change with respect to the delivery of content to mobile subscribers in order to minimise the number of clicks from the customer to locate the desired content and then to purchase/license it.

There is a big shift in VAS offerings with the emergence of Voice SMS delivery platforms where contents that were delivered as text messages are now distributed over voice platforms. Thus rather than needing to be able to read and write, the subscriber can simply leave a voice message for another subscriber. This is viewed as a particularly attractive service for illiterate users. Unlike voice mail, with voice SMS the user simply pays for sending/receiving the message rather than needing to pay a monthly fee for a voice mail account.

[11] In order to view the contents properly in the mobile handset without scattering of data's as most of the web sites are created for viewing in the big desktop monitor.

8. Value Added Services Challenges

While the VAS market is developing rapidly, there still exist many challenges for VAS in the present telecommunication market. As the current telecommunications market is based on the Biased Revenue Sharing Model where revenue is shared among the different contributors [13] [33]. This is a serious challenge for the telecommunication sector as it is very difficult to share the revenue outcome as this sector does not produce content.

There is a serious lack of awareness among many consumers about value added services as they mainly use their mobile for making voice call and sending messages, thus many customers do not use these services. One result is that there is a lot of wasted effort and money on the resources related to developing, deploying, and supporting VASs that are not used. But this is not the potential customer's fault in not using the services.

Due to large proportion of prepaid customers VAS providers view these customers as cost sensitive – otherwise they would be a post paid customer and would simply pay a flat monthly bill. Thus the challenge will be to attract prepaid customers to pay for one or more VAS products.

The content provider does not provide copyright protection for their contents and also authentication standards for some contents and this pose a serious challenge for VAS operators in India.

The cost of high end feature rich handsets is beyond the buying power of most users, causing other major challenges for VAS [34] [35]. This is also a major threat for VAS because most of the new value added services require advanced handsets with more memory and processing power. They cannot be used on the old handsets which prevents many users from utilizing the VASs.

9. Impact of Content developers in MVAS

Content developers develop and own the original copyrighted contents and applications. Examples of content developer's offerings include songs, entertainment, news, movies, TV listings, movie trailers, movie clips, games, show times, animated cartoons, and promotional media content. Some of the major content providers in India are OnMobile, Nazara Technologies, mauj, SaReGaMa, Sony, and Jump.

The introduction of 3G will enable entertainment, infotainment, and voice communications to be available to the user via one device [29]. However, this will also pose a challenge for the content providers, as the content providers must produce content which is not only innovative but also affordable --in order to encourage mass adaption. Copyright protection and authentication standards are also very important for the content developers [10].

Nazara Technologies is one of the leading mobile entertainment companies and content provider. [12]They have focused on the 500+ million mobile subscriber bases in India and seek to exploit the new trends that are emerging in the market [15]. They develop a range of branded and original mobile content that is highly relevant to the culturally diverse consumer base in the country [8] [9]. As a content provider they will need to provide new content for the entertainment purposes that exploit the capabilities of 3G. Nazara technologies partners in India include Airtel, Idea, Vodafone, Loop, Tata Indicom, Reliance India Mobile and Cellebrum, Aircel, Virgin mobiles, BSNL, MTNL, Yahoo, and Rediff.

The content providers will be important, perhaps even key, for driving increased VAS usage with the introduction of 3G services [22]. The contents provided over 3G should be very informative, useful, and attract lots of 3G customers. The content providers have to decide what contents can be provided as 3G VAS.

Currently, the MVAS market is fragmented and consists of a large number of small content providers. Consolidation of MVAS market will happen, leading to the emergence of a few strong content providers. This would enable content providers to command a greater share of revenue in the MVAS ecosystem, hence reducing the revenue of the network operators or forcing greater spending by customers.[13]

[12] http://articles.economictimes.indiatimes.com/2010-05-26/news/28380809_1_online-gaming-nazara-technologies-3g

[13] It is likely to reduce as the VAS price will come down considerably if there are only few strong content providers.

10. Impact of Software Developers on MVAS

Telecommunication services can be seen from two different perspectives. One is purely a telecommunications perspective and the second is an IT and telecommunications perspective. In reality and when considered a business customer, IT and telecommunication *together* defines VAS.

The main role of software developers in MVAS is to develop and manage all the software development or the majority part of software development including in-house quality checks [22]. The software developers also work with third party developers to develop and shape up the entire process. Sample offerings of the software developers in the field of MVAS include security applications, middleware solutions, payment applications, games, repurposing of contents, and a diverse range of applications for MVAS.

The main telecommunication software developers in India are Mauj, mCheck, air2web, July, and Affle.

11. Value Added Services in the Future

Indian telecommunication consumers are in the midst of a major transformation from basic telephony service (voice) to high end VAS which is mainly based on data. Telecommunications technology has developed rapidly in the last few years and now provides a very capable platform for VAS.

The current trends in VAS in India include an increased focus on private equity and venture capital firms. There is a tremendous growth in demand for mobile music and gaming from customers [25]. There exists a good partnership between mobile manufacturers/operators and MVAS players. There is a huge growth in the telecommunications sector through acquisitions and demand from corporations for enterprise value added services.[14] Also network operators and service providers should merge with the content providers for adding value to their services.

The future of telecommunication in India guarantees a rich and wide variety of useful value added services and increased usage of mobile phones or handsets. The network operators cannot drive VAS by themselves, but there will be few standalone value added service operators who emerge from the non-telecommunications operator community and they will provide VAS directly to their consumers. Just as we have lots of telecommunications operators today,[15] we will have a number of different VAS operators in the future who will offer a variety of innovative products and services [20]. The important tasks for these VAS operators will be to create a direct relationship with the customers who use their value added services. Hence these VAS operators will want to have their own billing relationship to their customers, both to increase their revenue and to enable them to provide better service to their customers. When there are separate VAS operators and they interact directly with their customers, this automatically leads to very high innovation in the VAS field.[16]

The MVAS industry in India is undergoing a lot of structural changes and is poised to grow and collect greater revenues. The introduction of Next Generation Networks (NGN) is coming at a fast pace in the Indian telecommunications sector. These networks should enhance the quality of services offered to the customers in the MVAS market in India [32]. The customers or users of these value added services would be able to access more feature rich services after the implementation of these Next Generation Services. One form of NGN uses soft switch technology, hence it is mainly based on packet switching and IP telephony and enables introduction of new mobile value added services rapidly and at very reasonable cost.

There are enormous opportunities available for the operators in the field of value added services [12]. Their innovation teams are working hard to come up with new services and

[14] Acquisitions lead to good growth as new opportunities opens up and most of the GSM operators goes for acquisitions for growth purpose. For Example Vodafone is acquired by Essar group after which it has grown to become a big company.
[15] Yes, they provide the common basic services but the VAS operators can differ in the way they provide the services to the consumers.
[16] Yes, this has separate cost but they will be providing only to the VAS operators for the use of VAS.

applications for their customers. The next generation of telecom is entirely focused on the customers at the centre of an ecosystem [12].

12. Method

In this chapter we will focus on an evaluation and analysis of a couple of value added services in the telecom industry. We shall also evaluate the role of content providers the important actor in the value chain of mobile value added service.

12.1. Value added Service

By considering a particular MVAS we can gain insight into why this particular VAS is very important and useful, what are the current efforts regarding this particular VAS, which telecom operators in India currently provide this service, and what are the different organizations in India who have adopted this VAS?

This master thesis will mainly focus on Mobile commerce (M-Commerce). Although there are many reports available regarding M-Commerce value added service, there are no reports that enable us to understand all of the above questions or give detailed answers to these questions

This thesis report will also discuss how these services help the operators to generate revenue by increasing ARPU and how to improve this specific type of value added service.

This thesis report will also evaluate all the underlying value added services below mobile-commerce and analyse each of them in detail. M-commerce is growing rapidly in the mobile VAS industry and is an excellent service to offer to mobile subscribers. There is a large amount of research and growth in the MVAS industry regarding M-commerce and it has very high potential and offers tremendous opportunities for research in this area.

First the thesis will discuss mobile banking in detail and will evaluate in depth all the areas of Mobile banking. Then the thesis will give details after evaluating and examining the different ways in which a mobile banking service can be improved. The thesis report will discuss mobile banking (M-Commerce) because currently lots of efforts are being made to provide and improve such services for the mobile subscribers in India. Many banks in India are eager to attract more customers by providing rich value added services to the customers.

Next the thesis will give details about the MVAS service mobile ticketing in detail. This MVAS service allows the user to book various forms of tickets such as air plane, train, and movie tickets through the mobile. The thesis will give good insights into the advantages and disadvantages of this mobile value added service.

As the population in India is very large there will generally be a big queue everywhere throughout the country and especially at ticket booking counters. These long queues irritates most of the people in India, thus a mobile booking value added service to book tickets would be very easy and convenient service for subscribers in India. According to a survey from Gartner Location based services will top the VAS services in India along with the different Mobile commerce service in various positions in the top ten VAS services in India.

12.2. Ringback tones

Next the thesis will give a detailed insight of the ringback tone VAS provided by the OnMobile company in India in detail. As we know from the previous chapters that ringback

tone service is one of the highest revenue generators in the telecom industry in India and the main providers of this service in India is OnMobile. OnMobile provides this ringback tone service in different varieties in the name ringback tone version 2.0.

This thesis report analyse these different ringback tone services provided by OnMobile VAS Company to the customers, in relation to the mobile operators in India. Each of the different varieties of ringback tones services are analysed in detail with this company. With which operators in India they have tie-ups for providing these services are discussed. OnMobile have tie-ups with almost all the mobile operators in India for providing ringback tone service.

12.3. Content Providers

A clear explanation will be given of why the main actor of the current value chain is content providers and how effective the role of the content provider with respect to Value Added Services and the 3G network operators in India. This section will address the question how important it is for the content providers to provide good content in order to suffice all kind of people in the city? The role and importance of software developers for value added services will also be discussed in detail. This section will also answer the questions: How important it is for the software developers to develop applications for using the value added services? How important it is to make the applications usable by all kind of people including those in both the urban and rural areas?

From the literature study phase I came to a conclusion that content providers play a major role in the value chain of value added services and with the introduction of 3G services the role of content providers will become very important. The content providers will create copyrighted contents for distribution over VAS to their subscribers. In order to satisfy all the VAS subscribers it is important for the content providers to provide suitable content for all kinds of subscribers. Only if the contents are good and suitable for the diverse set of people who could use the VAS and will ultimately increases the ARPU in the telecommunication sector.

As part of my analysis and evaluation, first I analyse and evaluate the contents provided by the content providers to the subscribers over VAS and analyse if the contents could satisfy all people. Second I will analyse what kind of new contents content providers could provide over VAS to attract more subscribers and give a basic analysis on how the current contents can be improved. Third I will analyse the role of content providers in the present VAS value chain and how the revenue is shared for the content providers. Fourth I will analyse the major difference between the roles of the content providers and the content aggregators in the VAS value chain.

Finally the thesis will discuss more details about the content provider's role in the value chain because 3G services are being rolled out and the contents provided to subscribers over 3G by content providers, most of whom are copyrighted content owners. Also the contents that are provided over MVAS over 2G can also be provided over 3G networks by these content providers and only such content s produce large revenue in telecommunication industry as

many subscribers use these services by paying a higher amount of money than they spend for average call which the subscribers usually make.[17]

[17] The subscribers are willing to pay more money for some of the useful VAS, and most of the subscribers in India use the ringback tone VAS. With the boost of IT in India people do not mind spending more money for these services.(The survey in the chapter 13 also gives more detail about this)

13. Analysis

As was discussed in chapter 12, in this chapter we will first analyse and evaluate the important value added services that are currently being offered to customers. Following this we will analyse and evaluate the important actors in the MVAS value chain.

13.1. Mobile Value Added Services

To evaluate the mobile value added service we will consider the M-Commerce VAS. This is a very useful service that is being developed and offered to the subscribers currently in India. Efforts are progressing to provide M-commerce through fast data services such as GPRS (General packet radio service) and EDGE (Enhanced data rates for GSM (Global System for Mobile communication) Evolution).

Via the mobile commerce service different services can be offered to the mobile subscribers, such as mobile banking, mobile ticketing, mobile wallet, mobile coupons, location-based services, mobile browsing, mobile purchasing, mobile marketing, and advertising. According to statistics from BSNL these services are likely to have generated around $63 billion in revenue by the year 2010 [36].

Mobile banking uses the mobile commerce service to enable various banks and financial institutions to offer their customers rich value added services such as accessing account information, making account transactions (transferring money, paying bills, or buying stocks). The subscribers get banking alert when they make any transactions, For example a withdrawal of money, deposit of money, or money transfer to any other account, instantly via the mobile phone. This ensures that the transaction is genuine and correct.

Mobile Ticketing is another mobile commerce service which is offered as a value added service to mobile subscribers by different operators across India. This service allows subscribers to book tickets with the help of short codes and numbers. Mobile ticketing helps subscribers to book their tickets through a mobile device just by sending an SMS and saves a lot of time. The subscriber can use this service when the subscriber is in a hurry and do not have time to stand in a queue in order to buy tickets. When booking an airline ticket or train ticket there is provisions for checking the ticket's status before proceeding to book a ticket through their mobile.

There is a revolution in the way a subscriber stores a ticket in their mobile phone in the form of mobile barcodes. Using this technology as its core and maximising the profit and revenue of the mobile VAS industry may drive the integration of Radio frequency identification (RFID) into mobile devices. Consumer's demands for easy to use applications makes such services very useful and can generate revenue for the mobile VAS industry.

Via a mobile browser the subscribers can view online catalogues and can purchase goods by selecting and paying through their mobile. This makes shopping a lot easier and more comfortable for subscribers.

We will analyse these mobile commerce services in detail by considering the different factors involved in these services and basically we will evaluate how useful the service is and discuss

which organizations that provide these services and also evaluate the different possibilities of improvements that can be made to these services.

Figure 8 illustrates the different major mobile commerce services and the sub services under them.

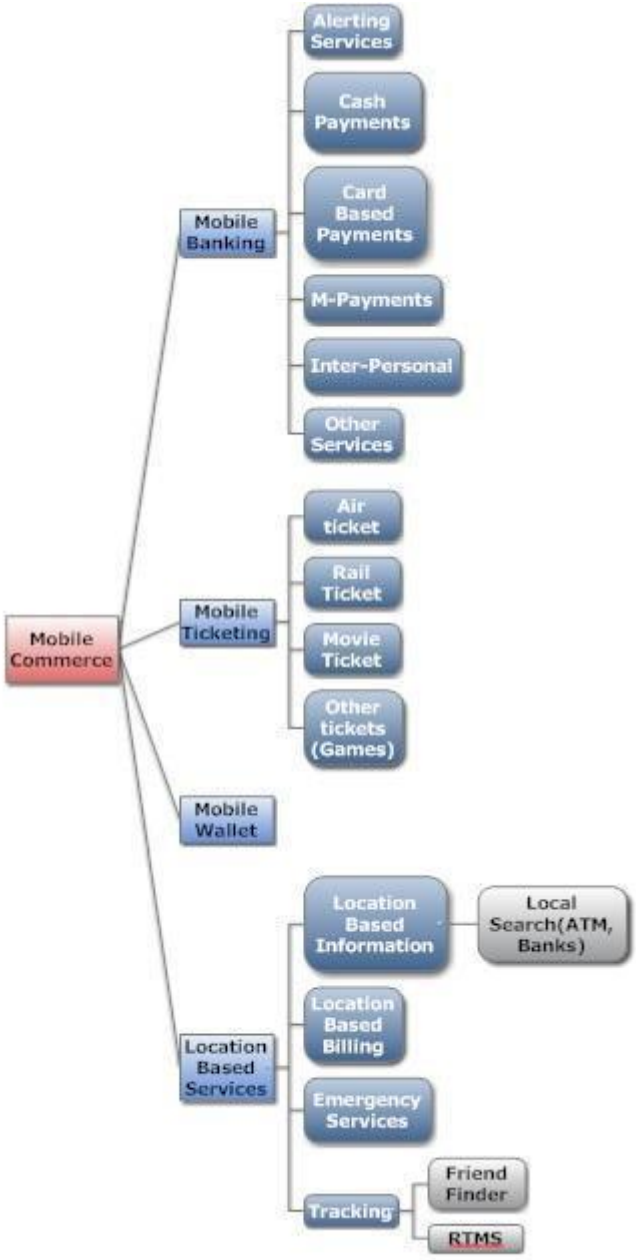

Figure 8: *Mobile Commerce Services*

13.1.1. Mobile Banking

Today operators are working to provide mobile banking services over fast data services such as GPRS and EDGE. All major banks offer mobile banking service as a value added service to their customers. For example, HDFC Bank, ICICI Bank, and State bank of India

(SBI) all provide mobile banking alerting service to their customers. The mobile operators in India offer such new value added services to their subscribers in India because call charges have dropped to record low prices due to entry of new players (NTT DoCoMo Inc and Telenor ASA). There is strong market competition between all these mobile operators.

For mobile banking the data transfer costs are very low and there will be a fixed flat rate for the subscribers to use these services. With the introduction of new handsets day by day with more advanced features these services can be offered to subscribers with additional new features and also additional new functionality.

Currently in India the operators only provide alerting services for their subscribers. The subscriber can also enquire about the account balance, record of last five transactions, location of nearest ATM branch, and stop payment of a cheque by sending a SMS message.

Vodafone and Bharti (Airtel) were the first operators in India to offer mobile banking service with various other features by partnering with the nation's largest banks. Vodafone Essar Ltd. is the third biggest network operator in India after the Bharti (Airtel) and BSNL.[18] They will partner with ICICI bank Ltd, India's second largest lender, to offer electronic payments.[19] Meanwhile Bharti (Airtel) will partner with the largest lender, State Bank of India, and form a venture to provide money transfer and other banking services via mobile phones. With the help of this mobile-phone partnership, the banks will be able to reach more customers, including those in remote areas.

"Mobile Banking is a powerful mobile VAS for the subscribers, as they can avoid the long queues at the SBI branches" said in a statement by Reliance Communications President Mahesh Prasad (Wireless Business) on the launch of new MVAS called Mobile Banking by RIL to provide various facilities to its users.[20] RIL subscribers do not need any special mobile application or GPRS to use these services, but the subscribers must have an active account in SBI. The subscriber has to just enter in the short code to view the menu choices and can then select their choice from the listed options. With this service the subscriber will be able to see various details such as account balance, get mini statements, do a Funds Transfer, request a cheque book, Change MPIN, recharge their mobile account, and make mobile payments.

UBI, one of the national banks of India have also launched a mobile banking service in collaboration with Nokia known as 'Union Bank Money powered by Nokia' across India. This service specifically targets subscribers who do not have a bank account in their own name. This service provides access to financial services to these subscribers through their mobile phones. With this service enabled a subscriber can transfer money to other individuals, withdraw cash from cash-out outlets (registered Nokia stores) and ATMs, pay utility bills, as

[18] http://timesofindia.indiatimes.com/tech/news/telecom/Vodafone-Bharti-to-offer-mobile-banking-in-India/articleshow/7268952.cms, last accessed April 25th 2011
[19] http://www.bloomberg.com/news/2011-01-12/vodafone-bharti-will-offer-mobile-phone-banking-in-india-to-woo-customers.html, last accessed April 25th 2011
[20] http://www.business-standard.com/india/news/reliance-launches-mobile-banking-servicessbi-for-gsm-subscribe/432912/, last accessed April 25th 2011

well as recharge their prepaid SIM cards by using the subscriber's mobile device. This type of service eliminates the need for intermediaries and delivers true convenience. [37] Once this service is rolled out in the market Union bank Money will be the single largest network in India to provide mobile financial services to consumers in urban areas, as well as penetrating well in rural areas among those who do not have bank account. This service can be used with all types of handsets across India.

Many people in India still have no access to banking services according to K.C. Chakrabarty, deputy governor of Reserve Bank of India. So the government has decided to utilize the mobile network infrastructure to provide banking service for more people. According to Deputy Governor Shyamala Gopinath of the Reserve Bank of India they have allowed 40 banks to provide mobile banking services.[21] By September 2010 there were 887,000 customers using a mobile banking service in India. This shows that mobile banking is becoming popular and many subscribers in India will soon be provided this service and many will start using this service.

The security features that can be offered while offering these services currently provide very high security mechanisms for such services [37]. These services were developed mainly focusing the mobile and these services works well with a mobile. However there are a lot of differences from the same service offered through the web as lots of additional features can be offered for the same service through web.

Security Concerns

Security is essential in any service that is offered, especially for mobile commerce because here the subscribers are dealing with money. There are many security related concerns about a mobile commerce service.

Mobile devices are very small and the subscriber can lose the device or it can easily be stolen from the subscriber and then misused. If any of the confidential content is sent as clear text they could easily be read and exploited.

Location-aware applications are popular in the new handsets equipped with Global Positioning System (GPS). However their location information can be a security concern with respect to the privacy of the subscriber, as it is very easy to locate the handset.

Another major concern is the lack of standardization of payment solutions. There is no standardized method that is accepted by all the operators for mobile payments.

Security measures

There are some important security measures that have to be followed by operators when providing these services for their subscribers. We will discuss some of their important security measures in this section.

[21] http://www.bloomberg.com/news/2011-01-12/vodafone-bharti-will-offer-mobile-phone-banking-in-india-to-woo-customers.html, last visited May 2nd 2011.

a) Implementation of secure PIN for transaction

For each and every transaction that is made through the mobile the subscriber has to use a unique secure Personal identification number (PIN) through the mobile. Only if the secure PIN matches for the current transaction, does the transaction succeeds otherwise the subscriber has to enter a new secure PIN again.

b) Secure encryption

Applications that are used for mobile payment should use encrypted SMS channels for transactions as most of the banking transactions are done by sending short message to the required number and this helps for protecting data integrity and privacy.

c) Linking Phone Numbers

The debit or credit cards can be linked to a subscriber's phone number for security reasons. This ensures that the transaction can be done only by the mobile subscriber who has that particular number or the subscriber identification module (SIM) card. This ensures that only the particular account holder is making the transaction. The subscriber can even sign for the particular transaction with the secret key code sent to the customer to the mobile phone while making a transaction.

Mobile Banking Services

A number of different mobile banking services are offered to the customers. Some of these are shown in Table 2.

Table 2: Types of mobile banking services

Service	Purpose
Alerting Service	Transaction alerts, reminders, stock alerts, offers and marketing promotions, Mini statements, recent transactions.
Cash Payment	Electronic purse or Wallet
Card based payments	Mobile debit/credit/pre-paid card
M-Payments	Business to Consumer
Inter-personal	Person to person
Other services	Utility bill payments, credit card payment, mobile top up, Access to loan statements and card statements, status on cheque, stop payment on cheque, ordering cheque books

13.1.2. Mobile Ticketing

Mobile ticketing is also another major area in mobile commerce where different forms of tickets (Air, Rail, and movie) can be purchased through the mobile itself. Mobile ticketing can be classified into three different sectors: transport, sporting events and entertainment, and other events. This service has a very high potential among MVAS. Mobile ticketing service is likely to redefine ticket transaction costs in all industries in addition to avoiding people standing in queues.

Mobile ticketing is very helpful when the customers can book the tickets through the mobile devices itself and without standing in any queue. Once the customer sends the necessary short code for the specific ticket, the customer gets the ticket immediately in phone as a text message with a special barcode. There is no need for the subscriber to print this ticket. The subscriber can just carry the mobile phone to the event or station and can just show the barcode at the counter or to the ticket checker.

Mobile ticketing also tremendously increases the sales of the tickets because tickets can be sold until the last moment through the mobile phone. The subscribers who are near cinema or theatre, or mall can immediately book a ticket just by sending a message to a short code.

The subscribers can first enquire about the ticket availability for the movies running in the theatre and can choose a movie accordingly. This reduces the number of people in the queue, hence only some ticketing counters will be needed once many subscribers start using their mobile phones for booking tickets.

The subscriber has lot of convenience when using this service. The subscriber can also cancel the ticket at the click of a button if the subscriber does not feel like watching the movie. [22]

In India, Airtel provides mobile ticketing through Airtel Live. Airtel live is the India's largest WAP portal, accessible to all subscribers with data enabled handsets. Airtel subscribers can do m-ticketing to purchase tickets for Priya Village Roadshows (PVR) movies online [61].

Vodafone also provide a mobile ticketing service for booking various tickets and the subscriber has to do the following for buying a ticket:

- First, the subscriber has to enter a toll free short code number. Then the subscriber has to select the option of mobile ticketing. Then the subscriber has to confirm their selection. After doing this the subscriber chooses the movie, the theatre, ticket class, and the number of tickets. Next the subscriber has to pay the amount read out by the IVR by selecting a payment option. Then the subscriber can enter their credit card details for the payment. Once the payment is made the subscriber gets a confirmation message.
- Once all the steps are complete the customer receives a confirmation message about the payment and a booking reference number. With this reference number the subscriber can collect the ticket at the entrance of the theatre.[23]

13.1.3. Mobile Wallet

Physical wallets are losing weight day by day due to the introduction of new value added services. Technology is improving daily and it became possible to get rid of the wallet completely. The Reserve Bank of India (RBI) is working hard and taking the necessary steps

[22] Unsold tickets can be given for some of the randomly picked up customers who subscribe for VASs as compliment to attract them.
[23] Though there is a queue the customer are sure that they will get a ticket and just stands there only for getting the ticket and the queue moves very quickly.

to popularize mobile payments and also began to issue the licenses necessary for such services.[24]

The latest development in mobile wallets was launched by Corporation bank and the service is known as "YPayCash". "YPayCash" is a mobile payment platform developed along with eMudhra Consumer Services Ltd. The chairman and managing director of the Corporation Bank said that "Mobile banking has become very popular as it creates a convenient and fast financial transactional channel. We are glad to provide this secure mobile payment platform". [25]

The other banks which offer the Mobile wallet service are Yes Bank Ltd and Union Bank of India. RBI has currently granted license to only one other operator Bharti (Airtel), to provide a similar service through Airtel Money.

Bharti airtel has launched their mobile wallet service "Airtel money" with the goal of providing an easy and secure way of making payments through mobile phones. At the beginning this service was only available in Gurgaon. [46] Subscribers can use "Airtel money" service to make different types of payments, such as electricity bills, online movie tickets, etc. This "Airtel money" service introduced by Bharti airtel is the first service of its kind introduced by a mobile operator in India. This service helps subscribers to transform their handy mobile phone into a secure and convenient wallet which the subscribers can load with money and then use this money for shopping and making payments. Airtel subscribers who need this service fill out an application form stating their need for the service. Once the application is approved the subscriber's existing SIM will be upgraded to new 64k airtel money SIM. [46] After this the customer has to activate the new SIM by entering their MPIN and then can load money into it.

13.1.3.1. How to activate the service?

If the subscriber is an existing Corporation Bank account holder, then the subscriber simply walks to their branch and apply for this service. Once their unique mobile number is added to the system database the subscriber will automatically get a SMS with a link in the message. The subscriber simply clicks the link to install the application. After installing the application the customer can log on to the mobile banking wallet service. The first time when the subscriber logs in to the application the subscriber must create an alphanumeric password for this application.

Before using the mobile wallet application the subscriber has to first put money into their mobile wallet account through the cell phone. This is done in same as way the subscriber tops-up a prepaid account. Currently Rs 5000 is the limit for a single top-up. The other way to deposit money in the mobile wallet account is to transfer a fixed amount of money a savings account into this account.

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[24] http://www.rbi.org.in/Scripts/bs_viewcontent.aspx?Id=1365, last visited April 26th 2011

[25] http://www.livemint.com/2011/04/18210110/Options-to-shop-with-your-mobi.html, last visited April 26th 2011.

13.1.3.2. How to make transaction?

Once the mobile wallet has money the customer can use this service for payment purposes just like a credit card. The customer has to first log to in the client application, and then enters the amount to be paid. Once the amount is entered the application will generate a unique 2-dimensional bar code containing an account number, phone number, time scan, and various other details. The shop keeper will then scan this barcode through his mobile client application and saves it, thus the transaction is complete. Once this is done both the shop keeper and the customer gets a message indicating the successful completion of the transaction. The customer does not need to give any other details or proof for using this service. The customer can use this service for payment in many retail outlets and for paying utility bills and transactions.

Bharti (Airtel) is also working on a similar application where the customer can pay their bills from the credit balance available on the subscriber's phone [47]. This mobile wallet application will surely be a big benefit the mobile subscribers in situations where the subscriber runs out of cash, as they can use this mobile wallet service to pay urgency bills.

This mobile wallet service will surely be a revenue generator for the operators because once this service is commercialized and operators offer this service to their subscribers, these subscribers will deposit money into the mobile wallet application. This will give huge deposits for the mobile operators.[26] The ARPU will rise tremendously as most of the subscribers will keep their mobile wallet topped up, but not use the amount immediately.

There are various disadvantages also in providing such services because; the customer cannot use the mobile wallet application for paying bills in all shops. The subscriber can use only in those shops where the merchant also uses the mobile wallet client application. The subscriber can deposit only a minimum amount of money or top up with only a minimum sum of money in the mobile wallet account, so obviously the mobile subscriber cannot use this service to buy a product for more than the balance in the mobile wallet application. In this case the customer will have to pay via another means, such as cash or credit/debit cards but for emergency purposes such as when the customer runs out of cash or leaves their credit/debit card at home the customer can use the mobile wallet service but this service can be used only in certain shops where the merchant accepts this service.

This is surely going to be a large business as the mobile operator gets commission from the merchant and also service charge from the customer. The operator can also give some validity period for using the amount in the mobile wallet.

13.1.4. Location Based Services

For the wireless service provider the knowledge of the location of the subscriber is already very vital and an important asset. If they can use this information the service provider can offer new value added services to subscribers, in turn increasing ARPU and profitability [38]. Services which are based on the location of a subscriber are known as Location Based

[26] Just like prepaid recharge when the customer tops up the wallet the mobile operator gets service charge from the customer.

Services (LBS). There are many different categories if Location Based Services (LBS) – Location based information, Location sensitive billing, Emergency services, and Tracking.[27] The technology behind LBS is 'positioning' and the most widely recognized system for this is Global Positioning System (GPS). [28]

13.1.4.1. Location based information

LBS are becoming the new killer application and catching on in the country very rapidly in MVAS. It will soon be possible for the boss to locate the subscriber within a 300 square meters area. There will be lots of penetration of LBS during the early stages of providing this service and it will continue to grow at a very high rate [54]. An LBS application would interact with other location technology components to determine the user's location and could be used to provide a list of restaurants within certain proximity of the mobile user, call a cab from the nearest taxi stand, ask for help from the nearest police station, an ambulance from the nearest hospital, etc.

As we see many applications in the internet where, subscribers form groups. Providing updates of the user's location via these location based services makes it possible for the mobile subscriber to know the location of everyone in their buddy list. Members of the group can be informed about the location of other members. For example, scheduling meetings with other users when nearby [55].

13.1.4.2. Location based billing

User can have preferential billing using this type of application. Through location based billing, the user can establish personal zones such as a home zone or a work zone. Through arrangements with the service provider, the user could perhaps enjoy flat-rate calling while in their home area and special rates while in other defined zones.

13.1.4.3. Emergency services

Location based emergency services can pinpoint the user's location and relay it to the appropriate authorities. Such services can be very useful in the event of natural calamities like earth-quake, cyclone and in case of crime related incidents such as kidnapping.[29]

13.1.4.4. Tracking

This application is very useful for fleet tracking and mobile commerce services. Fleet applications typically entail tracking vehicles enabling the owner to know the whereabouts of the vehicle. Tracking is also an enabler for mobile commerce services. A mobile user could be tracked and provided information that he desires notification of a sale in a store in proximity to the user's current proximity.

Although location-based services were developed long ago, they have become popular very recently and their success is mainly because of:

[27] http://www.india-cellular.com/lets-learn/LBS.html, last visited May 2nd 2011.
[28] http://parents.vodafone.com/locationservices, last visited April 26th 2011.
[29] Current infrastructure does not help for the emergency services like earthquake and cyclone, but in future it is possible as there will be continuous improvement in the infrastructure and the services.

1) The advancements made in the handsets, specifically the increasing number of handsets that come with the GPS and/or Wi-Fi access[30]. For example, I-Phone, Blackberry, Nokia, Motorola, High Tech Computer Corporation (HTC), Samsung, have all developed high end mobile phones which are equipped with advanced features and the latest technologies, such as GPS and Wi-Fi.
2) The ability to download location based mobile applications from the internet and to use websites and browsers that offer location capabilities on the mobile phone. Companies that developed these applications, websites, and browsers – include brands like Apple, Google, Microsoft, and Yahoo.

These new location-based services are not always provided by or controlled by mobile networks. The service can identify the location through a combination of mobile networks, GPS, and Wi-Fi hot spots. There are thousands of these applications available and they are increasingly being integrated into online social networks, so that a user can share his or her location with friends [39].

In India many operators have started providing LBS, for example, BSNL, Vodafone, Airtel, Aircel, and Reliance.

BSNL currently offers four Location based services for the customers in India [36]. These services are:

1) Resource Tracking and Management Service (RTMS)

RTMS supports real-time tracking, management, and communication with field employees and fleet drivers of a company equipped with mobile phones. This service is very useful for transport, logistics, and corporate employee work force management. No special device other than mobile handset is required to keep track of vehicles. This RTMS service can be used by subscribers over the Internet by accessing a website or through a WAP portal.

2) People Finder Service

The people finder service enables mobile users to locate, monitor, and communicate with their buddies. It enables users to add location and other location related content to their personal communication.

Mobile users can create a buddy list or groups for this service. They can locate them whenever needed without subsequently getting permission from the other user once such permission is already received. With this service the subscriber can locate, monitor, and communicate among friends, family, and employees. The subscriber can also send SMS and MMS messages to all their buddies in a simple manner

[30] Wi-Fi Positioning System (WPS) uses a wireless fidelity network instead of GPS or cell tower systems or location beacons to determine the position. Nationwide access points or network of location beacons are used to measure the actual location position and the position found is usually better than the GPS.

This people finder service can be used by subscribers over the Internet directly or by accessing a WAP portal if the subscriber has a high end mobile phone or through SMS if the subscriber has a basic mobile phone.

3) Advertisement

BSNL offers a location based SMS promotion and advertisement service. This service broadcasts advertisements as SMS messages to subscribers within a defined geographical region. The subscribers will receive advertisements for movies, restaurants, apparel, food items, household items, or all of the above.

The subscribers with basic handsets receive their advertisements as SMS or calls, whereas subscribers with high end mobile handsets receive them in the form of MMS, calls, and/or video.

The service can be used by subscribers, free of cost because these promotional SMS are sent by the mobile operators to all their customers. The subscriber can stop receiving these promotional SMSs by sending a message to a specific short code or by calling the operator's customer care service and requesting them to stop sending these promotional SMS or calls.[31]

4) Chatting

Chatting provides an "SMS chat" service to the subscribers who would like to communicate or meet based on their current location. They can specify the distance (in Km) and duration (in hours) within which they want to find their buddy to chat. This service enables people to meet people of the same interests. The subscriber provides personal profile information (gender, interests, nickname, etc.). The chatting service can be accessed through SMS, WAP, and web.

Some of the other operators who are currently working on to provide LBS are,

Vodafone is currently working on various LBS. They classify their services into active and passive services. Active location services are those that are directly initiated by the mobile phone user. An example of such service is a query by the subscriber such as: "Where is the nearest ATM machine/cinema theatre etc."

Aircel have introduced new LBS called "Pocket Finder". With this "Pocket Finder" service enabled, when the subscriber goes to an unknown or unfamiliar part of the town, this service enables them to know their present location and heading.[32] The subscriber can also find out about the nearest restaurants, coffee shops, etc. Apart from this the subscriber can use this service to find the location of family and friends.

[31] Even if the operator broadcasts, customer can stop receiving the promotional SMS by sending a message to the operator to remove the number from the bulk SMS (Promotional) list.

[32] http://www.aircel.com/AircelWar/appmanager/aircel/chennai?_nfpb=true&_pageLabel=P18800222611299734015874, last visited May 2nd 2011.

The subscriber can access this service through SMS if the subscriber has a basic mobile phone or can access these services with WAP or a downloadable application if the subscriber has a high end mobile phone.

13.1.4.5. SMS

In order to start what service the subscriber has to send a SMS to a specific short code. [45] This short code is used only for the activation of the service. Once the service is activated the subscriber sends different SMSs to different short codes for different services.

13.1.4.6. Friend Finder

Friend finder types LBS already have substantial market in the country. Airtel was the first mobile operator in India to roll out application for their subscribers and they provide these services at a very nominal rate.

1) In order to find a friend the subscriber has to send the phone number of their friend in a specific format given by the service provider to a given short code.
2) The recipient's mobile number will get an SMS with a message saying that *"your friend wants to add you as friend"* and the recipient can either accept or reject the request.
3) If the recipient accepts the request then the subscriber can find the location of the subscriber.
4) The recipient can accept the request, but later can reject the send an unsubscribe message to the same short code terminating service.

This service will be increasingly useful for the parents who send their children to school. This service can be used to track delivery boys and cab drivers at work.

In rural areas lacking internet connectivity and electricity, people cannot be in touch with their friends and relatives easily, but these LBS would be a handy service to people living in rural areas to keep in touch with their family and friends.

13.1.4.7. Local Search

If the subscriber wants to search for a specific location, then the subscriber can send the name of the location in a specific format and can learn it is location. For example, the query: bank, ATM.

13.1.4.8. Unstructured Supplementary service data (USSD)

The subscriber has to dial a special number. The subscriber will be given a new menu called the packet finder menu. The subscriber selects the required service from the menu. This communication uses the USSD protocol to talk to a server in the subscriber's home network.

13.1.4.9. WAP

When the service is enabled the subscriber simply accesses the Aircel Pocket Internet page and then clicks on the pocket finder link under "Services". Once the subscriber clicks the link he or she will be directed to a WAP page from where he or she can choose to subscribe or unsubscribe option and manage the subscriber's profile.

13.1.4.10. Application

The subscriber has to send an SMS stating "Finder" to a specified short code and they will receive an SMS with a link to download the application. Once the subscriber clicks the link the application is downloaded to the subscriber's phone and they can now access all the services.

13.1.5. Other analysis

There are a few key points that have to be analysed with respect to mobile commerce services. The main points to analyse about mobile commerce service are:

1) How many subscribers in India are willing to use their mobile phones to use mobile commerce services for mobile banking, to buy various tickets through mobile ticketing, use a mobile wallet service for payment in shops, and use a location finder service to search for friends and for other purposes?

2) What are the various new trends that may affect mobile commerce services?

3) What are the drivers and constraints that affect the market's development?

4) How will mobile commerce change over the next five years?

5) What are the advantages and disadvantages of using a mobile commerce service?

6) How can mobile commerce service be improved?

13.1.5.1. New trends in mobile commerce services

Most of the subscribers who utilize a mobile commerce service use it mainly for recharging their mobile handset's account for calls, paying mobile phone bills, and for booking movie tickets. These are currently the three most popular mobile commerce services in India. Mobile banking and booking of various tickets, such as flight ticket and train ticket are also becoming popular. Location based services are expected to be a very popular service among subscribers in India, as it is one of the easiest tools to find the whereabouts of a person.

Increased mobile penetration and usage of GPRS and EDGE services have made these m-commerce services very popular and provide a platform for more and more mobile commerce services. The transactions made through mobile phone are much cheaper than traditional banks. New innovative solutions facilitate daily payments such as for auto tolls and taxi fares. Inter-bank transfer of money is also one of the fastest growing trends in mobile commerce in India.

13.1.5.2. Drivers and constraints faced by mobile commerce in India

There are many different drivers and constraints faced by the mobile commerce industry in India. The biggest constraint on every mobile commerce service in India is security concerns when doing mobile commerce transactions. Some of the mobile commerce services, such as mobile wallet have lots of security concerns. All of these services follow the guidelines issued by the RBI.

Some of additional constraints of mobile commerce services are the speed of the GPRS and EDGE links and ease of use of the user interface.

For various reasons, as pointed out by banks in India, the number of transactions made through mobile banking is very low. One of the main reasons is, the cost factor in implementing m-commerce service in India, because end to end encryption is needed for such transactions, using the mobile most of the details transferred via the mobile for making such transactions are very confidential. However most of the banks feel that providing end to end security is required very limited as very little amount of money is dealt with in transactions via the subscribers mobile.

13.1.5.3. Advantages of Mobile Commerce

With a mobile banking service, it is not necessary for the subscribers to go to the bank in hot weather and there is no need for them to stand in long queue in Banks for basic purposes. This service helps a lot to the old and disabled persons.

With mobile ticketing service the subscriber can book tickets without travelling to ticket vending places, without standing in queues, and tickets can also be booked at the last moment.

13.1.5.4. Disadvantages of Mobile commerce

Though there are lots of advantages of the mobile ticketing service there can be a lot of misuse of these services, as some subscribers can buy blocks of tickets through their mobile and then sell these tickets for a much higher price at the last moment. Of course this misuse can be curtailed to a large extent by demanding production of proof of identity at the venue, to ensure that only the subscriber who booked the tickets with the mobile phone can utilize the service.

There are lots of disadvantages with location based services as the subscriber loses location privacy to a great extent. If the subscriber mistakenly says “yes” to allow others to locate him when he actually does not wants to will lose his location privacy he will be in trouble.

13.1.5.5. Future possibilities

The mobile banking and mobile wallet services can be provided to the subscribers in collaboration with the foreign banks where the customer can use the same balance in their mobile phone or the bank to pay bills in any foreign destination. The operators and the banks that provide these services should have some agreement with foreign network operators and banks in order to make such transactions possible for the customers. The operators and banks currently only allow customers to have a small amount in their mobile wallet service. This limit should be increased and the customers should be allowed to have larger balances, so that they can use their mobile phones to make, larger transactions when desired.

13.1.6. Survey Results

A survey was created for these services among different users of value added services in India and the following results are obtained. The total number of people who responded for the survey was around forty two

First a general survey for how much people are willing to spend on Value added services for a month is surveyed and the results are as below table 3

Table 3: *Customers ready to pay for VAS per month*

Amount in Rs	No of customer's
100	10
100 - 150	10
150 - 200	8
200 - 250	12
250 - 300	2

and from forty two responses we got a conclusion that customers are willing to pay a minimum sum of money for the value added services. Most people have voted for spending around 200 – 250 Rs per month for VAS which is roughly around $ 5.6 per month.

The below pie chart figure 9, gives the pictorial representation of the percentage of users in the different range

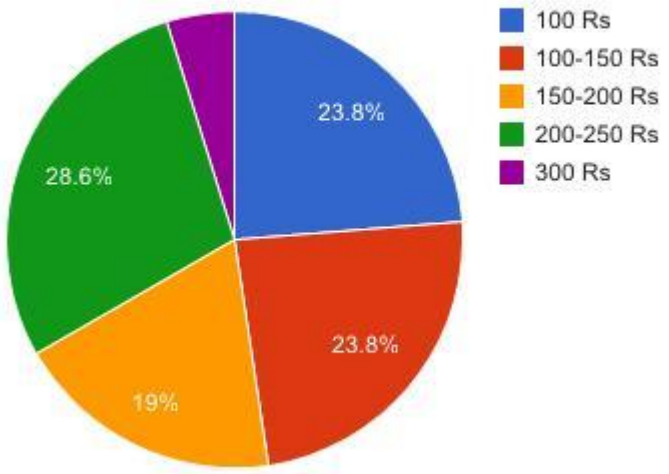

Figure 9: *Graphical representation of number of customers in different level*

Then a survey was conducted for finding out which of the mobile commerce services people are willing to use mostly out of the different services like mobile banking, mobile ticketing, mobile wallet and mobile coupons. The people responded with the following options as mentioned in the table 4.

Table 4: *Number of customers who responded positively for different mobile commerce services*

Type of M-Commerce service	Positive response
Mobile Banking	38
Mobile Ticketing	38
Mobile Wallet	16
Mobile Coupons	15

The below figure 10, pie chart gives a pictorial representation of, total percentage of users who wish to use the different M-commerce services from the above table.

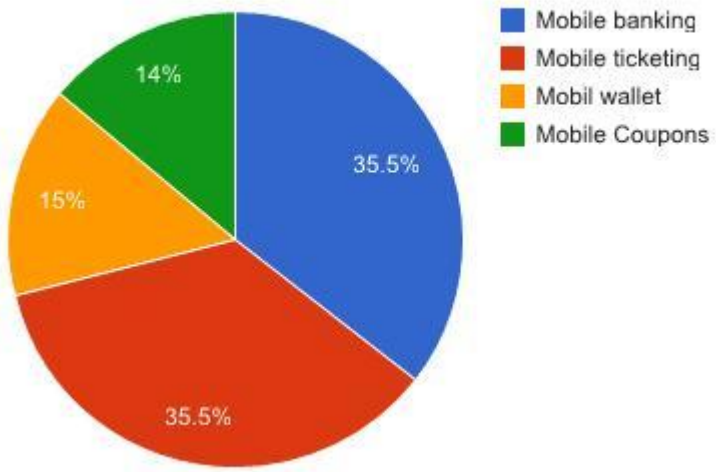

Figure 10: *Graphical representation of total positive response for M-Commerce services*

From the above graph it is found that most of the customers have voted positively for the Mobile banking and the mobile ticketing services. More details about these services are discussed earlier in chapter 13.

The other two services like Mobile wallet and the mobile coupons have almost equal number of responses but very less than that of the mobile banking and ticketing service. As these two services (Mobile wallet and mobile coupons) deal with money and are in the initial stages of introduction to the consumers, many consumers are not fully aware of these services still. The

providers of these services have to work thoroughly in improving these services with full security measures as these services deals with money and also the service should be very helpful for the customers.

Then a survey was conducted for finding which location based service is mostly used by many subscribers. The following results are obtained from the responses of VAS customers in India as mentioned in the table 5.

Table 5: *Number of Customers who responded positively for different LBS's*

LBS Type	Positive response
Location based information	38
Location based billing	31
Emergency service	33
Tracking service	32

From the above response the total percentage users of the different LBS is shown in the below figure 11, pie chart.

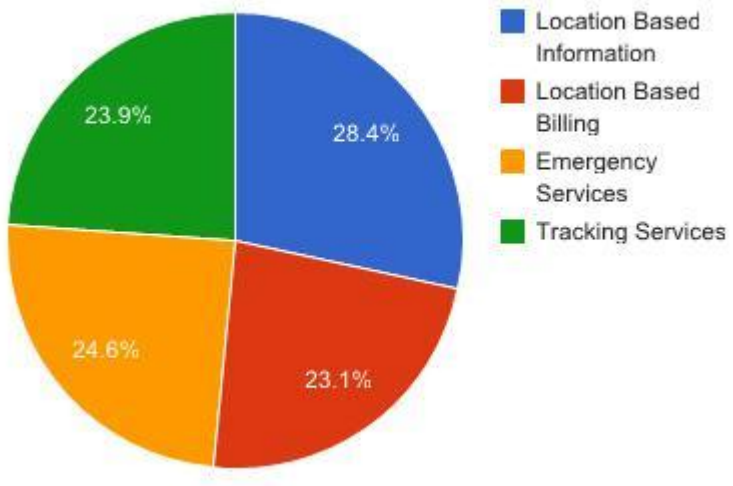

Figure 11: Graphical representation of percentage of positive response from the customers.

From the above survey results, it is found that most of the subscribers are very much interested in the VAS and also those VASs which interests them the more. The main purpose of conducting this survey is to find which mobile commerce services are in demand in the industry and which services are mainly used by the customers. This also helps the telecom industry to concentrate more on those services and provide additional features and improve those services.

People have responded almost equally to most of the location based services, but most people have responded positively for the 'location based information' service as it helps the customers to locate their destination easily in a new place. Further information about this service is already discussed in the chapter 13. Other location based services like 'location based billing', 'Emergency services' and 'tracking services' have almost equal responses from the customers.

13.2. Ring Back Tones by OnMobile

Caller Ring Back tones is one of the breakthrough and markets leading value added service created in the telecom industry which generates high margin of revenue and one of the major industry which deals with this VAS is OnMobile. This service generates more than 70 % of the total revenue in the telecom sector [51]. This RBT service is handset independent and thus can be used by all the mobile users irrespective of what handset they use. OnMobile still believes that there is tremendous scope of improvement in the RBT area. This will drive more innovation in the areas of RBT and suffice all different age group of people. The users can make a good influence with the ringback tunes set for their number. Most of the mobile operators in India are customers of OnMobile for these services. OnMobile also says that it receives a third of its total revenue through ringback tones.

Ringback tones are those tones which people hear usually when they call any subscriber and before the callee answers. The tones are purely based on the customers wish; They (customers) can select their ringback tones. The operators increases the popularity of the RBT's by offering a wide variety of content (tunes), updating the contents at regular intervals, and a secure technology to drive the contents. OnMobile makes sure that they update the contents available through ringtones and deploying a secure technology to drive the content.

They provide all services in ringback Tones 2.0 , such as complete solution with Ad-RBT, Reverse RBT, Search, Social RBT and Press * to copy services [51]. OnMobile's RBT application provides a secure and scalable technology, vast repository of songs, live audio and monthly updates; operators are assured of customer satisfaction and market dominance. Over 250 million songs were downloaded on OnMobile's RBT platform in 2009 [52]. OnMobile also claims that most of the mobile operators in India are offering the caller tune service to its subscribers and more than 37 million caller tune users are being served every month by them.

OnMobile also provide shuffle ringtones where the customer can select whole movie songs as ringtones and with this service the ringback tone of the subscriber shuffle automatically and changes whenever a subscriber calls the customer. Usually there will be five songs in the shuffle list. The customer will be charged extra amount for this shuffle service. There are some exclusive ringtones as well for which the subscriber has to pay more to set those tones as ringback tone.

OnMobile have constantly ensures to provide new features to customers and one of them is personalizing the customers RBT according to their own wish. With such innovations with the caller tunes OnMobile have always ensured that customer's sign up for this service and change the tones whenever there is an update, which in turn will increase the revenue. The

customer can call up the operator and record an RBT, can prefix a voice message before the RBT, and can record their own RBT using the karaoke feature of OnMobile. For example an Ad like when a customer calls his wife and he will be greeted with a Ad instead of the ordinary ringtone, that reminds him about his wife's birthday which falls in one or two days and he can get a good offer in the local shops. OnMobile also believes that such Ads will lead to a multibillion dollar business in the telecom industry.

13.2.1. Ringback Advertising (Ad Ring Back or Ad-RBT)

One of the leading revenue generators in VAS has targeted the advertising medium for generating more revenue with this service. OnMobile in fact is now actually positioning itself as an operator of this new advertising system. We have seen advertisements in most of the websites and services provided through mobile phones. But providing Ads with ringtones is a very innovative way for advertisers and mobile operators. It will be fun to have Ads as ringtones which will be a good reminder for the people who call and reach the people more easily. Ringback Advertising is on the rise.

OnMobile is working with Vodafone and GroupM for setting up ad-based caller tune. According to OnMobile this new service already covers over 80 percent of the Vodafone Indian circles with over one lakh subscribers already signed up for the service [53].

How Ad-RBT works? Instead of playing the music or tones as ringback tone a subscriber allows his mobile operator to play ads as his caller tune. As the subscriber allows the operator to play ads as ring tone the customer gets some incentives for this like free talk time or some other basic VAS services. These Ads will be played based on the profile of the caller and the callee.

It is better for OnMobile to bring in new offerings to subscribers to increase its profits and the operating margin has also become very low currently as they pay more for the content owners for the for the content and royalty costs, the operators are also asking them for discounts for getting large volume of ring tones. So providing Ad-RBT service will be a good opportunity for the company to gain more profits and increase the revenue gain. According to a survey OnMobile pays up from 7.2 percent of revenue in 2007 to 19 percent in 2009 for the content and royalty costs. The operating margins of OnMobile have gone down from 64.7 percent in 2005 to 22.7 percent in 2009 [51].

The main idea is to advertise the local shops ads within a reach of certain Km from the subscribers place. The concept behind this is to tempt the customers by advertising the products as ringtones and also remind the customers about the destination is very close to the customer and make the customer to visit the place before moving away from that place. This service is a real revolution in the ringback tone industry and very good way of adverting to the customers.

13.2.2. Reverse RBT

The service which allows subscribers to personalize their ringtones according to their requirement is Reverse RBT. The customer will hear this customized ringtone as ringback tone when the customer calls to any subscriber. This ringback tone can be of any type

available in the ringtone types like music, songs, ads or others and this will purely be based on the subscriber's selection. This service is completely a network based feature and is independent from the handset.

With reverse RBT users can experience their own choice of music or songs when they make a call and it can be of any of the choices available for the ringtones.

Research indicate that only 23 % of the total callers do not set RBT since they do not want to use this service as they do not want to pay for something they do not hear [52]. Therefore Reverse RBT is introduced in order to capture this segment of people who does not subscribe to the general RBT service. Operator can also use this service to play useful information and news to the subscribers.

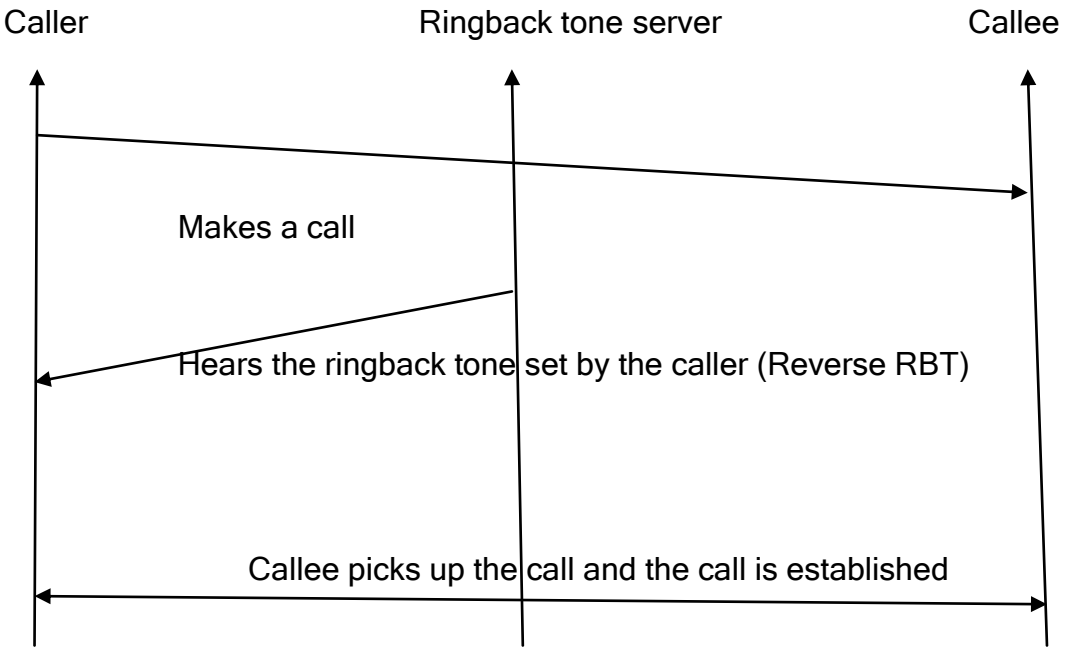

Figure 12: *Representation of how reverse RBT works*

The different features provided by OnMobile for Reverse RBT are shown in table 6 as follows, [51]

Table 6: *Different features provided by OnMobile in Reverse RBT*

Feature Number	Type of feature
1.	Operator jingle
2.	Song as RRBT: for all called parties
3.	Personalized RRBTs
4.	Time based RRBTs
5.	Special number promotions
6.	User defined shuffle
7.	System defined shuffle
8.	Sports feed as RRBT
9.	Karaoke
10.	Manage options and user profiles
11.	Subscription and termination of RRBT service
12.	Micro-charging
13.	Grace for subscription
14.	Grace for song selection
15.	Suspension for subscription
16.	Suspension for song selection
17.	Try and buy
18.	Content Categorization
19.	Short-codes for content
20.	Language selection
21.	Bulk activation and selection
22.	Blacklist on CCC GUI

13.2.2.1. Service Access

The service accessibility for provisioning and activation are available on number of different possible channels like IVR, SMS, WAP, Web, USSD, Customer Care GUI, Retail Channel, Music Search, Outbound search, outbound diallers, one touch to copy, other channels can be easily integrated.

13.2.3. Social RBT

This “social RBT” is the latest innovation in RBT by OnMobile. With new innovations like this in RBT will increase the revenue generated by this VAS. Social RBT integrates ringback tones with social networks, which help the users to share their musical preference to their friends in the social networks. The users adapt to these new services as they help them to change the ringtones according to new trends and with the notification of change from their friends. Also with this new innovation, OnMobile is taking the RBT to new consumer segments and also increase the adoption among the existing user base and drive growth in the RBT revenue.

There are millions of Indian users in the social networking websites and they share their thoughts and information in these sites. These are thus restricted to only those users who use

internet, but now there is an opportunity to share the updates through mobile with the social RBT.

Social RBT service is a unique way of identifying or searching songs listen to and share music. This service not only enables the users to share songs with the callers, but also allows them to share music and updates with friends on their web-based social networks. The change of song notification is sent to the user's social graph. This service is very useful for the customers to express themselves exclusively.

This new service will help the industry as many new users will start using this service and also makes them to permanently stick with using this service. Social RBT involves personalization of the RBT. The users can choose their ringtones based on the ratings and recommendations provided for the different songs by the different users in the network.

The contacts that are chosen by the subscriber are automatically informed when the user makes a change in the song selection. So this service also helps the users to inform other users about the new songs and also influence them in changing the song selection. Thus this service automatically helps the telecom operators to increase the revenue by a huge margin.

OnMobile is said to have talks with the operators for introducing the social RBT in the market. This Social RBT is not only a medium to inform users about the songs preferences but the customers can also updates their status, mood and thoughts. This sharing is made more easy and comfortable to the close circle of the customers.

13.2.4. Search

OnMobile also provides a good feature for its customers to search ringtones. With this service it allows the subscribers to find their favourite songs just by saying first few words of the songs aloud instead of typing the whole song name in the search database the subscriber can use this voice response service to search the songs. OnMobile Company believes that this service has increased the usage of ringtones by the user tremendously from the existing catalogues.

The customer first calls a short code number and then it starts playing the songs list. The customer can select the song from the list being announced in the call just by saying the name of the song, The customer can also asks for a new movie name in the call which then starts playing the songs in the new movie. The customer can select the song from this list just by saying the name of the song while in the call and this song will be set as ringback tone to the subscriber.

Though it is a very useful service provided to the customers there can be lots of disadvantages with this service. The voice recognition will not be as good to select the exact song which the customer need in just one try. The customer has to repeat the word again and again until the voice recognition software finds the exact song needed by the customer. Sometimes the customer gets irritated of this service as it won't recognize the exact song even after so many attempts.

OnMobile should seriously consider such faults and try to improve the service so that many people will start using these services. Once this service works properly and starts finding the songs in the first attempt itself will make this service a sure hit among the customers using the VAS in India.

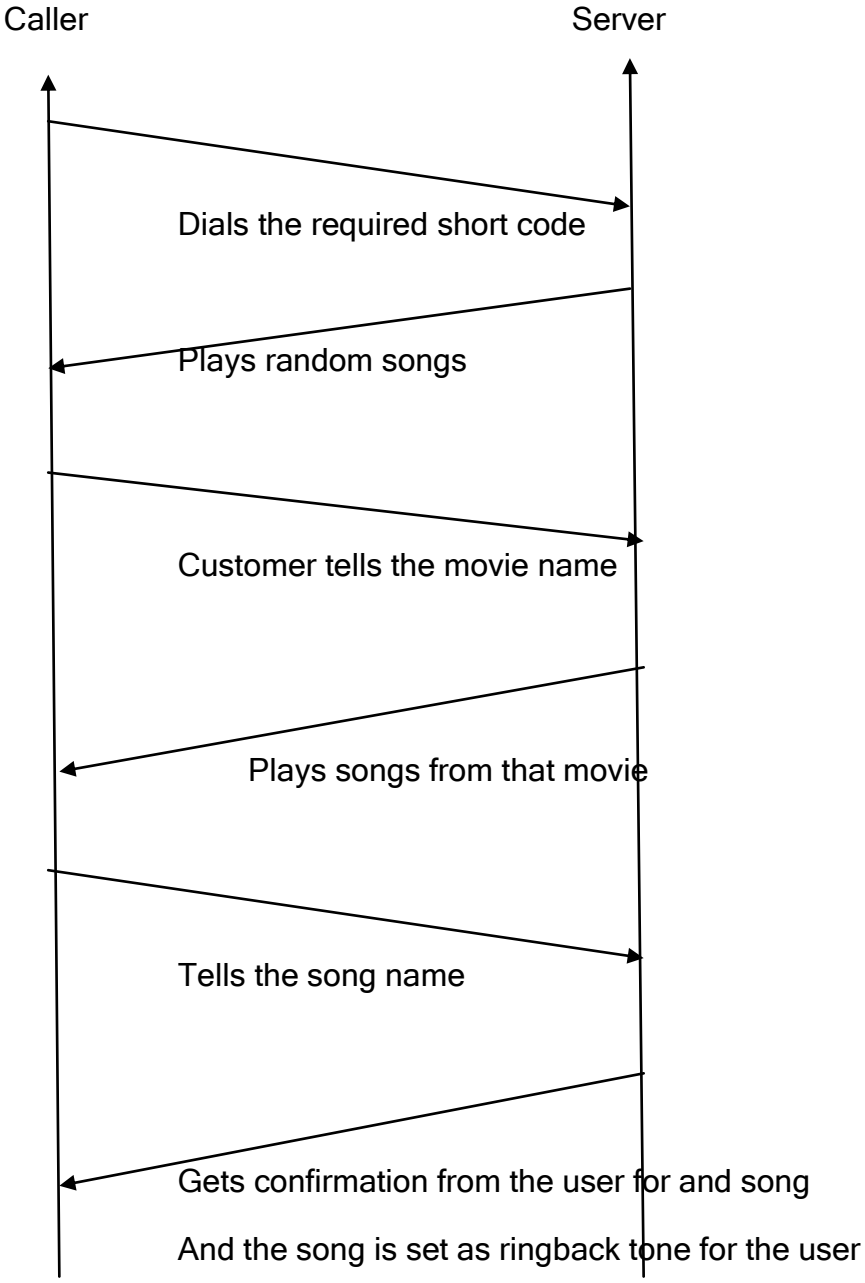

Figure 13: *Representation of how "Search" feature works in RBT service*

13.2.5. Press * to copy

This is also a major revolution in the VAS industry for ringtones. Press star (*) to copy is a service that OnMobile has showcased as one of its key innovations in terms of ringback tones With this OnMobile's "Press * to copy" service it is very easy for the customers to copy a ringtone of another subscriber while calling them and before the callee picks up the call. The customer has to just press"*" button in his mobile phone when he hears the ring tone of the Callee. If the ringback tone service is activated to the subscriber the ringtone of the callee will be immediately copied to the subscriber. But if the service is not active for the subscriber it takes one day for first activating the ringback tone service and then the caller tune of the callee will be set to the subscriber.

The below block diagram represents the general procedure of how to copy the ringback tone of the callee.

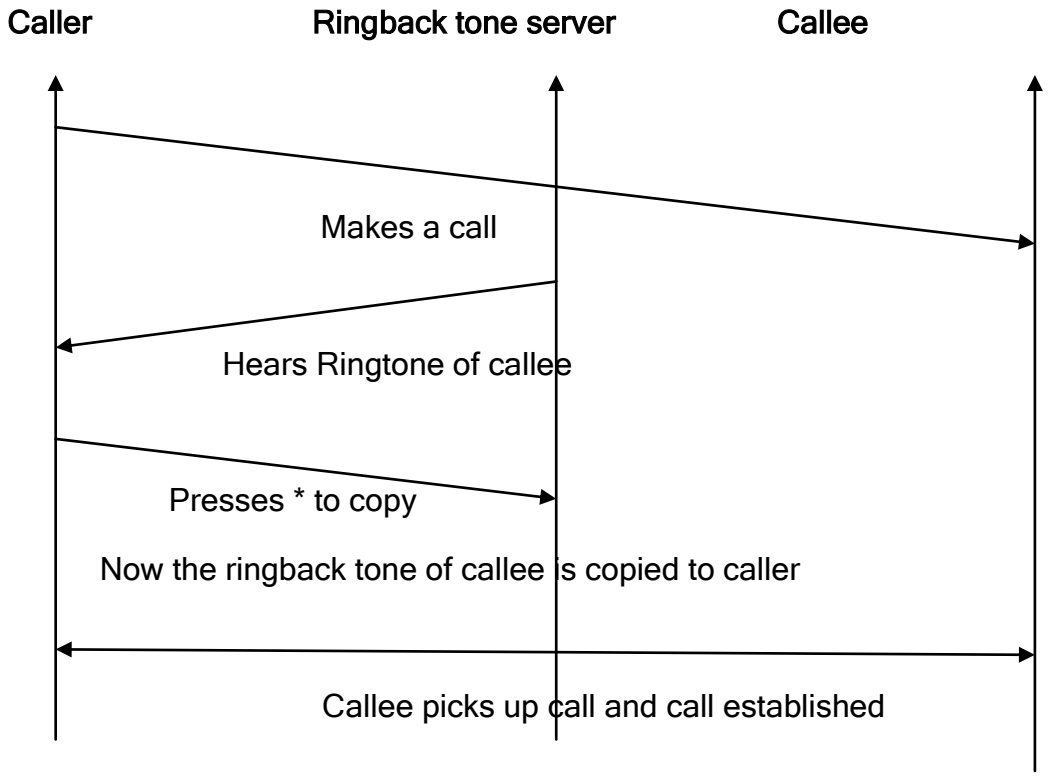

Figure 14: *Representation of how "press * to copy" service works in RBT*

13.3. Content Providers

The contents that are provided to the customers over MVAS are very important to generating revenue and the content providers play a major role in developing and providing such content. The main motive of these content providers should be to entertain the end consumers or subscribers, engage the consumers with good content through MVAS, and inform them with latest updates. The role of the content provider in MVAS value chain is as

important as any other player in the MVAS value chain. We will evaluate the role of content providers in the value chain, first by analysing the different contents provided by them for the value added services. Then we will analyse the subscribers who use such value added services more. Then we will try to figure out if the subscribers are really very happy with the contents provided over MVAS. We will also try to evaluate if the contents that are provided by the content provider satisfy all people. What new contents can be provided by the content providers which might be very valuable for the subscribers using MVAS, thus making the service more attractive and sticky.

The content providers get a decent percentage of the mobile VAS revenue. Though MVAS mainly generates revenue for the mobile operators and is very advantageous for them, the content providers also get a decent share of the revenue for the contents they provide.

There are large numbers of mobile subscribers in India and their number is growing up daily at a rapid pace. Like all the other players in the MVAS industry, the content providers are also positioning themselves to take advantage of the market.

There is a sea change in the manufacturing mobile handsets; currently the handset manufacturing companies are bringing out high end mobile phones and 3G enabled phones. Using these phones the subscribers can access the internet and access various online portals making it very easy for them to locate content and also making these handsets very popular among the consumers. [33]The consumers find it very easy to download content.

Indian consumers are very smart in selecting from multiple choices and all consumers expect very high quality MVAS contents in return for the money they paid. Content providers should keep this in mind while developing content.

The major companies in India providing contents for MVAS or noting as MVAS operators in India are Indiagames Ltd, Hungama Mobiles, Nazara Technologies, Mauj, Jump Games, Mobile2Win India Pvt. Ltd., Geodesic, Sony, OnMobile, and Sa re ga ma. According to Mr.Krishna Durbha, president of VAS at Reliance Communications Ltd. these content providers are ready for any strategy, to attract more customers to MVAS and they are also open to providing the best content to the subscribers. Additionally these content providers are ready to welcome any third party content partners to help in the growth of their business.

Even though the content providers interact directly with the consumers it is very difficult for them to provide VAS directly, but rather they provide these MVAS only through mobile operators as billing for these services remains a big problem for them and is not easily done without the operators as they need very good infrastructure for this purpose and also help from the operators to collect the data's.

The content providers provide various MVAS content in different forms like games, wallpapers, ringtones, news, and matrimony proposals. Currently VAS mainly focuses on

[33] The introduction of 3G drives VASs to the next level with new advancements in the services provided to the customers. Most of the customers still use the basic handsets without 3G as the cost of a 3G enabled handset is very high, so MVAS continues to dominate in the telecom industry in India with 2G services.

movies and music, hence the content providers focus on these contents. They partner with different operators and provide their contents to these operators. The content providers develop games and also have all the marketing rights for these games. Later we will analyse the basic handset requirements for some of these games. The content providers also work with the various major matrimonial organizations and provide the profile information available via their websites through MVAS. We will analyse exactly what details are provided by this MVAS and how the service can be improved. Content providers also work with various film production studios and provide the pictures of the actors and actresses as mobile wallpapers through mobile value added service. These content providers also provide up to date news through MVAS. We will evaluate the type of news provided through MVAS and also analyse the kinds of news that can be provided to the subscribers and how they can be improved further.

Figure 15 shows some of the basic contents provided by the content providers in India. The following sections will analyse in detail the different types of contents provided by content providers.

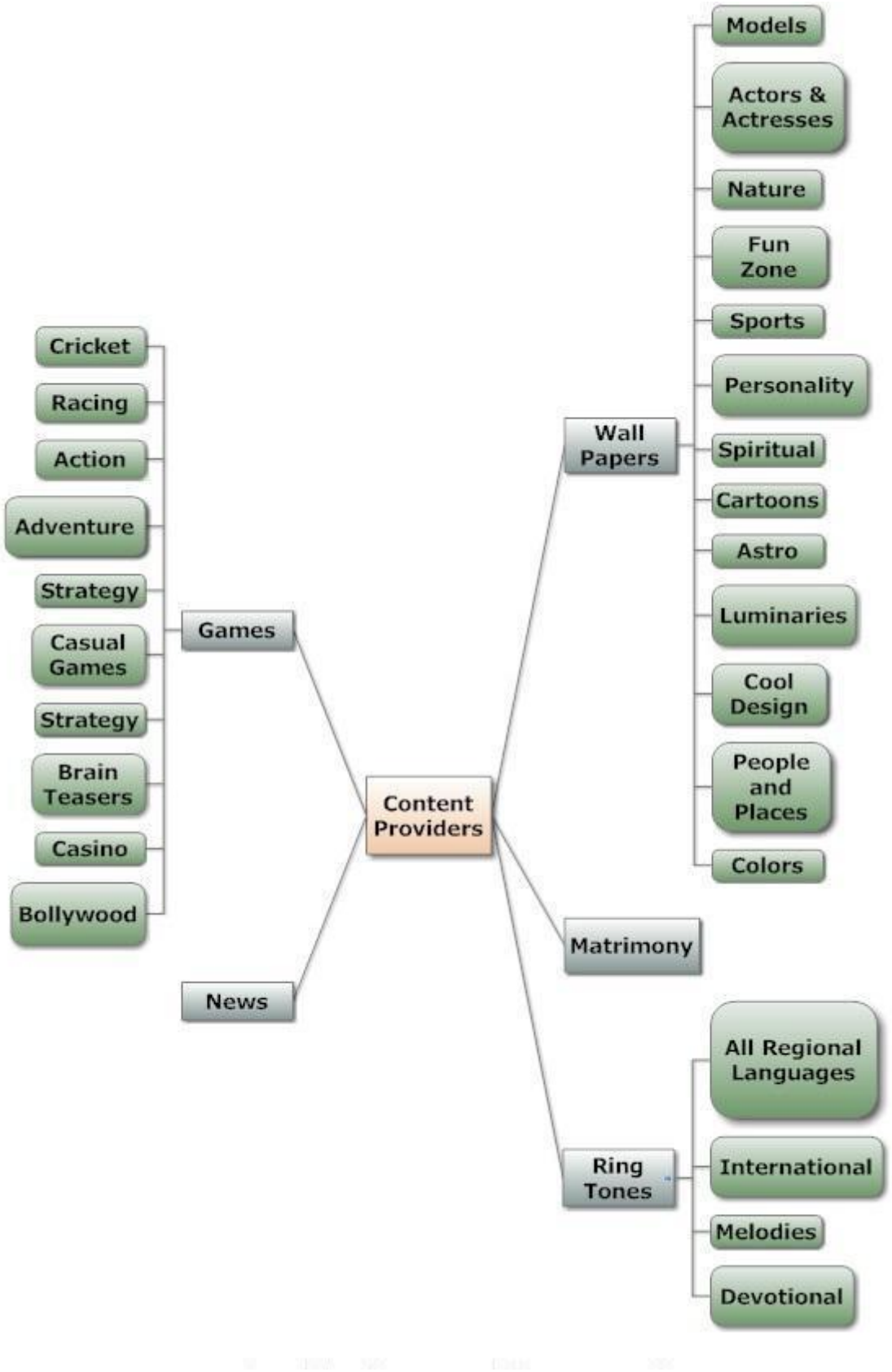

Figure 15: *Few contents provided by content providers*

13.3.1. Games

Whenever we feel lonely mobile games come in handy. We can also play these games whenever we are idle. Content providers develop games of their own and mainly develop those games which are very popular on PCs and video games. While developing these games, the content providers, take into consideration the interests of their target age group of subscribers, so as to maximize their profit. The main way to attract many subscribers to MVAS games is to provide really good games. These games are created by content providers according to the availability of hardware in the mobile phone and they create different games for different mobile handsets.

Now we will see some of the games that are currently provided by the major content providers as part of their mobile VAS. Content providers mainly develop games of different categories, such as cricket, racing, action, adventure, strategy, casual, brain teasers, casino, and Bollywood [40] [41] [42]. A summary of these types of games are given in Table 7.

Table 7: MVAS games categories

Category	Games
Cricket	Asia cup, 20-20 cricket, Brain Lara cricket, Cricket championship, cartoon cricket, Cricket T20 world championship
Racing	Cyber elk, Final Fury, Pirates of Caribbean, Toy Story 3, Driving Mania
Action	Army Sniper Academy, Under Ground, Tank Invasion, Swords of Fury, The great war of Troy, Ninja Story, Warsheep
Adventure	Angel of Evil Dragon, Dynamite, Helix the Devil, Motor Heavy fuel.
Strategy	Warsheep mobile, Halloween Nightmare, Bikino, Wizards of Mickey, WAR, Night club fever
Casual games	3D world championship, snowboarding, summer sports, Battle chess, ping pong, Bikini golf Britney
Brain Teasers	Chess, Sudoku
Casino	UNO Challenge, midnight poker, video poker, Caribbean poker
Bollywood	Flavours, chandini chowk to China, Vaastu Saastra

When we see games are provided in each of the categories. We find that the games are developed mainly based on what people are interested in the country. For example, India is mainly obsessed with cricket and nearly the whole country is crazy about the game. So developing a cricket game has very good potential and will be liked by many people and they will also not mind spending money for such games. When we see the games in the Bollywood category, almost all of these games are developed based on the theme of a Bollywood movie. They are mostly developed based on an action movies directed in Bollywood.

Today it is very important to keep the brain very sharp to cope up with the pace of the fellow people. Therefore, it is very good to play some brain teasers and continuously sharpen the brain. The games developed in the other categories are all created in order to provide good entertainment and company to the subscribers.

How to download the games

Games can be downloaded either from the website via 3G (or Internet) or the subscriber can send the code of the game to a short code and download the game. After the code for the game has been sent to the appropriate short code, the subscriber gets a "service message" then the subscriber has to retrieve this message in order to proceed with the download by clicking the download option.

With the introduction of 3G subscribers can download games and play these games with other subscribers who are online and want to play the same game.

13.3.2. Wallpapers

Content providers develop various wallpapers for the subscribers of MVAS. Almost all subscribers who use a mobile handset wish to download wallpapers to make their mobile handset look attractive.

Wallpaper is an important content to provide to the subscribers or end customers with care because the consumers are very choosy in selecting the wall papers and different subscriber's desire different kinds of wallpapers. So the content providers should be sure to provide different forms of wall papers to meet the requirements of all sections of people as people select wallpapers according to their mood, or role models and their standards.

The wallpapers can be classified into different categories: models, nature, fun zone, sports, personality, actors and actresses, spiritual, cartoons, astrological, luminaries, cool design, people and places, and colours. In each of these different categories there are lots of wall papers available for the subscribers: users select their choice of wallpaper from these. Subscribers can either download these wall papers directly from the website by accessing the internet through 3G or WAP portals; or they can download the wallpaper by sending a short message to the appropriate short code number. The customers will receive a service message and then once the subscriber clicks the link they can retrieve the wallpaper [40]. The different categories of wallpapers in MVAS are listed in Table 8.

Table 8: MVAS Wallpapers categories

Type	Description
Models	These wallpapers can feature models from all over the world
Nature	These wallpapers range feature natures beautiful locations around the world.
Fun Zone	These wallpapers are fun wallpapers such as quotes.
Sports	These wallpapers feature from different kind of sports, sports man and sports equipments.
Personality	These personality wallpapers feature from all the top personalities around the world.
Actors and Actresses	The actors and actresses wallpapers feature different actors and actresses around the world from Hollywood, Bollywood, Kollywood and Tollywood.
Spiritual	The spiritual wallpapers include from different Gods and Goddesses in the world.
Cartoons	The cartoon wallpapers range from different cartoon characters around the world.
Astrological	The Astrological wallpapers include from different astrological signs and symbols.
Luminaries	These wallpapers include the different celestial bodies, stars, Moon.
Cool design	This wall paper includes the cool design stuff such as paintings and art.
People and places	These wall papers are those which depicts different people and places around the world
Colours	These wall papers are made up of different colours.

13.3.3. Ringtones

The content providers also provide different varieties of ringtones to satisfy all types of people. There are many different categories available for the ringtones provided by these content providers, for example, Bollywood's Latest, Bollywood Hits, Bollywood classics, Regional, Exquisite, Indipop, International, Devotional, Ghazal, Bollywood Archive, Instrumental, Patriotic, Gujarati, Hollywood, Hindi, Classical, English, Tamil, Haryani, Punjabi and various other regional languages [43] [44]. OnMobile plays an important role in providing ringtones to subscribers in India.

With 2G technologies only polyphonic ringtones were popular and subscriber's downloaded ringtones from all the genres mentioned above. With the introduction of 3G technology, MP3 ringtones are becoming more and more popular; hence the subscriber has a wide variety of choices of ringtones to download. These ringtones can be downloaded as described below.

13.3.3.1. How to download?

Ringtones can be downloaded by the customer by sending a code in the necessary format to the appropriate short code. In return the subscriber gets a service message in their "Service inbox". Once the link is clicked, it shows the price of the tone for downloading and a link. When the subscriber clicks "retrieve" the ringtone will be downloaded to the phone.

When using a 3G service the subscriber can directly visit any of the song provider's website and can download songs directly from a wide range of online catalogue available.

Price

The price for most of ringtones is same, but for some special collections of ringtones the rate is very high when compared to that of an ordinary one.

13.3.4. News

Content providers provide different varieties of news to their subscribers, such as regional news, national news, international news, business news and sports news. This news can be read as feeds. If the subscriber clicks the link they can get the whole story.

Content providers work in close coordination with the major newspapers and in order to obtain up-to-date news. They feed this news into a database and the subscribers will be updated with the current/latest news.

13.3.5. Matrimony

Content providers work in coordination various top matrimonial web sites in India and they obtain profile information that is registered on these websites. These profiles will be made available to subscribers through MVAS. The customer will be able to view almost all the information that is available online for a particular profile through their mobile phone via MVAS.

13.3.6. Latest advancements

After the successful broadcast of the Indian Premier League (Cricket) Live through 'Youtube' with a special channel, some of the content providers have approached Google to upload some of their premium contents on 'Youtube'.[34] Many of the leading entertainment companies are eager to distribute their content to audiences in remote international markets, where physical film distribution may not be feasible.

In earlier days there was little interaction between the companies which specialize in providing entertainment (i.e. Content providers) and end consumers. The limited interaction is mainly done with the mobile operators. As a result a revenue sharing model was the only option available for content providers.

Today mobile content creators can have more direct interaction with end customers. This helps them know about customer's choices, requirements, and preferences. Only if the content providers know more about the end customers can they improve the quality of their offers. Thus they can provide good and effective content for their end users. This further improves the relationship between the consumers and the content providers.

[34] http://www.business-standard.com/india/news/indian-content-providers-tap-google-for-youtube-access/389643/

Another new advance by content providers is that consumers can themselves create content and can share it with other subscribers. As all sorts of people will be sharing their content, the content that will be made available will have a wide variety and be available also in all forms.

13.3.7. Other analysis

The other analyses that can be made of content providers are:

1) Are the content providers providing the right type of contents to the subscribers?
2) What are the improvements that can be made in the contents provided by the content providers?
3) How important is the role of content providers with the introduction of the 3G services?
4) What new contents can be provided by the content providers for the subscribers in India?

13.3.7.1. Contents provided by content providers

The sum of all the different contents that are provided by the content providers, such as games, wallpapers, news, ringtones and, matrimony should satisfy all the subscribers who subscribe for the different MVAS and those who use 3G services. Only if the contents are of high quality and suitable for consumers will the subscribers be interested in using these services. Content providers are working hard to provide the correct type of content.

13.3.7.2. Importance of content providers with the introduction of 3G

With the introduction of 3G services in India, the role of content providers and their share in the value chain has increased tremendously. For most of the services that are provided over 3G or in the data revolution of telecommunications it is the content provider who plays a major role as they provide the essence of the MVAS provided by the industry. The contents provided to the customers should be very entertaining and interesting to their target audience.

13.3.7.3. Future possibilities

The content provider can improve the contents that are provided to the subscribers in an effective way by providing the correct type of contents that are relevant to the subscribers in the different regions of the country. Different subscribers have different tastes and a wide variety of contents are needed to satisfy all these subscribers. The contents should be presented in such a way that those who are using the MVAS will enjoy these services. The subscriber should have a keen interest in viewing most of the contents again and again which leads to a good growth in revenue for the content developers.

13.3.7.4. What new contents can be provided?

Some of the new contents that can be provided to the consumers over MVAS and 3G by the content providers can be in the form of educational contents for students. The content providers can also provide daily magazines for older people for MVAS and 3G customers in India. The content providers can create their own magazines and can have copyrighted content in them and the content providers can provide such contents as a monthly issue or as weekly magazines for their customers in India. The content providers should try to create

these magazines in most of the major languages in India so that all the subscribers can enjoy the content in their own language.

13.3.8. Survey results

A small survey was conducted with the different location based services among the mobile users in India and the following results are obtained.

First a general survey was conducted among the customers to find out which location based services are very popular among the consumers. The table 8 gives the details of the responses from the consumers.

Table 9: *Number of customers who responded positively for the different LBS*

Content type	No of Consumers
Ringtones	40
Games	32
Wallpapers	36
News	25
Matrimony	13

From the above values the percentage details of the total consumers using location based services are found to be as the following

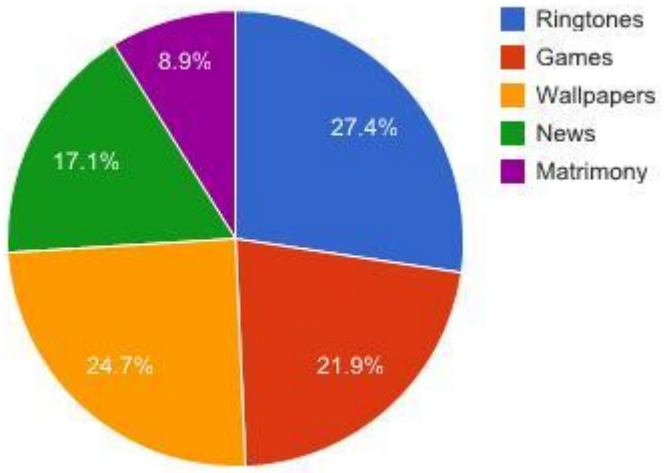

Figure 16: *Graphical representation of the average positive response from customers*

From the above pie chart it is very clear that the main content that people usually download is ringtones as new songs are updated day to day customers download songs in order to update

themselves with the latest and the current chart toppers. So it is very important for the content providers to update the database with the new songs and attract more customers towards the VASs.

After ringtones people have responded for downloading wallpapers. Wallpapers are the second important contents which people download more, so the content providers should update the wallpapers database with new wallpapers so that more people download their favourite wallpapers and customize their phones with them. Customers usually customize their phones and change the wallpapers so often so it is very important for the content providers to update the database in regular basis so as to improve the quality of the wallpapers and also provide new contents, so that each time when the customer browse the list of wallpapers, he/she finds something new and download that wallpaper.

The next important content for which most customers have given positive response is games. Different customers download different verities of games which interests them the more. So it is very important for the content providers to provide good games in all the gaming categories as said in the chapter 13 under the sub topic games in content providers. Only if the customer finds a game which interests him more he downloads the game and adds to the revenue.

The next important content for which more people have responded positively is NEWS. So it is very important for the content providers to update the NEWS then and there and provide news in all the categories as discussed in the chapter 13 under the topic NEWS in content providers. As people spend money for availing these services it is very important for the content providers to take full care for providing better contents to the customers which results in very high revenue for the operators as well as the content providers and on the whole a good revenue for the telecom industry.

And finally very few people have responded positively for the matrimonial services currently as the service is in the initial phase. Once the content providers make the service more attractive more people will start using the service and it will be very popular among those who are in the age group between ‘22’ to ‘30’.

14. Conclusions

From the chapter 12 and 13 we found that there are lots of new MVAS services are coming onto the market. There is a tremendous increase in the revenue for the telecommunication sector. However in order to derive the full benefits of these services, every subscriber should have an advanced mobile handset. The new VAS that are introduced daily have a tremendous effect on the way that people use their mobile phones and the mobile phone is proving to be more like a friend. With the introduction of 3G services in India the scenario is drastically changing due to introduction of new VAS. The revenue that is generated through the Indian Mobile VAS cannot be compared with that of any other market throughout the world. It could be one of the highest revenue generators in India.

We have analysed almost all the major goals discussed in chapter 12, specifically the uses of mobile commerce and the different services available in m-commerce, focusing on mobile banking, mobile ticketing, mobile wallet, and location based services. We have also discussed and analysed the different advantages and disadvantages of these MVAS.

Some of the MVAS, specifically mobile banking, mobile ticketing, mobile wallet, and Location based services discussed are becoming increasingly popular and we analysed these topics in detail in chapter 13.

The significant insight that was gained is that mobile commerce is one the fastest growing MVAS in India and more and more operators want to provide this service to their subscribers. This, in turn, has increased the revenue of the mobile operators. These VASs are becoming very useful to all types of subscribers. The entire sub categories of VASs that are provided under the umbrella of mobile commerce are very useful, highly effective services for same set of subscribers.

Then we have analysed the importance of ringback tones and the different types of ringback tones service that are provided by a company OnMobile. We have also analysed in detail the importance of the different types of ringtones provided to the subscribers. We have also analysed how the various ringback tones differ from each other and why OnMobile Company goes for different types of ringback tones services.

We also analysed the importance of the content providers in the value chain, and their roles and the type of content they offer. Then we have also discussed the importance of content providers in the data revolution of telecommunications and their additional role with the introduction of 3G. Also, we have analysed the different contents that are provided by the content providers. With the roll out of 3G services in India the role of content providers is becoming increasingly important. With the advent of this new technology, the contents provided by them should aim to delight all sections of people in the targeted customers. Only if all the targeted customers get their preferred contents through MVAS more people will use these services and this in turn will increase the revenue of the mobile operators as well as the content providers. None of the contents that are created by the content providers are exclusively made for mobile phones, except games.

From the different survey results we found how much people are willing to spend for VAS and the results gave a conclusion that most of the people are willing to spend a good amount of money for VASs. We also found that mobile banking and mobile ticketing are the most preferred mobile commerce services in India. Most of the people are willing to use the location based services and mainly they use Location based information and Location based billing. We also found that most important contents that people mostly get through VAS are ringtones, wallpapers and games.

Those who like to work in the area of MVAS in India and work on the major VAS (such as mobile commerce) will create more services for the subscribers in India. The m-commerce in India will depend upon how effectively the mobile operators and the banks can work together to provide some services to their customers in India. The role of content providers in the Indian MVAS value chain and the contents they provide for the MVAS and their success will depend upon how effectively the content providers are in providing relevant content.

Future work should be the evaluation MVAS and the role of the content providers in the value chain of India by studying specific services in more detail. This will probably require working inside one of the major companies in this value chain.

15. Future Work

In future more MVAS services should be analysed and evaluated. The statistics of number of users using these VASs should be examined. A more detailed analysis can be made on to find out how many subscribers are subscribing for these services and can find the importance of the different VAS given to the customers. The m-commerce services can be further analysed and to evaluate which mobile commerce services are very useful and which services are most used by subscribers in India. The role of software developers can be thoroughly examined. The difference between the role and importance of content provider and the content aggregator can be analysed in the MVAS value chain. Analysis can also be made on why content aggregators are really needed for the MVAS value chain. The content providers who provide news and matrimonial contents over the MVAS can further be analysed in detail to examine how their content can be improved further.

With the development of new advanced handsets by the handset manufacturers, a detailed study should be made of how new contents could be developed to exploit the new hardware availability in these handsets. The survey can be done with more number of people and in more detailed way to gain more useful results. A analysis on how ringback tone services can be improved to gain more customers attention to the service can be analysed in detail. A detailed study on what contents can be provided to the customers through ringback tones can be analysed with the introduction of 3G.

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