Conceptual Framework and Profile of Cellular Phones-A Study

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Abstract

This article presented the conceptual framework of consumer behavior and factors influencing consumer behavior as well as its influence on customer loyalty. It is also explored the concepts pertaining to consumer behavior and its impact on framing the customer relationship management strategies. The consumer behaviour and its various components regarding its components like brand knowledge, brand awareness and brand association are also theoretically explored.

Key Words: consumer, purchaser, behavioral responses, marketing, brands,

Loyal customers, etc

INTRODUCTION

This article elaborately presents the conceptual frame work of consumer behavior, customer preference and explains the factors influencing the satisfaction of customer which matures to loyal customers. Simple observation provides limited insight into the complex nature of consumer choice and researchers have increasingly sought the more sophisticated concepts and methods of investigation provided by behavioural sciences in order to understand, predict, and possibly control consumer behaviour more effectively. Psychology, social Psychology and sociology are the disciplines most widely employed in this endeavour to identify the factors considered by the customer's expectations, to satisfy them and to retain them for the long - term benefit of the organisation.

This article deals with the studies of consumer behaviour as a sub discipline of marketing with the aim to identify how consumer research can be put to use in marketing practice, regards the field of consumer behavior as an applied social science. Accordingly, the value of the knowledge generated should be evaluated in terms of its ability to improve the effectiveness of marketing practice. According to this perspective, marketing management inevitably rests upon some conception of how consumers behave and of the consequences their reactions to product, price, promotion, and distribution strategies are likely to have for the attainment of corporate goals. In affluent competitive economies successful marketing depends above all on matching the marketing mix, which results from the integration of these strategies with the willingness of consumers to buy and in doing so more effectively than one's rivals. The consumer-oriented management which results from such as matching is a response to the enormous discretion exercised by purchasers in these economies. Moreover, the choices made by consumers have consequences not merely for competing companies within a given, traditionally- defined industry; because of the high levels at which discretionary income is running, companies are increasingly forced to compete across the conventional boundaries of markets and industries (Chisinall, Peter M., 1975).

Recently, though, some researchers have argued that consumer behaviour should not have a strategic focus at all. It should instead focus on the understanding of consumption for its own sake,

rather than because the knowledge generated can be applied by marketers, (Chisnan, Peter M, 1975).While this view has emerged relatively recently, it has encouraged many to expand the scope of their work beyond the field's traditional focus, on the applied benefits of undertaking consumer studies. This more critical view of consumer research has also led to the recognition that not all consumer behavior and/or marketing activity is necessarily beneficial to individuals or society. As a result, current consumer research is likely to include attention to the "dark side" of consumer behaviour, such as addiction, prostitution, homelessness, shoplifting, or environmental waste, (Costa, Janeen Arnold, 1979).This activity builds upon the earlier work of researchers who have studied consumer issues related to public policy, ethics, and consumerism. There is a growing movement in the field to develop knowledge about social marketing, which involves the promotion of causes and ideas, such as responsible drinking, energy conservation, and population control.

Consumer behaviour refers to a customer's commitment or attachment to a brand, store, manufacturer, service provider or other entity based on favourable attributes and behavioral responses, such as repeat purchases. The basic perspective of bahaviour describes the behavior of the customer towards the product or service and customer loyalty as an attitude, or pre-disposition to behave. There are different variations in the term bahaviour is used, in terms of sales, profits or visit of customer to the point of sale. Among the customer base 20% of the customers forms the 80% of the revenue to organisations. Service organizations treat such customers with special offers with exclusive benefit options to these loyal customers like gold, silver and platinum customers. Customers in the study "of the processes involved when individuals or groups Select, purchase, use, or dispose of products, services, ideas, or experiences to satisfy needs and desires". In the marketing context, the term 'customer ' refers not only to the act of purchase itself, but also to patterns of aggregate buying which include pre-purchase and post-purchase activities.

In consumer behaviour, the notion of a "trickle-town" theory based on the ordinal class concept has been in vogue for some time. The theory suggests that people belonging to lower classes emulate or imitate the behaviour of people belonging to the upper classes, and in the process, an innovation is gradually diffused from higher to lower classes, (Rao S. L. and Natarajan I, 1994). However, the trickle-down theory has been criticized on many grounds; (Reynolds, F. L. and WellsW.D, 1977).Perhaps the most logical objection would come from the level-of-aspiration theory, (Shrivastava P. K, 1981), which suggests that one's expected aspiration is tempered with reality, and that an individual therefore brings his aspirations to his level of reach in order to avoid constant frustrations. Also, the theory of social interaction (William, Stanton J., 1981), for a good statement suggests that a person may be more satisfied in an interaction situation where there are similarities of "exogenous factors" such as age, education, background, etc. (AdiGodrej,1993),provides some evidence which suggests that whatever influence occurs is probably within a given class, and that within each class one can find two groups—the minority which is above-average and the majority which is the average. Finally, (Agarwal, Muthukumaran and Sharma), also found that there are opinion leaders at all levels of social class rather than a concentration in one class.

FAMILY

Family refers to two or more persons related by blood, marriage of adoption who reside together, (Elliot Stuart, 1992), consumer behaviour experts agree that the family exerts the major influence on the consumer behaviour of its members (see for example, (Girish, Punj and David, Stewart W., 1983) The family shapes its members personality characteristics, attitudes and evaluate criteria, i.e.,the way its members look at the world and they relate to it. Family members constitute the most influential primary reference group, (Gollule, J. and Javitz, H., 1989).The family is the most important consumer-buying organization in society, and family members constitute the most influential primary reference group. The family has been researched extensively. We can distinguish

between two families in the buyer's life. The family of orientation consists of parents and siblings. From parents a person acquires an orientation toward religion, politics, and economics and a sense of personal ambitions, self-worth, and love. Even if the buyer no longer interacts very much with his or her parents, their influence on the buyer's behaviour can be significant. In countries where parents live with grown children, their influence can be substantial. A more direct influence one very day buying behaviour is the family of procreation namely, one's spouse and children.

CUSTOMER PERCEPTION

Perceptions are shaped by three sets of influences: the physical characteristics of the stimuli, the relation of the stimuli to their surroundings and conditions within the individual. While the first two sets of influences are both related to stimuli, the last set of influences is the only reason that makes perception a personal trait. Factors that influence this frame of reference include learning experiences, attitude, personality and self - image (Webster Frederick E. Jr., 1965). Further, (Wells, William D and Douglas, Tigert, 1971) found that there is a large body of literature on perception discussing how people's perceptions are influenced by various factors. These factors are people's mood (or) frames of mind physical abilities to experience sensation, their personalities and motivations, the social and physical context of the stimuli being perceived, and the physical composition of the stimuli. Eilkie emphasized the two key factors that determine what is perceived and how it is perceived stimulus characteristics help us to understand what properties of a stimuli cause it to receive more attention that it otherwise might. Further, he discussed how these properties lead to particular forms of treatment by CIP (Consumer Information Processing) system. Consumer characteristics on the other hand, refer to the influences that our physical, and conceptual systems have on what we perceive and how we perceive it.

Some researchers have employed the perception phenomenon in understanding buying behaviour that when brands of beer are given in unmarked bottles, beer drinkers are unable to identify the brands. Brand perception as developed by company promotion is, therefore, quite important in keeping customers loyal. Several studies have been reported on the identification of cola beverages based on taste only. Generally, the respondents have not been able to do better than by chance, suggesting that brand preference may be based on brand perceptions developed by marketing and social factors.

PRE PURCHASE BEHAVIOUR

Pre-purchase activity consists of growing awareness of need and wants, search for the service providers for the product or service from different sources of information. Post-purchase activities involve the evaluation of the purchased service or product, reduction of any anxiety accompanies the purchase of expensive or infrequently bought items. The behavioural brand loyalty approach explored the consistency of customers in repurchasing of brands. It measures the proportion of purchases – the number of times the most frequently purchased brand is purchased, divided by the total number of times the product category is purchased.

CHANGING BEHAVIOUR OF CUSTOMERS-AN OVERVIEW

Measuring the loyalty in terms of purchases, repeated purchases, sequence of purchases and most recent purchases may sometime result not because of loyal, instead may be of other factors like, the availability of products, price volatility, convenience and inertia of habit. The attitude of loyal customers involves much more on repeat purchases. This holds a lot of factors on preference or attitude of the service provider towards customer satisfaction and after sales support. An attitude of the customers involves individual's affective, cognitive and behavioural attitude. To identify these factors organisations employ lot of research to identify the level of emotional belief and feelings

about their product and services offered. Attitude of customers is a psychological process of evaluation, decision-making towards purchase and a strong predisposition towards over all liking of a brand.

LOYAL CUSTOMERS

Loyal customers, with regular purchases, strong on behavioural attribute, are very important to any organizations. Those customers are very profitable to organization, not only from the revenue generated from those customers; they will spread a positive word of mouth about the product they enjoyed from the organization. Relationship commitment is an enduring valuable relation between customer and the organization which implies an attitude and positive response towards the organization. A strong commitment and positive relations between a customer and organisation is a mutually beneficial to both. The relationship has a value and has to be preserved for the long term transactions. Transactions are discrete events result in no feeling of relationship and no anticipation of future interactions. Customers focused towards the transaction tend to seek maximum benefit from the current interactions. But committed customers may be willing to negotiate and even compromise to maintain the relationship for a long period of time. Thus relationship characterized by cooperative actions, compromises and sharing of benefits and costs for future plans. Thus the basic objective of relationship is to build trust, loyalty which leads to fulfilling the marketing objective of the organisation, (Uta juttner and Hans Peter Wehrli, 1995). The main aspect of relationship is considered based on the richness of interactions, which are necessary to initiate, maintain and develop the relationship for long - term benefit. The more transactional may exhibit a low trust, but committing a limited number or resources in maintaining the relationship. Switching cost is low and there is low level of relationship, in contrast committed relationship characterized by trust, friendship, similar goals and a synergy in learning and knowledge sharing, (Michael Harvey and Cheri Speier, 2000). The committed customers are highly meticulous in expressing their loyalty before they commit themselves for the need of the product, behaviour at the time of purchase and behaviour after purchase. These factors collectively affect customer loyalty in the sense of high quality service at lower price.

CONSUMER LOYALTY

Another aspect of customer loyalty requires a close and emotional relation between the organisation and customer. Customers should have a positive brand affinity, with the organisation, (ArjunChaudhuriandMorrisB.Holbrook, 2002). In many cases, organisations try to maintain a positive relation with the customers with their brands they develop or acquire. Brand equity plays a major role in terms of maintaining the positive relations with the customers which goes beyond functional aspects but also a sense of closeness when they see others using the same brand. Many organisations find it difficult to have emotional bonding with loyal customers. CRM plays a major role for a rational consumer to establishing a feeling of closeness, affection and trust as true emotional bonding based on trust and respect, (Tony Cram, 2002). CRM systems attempt to build emotional binding with customers. The CRM subsystems may sometimes limit the bonding with the customers. Personal contacts are very important in relational bonding process and contain many subtle issues that affect customer willingness to buy. Non-verbal signals, friendships and personal interactions are the major factors for building trust and may be short-changed as efforts to reduce labor cost by building strong relations.

TRUST

Trust forms an important factor for emotional bonding, which exists when one party has confidence on the exchange partner, (Robert Morgan and Shelby D. Hunt, 1994). Trust can be defined as willingness of the customer to rely on organization or brand to perform its stated functions. Trust reduces uncertainty/Risk and is viewed as a carefully planned process and instant an eon's response, (Arjun Chaudhuri and Morris. B. Holbrook, 2002). Trust creates a belief in the minds of customer a sense of reliable and integrity. It creates a sense of honest, fair and sense of responsibility about the organisation.The organisation research has to create a positive mind - set with lot of aspects like timely delivery, value added service, maintaining open and honest communication by keeping the expected service.

CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

The main function of the organisation is to bring buyers and sellers together to create customer. Keeping or maintaining the customers is also equally important for the long term relations and ultimately benefit of the organisation. The term relationship management communicates to the customers the long - term vision of the organization in maintaining the relations. Marketers should be able to understand that the sale is not the end of the process; rather it is the beginning of the relations between the organisation and the customers. In the increasing proportions of transactions, the relationship intensifies in the subsequent sales. The principle of the customer relationship starts when the customer receives more than what he expects from the service provider which satisfies and pleased by the value added service rendered by the organisation. Satisfied customer tends to utilize the service of the organisation whenever he needs a product or similar product offered by the organisation. As the firms tries to serve the customer in the same manner whenever he tries to utilize the service, helps the organisation to maximize the lifetime value of the customer relationship, (Theodore Levitt, 1981). With this relation the buyers can purchase promises of satisfaction from the firms and prefer to do business with firms they trust, (Patricia. M. Doney, and Joseph. P. Cannon, 1997).It is an advantage for the organisation also as the relation is able to increase the sales and reduce marketing cost in the long run, (Mary. J. Bitner, 1995). The firms should understand that no two buyers will buy for the same reason, and doing repeat business with the existing customer is beneficial for both the customer as well as for the long - term business perspectives. So it is the responsibility of the marketers to utilize the resources available in the organisation to create, interpret, and maintain relationship with the customers, (Regis McKenna, 1991).

CRM or Customer Relationship Management in simplest definition is a process to compile information that increases understanding about the customer and increases organisation relationships with its customers. CRM consists of analysis and action (Tony Cram, 2002). Which uses the advancement of the information technology to provide a comprehensive, reliable and integrated view of its customers base so that the organisation process can maintain relations and interactions for the mutual benefit. The CRM strategy should help the organization to individualize and personalize the relations with the existing as well as with the potential customers and to increase the profitability from the relations, (Herb Edelstein, 2000). Thus CRM is to enhance customer service, improve customer satisfaction, and ensure customer retention, by aligning business process with the use of information technology.

The CRM system maintains the information about the customer, customer characters, buying behaviour, previous sales transactions, marketing effectiveness

And market trends, (StewartDeck, 2001). An effective CRM system should help the organization to provide sufficient information to the customer which matches his requirements, so that the product offerings, can reach the exact users. In the recent times, the CRM system can be accessed by the customer to know and verify his transactions with the organisation.

A CRM approach is a step in marketing, focusing towards an integrated system aiming at customer needs, enhancing profits in the long-term benefits of both organisation and customers. The integrated system should provide all the information about the customer available in the different functional areas of the organization as customer and suppliers. From the time the first transaction was made the organisation is able to generate different information about the customer such as his demographic profile, his likes and dislikes which will help the organisation to personalize the offerings. There are lots of potential uses of CRM with the customers' data, but the customer's privacy should not be disturbed. The ultimate aim of building an effective CRM is to have a mutually beneficial relation in the form of customers experience by offering personalized product and services, (Christian Gronroos, 1990). But organisations find it difficult to build information about the customer. It requires array of skills from data capture, processing and analyzing. This should also follow with the security of data and with the touch of personalization, (Debabroto Chatterjee, Rajdeep Grewal and V. Sambamurthy, 2002).Though CRM is a technological development, organisations should think it as a tool exclusively for customer focus.

IMPORTANCE OF CRM

In the traditional concept of marketing, the entire business process of organisation revolves around customer. All the customers may not be the same, some may require great deal of effort service and cost more to retain them. The basic fact is that different customers represent different levels of profit to the organisation. With CRM tools it is possible for the organisation to calculate the lifetime value of the customer by comparing the cost spend to acquire the customer with that of the profitable transactions, positive word-of-mouth about the organization and the potential future profits from the customer. The CRM has lot of benefits to the customer as well as to the organisations. It provides a profitable way of attract, maintain and retain the customer in a cost effective manner and also reduces the cost of transaction. For customer it helps in proving a one point of contact for his needs.

EFFECTIVENESS OF CRM

An effective CRM system helps the organization to understand the customer through his purchasing patterns and addressing the customer's feelings. This will satisfy the customer, creating a trust and in the continuing process will be able to retain the customer where the organisation can concentrate on getting new customers. Customer retention is a costly affair and it varies in different industries. CRM helps the organisation to have high share of customers, the organisation customizing and selling more service and product to the customer rather than selling one product. Thus the CRM helps to retain the customers, reduce the cost of maintaining the customers and helps enhanced customer loyalty at the same time creating value to customers, (Warren Karlenzig, 2002).

POTENTIAL BENEFITS OF CRM TO CUSTOMERS

Customers also tend to benefit from the CRM systems as like organisations. CRM helps in continuity of relations with the organisation, which reduces the analyzing the alternatives in the pre-purchase behaviour of customers. If the customer is satisfied with the continuous link by meeting his needs over time, it helps to reduce the perceived risk of dealing with the new vendor or organisation. An effective CRM system provides a different types of touch point like telephone contact, e-mails, customer help desk or mail to interact and to know more about the customer's needs. CRM system provides a touch of personalization by identifying the name, purchase patterns and can forecast the customer's future needs. To certain extent, CRM system also helps in one-to-one marketing to tailor made the offerings, (Don Pappers and Martha Rogers).Thus for a customer CRM helps to satisfy his needs, increase the value of relationship and reduce the risk associated with interactions with new organisations.

The above mentioned concepts of CRM and its correlation with consumer behavioural aspects give a rich interlocking picture in the present marketing theory at the national and international level. This forces us to study the consumer behaviour and its theoretical framework elaborately, justifying the aim of the research.

CELLULAR PHONES-AN OVER VIEW

A cellular phone (also known as a cellular phone, cell phone, a hand phone and mobile phone) is a device that can make and receive telephone calls over a radio link whilst moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile network operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

The development of devices which connect wirelessly to the public switched telephone network. The transmission of speech by radio has a long and varied history going back to Reginald Fessenden's invention and shore-to-ship demonstration of radio telephony, through the Second World War with military use of radio telephony links. Hand-held radio transceivers have been available since the 1940s. Cellular phone for automobiles became available from some telephone companies in the 1940's. Early devices were bulky and consumed high power and the network supported only a few simultaneous conversations. Modern cellular networks allow automatic and pervasive use of cellular phones for voice and data communications. Cellular phone history is often divided into generations (first, second, third and so on) to mark significant step changes in capabilities as the technology improved. In addition to telephony, modern cellular phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Cellular phones that offer these and more general computing capabilities are referred to as cellular phones.

The first hand-held cellular phone was demonstrated by Dr Martin Cooper of Motorola in 1973, using a handset weighing around1 kg. In1983, the Dyna TAC 8000 x was the first to be commercially available. In the twenty years from 1990 to 2010, worldwide cellular phone subscriptions grew from 12.4 million to over 4.6 billion, penetrating the developing economies and reaching the bottom of the economic pyramid.

CELLULAR PHONES AND ITS GROWTH

Radiophones have a long and varied history going back to Reginald Fessenden's invention and shore-to-ship demonstration of radio telephony, through the Second World War with military use of radio telephony links and civil services in the 1950s.

The first cellular phone call made from a car occurred in St.Louis, Missouri, and USA on June 17, 1946, using the Bell System's Cellular phone Service.

In1956, the world's first partly automatic car phone system, Mobile System A (MTA), was launched in Sweden. MTA phones were composed of vacuum tubes and relays, and had aweightof40 kg. In 1962, a more modern version called Mobile System B (MTB) was launched, which was a push-button telephone, and which used transistors to enhance the telephone's calling capacity and improve its operational reliability, thereby reducing the weight of the apparatus to 10 kg. In 1971, the MTD version was launched, opening for several different brands of equipment and gaining commercial success.

Martin Cooper, a Motorola researcher and executive is considered to be the inventor of the first practical cellular phone for handheld use in a non-vehicle setting, after along race against Bell Labs for the first portable cellular phone. Using a modern, if somewhat heavy portable handset,

Cooper made the first call on a handheld cellular phone on April 3, 1973 to his rival, Dr. Joel S. Engel of Bell Labs.

The world's first commercial automated cellular network was launched in Japan by NTT in1979, initially in the metropolitan area of Tokyo. Within five years, the NTT network had been expanded to cover the whole population of Japan and became the first nationwide 1G network. In 1981, this was followed by the simultaneous launch of the Nordic Cellular phone (NMT) system in Denmark, Finland, Norway and Sweden. NMT was the first cellular phone network featuring international roaming. The first 1G network launched in the USA was Chicago-based Ameritech in 1983 using the Motorola Dyna TAC cellular phone. Several countries then followed in the early-to-mid 1980s including the UK, Mexico and Canada.

In 1991, the second generation (2G) cellular technology was launched in Finland by Radio linja on the GSM standard, which sparked competition in the sector as the new operators challenged the incumbent 1G network operators.

Ten years later, in 2001, the third generation (3G) was launched in Japan by NTTD Co Moon the WCDMA standard. This was followed by 3.5G,3G+or turbo 3G enhancements based on the high-speed packet access (HSPA) family, allowing UMTS networks to have higher data transfer speeds and capacity.

All cellular phones have a number of features in common, but manufacturers also try to differentiate their own products by implementing additional functions to make them more attractive to consumers. This has led to great innovation in cellular phone development over the past 20 years.

The common components found on all phones are:

o A battery, providing the power source for the phone functions

o An input mechanism to allow the user to interact with the phone.

The most common input mechanism is a keypad, but touch screens are also found in some high-end cellular phones.

o Basic cellular phone services to allow users to make calls and send text messages.

o All GSM phones use a SIM card to allow an account to be swapped among devices. Some CDMA devices also have a similar card called a R-UIM.

Individual GSM, WCDMA, I DEN and some satellite phone devices are uniquely identified by an International Mobile Equipment Identity (IMEI) number.

Low-end cellular phones are often referred to as feature phones, and offer basic telephony, as well as functions such as playing music and taking photos, and sometimes simple applications based on generic managed platforms such as Java ME or BREW. Handsets with more advanced computing ability through the use of native software applications became known as cellular phones. The first cellular phone was the Nokia 9000 Communicator in 1996 which added PDA functionality to the basic cellular phone at the time. As miniaturization and increased processing power of microchips has enabled ever more features to be added to phones, the concept of the cellular phone has evolved, and what was a high-end cellular phone five years ago, is a standard phone today.

Several phone series have been introduced to address a given market segment, such as the RIM BlackBerry focusing on enterprise/corporate customer email needs; the Sony Ericsson Walkman series of music phones and Cyber shot series of camera phones; the Nokia N-series of multimedia phones, the Palm Pre the HTC Dream and the Apple i Phone.

Some cellular phone can make mobile payments via direct mobile billing schemes or through contactless payments if the phone and point of sale support Near Field Communication (NFC). This requires the co-operation of manufacturers, network operators and retail merchants to enable contactless payments through NFC-equipped cellular phones.

Other features that may be found on cellular phones include GPS navigation, music (MP3) and video (MP4) playback, RDS radio receiver, alarms, memo recording, personal digital assistant functions, ability to watch streaming video, video download, video calling, built-in cameras (1.0+ Mpx) and camcorders (video recording), with autofocus[dubious – discuss] and flash, ringtones, games, PTT, memory card reader (SD), USB (2.0), dual line support, infrared, Bluetooth (2.0) and WiFi connectivity, instant messaging, Internet e-mail and browsing and serving as a wireless modem.

Nokia and the University of Cambridge demonstrated a bendable cell phone called the Morph. Some phones have an electromechanical transducer on the back which changes the electrical voice signal into mechanical vibrations. The vibrations flow through the cheek bones or forehead allowing the user to hear the conversation. This is useful in the noisy situations or if the user is hard of hearing.

SERVICES INVOLVED IN CELLULAR PHONES

Cellular phones generally obtain power from rechargeable batteries. There are a variety of ways used to charge cell phones, including USB, portable batteries, mains power (using an AC adapter), cigarette lighters (using an adapter), or a dynamo. In 2009, the first wireless charger was released for consumer use. Some manufacturers have been experimenting with alternative power sources, including solar cells.

Various initiatives, such as the EU Common External Power Supply have been announced to standardize the interface to the charger, and to promote energy efficiency of mains-operated chargers. A star rating system is promoted by some manufacturers, where the most efficient chargers consume less than 0.03 watts and obtain a five-star rating.

DEVELOPMENTS IN CELLULAR NETWORKS

The technological development that distinguished the First Generation of cellular phones from the previous generation was the use of multiple cell sites, and the ability to transfer calls from one site to the next as the user travelled between cells during a conversation. The first commercially automated cellular network (the1 Generation) was launched in Japan by NTT in 1979. The initial launch network covered the full metropolitan area of Tokyo's over 20 million inhabitants with a cellular network of 23 base stations. Within five years, the NTT network had been expanded to cover the whole population of Japan and became the first nation-wide 1G network. Analog Motorola Dyna TAC 8000X Advanced Cellular phone System cellular phone as of 1983.

The next 1G network to launch was the Nordic Cellular phone (NMT) system in Denmark, Finland, Norway and Sweden in 1981. NMT was the first cellular phone network to feature international roaming. The Swedish electrical engineer Östen Mäkitalo started work on this vision in 1966, and is considered to be the father of the NMT system and by some the father of the cellular phone itself, since he and two colleagues hold a patent from1971on a cellular system with handover and roaming. The NMT installations were based on the Ericsson AXE digital exchange nodes.

Several other countries also launched 1G network in the early 1980s including the UK, Mexico and Canada. A two year trial started in1981in Baltimore and Washington DC with 150 users and 300 Motorola Dyna TAC pre- production phones. This took place on a seven tower cellular network that covered the area. The DC area trial turned into commercial services in about 1983 with

fixed cellular car phones also built by Motorola. They later added the 8000X to their Cellular offerings. A similar trial and commercial launch also took place in Chicago by Ameritech in 1983 using the famous first hand-held cellular phone Motorola Dyna TAC.

AT&T's 1971 proposal for Advanced Cellular phone System (AMPS) was approved by the FCC in 1982 and frequencies were allocated in the 824–894 MHz band. Analog AMPS was superseded by Digital AMPS in 1990.

In 1984, Bell Labs developed modern commercial cellular technology (based, to a large extent, on the Gladden, Parelman Patent), which employed multiple, centrally controlled base stations (cell sites), each providing service to a small cell area. The sites were set up so that cells partially overlapped and different base stations operated using the same frequencies with little or no interference.

Vodafone made the UK's first mobile call at a few minutes past midnight on January 1, 1985. The technology in these early networks was pushed to the limit to accommodate increasing usage. The base stations and the cellular phones utilized variable transmission power, which allowed range and cell size to vary. As the system expanded and neared capacity, the ability to reduce transmission power allowed new cells to be added, resulting in more, smaller cells and thus more capacity. The evidence of this growth can still be seen in the many older, tall cell site towers with no antennae on the upper parts of their towers. These sites originally created large cells, and so had their antennae mounted atop high towers; the towers were designed so that as the system expanded—and cell sizes shrank—the antennae could be lowered on their original masts to reduce range.

SECOND GENERATION: DIGITAL NETWORKS (2g,2.5g, and 2.75g)

Two 1991 GSM cellular phones with several AC adapters

In the 1990s, the 'second generation' (2G) cellular phone systems emerged, primarily using the GSM standard. These differed from the previous generation by using digital instead of analog transmission, and also fast out-of-band phone-to- network signaling. The rise in cellular phone usage as a result of 2G was explosive and this era also saw the advent of prepaid cellular phones.

In 1991 the first GSM network (Radio linja) launched in Finland. In general the frequencies used by 2G systems in Europe were higher than those in America, though with some overlap. For example, the 900 MHz frequency range was used for both 1G and 2G systems in Europe, so the1G systems were rapidly closed down to make space for the 2G systems. In America the IS-54 standard was deployed in the same band as AMPS and displaced some of the existing analog channels.

Coinciding with the introduction of 2G systems was a trend away from the larger "brick" phones toward tiny 100–200g hand-held devices. This change was possible not only through technological improvements such as more advanced batteries and more energy-efficient electronics, but also because of the higher density of cell sites to accommodate increasing usage. The latter meant that the average distance transmission from phone to the base station shortened, leading to increased battery life whilst on the move.

Personal Handy-phone System mobiles and modems used in Japan around 1997–2003. The second generation introduced a new variant of communication called SMS or text messaging. It was initially available only on GSM networks but spread eventually on all digital networks. The first machine-generated SMS message was sent in the UK on 3 December 1992 followed in 1993 by the first person-to-person SMS sent in Finland. The advent of prepaid services in the late 1990s soon made SMS the communication method of choice amongst the young, a trend which spread across all ages.

2G also introduced the ability to access media content on cellular phones. In 1998 the first downloadable content sold to cellular phones was the ring tone, launched by Finland's Radio linja (now Elisa).Advertising on the cellular phone first appeared in Finland when a free daily SMS news headline service was launched in 2000, sponsored by advertising.

Mobile payments were trialled in 1998 in Finland and Sweden where a cellular phone was used to pay for a Coca Cola vending machine and car parking. Commercial launches followed in 1999 in Norway. The first commercial payment system to mimic banks and credit cards was launched in the Philippines in 1999 simultaneously by mobile operators Globe and Cellular. The first full internet service on cellular phones was introduced by NTT Do Co Mo in Japan in 1999.

THIRD GENERATION: HIGH SPEED IP DATA NETWORKS AND MOBILE BROAD BAND (3G)

As the use of 2G phones became more widespread and people began to utilize cellular phones in their daily lives, it became clear that demand for data services (such as access to the internet) was growing. Furthermore, experience from fixed broadband services showed there would also be an ever increasing demand for greater data speeds. The 2G technology was nowhere near up to the job, so the industry began to work on the next generation of technology known as3G. The main technological difference that distinguishes 3G technology from 2G technology is the use of packet switching rather than circuit switching for data transmission. In addition, the standardization process focused on requirements more than technology (2Mbit/s maximum data rate indoors, 384kbit/s outdoors, for example).

Inevitably this led to many competing standards with different contenders pushing their own technologies, and the vision of a single unified worldwide standard looked far from reality. The standard 2G CDMA networks became 3G compliant with the adoption of Revision At oEV-DO, which made several additions to the protocol whilst retaining backwards compatibility:

- The introduction of several new forward link data rates that increase the maximum burst rate from 2.45 Mbit/s to 3.1 Mbit/s.

- Protocols that would decrease connection establishment time.

- The ability for more than one mobile to share the same time slot.

- The introduction of QoS flags.

All these were put in place to allow for low latency, low bit rate communications such as VoIP.

The first pre-commercial trial network with 3G was launched by NTT DoCoMo in Japan in the Tokyo region in May, 2001. NTT DoCoMo launched the first commercial 3G network on October 1, 2001, using the WCDMA technology. In 2002 the first 3G networks on the rival CDMA2000 1xEV-DO technology were launched by SK Telecom and KTF in South Korea, and Monet in the USA. Monet has since gone bankrupt. By the end of 2002, the second WCDMA network was launched in Japan by Vodafone KK (now Soft bank). European launches of 3G were in Italy and the UK by the Three/Hutchison group, on WCDMA. 2003 saw a further 8 commercial launches of 3G, six more on WCDMA and two more on the EV-DO standard.

During the development of 3G systems, 2.5G systems such as CDMA 20001x and GPRS were developed as extensions to existing 2G networks. These provide some of the features of 3G without fulfilling the promised high data rates or full range of multimedia services. CDMA2000-1X delivers theoretical maximum data speeds of up to 307 kbit/s. Just beyond these is the EDGE system

which in theory covers the requirements for 3G system, but is so narrowly above these that any practical system would be sure to fall short.

The high connection speeds of 3G technology enabled a transformation in the industry: for the first time, media streaming of radio (and even television) content to 3G handsets became possible, with companies such as Real Networks and Disney among the early pioneers in this type of offering.

In the mid 2000s an evolution of 3G technology begun to be implemented, namely High-Speed Downlink Packet Access (HSDPA). It is an enhanced 3G (third generation) mobile telephony-communications protocol in the High-Speed Packet Access (HSPA) family, also coined 3.5G, 3G+ or turbo 3G, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data transfer speeds and capacity. Current HSDPA deployments support down-link speeds of 1.8, 3.6, 7.2 and 14.0 Mbit/s. Further speed increases are available with HSPA+, which provides speeds of up to 42 Mbit/s downlink and 84 Mbit/s with Release 9 of the 3GPP standards.

By the end of 2007 there were 295 million subscribers on 3G networks worldwide, which reflected 9% of the total worldwide subscriber base. About two thirds of these were on the WCDMA standard and one third on the EV-DO standard. The 3G telecoms services generated over 120 Billion dollars of revenues during 2007, and at many markets the majority of new phones activated were 3G phones. In Japan and South Korea the market no longer supplies phones of the second generation.

Although cellular phones had long had the ability to access data networks such as the Internet, it was not until the widespread availability of good quality 3G coverage in the mid 2000s that specialized devices appeared to access the mobile internet. The first such devices, known as "dongles", plugged directly into a computer through the USB port. Another new class of device appeared subsequently, the so-called "compact wireless router" such as the Novatel-MiFi, which makes 3G internet connectivity available to multiple computers simultaneously over Wi-Fi, rather than just to a single computer via a USB plug-in.

Such devices became especially popular for use with laptop computers due to the added portability they bestow. Consequently, some computer manufacturers started to embed the mobile data function directly into the laptop so a dongle or MiFi wasn't needed. Instead, the SIM card could be inserted directly into the device itself to access the mobile data services. Such 3G-capable laptops became commonly known as "net books". Other types of data-aware devices followed in the net book's footsteps. By the beginning of 2010, E-readers, such as the Amazon Kindle and the Nook from Barnes & Noble, had already become available with embedded wireless internet, and Apple Computer had announced plans for embedded wireless internet on its iPad tablet devices beginning that fall.

FOURTH GENERATION: ALL-IP NET WORKS (4G)

By 2009, it had become clear that, at some point, 3G networks would be overwhelmed by the growth of bandwidth-intensive applications like streaming media. [25] Consequently, the industry began looking to data-optimized 4th- generation technologies, with the promise of speed improvements upto10-fold over existing 3G technologies. The first two commercially available technologies billed as 4G were the WiMAX standard (offered in theU.S.by Sprint) and the LTE standard, first offered in Scandinavia by Telia Sonera.

One of the main ways in which 4G differed technologically from 3G was in its elimination of circuit switching, instead employing an all-IP network. Thus, 4G ushered in a treatment of voice calls just like any other type of streaming audio media, utilizing packet switching over internet, LAN or WAN networks via VoIP.

SATELLITE MOBILE (SATELLITE PHONE)

Earth-orbiting satellites can cover remote areas out of reach of wired networks or where construction of a cellular network is uneconomic. The In mars at satellite telephone system, originally developed in 1979 for safety of life at sea, is now also useful for areas out of reach of landline, conventional cellular, or marine VHF radio stations. In 1998 the Iridium satellite system was setup, and although the initial operating company went bankrupt due to high initial expenses, the service is available today.

CELLULAR PHONE IN INDIA

With a subscriber base of more than 851 million, the Mobile telecommunications system in India is the second largest in the world and it was thrown open to private players in the1990s.GSM was comfortably maintaining its position as the dominant mobile technology with 80% of the mobile subscriber market, but CDMA seemed to have stabilised its market share at 20% for the time being. By March 2010 the country had 584 million mobile subscribers, up from 350 million just 15 months earlier. The mobile market was continuing to expand at an annual rate in excess of 40% coming into 2010.

The country is divided into multiple zones, called circles (roughly along state boundaries). Government and several private players run local and long distance telephone services. Competition has caused prices to drop and calls across India are one of the cheapest in the world. The rates are supposed to go down further with new measures to be taken by the Information Ministry. In September 2004, the number of cellular phone connections crossed the number of fixed-line connections and presently dwarfs the wire line segment by a ratio of around 20:1. The mobile subscriber base has grown by a factor of over a hundred and thirty, from 5 million subscribers in 2001 to over 881 million subscribers as of October 2011. India primarily follows the GSM mobile system, in the 900 MHz band. Recent operators also operate in the 1800 MHz band. The dominant players are Airtel, Reliance Info comm, Vodafone, Idea cellular and BSNL/MTNL. There are many smaller players, with operations in only a few states. International roaming agreements exist between most operators and many foreign carriers. The government allowed Mobile number portability (MNP) which enables cellular phone users to retain their cellular phone numbers when changing from one mobile network operator to another. India is divided into 22 telecom circles.
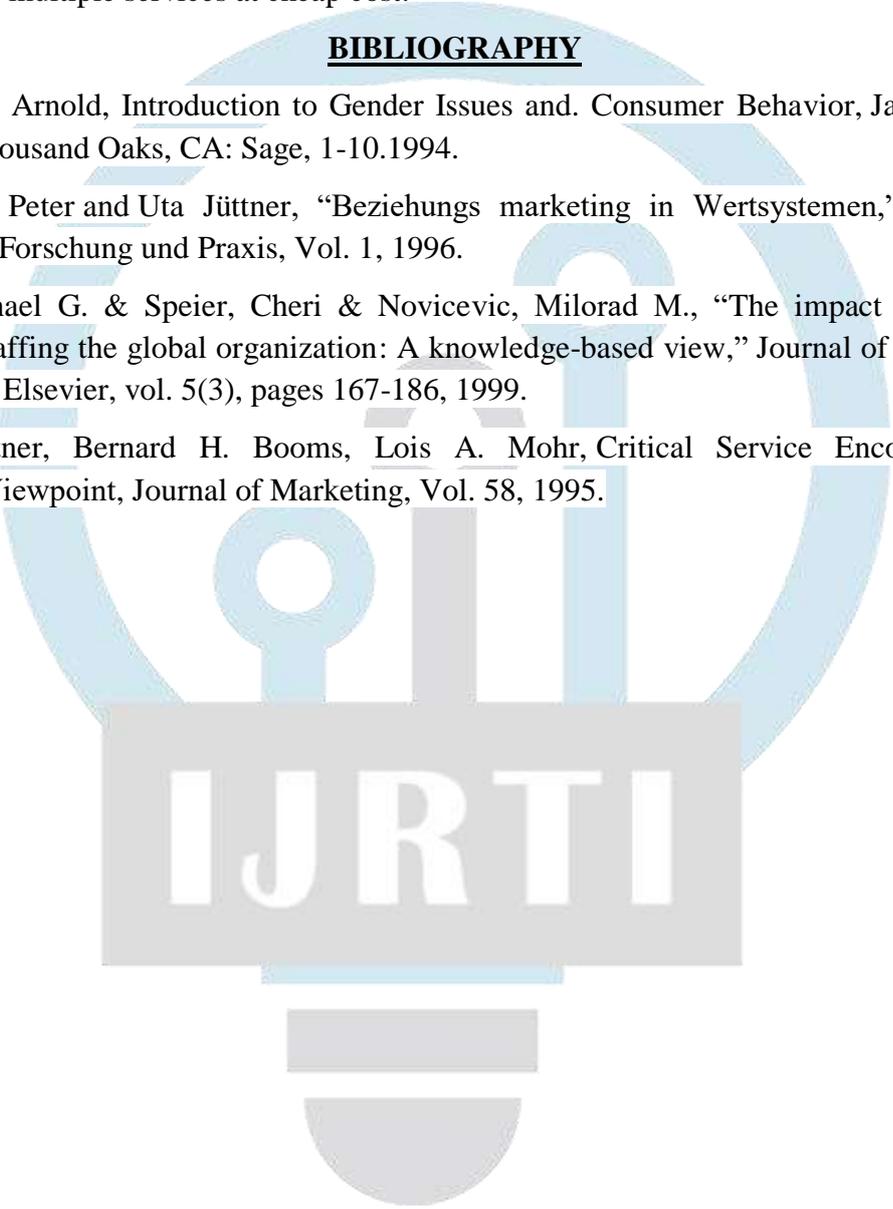
CELLULAR PHONE BRANDS IN INDIA

These are the handset players in India Nokia, Sony Ericsson, Samsung, HTC, Apple, Fly, LG, Black Berry, Orion, Karbonn, Micromax, Videocon, Lava, iCube, Onida, Celkon, vodafone, WIWO, Techberry etc.

In the Next Generation Networks, multiple access networks can connect customers to a core network based on IP technology. These access networks include fibre optics or coaxial cable networks connected to fixed locations or customers connected through wi-fi as well as to 3G and 4G networks connected to mobile users. As a result, in the future, it would be impossible to identify whether the next generation network is a fixed or mobile network and the wireless access broadband would be used both for fixed and mobile services. It would then be futile to differentiate between fixed and mobile networks – both fixed and mobile users will access services through a single core network. Most telecom companies won 3G and 4G licences in a competitive auction. They have now rolled out their third-generation (3G) mobile services since early 2010, but most companies will officially launch fourth-generation (4G) mobile services based on LTE or Long Term Evolution technology from 2012.

Indian telecom networks are not as intensive as developed country's telecom networks and India's tele density is low only in rural areas. 670,000 route kilometers (419,000 miles) of optical fibres has been laid in India by the major operators, even in remote areas and the process continues. BSNL alone has laid optical fibre to 30,000 Telephone Exchanges out of their 36 Exchanges. Keeping in Mind the viability of providing services in rural areas, an attractive solution appears to be one which offers multiple service facility at low costs. A rural network based on the extensive optical fibre network, using Internet Protocol and offering a variety of services and the availability of open platforms for service development, viz. the Next Generation Network, appears to be an attractive proposition. Fibre network can be easily converted to Next Generation network and then used for delivering multiple services at cheap cost.

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