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INTRINSIC/EXTRINSIC UNFAMILIARITY ON THE TELECOMMUNICATIONS CONVERGENCE USAGE: THE TRUE USEFULNESS OF THE TECHNOLOGY

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BY

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Abstract

The research objective of this dissertation is to develop and validate a comprehensive usage of the telecommunications products/services. Based on preference and usage literature it has been defined that companies and consumers use technology for different reasons but both spend more than necessary for the same situation. They

don’t have enough knowledge to define the best convergence usage because of the systems integration existent in the market. Analyzing different kinds of studies and scenarios, this dissertation evaluated qualitatively and quantitatively the entrepreneurial and residential technology usage comparing all results with the literature to demonstrate that even the best integration developed by providers are not sufficient to guarantee an optimum solution. Telecommunications providers, industry and government don’t provide an optimized solution for our current consumers whether they are individual or enterprises. Some services or products are good for one use but bad for others, so the solution to integrate the technology is not used by consumers. However, it is used by providers that save some infrastructure costs without any transference of savings for their consumers. Concerning this problematic and lack in the market, different modeling and solutions were proposed for each kind of usage analyzed and different warnings were presented proposing new studies and values in our daily need for new technologies.

Acknowledgements

After spending a few years working in Brazil as a Professor and an Engineer in the education area and telecommunications sector I joined the doctoral program at the University of Bergamo (Italy), to engage in research on new technology application and usage based on consumer behavior. The last three and a half years involved enormous support from family, friends, faculty and colleagues, and to all of them I would like to express my most sincere gratitude.

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A special acknowledgment I would like to present is to my friend Fabio Cassia, who works with me, and who taught me this new area and supported me in all my time in Italy, driving me by the right directions and correcting me in my Italian journey of learning and adaptation with the culture and language. Last, but not the least, my son and my fiancée, Sergie and Caroline, who have been a source of great strength, balancing my basic, financial, professional, and emotional needs with their own, despite living twelve thousand kilometers apart for the last three years.

DEDICATION

To

The Late

MY GRANDMOTHER NAIR MONTERO VALDEZ ARRUDA

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INTRODUCTION

The telecommunications sector has captured a great deal of the changes in the global economy. Due to the rapid development in technologies, the transformation of companies and stiff competition, many corporations have been divided and integrated in order to strengthen themselves and maintain focus on a reasonable number of clients who would guarantee investment in the sector. The mobile phone industry was the first major development in this sector followed by mobile internet connectivity. In fact, the telecom sector has been integrated by producing conjoint devices, or as cited in the literature, multifunctional, bundled, and integrated products. Manufacturers have developed these products for the purpose of being denominated as "all-in-one." The service providers have also offered a convergence of services that utilize these products. The American all-in-one (Nunes et al., 2000) is a result of all these developments where clients are searching for bundled products because they represent less risk (Harris and Blair, 2006). In addition to horizontal integration, there has also been vertical integration. The companies have started offering services in a variety of different sub-sectors, which previously had not been allowed. In the United States, companies are offering single communications solution based on metallic pair cable, or fiber optics. These conduits can provide clients with cable TV, internet access, and telephone services in their homes at a fixed price. There is unlimited local telephone calling, a large selection of television channels, and internet access provided by an ADSL fixed link.

Telecom provider companies are providing landline and mobile telecommunications under the same provider name. They are able to use the rules and regulations governing intra-mobile and landline communication to their advantage. These companies are offering discounts or augmented prices for connections as long as calls are made inside their own networks. In the case of landlines, sometimes these companies also offer discounts when making connections using a competitor's networks.

The landline is used geographically in general country-of-origin cables that were previously installed by the government rather than the use of a shared radio frequency as seen with the mobile network. Before privatization, the government owned all controls and use of communications. After being privatized, the companies responsible for the privatization presented a service that, by law, rented the use of the infra-structure

to other users, including other competitors in the sector. However, rather than cost-by-user, a fixed monthly or annual fee would be put into place. This means that if a competitor is trafficking one call from its line to the competitor's line, the incoming call uses the original cable network infrastructure. Meanwhile, the charge is made independently regardless of the number of uses the competitor makes.

The mobile network pays by use because the transport used is the environment (free space), so all competitors are sharing this radio frequency space according to the authorized frequency for each provider. By doing it this way the costs incurred by a mobile company who calls among other mobile numbers inside its own network are different from the costs from the calls are effectuated between two different networks. The network effecting the call has to pay its own internal costs plus the agreed upon cost of the competitor.

With this perspective, imagine now if a landline company also owns a mobile company, and when this company wants to plan a marketing attack to greatly impact the market. By developing a plan with zero costs to landline numbers within a certain time, it would effect the market by saying that rather than owning a fixed line at home, replacing the landline with a mobile phone would be more practical and efficient because it could be used as both a landline and mobile phone. Any resemblance with the marketing strategy of the Vodafone Company in Italy is pure coincidence!

Technologically, the market has the best developed systems which have been absorbed and updated in a small amount of time due to frequent needs with new applications of the consumers. However, based on cost-benefit, the consumers have the worst rate concerning their real needs, technologies, usage and applied cost.

This thesis presents research to analyze the cost-benefit problem and to propose solutions concerning its usage, the product technology, and solutions. The thesis is presented in three sections. The first section includes studies from the enterprise solution, the second discusses individual usage, and the final section describes problems and solutions. Each section contains two chapters and these chapters are pertinent to each section's purpose and the general thesis design.

Section one presents the telecommunications usage in the entrepreneurial sector which is then divided into two chapters. The first chapter presents the systems integration with the case of University of Bergamo where a model for the telecommunications services was developed, which discussed the all possibilities of voice and data communication services. The research demonstrated the costs from the existent telecommunications

services in the university using the existent PBX tariff software and network. Using this data and based on literature about service integration appliance that provide the same communication with different services or products, the proposition of a conjoint system to reduce company costs was developed. Based on this system, a system was modeled and an equation developed to measure and define which structures should be applied to different sorts of companies based on costs and services of communication as local, interurban, international, voice over IP calls, internet, intranet, and mobile phones calls.

It is also described in chapter one, a problem concerning regulations in the sector. It presents the necessity of creating the model previously cited capable of guaranteeing the best cost-benefit related with voice and data communication. After the generalization of the problem, the study suggests the use of systems integrators who are represented by telecom consultants. These representatives would be specialists in the area who would consist of different people who neither work for companies selling products or services in the area, nor would be the internal professionals from the analyzed company or providers of products or services.

Chapter two introduces the "Self-Realization Marketing" which has been misused and misunderstood in the market due to the necessity of excessive technology usage or integrations not formally useful. In this chapter, the study bases itself theoretically through literature by informing the existents research, comparing results, and realizing new purposes. It proposes a model of this "Self-Realization Marketing" based on the self-realization theory (Wright, 1908) viewed in the psychological and sociological areas of study integrating the use of telecommunications providers with mobile phone companies (brand and co-brand), and an unknown ideal optimization of cost-benefit to the voice and data communication used. This self-realization is presented as a need by the possession process (Belk, 1988) as will be seen in chapter 3.

Section two; explain the individual usage starting with chapter three's presentation of a qualitative study using netnography for iPhone's introduction in the American market. The iPhone is a highly technological mobile phone from the Apple Company which was launched in mid 2007 in the U.S. market. In only a few months they sold more than 7 million devices in the national market. In Apple's website there was a blog which discusses Apple products. It also included a separate blog for the iPhone, which used key words based on usage, trends, and social needs. It contained discussions, questions and answers from owners and inquisitors (adepts) concerned with usage and product preference. Nearly 150 posts containing 13,000 words were used creating a database

which would be analyzed and codified to generate a qualitative study about the usage of a high technology product. Two main findings were discovered in this model: devotion and latest users. This chapter shows the technology used by the individual (personal) sector as a social tool rather than a utilitarian product (Katz and Sugiyama, 2006). It demonstrates how much the high technology and integration of products in this technology influence the devotion or need for a continuous updated process.

Chapter four presents a quantitative study based on a survey developed at the University of Rhode Island and at Amazon Studies Institute located in the United States and Brazil respectively. After an exhaustive study on the literature concerning social presence, consumer behavior, bundled products, multi-function products, usage, hedonism and utilitarianism, a questionnaire was developed to resolve three sub-studies based on the created hypotheses. These studies were based on conception factors concerning hedonism and utilitarianism (Okada, 2005). Smart phones were used for a product evaluation in the actual market with their integrations. The studies individually analyzed each different product presented in terms of hedonism and utilitarianism. The cross factors of budgeting and purchasing, or receiving them as a gift, as well as price levels with high and low brand factors were determined. These studies present statistical data confirming the theory proposal from the Self-Realization Marketing in chapter two and the qualitative study from the chapter three.

The third and final section of this thesis is divided into two chapters as well. It presents a study about regulations in the telecommunications sector and the extrinsic factors that have been affecting it. Chapter five starts with the theoretical study of problems in regulations. It concerns the last studies developed previously, presenting the VOIP as one of the biggest problematic factors in this area. It also shows how the problem is centered on the convergence of services (Shin, 2006). The VOIP can have multiple possibilities of integration and usage without any control from the government, where services with different operational regulations are hard to organize and control. The use of services with convergence sometimes has propagated an increase of lags and gaps in the correct usage of the technology.

Chapter six discusses the results of the problems caused in social usage for this type of technology for individual users. It is a chapter containing comparisons from all the developments created in this thesis with new perspectives and proposals for future research (Malhotra et al., 2004). It reflects the systems usage problem existing in the companies described in chapters one, two and five as well as the personal usage

problem discussed in the chapters three and four. It also discusses future problems due the introduction of future technologies to the telecommunications sector if it's not well regulated.

The thesis conclusion briefly illustrates the individual results for each one of the studies and how they were interconnected creating a solid base which certified that the technology usage had been developed incorrectly. The proper unknown usage is based on cost-benefit where some companies over- and under-charged technologies not reaching an optimum value of quality by cost. When these companies have an optimum value of quality, the cost is high. Individual consumers have, in most cases, an overload of technology in comparison to an underestimated usage due to social choice. Consumers here were hedonic and enjoyed searching for the latest technology or aesthetically pleasing product in the market.

Finalizing the process, the regulation in the sector is difficult to control based on the high technology involved, quick development, and strong updating factor that facilitate providers who take advantages of the market, reducing costs and not transferring them to the end consumer.

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SECTION ONE

THE TELECOMMUNICATIONS USAGE IN THE ENTREPRENEURIAL SECTOR

Chapter 1

Technology Convergence on Telecommunications Systems Integration

Chapter 1 - Technology Convergence on Telecommunications Systems Integration

Objective - This chapter introduces a technological integration applied to the characteristics of the given study case, at the University of Bergamo in Italy, where research is being developed on the existing technological instruments and on their costs. By creating the operational logistics for these instruments, it was compared with the latest technological products and was proposed changes of the devices or in the way they are being used, in order to guarantee a significant cost reduction for the university. There is a range of technologies in companies that have evaluated their own operational system, which guarantees at least the same quality as the existing application concerning services. However, with a tendency to replace technologies for others that have automatic updating and guarantee further applications of newer technologies, following the current growing market, Internet Protocol (IP). The main analysis was made on landlines, mobile telecommunication, access to the Internet and chains of integrated data, where the convergent services, like communication between integrated service bases, focused on a new structure for a better cost-benefit plans for the interested parties, and is adaptable to any model. This work also introduces a model for the evaluation of more general cases for medium and large companies. Starting from market data an algorithm is proposed to evaluate the best product marketing and technological services to choose.

Key - words: *Technology Convergence, Technological Marketing, Telecommunications, VoIP, Cellular, LCR, Cost-benefit and Logistics.*

1.1 INTRODUCTION

The telecommunication market has supplied an enormous amount of products to consumers (Burgamelli and Pagano, 2004), based on technology process decentralization (Desanctis and Jackson, 1994), offering quick responses to current market changes. It has also caused medium and large companies (Douglas and Glen, 2000) to require several of their services (i.e. landlines, mobile telephones, access to the internet, etc.). All these services, in one way or another, have been forced to depend exclusively on the communication protocols and platforms available on the market (Barnett, 1988).

All telephone providers, both landline or mobile, fight for clients using governmental rules for the use of technology to their own advantage (Oxley and Sampson, 2004; Melody, 1999). Most of the time these companies impose disproportionate costs on their clients (Pavitt, 1997), creating a need for a lower cost market.

The technology convergence in the market (Duan et al., 2005; Jovanovic and MacDonald, 1994) generates a great benefit for consumers by the implementation of Integrated Systems (Stavridou, 1999; Brown, 2000; Cantwell and Santangelo, 2000; ABA, 1990). According to Pollalis (2003), the importance of information technology to the current market providers relies on the basic

points of the Integrated System organization. To understand this market explosion or the diversified strategy in the market (Anderson and Goffee, 2001) it is necessary to understand their development together, the main point of which is the internet (Erbschlof, 2001).

The importance of this work is based on a marketing knowledge of all the available technologies, apart from the outcome of our research, such as the current electronic marketing model (Dai and Kauffman, 2002) and the present integrated products (Sandberg and Werr, 2003). Presuming that the providers should only be used as outsourcing companies, providing their satellite or landline services and not provide solutions with their own and exclusive devices, as they currently do. Based on value creation, the providers sell images (Malhotra et al., 2004) claiming that some technology called X (name invented by the provider), works in a certain way, profiting from their clients' ignorance of technology regarding what else is available in the market.

The University of Bergamo, in Italy, made their entire structure available to us for the analysis of its telecommunication technology infrastructure, and they supplied us with all the relevant data on their telecommunication system and the data on the university's investment procedures, in order for us to find a better solution.

The data analyzed was not supplied in great detail due to privacy laws, but with percentage charts including the cost-benefit values of the university. It was generated the substitution of an earlier technological structure by a more modern one, while maintained the original communication services, with the addition of supplement any networks (Gonçalves and Garção, 2002), and joined together form an internal network of communication. It was our choice for the lowest possible route for communication (LCR, Least Cost Routing).

This study begins by showing the kind of technologies available on the market and their application. Subsequently, the case of the university is demonstrated by constructing the structure at the starting point with its evolution by using the updates currently on the market. Based on this case and on the proposed integration to reduce costs a modeling was analyzed to converge all the technologies together, to choose the best route guaranteeing the present telecommunication with lower costs for the university. In the implementation of the System Integration structure the model is divided into three parts: traffic analysis, internal fixed costs (landline, mobile and internet services fees) and the investment analysis. Each one of these structures is dependent on the others, which could produce different combinations with different technologies and different costs of investment and monthly expenses.

A model for the telecommunications services was made for the convergence between new technology (investment) and the new structure projected (strategic marketing) applying a decisional model with the structure, the technology and the market showing how the telecommunications sector sell their services and profit from errors in the market. In conclusion the behavioral and market value is determined that convinced most of the companies to accept

these applied models which with a simple re-modeling in the process and investment evaluation (Brusoni et al., 2001), could provide different solutions for the same needs.

1.2 Evaluation of Telecommunication Systems

All the available telecommunication technologies on the market are based on point to point and multi-point communication aspects (Alkahtani et al., 2006; Dörries and Zier, 2001), in which the providers charge for the communication time provided (telephone impulses) or bandwidth (Wide Area Networking – WAN), the technology used for accessing data on the internet or communicating between parent company and banks, services, suppliers and many others.

A. Fixed Telecommunications (Landline)

The public telecommunication has been taken over by private service systems from the government, especially in the last decade, however, the original names were generally maintained, due to the fact that they also took over the clients. Depending on the country analyzed, landlines had always been controlled by the government, where they had two basic operational procedures; via cable or via WLL (Wireless Loop Location), see figure 1.1. These systems are connected to the client's homes via cable or wireless, with an antenna installed in the house, with a phone connected to it. These systems may have their own kind of related protocols to accomplish either voice or fax data communication, or even to make the simultaneous traffic of data and voice possible, where ISDN (Integrated Services Digital Network) and ADSL (Asymmetric Digital Subscriber Line) protocols or Cable Modem are used (Wei et al., 2005).

Fixed telecommunication is charged by impulses or minutes, and in the contract the client must accept the terms for the communication, which includes a monthly payment for fixed maintenance, fee and connection time.

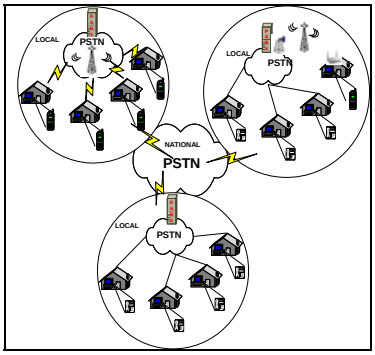

Fig. 1.1. Landline installed by the landline providers with cable and WLL technology.

B. Mobile Telecommunication

Cellular telecommunication at first developed using the same logic as the landline however, with time it did not need the local cable infrastructure of the fixed providers and eventually reached the height of its independence, becoming totally free to provide connections for any kind of service (figure 1.2).

The service costs may vary. These can be low communication cost if it only depends on the provider's network. If it depends on a shared network with other providers, for instance for long distance calls, the cost will be higher (Buellingen and Woerter, 2004; Verisign, 2005). There are some times when a client goes through up to three different providers, being forced to pay for their services, which increases the final communication cost even more.

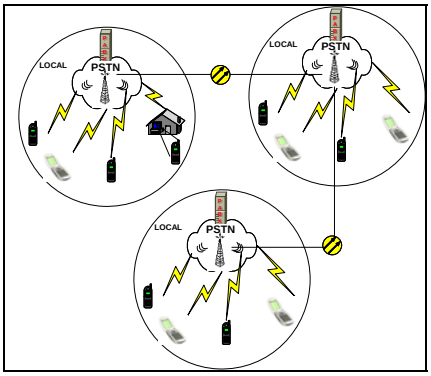

Fig. 1.2. Communication between cellular networks of the same provider via fiber optics

C. Broadband

The broadband communication system reached an acceptable limit for the service to residential clients basically using the ISDN technology (Rosenberry and Sidhu, 2000), which besides transmitting voice communication, is able to connect between two or more speeds, one of 128 Kbps for BRI systems and another of 2 Mbps for the PRI systems, however, with costs based on telephone impulses.

The ADSL system (Peelen et al., 2003) is another technology market in broadband which, however, is connected directly to the internet (Virtual Private Network - VPN), enabling companies or individuals to communicate between parties. This allows voice transmission for conventional telecommunication without any band loss, reaching up to 2 Mbps and charging for the bandwidth rented.

Cable Modem is the third system which also transmits voice, data and images through the same network cable connected to the client, either offering access to the internet, conventional telephones or cable TV, where the costs are based on the bandwidth contracted and the number

of cable TV channels. VPN technology is required for telecommunication between a company and its branches anyway.

The last model analyzed of data connection is the so-called DNC (Direct Numeric Connection) (Lechleider and Bellcore, 1991), or, as it is better known, the *Dedicated Link*. This is a private link connecting two or more companies, directly on a point to point kind of system. In this communication model, the speed also varies from 64 Kbps up to 2 Mbps which a monthly fee on services provided by the telecommunication provider is charged, based on the contract deal chosen.

All these connections offer the same communication services to the customers, who decide which technology is most appropriate for their needs, if at home or the office, or if they want a particular modem (figure 1.3) to obtain the communication required. The protocol will depend on the kind of technology chosen, where this will have its own modem type, as for instance, ADSL networks will need an ADSL modem.

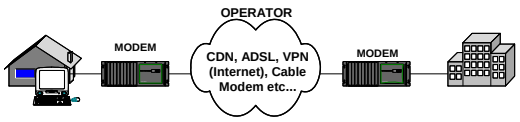

Fig. 1.3. Network communication via Modem in the client's home or company.

D. Telecommunication in the Italian Market

Table 1.1 introduces the prices applied by the landline provider Telecom Italy (Price, 2006a), by a cellular telecommunication provider TIM (Price, 2006b), and by a telecommunication system via VoIP-Skype (Price, 2006c; Arruda Filho et al., 2006) (voice over internet protocol), for connections made on their networks for local, long distance, international calls and other networks.

The values introduced are general and serve only to demonstrate the logistics regarding the technology available applied, which solutions can be offered in order to reduce internal operational assistance costs, improve the company's logistics, and the company's performance.

Figure 1.4 introduces in a general form the diverse technologies and the costs of connections for different networks, where several features can be analyzed, such as whether it is a technology or a product, and which are the best solutions for the clients, because depending on the working procedures of each company, it is possible to evaluate which system works best for them.

The graph shows that for companies it is fundamental to work with mixed systems (hybrids) (Man et al., 2005) and use a platform that controls and makes the calls, based on all the possible costs: technologies, tariffs, connection time and the whole process. Existing models on the market were examined, as well as each of the telecommunication providers. Promotions and

facilities play an important role in promoting the telecommunication business and imposing changes in a dynamic and competitive market.

Table 1.1 - Cost table of the connections of a landline, mobile or VoIP to several telephone providers with calls originating in Italy.

Provider / Call Type	Telecom / Landline	TIM / Cellular Telephony	VoIP - Skype
Local	0.077	0.2466	0.017
National	0.154	0.2466	0.017
TIM Mobile	0.228	0.1177	0.250
Others Mobile	0.25 to 0.29	0.2466	0.250
International	0.40 to 2.89	0.45 to 2.90	0.017

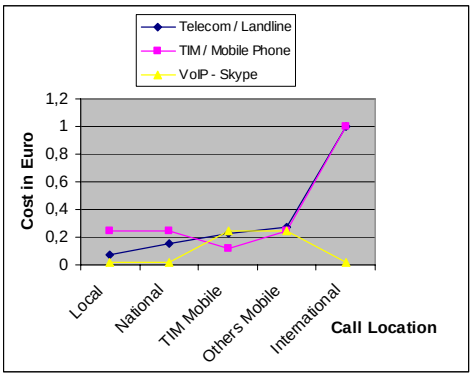

Fig. 1.4. Costs of communication made from Italy based on the destination of the connection and the providers used.

1.3 The Case of the University of Bergamo

The case of the University of Bergamo was developed to show as large companies can own good connectivity but bad cost-benefit rate. The companies' quality of service is adequate for their needs but the case shows how different usage with adaptive systems can improve backup, integration of new services and save a lot of money and efforts to any company in general by the use of the same analysis.

A. The Structure and the Complex

The case of the University of Bergamo is introduced in percentage values, to respect its privacy and also to maintain the autonomy of the study. It is important to understand that for each different organization there are different solutions between separate office buildings and also

within them. This work is developed in two platforms that tend to be united, which are the technologies implemented and their respective costs based on the operation of the institution; defining the services needed and the infrastructure necessary for its implementation.

A network totally based on IP could be a reasonable proposal for one institution and not for another, because the diversity is not so much in technology, but in service offered and rented by the company, so that its functionality has a high performance, thus, the analysis of the performance is identified by the efficiency of a certain technology, given its implementation costs in function of its level of utilization (Barker et al., 2005).

Figure 1.5 introduces the existing structure of communication at the university between external office buildings, regarding the network and telecommunication.

The network is composed of six complexes with the star center in the Caniana block of offices, with DNCs where all offices connections are made by a CISCO 7200 router, with 6 active WAN ports, where the Dalmine office complex has two communication links of 2 MB while the other offices have a communication link of 2 MB each.

All the offices have PBXs (Private Branch Exchange), where incoming connections are supplied by two ISDN PRI links for the Caniana complex, and by ISDN BRI lines for the other offices.

The network cost distribution is generally divided into: line fee, the rental of the PBX, the DNC link between offices and landline traffic (table 2).

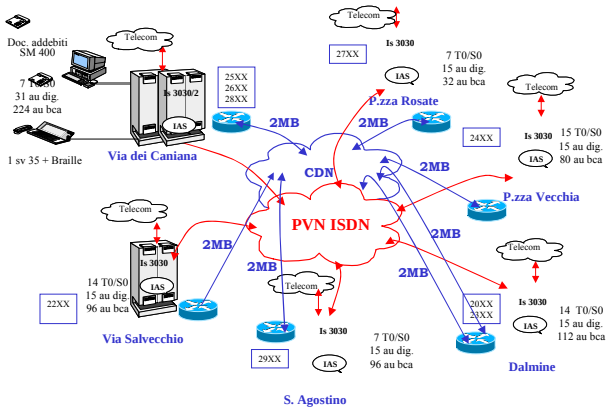

Fig. 1.5. Network and current telecommunication between the offices at the University of Bergamo.

The second column of table 1.2 introduces the fee costs for all technologies presented by the ISDN, BRI and PRI systems, followed by the PBX rent, based on the kinds of port and services established every two months. Column 4 introduces the data link service between the complexes, where all of these fixed costs are summed up in column 5. Column 6 introduces the variable costs of telephone impulses used by the university (traffic), and concludes with column 7, which shows the total annual costs for the institution.

Table 1.2 – Distribution of the network connection and telephone costs of all the offices at the University of Bergamo in percentage terms.

YEAR 2005	Landline Fee %	PABX Rental %	DNC Link %	Total Fixed Costs %	Landline Traffic %	Total %
1° BI	2.36	5.74	2.65	10.75	6.26	17.01
2° BI	2.34	5.43	2.65	10.42	5.19	15.61
3° BI	2.02	5.43	5.22	12.67	6.08	18.75
4° BI	1.95	5.43	3.19	10.57	6.43	17.00
5° BI	1.98	5.43	3.22	10.63	5.18	15.81
6° BI	2.04	5.43	3.11	10.58	5.24	15.81
Total	12.69	32.91	20.02	65.62	34.38	100.00

B. Economic Analysis of Costs and Convergent Technologies

To develop a detailed analysis and to verify which possible solutions are most adequate, it is necessary to analyze all the existing telecommunications bills of the institution regarding technology products and the fixed and variable costs introduced in table 1.2. Based on this, reference details are needed for each kind of connection (Leoncini and Montresor, 2000), such as local costs, international costs and others (see table 1.3).

Table 1.3 – Analysis of connections costs according to the type of Services used by each office at the university.

PABX	Total Cost %	Local %	National %	Mobile %	Internet %	Others %
Caniana	50.55	15.23	7.4	25.94	1.9	0.074
Salvec. Piazza	5.58	2.22	0.42	2.85	0.006	0.077
Vecchia	10.42	2.05	1.52	6.16	0.54	0.15
S. Agost.	14.56	1.97	2.16	10.23	0.19	0.014
Dalmine	9.51	1.1	1.37	6.92	0.004	0.11
Rosate	9.39	1.53	1.46	4.87	1.5	0.025
Total	100.00	24.1	14.33	56.97	4.14	0.45

Based on these values, understanding how the technology system works is necessary for each connection to these services, verifying the kind of technology conversion (SDM, 1999), if there is more than one link the PBX can make. It was found that in this specific case this did not occur, because no matter how many ISDN, BRI, PRI and analogical lines there were, they used

the same kind of connection, thus, the same kind of tariff applied by the telecommunication provider.

The primordial points to be analyzed are if the connections among the offices are charged by impulses or if there is a VoIP system or a different type with fixed connections, therefore, with lower fixed costs. Another basic point would be to analyze the points of communication between fixed and mobile phones, because depending on the tariffs agreed between the provider and the institution, a connection from one cell phone to another can be much cheaper than the ones made from a landline. Thus, this happens in the case where the PBX has ISDN or analogical links used to make cellular phone calls.

Table 1.4 introduces the same analysis as the previous table, however, it now analyzes the connection time for each kind of connection, because these points will be needed to develop a technological solution, to guarantee the maintenance of the quality of existing services of the PBX. This analysis will be useful to reduce costs later as shown in tables 1.3 and 1.2.

All the BRI, PRI and analogical existing lines were also analyzed, based on quantity, their distribution, monthly fee costs, technology and their functionality to the operational routine of the institution.

A third important point analyzed was the communication traffic between offices, as the university did not have a VoIP connection between them. Allowing an analysis of cost reduction, evaluation, which kind of systems would be able to replace the current ones, the number of channels, the bandwidth and products to maintain its functionality as seen in table 1.5.

Table 1.4 – Percentage Analysis of connection time in minutes used by each office and for each type of the connection made.

PABX	Total Time %	Local %	National %	Mobile %	Internat %	Others %
Caniana	52.82	36.12	6.46	8.11	0.43	1.7
Salvecc.	6.66	5.25	0.51	0.83	0.002	0.07
Piazza Vecchia	8.64	4.87	1.78	1.78	0.075	0.14
S.Agost.	10.28	4.68	2.53	2.96	0.046	0.06
Dalmine	14.39	7.64	1.6	4.78	0.017	0.35
Rosate	7.21	3.73	1.74	1.43	0.21	0.1
Total	100.00	62.29	14.62	19.89	0.78	2.42

Based on figure 1.5, the university uses a telecommunications system where there are 3 PRI links, 2 of 20 channels for the Caniana complex and 1 of 15 channels for the Rosate office, where the other offices have 33 BRI channels for external and internal communication between

other complexes. As each BRI channel has 2 voice communication channels, these 66 channels distributed throughout the university were not being fully used. It can be evaluated that 65% of local connections (Sum total call duration in table 1.5) are made between offices, leaving only 35% of real local connections (made to external numbers).

65% of the local calls between the branches from 62.29 % of the total local calls (table 1.4) are 40.48% of all calls made from the offices that is a 2/3 reduction in channels. This way the 24.10% of local costs (table 1.3) times 65% of reduction in calls between the offices are converged in VoIP and the subtraction (24.10% - 65% of 24.10%) is 8.54 % (i.e. the new local calls cost made from the offices to external numbers). In other words for 65% of communications between the offices have to use VOIP technology now and the new cost for local communications using landline traffic is reduced to 8.54% from 24.10%.

Table 1.5 – Analysis of the Traffic between all the offices at the university.

PABX	Call Costs %	Duration %	Receiver	PABX	Call Costs %	Duration %	Receiver
S.Agostino	3.67	3.93	Caniana	Piazza Vecchia	0.27	0.29	Agostino
	0.35	0.39	Dalmine		2.33	2.56	Caniana
	0.37	0.40	Rosate		0.18	0.20	Dalmine
	1.45	1.60	Salvecc		0.79	0.87	Rosate
	0.49	0.54	Vecchia		1.13	1.15	Salvecc
Total	6.32	6.86		Total	4.70	5.07	
Caniana	6.68	7.25	Agostino	Piazza Rosate	0.24	0.26	Agostin
	11.58	11.97	Dalmine		2.78	3.10	Caniana
	3.72	3.99	Rosate		0.04	0.05	Dalmine
	6.00	6.33	Salvecc		0.86	0.96	Salvecc
	6.84	7.33	Vecchia		0.65	0.71	Vecchia
Total	34.82	36.87		Total	4.58	5.08	
Dalmine	1.5	2.85	Caniana	Salvecchio	1.13	1.19	Agostin
	0.003	0.005	Rosate		4.80	5.10	Caniana
	0.10	0.28	Salvecc		0.28	0.31	Dalmine
	0.09	0.48	Vecchia		0.58	0.65	Rosate
Total	1.70	3.30			0.88	0.96	Vecchia
				Total	7.67	8.21	

Fixed fee costs will decrease dramatically with this proposal, while work continues on the variable costs, because besides the 15.66% of cost reduction in internal connections between

offices, the number of channels will be reduced based on the 40.48% reduction in connection time cited previously, that means connection time would be halved.

During the traffic analysis it was also possible to evaluate that the connections to mobile numbers are, in terms of cost 56.97% of the total phone bills of the university. These costs can be reduced by using connections based on communication plans between cell phones, which can reduce this cost by up to 50%. So, from the total cost there is a reduction of about 28.48% by installing technology that provides LCR (Senne, 2006), for when the dialed number is a cell phone coming from an extension number of the university, it routes the call to an internal cellular network, it also deals with the connections for the extension numbers (between offices), routing them via VoIP which will also be installed in the network, also managed by LCR.

Table 1.6 shows the evaluation of table 1.3 with the new percentage reduction after the changeover to VOIP and the cellular adapter systems. The transfer of technology to calls between the offices and cellular phones means the elimination of time connection to cell phones (19.89%) from landline connections which will be added to the 40.48% forecast before. This reduction of time connections is subsequently a reduction in fees for the landline but an increase in the network bandwidth (VOIP) and cell fees, because a new system for cell calls will be introduced (cellular adapter). The number of channels used for cell calls is now transferred to cell fees with cell channels which are cheaper than a landline fee.

There were 2 links of 20 voice channels working with a significant surplus of channels, and even though all the external calls that arrive from other offices (key number) use its PRI entrance link, it can be understood from the percentage analysis carried out between the offices that 40 lines would be sufficient, or from the predicted percentage reduction, 30 lines could be sufficient. The way to proceed, thus, will be left until the final evaluation project for cost reduction.

Table 1.6 – Analysis of cost reduction in the traffic analysis.

PABX	Total Time%	Local %	National %	Mobile %	Internet %	Others %
Old System	100.00	24.1	14.33	56.97	4.14	0.45
Changeover to new system	55.94	8.54	14.33	28.48	4.14	0.45

Evaluating figure 1.5 and analyzing tables 1. 4, 1.5 and 1.6, we propose that two PRI links of 15 lines should be installed. One for the S. Agostino Complex and the other for the Dalmine Complex, discarding all the 33 BRIs. This change reduces costs by about 35% of the fee costs, even taken into account the installation of the 2 new PRI links. However, it technologically

requires that bandwidth is increased, so that internal communication can be made by VoIP. The band allocation adds about 20% to the cost of the data link.

The rental of the central system is seen as a problem for the university, besides it doesn't represent an asset for the university, so it is proposed to eliminate the rent by purchasing the PBX.

Table 1.7 introduces the data for cost reduction, which are developed from all the calculated points.

Table 1.7 – Evaluation with percentage values of savings made in fixed and variable costs at the University of Bergamo installing new technologies for LCR in parallel to the existing system.

YEAR 2005	Fee Taxes %	PABX Rental %	CDN Link %	Total Fixed Costs %	Traffic %	Total %
Total	12.69	32.91	20.02	65.62	34.38	100.00
New Costs	8.30	0	24.02	32.32	15.15	47.47

The annual reduction to 47.47% becomes clear after the acquisition of the telecommunication system, because to achieve this value, the PBX was taken out of the project and the proposal is the inclusion of new technology to replace it. The choice of the PABX rent removal will be explained in the technological assets section.

The analysis of this case consists of part of the systems integration merger that will be shown in detail in sections 1.4 and 1.5.

1.4. Modeling Systems Integration and Measuring its Impacts

The constant changes in the market and updating allows the integration of many different kinds of technologies, reducing the costs of the services provided (Gale, 2005; Barnhart and Ratliff, 1993). Based on the case analyzed, a simplified formulation was created for assistance of any generalized case, made up of a structured system that can be implemented by a computer. As the telecommunication system is based on costs using percentage values, it enables a general formula which can be implemented in any company, depending on technical parameters.

The procedure is based on three steps, the first being the analysis of the traffic (for Bergamo University see tables 1.3, 1.4, 1.5 and 1.6), then the analysis of the system for general telecommunication (table 2) in function of the traffic, and finally a evaluation of this equation in function of the required investment for the proposed change technological structure in table 1.7.

Figure 1.6 shows the process analyzed here starting with the traffic analysis with the present technology in the time t_0. The study creates a model that allows changing the structure of

technology implemented in the company to reduce costs by systems integration. A new cost K is found to be lower than before the changes and integrations (K_{t1}). These first changes are based on technology and provider changes, which are chosen on the basis of best route for the same communication with lowest cost at a defined time, day and location.

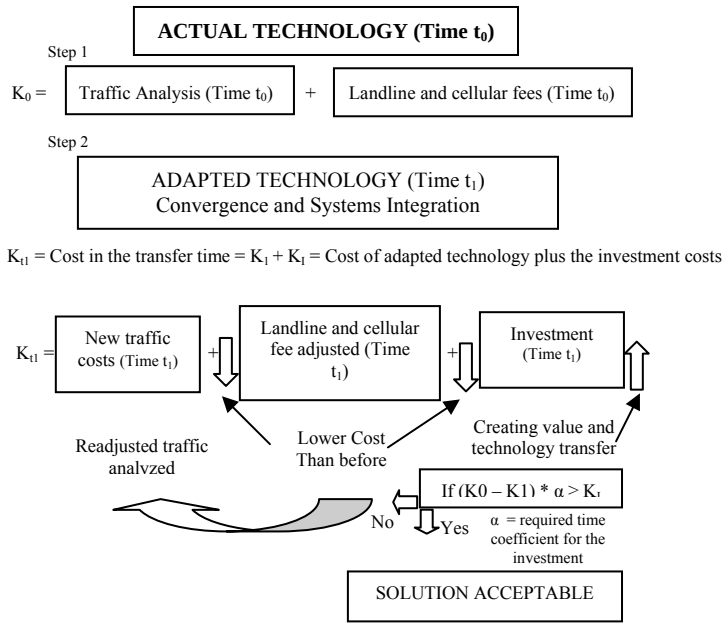

Fig. 1.6. Modeling Construction

This new cost K contributes by making another change in the proposed system, which later is separated from the analysis of the costs of landline fee, network and the existing structure. These costs are fixed and tend to change depending on the technology structure. So it is proposed that these two new costs, traffic and the fixed costs, are later deducted from the total cost for the company telecommunications previously analyzed (figure 1.6 step 2), and will generate a saving sufficient to cover the new investment over a defined period of time based on the rules of market and technological lifetime. If this saving is insufficient to purchase the new technology the model has to be redeveloped to find a new solution capable of satisfying the model and the investment. A constant α is introduced to regularize the necessary time to depreciate the investment.

A. Traffic Analysis

Several ways of optimization such as LCR can be found in literature (Mester and Bräyse, 2005; Bräyse et al., 2004). This chapter proposes a modeling by the optimization of costs (Lye et al., 2001), based on the division of external calls, where there are 5 possibilities: local calls, national calls, international calls, mobile calls and special number calls. It introduces the possibility of a joint analysis with separate formulas following the general system. An average company has a cost K of traffic based on their calls and the route used, so a way is analyzed to

reduce these costs by changing the routing by analyzing providers and technology. The total connection time of the system is given by:

Total connection time = local + national + international + mobile + special number calls.

The cost K is given by an analysis of the all possible costs in the telecommunications service as follow:

K = Total Cost of the telecommunication telephone services

K = (local cost + local cost between offices) + (national cost + national cost between offices) + (cost to cell phones + cost to employee cell phones) + (international cost + international cost between offices) + (cost of general services).

Note that the cost between offices is analyzed only where pertinent, depending on their locations (region or country).

The Cost K can be synthesized in the general formula by:

$$K_t = \sum_{m=1}^{S} \sum_{n=1}^{T} P_m \, x \, q_n \tag{1.1}$$

where P is the cost of telecommunication service and *q*, the quantity of the product (ILO, 2003), which in this case is the external call connection time. The type of service which varies in value for the sort of call, ranging from local to international connections is denominated *m*, and *n* is the parameter of measurement of time variation, which can vary from 1 second to an infinite value T of time.

Regarding the distribution of traffic within the case analyzed, the formula can be extended throughout the existing cost components detailed, giving:

$$\begin{aligned} K_t = & \sum_{t=1}^{t=t'} P_{Local} \; x \left(q_1 (t) + q_2 (t) \right) + \\ & \sum_{i=1}^{R} P_{National} \left[i \; . \; s(Q) \right] x \left\{ q_3 \left[i \; . \; s(Q) \right] + q_4 \left[i \; . \; s(Q) \right] \right\} + \\ & \sum_{n=1}^{T} P_{Mobile} \, (n) \, x \left(q_5 \, (n) + q_5 \, (n) \right) + \\ & \sum_{j=1}^{T'} P_{Intern} \left[j \; . \; s(Q) \right] x \left\{ q_7 \left[j \; . \; s(Q) \right] + q_8 \left[j \; . \; s(Q) \right] \right\} + \\ & + \sum_{v=1}^{X} P_{Others} \, (v) \, x \, q_9 \, (v) \end{aligned} \tag{1.2}$$

Where, developed with the problems of internal and external services of the institution, it becomes:

$$
\begin{aligned}
K_t = & \sum_{t=1}^{t=t'} P_{L1}\, x\, q_{L1}(t) \; + \; \sum_{t=1}^{t=t'} P_{L2}\, x\, q_{L2}(t) \; + \\
& \sum_{i=1}^{R} P_{N1}\left[i \,.\, s(Q)\right] x\, q_{N1}\left[i \,.\, s(Q)\right] \; + \\
& \sum_{i=1}^{R} P_{N2}\left[i \,.\, s(Q)\right] x\, q_{N2}\left[i \,.\, s(Q)\right] + \\
& \sum_{n=1}^{T} P_{M1}(n)\, x\, q_{M1}(n) + \sum_{n=1}^{T} P_{M2}(n)\, x\, q_{M2}(n) + \\
& \sum_{j=1}^{T'} P_{I1}\left[j \,.\, s(Q)\right] x\, q_{I1}\left[j \,.\, s(Q)\right] + \\
& \sum_{j=1}^{T'} P_{I2}\left[j \,.\, s(Q)\right] x\, q_{I2}\left[j \,.\, s(Q)\right] + \sum_{v=1}^{X} P_{O1}(v)\, x\, q_{O2}(v)
\end{aligned}
\tag{1.3}
$$

Where the indices represent:

L = Local

N = National

M = Mobile

I = International

O = Others

1 = External calls

2 = Internal calls (between offices)

The expanded model shown in Equation 1.3 is generalizable to all types of companies. All forms of corporate communications are accounted for by nine separate cost components within the model. To the extent that a firm does not have one or more of the costs components, then that component of the model will be represented as a null value. The following areas are organized and presented by the type of service.

1.4.1) Local calls

$$
\sum_{t=1}^{t=t'} P_{L1}\, x\, q_{L1}(t) \tag{1.4}
$$

Where,

t = call duration in seconds

P_{L1} = cost of local call with the answer impulse

$q_{L1}(t)$ = connection time in minutes.

If $\dfrac{\sum P_{L1}\, x\, q_{L1}(t)}{\sum P_{L1}'\, x\, q_{L1}'(t)} \langle 1$, the same provider should be kept.

In the provider is not kept, there should is a change to the one analyzed, where:

P_{L1}'= cost of local calls for the competitor's answer impulse.

q_{L1}'(t) = q_{L1}(t) because the scenario is the same local call time and the same analysis developed.

Thus, if $\frac{P_{L1}}{P_{L1}'} \langle 1$, keep the provider 1 chosen, if not use the competitor L1'.

1.4.2) Local Calls between offices

$$\sum_{t=1}^{t=t'} P_{L2}\, x\, q_{L2}\,(t) \tag{1.5}$$

Where,

Supposing $P_{L2} = P_{L1}$

q_{L2}(t) = Connection time between offices

If $\frac{K\,(L\,B)}{\sum P_{L2}\,.\,q_{L2}} \langle 1$, change all the call connections between offices with the installation of VoIP technology, where:

$$K\,(L\,B) = K\left(LB(1)\,x\,N\right) \tag{1.6}$$

With,

K(LB) = Cost of the bandwidth necessary to use all the voice channels between offices with VoIP technology (based on the kind of outgoing call).

LB(1) = Bandwidth of a voice channel in the data circuit (9,2 Kbps with the most advanced current technology) – voice gateway.

N = number of the maximum simultaneous channels existing for an office to maintain the same quality and availability of communication.

1.4.3) National Calls between Regions

$$\sum_{i=1}^{R} P_{N1}\left[i\ .\ s(Q)\right] x\, q_{N1}\left[i\ .\ s(Q)\right] \tag{1.7}$$

Where,

i = Regions

s = Landline providers

R = Most distant regions in each country

Q = Value to define the providers in the countries analyzed, varying from 1 to *n* (number of providers).

P_{N1} = Cost of national calls

q_{N1} = Connection time of the call made, based on each existing model in each country (price cap).

$P_{N1}[i.\ s(Q)]$ = Cost of national calls for a determined region using a determined provider.

$$\text{If } \frac{\sum_{i=1}^{R} P_{N1}[i\ .\ s(1)]\, x\, q_{N1}[i\ .\ s(1)]}{\sum_{i=1}^{R} P_{N1}[i\ .\ s(Q)]\, x\, q_{N1}[i\ .\ s(Q)]} \langle 1\,, \tag{1.8}$$

With

$q_{N1}[i\ .\ s(1)] = q_{N1}[i\ .\ s(Q)]$, or better

In case of, $\frac{P_{N1}[i\ .\ s(1)]}{P_{N1}[i\ .\ s(Q)]} \langle 1$, use for route s(1), this means programming the PBX to use the least cost routing. If not, find another combination of provider to the specific region called.

1.4.4) National Calls for regions directly from the other Company Offices.

$$\sum_{i=1}^{R} P_{N2}[i\ .\ s(Q)]\, x\, q_{N2}[i\ .\ s(Q)] \tag{1.9}$$

Supposing $P_{N2} = P_{N1}$

If $\frac{P_{N2}[i\ .\ s(1)]}{P_{N2}[i\ .\ s(Q)]} \langle 1$ (*) and $\frac{K\,(L\,B)'}{\sum P_{N2}\,.[i\,.\,s\,(1)]} \langle 1$

Where K (LB)' is the same as 1.4.2, this is now analyzed for intercity connections. Install VoIP integration in the existing dedicated data connection. In the case where it cannot be confirmed, voice connection for long-distance calls must be maintained and use the least cost routing S(1)'(*) with integrated LCR

(*) = national route to the providers channel

1.4.5) Calls to Cell Phones

$$\sum_{n=1}^{T} P_{M1}(n)\, x\, q_{M1}(n) \tag{1.10}$$

Where,

n = Type of mobile providers

T = Total number of mobile providers

P_{M1} = Call costs from a landline to a cell phone

q_{M1} = Connection time on a minute base

As in 1), if $\frac{\sum P_{M1}(n)\,x\,q_{M1}(n)}{\sum P_{M1}'(n)\,x\,q_{M1}'(n)} \langle 1$,

Where P_{M1} = call cost from a cell phone obtained from the average of the most called cell phones, where $q_{M1}' = q_{M1}$. With the same call duration and the same analysis developed, the equation is reduced, thus:

If $\frac{P_{M1}(n)}{P_{M1}'(n)} \langle 1$, then for the optimized way is defined for the integration of the system, including a cellular adapter for the system, to obtain LCR where the call goes directly from a cell phone system to a cell phone which would be defined by the lowest price of the average of P_{M1}'.

The number of cell phone channels is based directly on the same formula as 1.4.2 and 1.4.4 for the number of simultaneous channels.

1.4.6) Calls to Employees' Cell Phones

$$\sum_{n=1}^{T} P_{M2}(n)\,x\,q_{M2}(n), \tag{1.11}$$

Supposing $P_{M2} = P_{M1,}$

q_{M2} = Connection time to the employees' cell phones

P_{M2}' = proposed cost for the calls to all the institution's numbers.

If $\frac{P_{M2}'(1)}{P_{M2}'(n)} \langle 1$ and $\frac{P_{M2}'(n)}{P_{M2}(n)} = \frac{P_{M2}'(n)}{P_{M1}(n)} \langle 1$

This should use the same optimization decided in 5), where the employees use a company cell phone, also for personal use, to lower the outgoing call flow directly from the institution. These phone changes should only be made for the employees whose average incoming calls from the institution is greater than;

$\frac{\sum q_{M2}(n)}{NUM}$, (call total time to the employees divided by the total number of employees)

The employees who have a company phone will have the cost of private calls deducted from their salary. This will represent economically a cost reduction for the institution and also for the employees, who will use a special discount product for personal calls and calls to the institution (Managerial Plan).

1.4.7) International calls from regions

$$\sum_{j=1}^{T'} P_{I1}\left[j\ .\ s(Q)\right] x\, q_{I1}\left[j\ .\ s(Q)\right] \tag{1.12}$$

Where,

j = international regions (defined by Telecommunications Providers)

T' = Total number of existing international regions

s and Q = are the same subject as 1.4.3)

P_{I1} = Cost of the international call

q_{I1} = Connection time (Minute based);

and in the same way for 1.4.3)

If $\frac{P_{I1}[j\ .\ s(1)]}{P_{I1}[j\ .\ s(Q)]} \langle 1$,

apply route (1) based on a database of international prices which chooses according to time of day/night, country called and different providers tariffs, the LCR program is recommended as it uses the most economical route.

1.4.8) International calls to Offices Abroad

$$\sum_{j=1}^{T'} P_{I2}[j\ .\ s(Q)] x\, q_{I2}[j\ .\ s(Q)] \tag{1.13}$$

Supposing $P_{I2} = P_{I1,}$

If $\frac{P_{I2}[j\ .\ s(1)]}{P_{I2}[j\ .\ s(Q)]} \langle 1$ (*) and $\frac{K(LB)''}{\sum P_{I2}.[j.s(1)]} \langle 1$,

Where, K(LB)'' are the international connections now analyzed.

The VoIP integration into the existing dedicated data connection has to be installed, because if the link is VPN, it will not guarantee enough bandwidth for voice transmission. With VoIP it maintains voice connection for international calls and uses a lower cost route S(1)'' with the LCR integrated into the PBX.

1.4.9) Other kinds of phone calls (emergency, information numbers, etc)

$$\sum_{v=1}^{X} P_{O1}(v)\, x\ q_{O1}(v) \tag{1.14}$$

Where,

v = kind of service

X = total number of services used

P_{O1} = call cost of services available

q_{O1} = connection time or impulse to integrated service

When making a percentage analysis for all kinds of services, a possible alternative should be available, where using the basic proportional method, this verifies the necessity to change the main provider (landlines), based on costs of similar services and fee.

$$\frac{\sum_{v=1}^{X} P_{O1}(v)\, x\, q_{O1}(v)}{K} \langle \frac{1}{TNVS} \tag{1.15}$$

With;

K = total cost of the institution's communication traffic

TNVS = total number of the various services of the institution.

Where;

$$\text{If} \left(TNVS\ x \sum_{v=1}^{X} P_{O1}(v)\, x\, q_{O1}(v) \right) \langle\ K \tag{1.16}$$

The same provider is used as 1). If not, install the new provider, where

$\frac{P_{O1}}{P_{O1}'} \langle 1$, for P_{O1}' = cost of the new lower cost provider ≠ 1).

Once these rules are defined, the development for the structuring of the traffic within a company is defined, so the best cost reduction system can be chosen, in this way the best telecommunication route suitable for each service, time of day/night, destination and connections time can be obtained.

B. Analysis of Internal Telecommunications Network of the Company.

Based on table 1.2, the analysis of the telecommunication network of an average company is divided into 4 functions to be improved. Traffic was dealt with in A with all its complexity. The remaining function to be evaluated are; landline fees, the fee or monthly fixed costs for equipment used to operate the network, such as PBX, and finally, the network fee, based on the required bandwidth and distance from the network in the case of a dedicated link or Frame Relay. For internet links the costs depend on the required bandwidth.

1.4.10) Landline Fees

To reduce landline fees a reduction in the number of existing lines in the institution should be considered, analyzing each of the offices individually.

As seen in section B of 1.3, a reduction based on the substitution of several channels with VoIP, or for connections via cellular adapters was proposed, where the costs are not eliminated but

significantly reduced depending on the system chosen, since there are fewer channels for traditional voice transmission as they are transferred to the network channels. So, for each landline saved the fee is reduced, however, the channel should be added to the bandwidth, where each voice channel is multiplied by 9,2 Kbps (bandwidth of a good current VoIP system) (Choi et al., 2005). In this way the total bandwidth can be added to existing network link, for offices with VOIP and be evaluated for each connection between other offices.

The topics 1.4.2, 1.4.4, 1.4.5, 1.4.6 and 1.4.8, should be evaluated individually for each office. If there is a change (when the cost of the bandwidth divided by phone call costs made by the traditional method) is lower than 1, this means that the channels necessary (N) to maintain communication between offices will decrease, reducing, thus, the fee for each type of connection, which can be local, national, cellular or international. However, as we have a number of cases in which these lines are superimposed, it is necessary to analyze in which cases they are free to be re-used.

Thus, this gives:

$$N' = N_T \; x \frac{q_f}{q_T} \tag{1.17}$$

Where,

N' = number of channels reduced

N_T = total number of voice channels for an office

q_T = connection time per month per office

q_f = connection time made to the offices or to the employees' cell phones in the case of having been changed to another technology.

Thus, there is a percentage reduction of the fee analyzed given;

$$R_{\text{Re}\,ntal} = \frac{\text{Re}\,ntal\,(N')}{\text{Re}\,ntal\,(N_T)} x100 \tag{1.18}$$

Where;

R_{Rental} = percentage reduction of fee

Rental(N_T) = Rental (1) x N_T

Rental (1) = simple line fee

Rental (N') = Rental (1) x N'

Thus, to obtain a reduction in telephone fee, which in fact only needs the inclusion of the cellular fee for cases 1.4.6 and 1.4.7, where the connections that were made by landline to the cellular network (in the case of modification), are made from the internal cellular network to the external cellular network. This will reduce the number of landline channels and will transfer these channels to the mobile area, this will continue until the combined cost of the network fee

and traffic reaches the same level as the modified network. This fee transfer between the technologies was presented by the analysis of the case already presented.

Thus, equation 1.17 is repeated, with q_f being the sum of q_4 and q_5, finding thus an N'' (i.e. the number of the channels referring to the cellular adapter).

The cost of the cellular fee should be included in the total fee multiplying the value of the cellular fee by N'', where for the current cases a cellular fee is much lower than the landline fee.

1.4.11) The Data Network Fee

In the same way as for 1.4.1, the number of channels for data network was defined (i.e. the connections that should use VoIP technology). It calculates the cost increase for the network fee which is much lower than the landline fee, furthermore the fact that the VoIP network does not pay for traffic and, thus, also saves costs on connection time to the offices.

$$N''' = N_T \; x \frac{(q_2 + q_4 + q_8)}{q_T} \tag{1.19}$$

Where;

N''' = the number of VOIP channels included in the network between the offices of an institution.

Thus, following the equation (6), it was found,

$$K_{Fee}(t) = K(LB) + K_{FeeN}(t-1) \tag{1.20}$$

Where;

K_{FeeN}(t) = Fee of the current data network.

K(LB) = Cost of the necessary bandwidth to use all the voice channels between branches with VoIP.

K_{FeeN} (t-1) = Fee of the data network previous to the existence of VoIPs.

1.4.12) Technological Assets

Based on the diversification of technological assets and its diversified products and specific services (Yoon et al., 2002), the investment analysis could be worked out with the utilization of PBXs or routers in the network, which are rented from the providers or from companies specialized in systems integration, all this should be evaluated from an economical and logistical point of view for each company. Even though as improved application can be mathematically proved, a company might prefer a more expensive system, depending on its market and operational strategies.

The investment in technological assets for a company (Lastres and Cassiolato, 2003) may worry some companies because of rapid depreciation due to fast technological changes. To solve this

problem, the reduction of this loss can be achieved with a total maintenance contract with the technological supplier, which costs an average of 20% of the total value of the investment per year, which, however, always keeps the system up-to-date, both for hardware and software.

Another cost that must be incorporated in the budget is the financing of the human resources necessary to keep the system operating (Brusoni et al., 2001). One of the best options is to include in the contract costs for maintenance and repairs of the existing system. This way, the company doesn't have employ staff.

The ideal choice for the company most of the time would be to acquire its own network. However, it is believed that the choice of the company in having a rented network to reduce internal problems and extra logistics could be acceptable for the company administration.

C. The Investment Analysis

The investment analysis for the technical area is not easy to evaluate. It depends directly on the application of the technology inside the company in function to its needs and the infrastructure integration (Kumar, 2004). There are the basic needs, consisting of the functionality of sectors of common operation within the company such as the administration, accounting, stores, etc. A second need could be introduced as strategic, as technology now operates in the other sectors, such as the company's sales department, where this is used as a strategy to increase the growth of the company based on their sales, assistance, customer satisfaction, quality control, work optimization, production times, service and delivery reliability.

The third point which technological investment involves is the technological updating. This point is especially important for companies that sell technology to the public such as telecommunication, television, security, construction and other areas where updating is essential. In this model the evaluation changes the context totally, as it reviews the values from the point of view of the business planning and financing of technological innovation (Zara, 2005; Heertje, 1988). This is extremely necessary to develop to guarantee a return on the investment (payback) in a set period of time, as well as guaranteeing time for company progress in function of the projected break even point.

According to Chircu and Kauffman (2000), the impact factor over information technology (IT) investment can be evaluated; however Boltin (2005) has expressed his concern. The evaluation of the investment should be calculated in function of the previously mentioned 20% maintenance cost in the contract, plus the cost reduction introduced by the proposed technological solution.

In this study the return on the application of technology based on the growth of the company or the improvements to their business is not compared. This study concentrates on guaranteeing of the same operation and quality of the existing services with possible inclusions (innovations)

which are paid for directly with the reduction in the previous costs over a period of time shorter than necessary for the implementation of the return on investment, in this case 5 years.

Thus, the evaluation of the investment is based purely on the direct purchase of products that are technologically adequate to guarantee the functionality of the company and be offset by the savings offered by the new solution adopted.

Based on a cost K (i.e. that is the sum of all costs presented in the case examined), a new value for the cost (1-ξ) K is presented, where ξ is the percentage reduction on the previous cost, based on the implementation of the products and converging services for the optimization of the network due to the LCR applied. Thus, σ (savings) as a benefit over a certain period of time *n*, was defined which shows the maximum time that the same technology can continue to be used without having to change it (Fusa and Pisoni, 2001; Testa 1984), where for this telecommunication system case about 5 years in general is suggested, relying on the fact that there is a maintenance contract during this period.

This way;

$$\sigma = \sum_{t=0}^{n} \xi(t)\, x\, \mathrm{K}(t) \tag{1.21}$$

Where;

Starting point, $t = 0$

K(0) = K (Previous cost)

ξ(0) = 0

The amount of the investment should also be based on a maximum time for it to be paid back (Tsai and Hsieh, 2006), which cannot exceed the time for the total changeover in technology, avoiding thus making two simultaneous investments for the same technology, which in time *t* (*n*+1) is depreciated. The cost of this should rely on the factors of the applied technology and the value of the contract for maintenance necessary to guarantee the updating until the end of the product life and also on the interest rates paid by the company, creating thus;

$$\mathrm{K}_I = \sum_{t=0}^{n} I\left(1+\delta(t)\right)+\theta(t) \tag{1.22}$$

Where;

K_I = Total Cost of the Investment

I = Basic technology investment

δ(t) = Interest rates

θ(t) = τ (t) x I = total percentage cost of the investment for the maintenance contract

This way;

$$\mathrm{K}_I = \sum_{t=0}^{n} I\left(1+\delta(t)+\tau(t)\right) \tag{1.23}$$

Where;

For $\theta(0) = 0$ and $\delta(0) = 0$,

$K_I\,(0) = I$

Thus, for the implementation of the telecommunication system investment, it is necessary that the savings are greater or equal to the investment costs after a certain period of depreciation.

$$\sigma \geq K_I; \tag{1.24}$$

$$\sum_{t=0}^{n} \xi(t)\, x\, \mathrm{K}(t) \geq \sum_{t=0}^{n} I\left(1+\delta(t)+\tau(t)\right) \tag{1.25}$$

With the reduction in value of the costs for the telecommunication network, due to the investment in the latest technology, must be in time *n*, available on the market and meet company needs and be greater or equal to the total of the costs for the necessary investments, including system maintenance.

The simplified formula is:

$$\sum_{t=0}^{n} \frac{\xi(t)\, x\, \mathrm{K}(t)}{I\left(1+\delta(t)+\tau(t)\right)} \geq 1 \tag{1.26}$$

In the case that the outcome is not satisfactory, the investment should not be made, and a search for another solution made, with even lower costs until it gives satisfaction.

1.5. SYSTEMS INTEGRATION DEVELOPMENT

Technology Systems with high risks introduce potential catastrophic events (Greening and Johnson, 1996), so in this way, this technology has to be introduced in a way that guarantees reliability and trust in the changeover client acceptance in this sector as proposed (Phillips, 1998). The continuous development of this work was accomplished by the analysis of the case, the route solution proposal for cost reduction, and the equation of all the analyses generically, which could be applied any kind of company with the same evaluation requirement (Rajan and Zingales, 1998).

The study shows the evaluation and the proposal of the best solution for the client and market, to guarantee economically the correct application of the technology chosen, based on an

investment that is suitable for the individual company and should be achieved with the integrated systems (1.4 section A). It never introduces a solution which is unique or maximum, since the main point described here regards the integration factor and technology flexibility (Knot et al., 2001), where the services can work together, so that an algorithm is defined within the established terms. This algorithm uses current or past data for statistical analysis or optimization in order to choose, which system should be used for the required service.

Figure 1.7 introduces the integrated system model to be adopted based on the previously described points and on the complexities of new technology and innovation (Bonaccorsi et al., 1999).

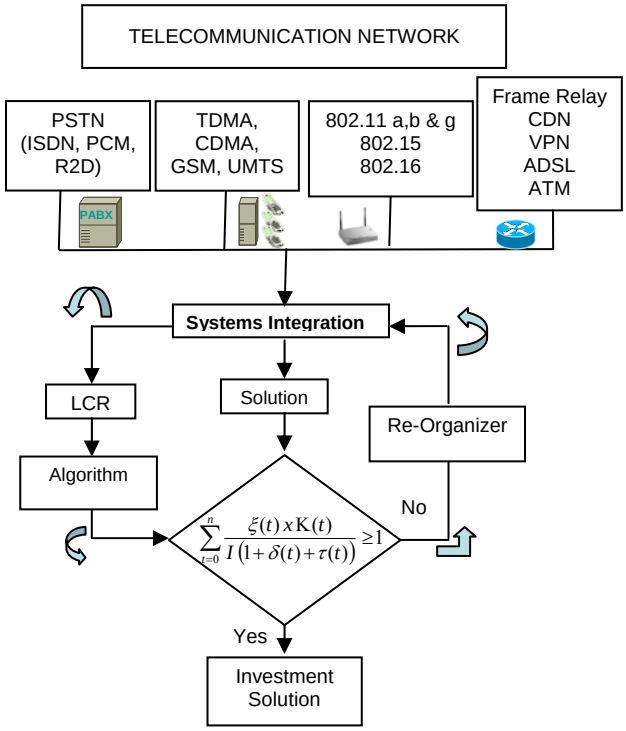

Fig. 1.7. Integration of the systems in a telecommunications network based on investments.

The strategic marketing developed by the telecommunication providers (Vesanen and Raulas, 2006) controls the market with a range of existing possibilities, where the figure of an integrated systems expert is unknown. In this way, the route used by the clients makes them completely dependant on the provider's proposals.

A more effective regulation by the government (Hobday et al., 2005) would be ideal to guarantee a certain harmony in the existing services on the market. It still lacks the figure of a system integrator (expert consultant), who is necessary to analyze the client's needs to study and determine the best investment to develop routes with benefits and lower costs for the client, as shown in figure 1.7.

The development of the structure presented depends on client needs, so the telecommunication sector has four main parties: the consumer, the government (Authority of Regulation), the providers and the telecommunications products companies. Studying the relationship within these structures the current market presents the product, service or convergence between them providing a solution or a client need. By analyzing the models and the advertising on the market for these systems it can be seen that the technological marketing uses mixed marketing strategies based on existing rules (Chen, 2006), which change constantly as technology updates and apply them to the market, as shown in figure 1.8.

Technological marketing is different in its application for research (Steenhuis and Bruijn, 2005), development and distribution assistance, where the analysis of the business should be developed with a certain level of technical knowledge. However, the way it is applied is very simple, since it is possible to evaluate it using e-commerce (Barnes et al., 2003). Through the internet it is also possible to search for information from around the world, as every continent is just a few seconds away from our virtual client.

If the application of technology or electronic marketing is not 100% perfect (Poon and Lau, 2006), the modeling of WEB can be implemented and researched (Leitch and Richardson, 2002), how proposed in the figure 1.8.

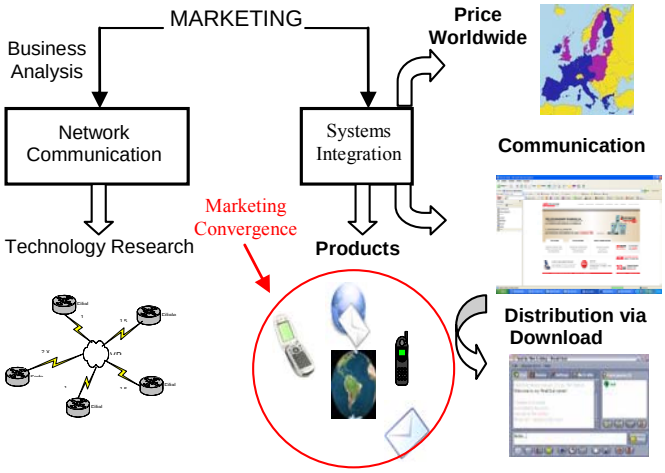

Fig. 1.8. Technological marketing applied to a telecommunication network.

The Technology Marketing Mix that decides whether the system will work or not, is important in order to find applications which are developing on the market, or the necessary tools which haven't been developed yet, and so create and adapt them to the clients' needs. These products, besides being very attractive, have the advantage of offering very fast service. The price is another important factor, because it can apply global currency values or make payment via credit cards or a bank transfer (Barnes et al., 2003).

Communication is the most distinguishing factor, because via internet, it is possible to receive online up-to-date information in real time. The distribution is in its way simple, because the clients can update their products from their base, via internet automatically at any time. (E.g. If they want to change their tariff for cell phones and buy a connection for China using VoIP software, they can).

The problem to face is the possibility of carrying out this marketing incorrectly and not developing the first point made (i.e. knowledge of the technology). It has been verified that beyond integration and a system convergence, it was found that currently a marketing convergence (Wind and Mahajan, 2002) using all the facilities to reach and to assist a large sector of the market existed.

1.6. CONCLUSION

This work uses the positivist research methods for the reduction of existing costs, based on the case of the University of Bergamo, in Italy, which were thoroughly evaluated. A solution of technological implementation is proposed, evaluating market prices for each kind of telecommunication service for the various functions, introducing the latest products and developing a service called Systems Integration, which is based on a logic that can be implemented via algorithm, expanding the Least Cost Routing (LCR) theory used for conventional telecommunication package and other existing technological services in telecommunications.

It works as a main server (Salama et al., 1997), with constant updating using software that manages all the services and all the possible applications and routes.

The technical construction for our technological solution concludes here, a mathematical formulation that was developed to introduce in a general way how to apply the same procedures to other companies without needing too much time or a more complex analysis, based on outline terms of the fixed, mobile and data networks, creating databases for cost information and of data inclusion of the company to be evaluated. In this way, the forecast analysis can be developed to define which solution best adapts to each case analyzed. There is, of course, not only one solution and neither an average proposal, due to the constant developments in telecommunications.

Regarding equation (1.26), the value n which defines the guarantee of the investment, was proposed for 5 years. It should be constantly monitored, because technological innovation can undergo radical changes, lowering value n, but it may create a reasonable harmony which would increase the value, thus, facilitating financing.

The marketing of technology systems can be considered one of the best applicable systems at the present time, because of the easy implementation and distribution throughout this market, which facilitates the acquisition of the necessary products and services offered to clients.

More detailed studies concerning the behavioral aspects of clients can be applied regarding the market results for cell phones and internet products, which after an initial boom, still present strong growth, with a maturity point in an undefined future period. Based on the technology advances and applications, maintaining the same model and system, the telecommunication companies maintain their position on top, by only modifying their application to clients.

No matter if a model is based on landline, mobile telecommunication, data network, VoIP, wireless and internet, the figure of a System Integrator will always be necessary because of the inclusion of new services, technologies and sufficient technological knowledge for the correct application of the model and analysis of the proposed solution, thus, figure 1.7 stands for all the equations defined in 1.4, leaving space for any new service or for the updating of new technologies.

As a final synthesis, solutions separate from the influence or interference of the telecommunication providers should be set up also by companies which deliver technological products, so in this way use them as service suppliers and products separately, without losing the main focus, which in this particular case is the client.

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Chapter 2

Self-Realization Marketing Over Technology Interoperability: Voice over IP Case

Chapter 2 - Self-Realization Marketing Over Technology Interoperability: Voice over IP Case

Objective: Drawing on behavior and trust literature, this study presents and discusses a marketing strategy applied by the operators of telecommunications, defined by the author as *Self-Realization Marketing*. Together with technology, this marketing strategy contributes to create value in this sector, partially taking advantage of inefficient regulation leading to market failure. From a technological point of view, this chapter evaluates the costs of three applications in long distance communication, considering landline and mobile telephony, as well as Voice over Internet protocol (VoIP) and their interoperability with the network. On the other hand, from a business point of view, landlines operators are losing clients because of the lack of specific regulation by the telecommunications authority. Through a theoretical discussion the study hypothesize that value creation in this sector is the result of three distinct components: technological advancements, branding opportunities and regulation failures. The contribution of Self-Realization Marketing is particularly underlined, showing how this tool can help to increase value both in a positive way (brand value) and in a negative way (hiding market failures).

Keywords: - Technology Marketing, Self-Realization Theory, Value Creation, Telecommunications Sector.

2.1 INTRODUCTION

According to Self-Realization Theory and its evolutions, an individual acts in order to develop or fulfill the potential created by his mind due to a number of stimuli (Wright, 1908). That potential is often the outcome not only of internal factors (desires) but also of external forces making the individual perceive it as a necessary state to be reached (Krippendorff,1973). Even if this Theory was firstly developed in psychological studies, it can be effectively applied to the technology area in order to help evolving technology to reach the market successfully.

In the last 10 years, telecommunications companies had a market explosion, based on long distance communications and mobile systems, supported by interoperability among different Technologies (Stremersch et al., 2003). This mobility facilitated and accelerated communication for the users (Goode et al., 2005), since, eventually, the market required costs to be reduced (Agarwal, 2002). In general, landline companies have lost a lot of the voice market after the mobile telephony advent (Andersson and Möllerryd, 1999), but on average they have retained their total sales, now deriving from data communications, internet and telephony for the medium and big-sized companies, which need local and international phone calls, fax, intercity connections, and internal network for communication among the many dependents and clients besides the integration for consumers' management (Piercy and Lane, 2003).

The lack of technological forecast and of adequate self-realization marketing strategies from the big operators has led small companies to create their own voice technology products, using protocols based on IP (Barnett Jr., 2006; Williams and Brunel-Cohen, 2004). The voice technology over IP, already existent in the market, was not frequently used, since high level equipment was necessary to operate from a central telephonic structure, which could only be found in big and medium-sized companies. Because of the high applied costs, these services were not formalized in the market, since few users had the knowledge to apply this specific technology to their professional contexts.

The increasing diffusion of internet, which is considered the greatest technology ever, still surprises many market consultants with its infinite amount of very used and well-known applications coming from inside the main system (Kent, 2005), thus, maintaining one of the most used and known technologies in the present time.

In 2005, mobile telephony reached its maximum growth in the market with the average, existence on of four or more operators in several countries in Europe, North and South America. The survival of these companies must rely on in services diversification (Chou et al., 2004; Dholakia and Dholakia, 2004), low cost phones, application to the third generation (Lehrer, 2004), minute promotions and text message deliveries (SMS - Short Message System) to other mobiles.

This work shows in a simple way how this game of business is possible, by integrating voice over IP technology, as the technological base, and specific Self-Realization Marketing strategies and not only taking profits of the momentaneous regulation failures. To understand these concepts we have first of all to explain the available technologies and their integration to realize voice communication and to compare them as regards prices and functionality. After that is important to explain how the price of each service is defined by public utilities to show actual regulations inefficiencies, failing to follow the quick technology convergence in the telecommunication area.

The reality of the market is logical for any technology consultant: soon mere applications will not be enough to retain the clients. The percentile loss prevision for these companies is terrifying, since there will be a reduction in the revenues, which will also lead to a reduction in the number of employees and outsourcing. Therefore, companies must find a quick way to meet the market's needs and create value by offering services (telephonic communication) based directly in VoIP by internet (Molony and Taaffe, 2006), supported by effective marketing strategies. Moreover, as it seems reasonable that regulations will be updated in the next future, value creation in the telecommunication sector will necessarily derive from a creative exploitation of advanced technologies through Self-Realization Marketing (figure 2.1).

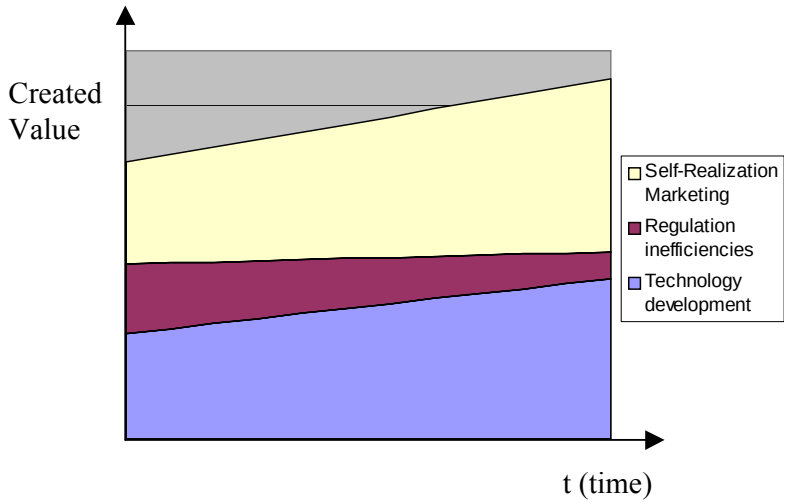

Fig. 2.1. Technology, regulation and marketing contribution to value creation.

The small soft-house companies and worldwide Internet providers like Skype, Google talk, MSN and Yahoo, have developed internet convergent platforms, which are based on the most well known technology in the world in voice communication (advanced telephony). They work via internet, with quality (Arruda Filho et al., 2006; Lennighan, 2006; Williams and Brunel-Cohen, 2004), and zero or very competitive cost when accomplished for a landline or mobile phone.

Mobility still guarantees the high use of mobile telephony, but only momentarily, while the use of data communication via hotspot's is not implemented (Damsgaad et al. 2006). With the advent of Wi-Max - wireless communication with protocol 802.16 (Kenedy, 2005), it will soon be implemented and people will be able to communicate via internet from any part of the city. Generally speaking, cellular phones are still in fashion because they are useful and easy to be carried anywhere you go. However, with a PDA (current electronic agenda) and a wireless connection, the client will be able to access internet and use software to establish voice communication using VoIP.

Thus, the products available in the area of telephony in general are facing a challenging enemy, which nowadays generates an enormous loss over landline telephony. People can communicate whether via home internet or from work with other computers or landlines and cellular phones, with much more acceptable costs, if not for free. The future may bring surprises: Based on Wi-Max technologies with broadband and internet with software VoIP, the systems of mobile telephony in great centers already tend to be replaced. Due to distribution logistics (cellular technology is years ahead and has much amount invested), the cities won't have their needs met in a global way.

Besides the analysis of the factors that lead to this process, actual regulation models applied by government are analysed and schemes/policies to be applied in the next future are discussed.

According to the study of Price Caps on the several services of landline, mobile telephony, and internet transmission, the rates applied should be revised. Due to the ease of connecting computer networks via IP, the convergence of telecommunications in voice and data tend to complicate the market of telephony, which may lead to a pretty high loss in this market. Despite an urgent action must and will probably be taken in order to stabilize the telephony market, this will not be enough for incumbents to successfully face new market challenges.

Therefore the aim of this chapter is to demonstrate how an increasing share of the value created in this sector will necessarily derive from innovation in business and marketing practices, leading to the introduction of Self-Realization Marketing. The study is organized as follows: In the next section Self-Realization Marketing is defined based on Self-Realization Theory, and its main aspects are presented. After that actual technologies of voice transmission are reviewed and Price Cap Regulation is explained together with a discussion of its pitfalls. Then two hypotheses about the interoperability between telephony and the internet are presented and the contribution of Self- Realization Marketing is underlined. Finally results and practical applications are discussed.

2.2 Introducing Self-Realization Marketing

According to studies in the sociology and psychology areas (Jones and Chandler, 2001; Morrison et al., 2000), self-realization indicates the self-creation of a necessity or reality, not existing at the moment X, which however after a certain time $X + \Delta$, based on behavior, seduction and dysfunction, self-realizes owning to an internal necessity in each being.

More specifically self-realization theory (Wright, 1908) has come to introduce as a factor, the desire to pursue an accomplishment to fill a self-created gap. In the field of economics (Fineman, 2006), this theory is able to successfully explain several aspects of consumerism, because often clients perceive a need which is not a real and objective one, but an imaginative one, which tends to create a whole scenery, trying to convince the person who created or thought of this argument to believe faithfully that this is the truth, and that there is no other solution to satisfy her / his needs. This is the very common in several consumers' behavior, who may not be objectively need and look for specific product, but nonetheless are willing to buy it. This may occur for several different reasons that do not seem to have a logical explanation and are investigated by the theories of psychology, sociology and economics, which share their knowledge in order to explain human behavior based on the creation of necessity, which is merely fictitious in time X and becomes real in time $X + \Delta$. From a managerial point of view, companies must be aware of these behavioral dynamics and of the opportunity to develop Self-Realizing Marketing strategies. These can help in creating and self-realizing realities able to satisfy customers more than the hard component of the offering.

In the telecommunication sector Self-Realization Marketing can specifically play a significant role in making clients perceive a higher value as compared to the portion of it generated by technological advancements and, in particular, by the mentioned convergence. In other terms in the telecommunication sector Self-Realization Marketing can be defined as the set of market policies to create self-realizing realities able to transform high-tech convergent technologies into specific benefits perceived by the clients.

A very clear point for understanding this market is directly linked to the cellular phones and their intense advertisement in our current society. The amount of differentiated products and services (Lehrer, 2004; Dholakia and Dholakia, 2004) and the single branding strategy itself were not good enough to make it run to the great competitive market of the operators. Therefore a co-branding was created aiming to make operators get involved with phone producers. Even though different brands are used, nowadays competitors have similar products, even when these models are "exclusively manufactured" (Roberts and Morisson, 2002; John et al, 2006).

However, even all these co-branding partnership resources have not been enough for the operators of cellular telephony to substantially differentiate their products, which automatically emphasize the need for a new Self-Realization Marketing, to create self-realizing realities. Companies inform their clients about the importance of specific products for their life, making them perceive their purchase as a priority. The efficacy of this effort is often emphasized by the fact that most clients do not know or understand the technological background of the products they are exposed to. Therefore companies focus on the introduction of the most general and acceptable features to convey perceived benefits such as mobility, flexibility and agility, for example suggesting that the acceleration of business requires to turn men into more technological human beings.

These Self-Realization Marketing strategies can obviously be introduced, given that high-quality and technical properties have previously incorporated into the new products.

These characteristics have different technical and market images, since what can solve the client's need, not necessarily means the optimum technical result of that need. Taking advantage of this level of complexity, operators start to create their own solutions. Being their clients huge corporations or simple private users, the operators are the ones who determine what the clients need, instead of allowing those needs to come directly from the market, as it should be. Therefore, given the information asymmetry between producers and clients about technologies, clients themselves can only evaluate the different products on the base of the values conveyed.

As mentioned before, *marketing* the telecommunications sector very often includes partnerships and the combination of two or more brands in a way of guaranteeing a better integration between technical devices (hard) and services / benefits (soft) their performances attached to their partners' group utilization factor as seen in the advertising of cellular phones services, for

example. It is verified on figure 2.2 that publicity uses associate values to create tendencies in market growth.

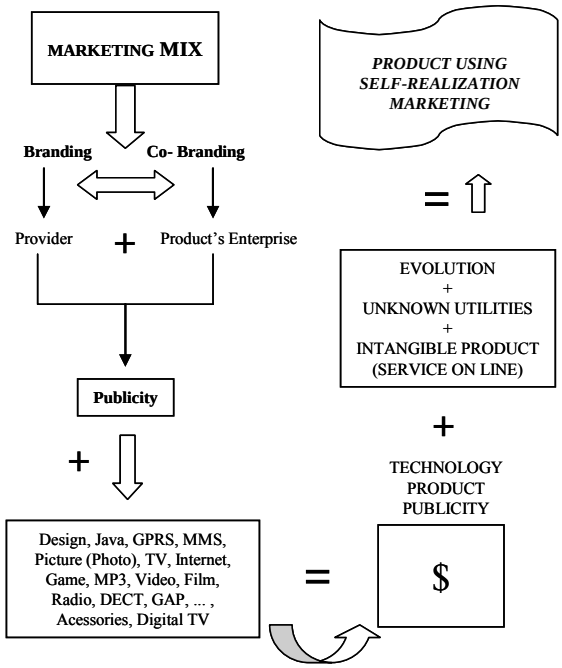

Fig. 2.2 Marketing integration between hard and soft components in the telecommunication sector.

The absence of adequate Self-Realization Marketing strategies is causing that applications such as Java's Utilization, GPRS (or any other system in figure 2.2) often do not match a direct consumer's need. A transparent communication in terms of new benefits and services provided by the specific applications would allow extra technologies to become ordinary to products, thus creating value for the client and, in turn, for the client. In other words, the 5 or more new technologies that are added to a cellular phone or DVD's, for example, are actually not used by the majority of clients who purchase the equipment.

Another example of bad technological market utilization would be the inoperability of switches that manage computer networks (Arruda Filho 2 et al., 2006), digital plasma TVs or television programs optimization (Danaher and Mawhinney, 2001) and video conference services (Kodama, 2004), among others. These equipments, already in use in companies and residences and which include technologies that were paid for but never used, have 0 (zero) revenues, due to the above mentioned reasons. This analysis is done considering the fact that all the technologies are sold only in term of added features or "plus technologies", substituting products without the new application. Anyway this process of substitution requires the application of Self-Realization Marketing in order to make the clients perceive the reasons and the need for such change, such as new benefits, simplification of life and so on.

In a simple and generic way, self realization marketing can be conceptually defined as the set of strategies to coordinate the value creation of the company both in technological and marketing areas (Cassia 2007; Iasevoli, 2004; Mazzei, 1999; ITU, 2006) in order to maxim the value provided by the product to the customers. In summary Self-Realizing Marketing strategies can be thought of as the results of the management of several factors:

$F[\zeta]$ = Brand Effect + Co-Brand Effect + Technology Advertising Spending + Convergence of integrated services and products + Technological unknown evolution

Giving the following formula:

$$F[\zeta]=\left(\frac{W_{brand}(WACC)}{\wp} x \frac{\wp'}{\tau}\right)+\frac{1}{\tau}\left(\frac{W_{Co-brand}(WACC)}{\overline{\wp_A \cdot \wp_B}} x \nabla A \nabla B\right) + \sum Pb(\upsilon x \ell)+\int_{i=x}^{x+\Delta} K(P_i . q_i)+\int \prod \quad (2.1)$$

Where;

W_{brand} = F_{brand} x μ = value of the brand

F_{brand} = Flow of differential incoming attributed to the brand

μ = multiplier to explain the brand marketing power

WACC = Weighted Average Cost of Capital

$\wp$ = Total hypothetical Client Number of the brand product at the time t-1

$\wp$ ' = Actual client number in the time t-1

τ = Total quantity of potential clients

$W_{Co-branding} = \overline{W_{brandA} + W_{brandB}}$ + (-) synergies

$\wp_A = \wp$

$\wp_B$ = Total Clients existent hypothetically to the B Brand of product (product to realize the co-brand)

∇A = Local Client Average of the branding A

∇B = Local Client Average of the branding B

Pb = Advertising spending

υ = Marketing Strategy

ℓ = Marketing Development

x = Primary self-realized Properties

K = Aggregated Value of Product (Supplementary Technologies)

P = Price of Product

q = Quantity of products

$\prod$ = Unknown evolution, utility increase and intangible products

The suggested formula of self-realization marketing foresees a context of application that does not take into account the values of application of branding or co-branding, but puts in evidence the impact of branding according to the previous year and the year to come concerning the company's value and profits.

The second part of the equation relates to co-branding, for example, uses an average of the branding that proceeded the technology process, with the association of a second partner's branding company, which can (in the case of the companies of cellular telephony) become the association of several co-brandings, since it works in partnership with several products simultaneously, such as Nokia, Ericsson, Siemens, etc.

The division inside the introduced formulas concerning total, local and average clients is included to evaluate the effect of the application of new co-brandings (and advertisement) at time t.

As a function of the cost of capital of the company, a positive or negative result may arise, which means that the presented values are a simple reference to accomplish normalization.

In general, the formula does not express value, but logistic content to define, whether the product or service owns characteristics of self-realization marketing or not. This analysis provides a way to assess if and how the product or service and its application have to be improved on the market. This formula is also a context matter of the non measured values.

The application of a *Self - Realization Marketing,* by the telecommunication operators takes into consideration the combination of several technological and managerial components, which can be harmonized by the mentioned marketing strategies to create a higher value. Figure 2.1, showed the value dependent on Self-Realization Marketing, technological advancements and regulation inefficiencies. These two last factors are explained in the following pages.

2.3 NETWORK ARCHITECTURE OF THE VOICE COMMUNICATION

As mentioned in the previous paragraph, Self-Realization Marketing offers suitable solutions to coordinate and maximize market impact of technological advancements, which still remain fundamental pre-requisite to start building value for customers. Therefore existing technologies of voice transmission in the market are now introduced and analyzed.

Three different models are available, leading to 4 products which were divided into voice communication for conventional telephony, VoIP and two hybrid systems through the utilization of two technologies simultaneously.

2.3.1. Conventional Telephony via Telecom

The communication network of conventional voice telephony via public net has been known by all users for many years. The analyzed system in this work was the telecommunications operator *Telecom Italy* and its respective values to the clients, in other words, impulses applied by the operator. The costs were taken from the official operator's site (Price, 2006). The technology works in a very simple way: the cable chain in metallic pair arrives into the users' home, delivering the transmission of a voice channel through each pair of connected threads. These threads are all convergent to a central network identified as PSTN (Public Switched Telephone Network), which manages the connection between client and the public network, and which owns several public centrals of telephony spread in the city. (Figure 2.3)

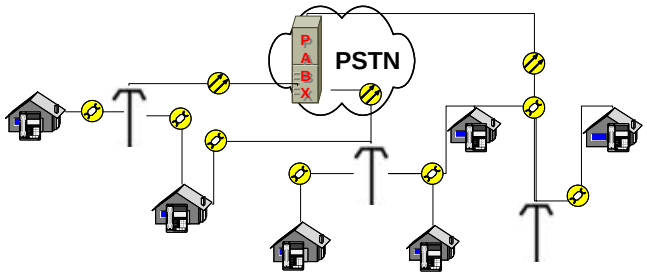

Fig. 2.3. Public network PSTN connected by cable of braided pair.

2.3.2. Call Center of Voice (Communication Hybrid System)

This system is typical for international phone cards, and communicates via landline telephonic or mobile net with its central of electronic assistance (call center), which diverts all the connections according to the necessity or according to the country that needs to be reached. This network works through cost-free connections made to 1-800 numbers in the U.S, 800 numbers in Europe, and 0800 numbers in Brazil. This cost-free connection can be made from residential landlines, public phones or mobile phones, and the amount of talking time for each card depends on the origin of the call (residential landline, cellular phone, etc.) and on its final destination. This kind of system owns the best revenue for connections originated from residential landlines to other residential landlines in other countries (Figure 2.4).

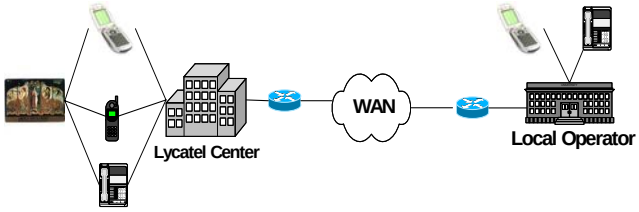

Fig. 2.4. Hybrid Connection of the Call Center to calls of International Telephonic card network.

2.3.3. Software Skype

Skype is a software that was created by the same group of KaZaA (current Skype Technology) and with the same functional principles of P2P (peer-to-peer), but only for conversation without the audio or file sharing used in MSN Messenger and Yahoo Messenger. Users just have to install the Skype program and register through a user's name. It's easy to use. The version used on this work is the 1.40.84. The Skype software is free, and functions can be added and paid to the Skype server. The phone calls go through the web for any Skype user in different places and operates, with any firewall NAT (Network Address Translation) and routers without losing quality.

Other features are simplicity and privacy, since the conversations are encrypted, point-to-point developed by the KaZaa and Joltid team (Reservaer, 2005). Skype transmits the data voice applying TCP (Transmission Control Protocol).

To establish communication with Skype, it is necessary to have a computer with the software installed. This will be enough to make any connections with other computers without having to pay anything (Arruda Filho et al., 2006), or with other landline or cellular phones (figure 2.5).

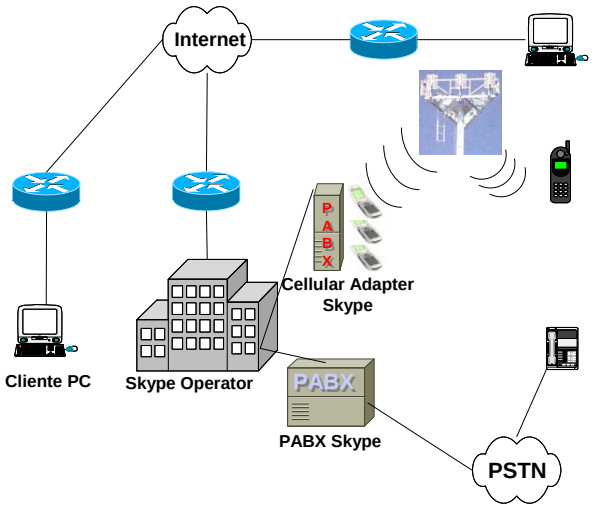

Fig. 2.5. Diagram of the operation structure of a voice communication by Skype.

The connection quality, as well as the accurate transmission of data depends greatly on a broadband internet connection, which will be responsible for the level of the transmitted signal.

2.3.4. Telextreme VoIP

In the same way as the international phone card, Telextreme works mediating a central which diverts the connections through a hybrid system that establishes the phone calls and connects them with a private network, making the international calls. The difference from the other systems is that this one owns an analogical adapter placed in the home phone, which makes the connections with the data central.

2.4. LANDLINE COMMUNICATION SYSTEMS ANALYSIS AND VOICE NETWORK

The different models presented above are characterized by different models of costs which in turn contribute to different level of value creation. Therefore a detailed analysis is performed in this paragraph.

It is verified that the technological form of communication products work in many ways. However, its application is the same. The government rates each service differently, since it only evaluates the transfer technology. Thus, the application that is transferred inside the technology is not rated. There are many publications aiming to inform about this already existing rate in the USA. Most of them show the relationship between the rentals and the service delivered, reinforcing the need to create a bigger and more competitive service in the sector (Gleckman, 2000; Carleton, 1997). Because of that, some services can be multiplied in very peculiar ways, also offering worthwhile costs due to their utilization. All IP transfers tend to offer reduced costs thanks to the sharing with several services simultaneously. Communication is transmitted on the same platform and, therefore, a unique rate of connection is paid (rental of the link).

Meanwhile, traditional telephony is rated directly by the communication pulse; it is rated by minute/use, which increases significantly the cost for the final client. Table 2.1 introduces the sale prices to the final client of the 4 different telephonic communication services operators introduced previously, which propose new ways out of the old monopoly (Shin and Ying, 1992). A recent VoIP's model is presented here, in order to show the level of current competition among companies offering the same service. The choice of a new competitor, still unknown in the market, was preferred than, for example, introducing comparisons between Skype and MSN, which are equivalent.

The analysis between these values introduced by table 2.1, are represented in figure 2.6, from which one can evaluated in a simple form the products that have more competitive market values by the demanded region. It is important to inform that this analysis was accomplished for phone calls made from landline numbers, inside Italy, with connections in other countries, as introduced on the table. The introduced values are the costs of called out per minute in Euros. In figure 2.6, it is not possible to visualize the service operator Telecom, since its cost is so high that it becomes very difficult to distinguish all the operators together.

Table 2.1. Cost Analysis to fixed numbers calling of different countries with different operators.

Operator / Country	Telecom	Lycatel	Skype	Telextreme
Australia	0,966	0,021504	0,017	0,019
Austria	0,409	0,021504	0,017	0,023
Belgium	0,409	0,021504	0,017	0,019
Brazil	1,084	0,043008	0,044	0,063
China	2,893	0,021504	0,017	0,019
Denmark	0,409	0,021504	0,017	0,02
France	0,409	0,021504	0,017	0,019
Germany	0,409	0,021504	0,017	0,019
Hong Kong	0,966	0,021504	0,017	0,008
Italy	0,154	0,021504	0,017	0,019
U.S.A	0,409	0,021504	0,017	0,023

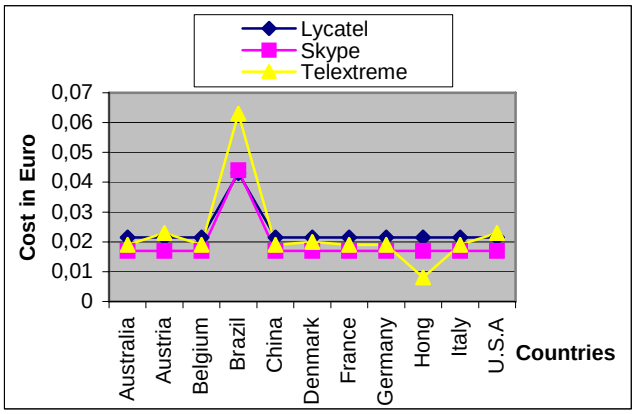

Fig. 2.6. Connections cost analysis made of the Italy for several countries with the 3 cheaper operators

Figure 2.6, introduces a comparison of the results of the three operators with the lowest prices: it is possible to observe that there is not a better company, because in some cases there are countries that are cheaper to link with a system than with another. Therefore, to accomplish general connections, a package of operations should be created or all the systems should be blended, using a router of phone calls with LCR (Least Cost Routing) (Barnhart and Ratliff, 1993), which according to the location of the call being made chooses the cheapest system.

Table 2.2 introduces the same analysis for calls directed toward cellular numbers in the evaluated countries: in figure 2.7 a comparison of these values and their competitive evaluation for regions can be seen.

Table 2.2. Cost analysis for the called cellular numbers of different countries with several operators.

Operator / Country	Telecom	Lycatel	Skype	Telextreme
Australia	1,2583	0,1071	0,165	0,166
Austria	0,7013	0,1564	0,219	0,189
Belgium	0,7013	0,1785	0,211	0,213
Brazil	1,3763	0,085	0,173	0,174
China	3,1853	0,0238	0,017	0,019
Denmark	0,7013	0,1445	0,2	0,19
France	0,7013	0,119	0,164	0,182
Germany	0,7013	0,1785	0,2	0,245
Hong Kong	1,2583	0,0238	0,017	0,008
Italy	0,2923	0,1564	0,25	0,245
U.S.A	0,7013	0,0238	0,017	0,023

The analysis developed by the tables and graphics presents both the technology models for voice communication of long distance, as well as the cheapest products, based on the country from where the connection will be made. It is important to point out that there is not a unique product, since connections to Hong Kong are cheaper when the Telextreme system is used. In Australia, on the other hand, Lycatel seems to be the most recommended.

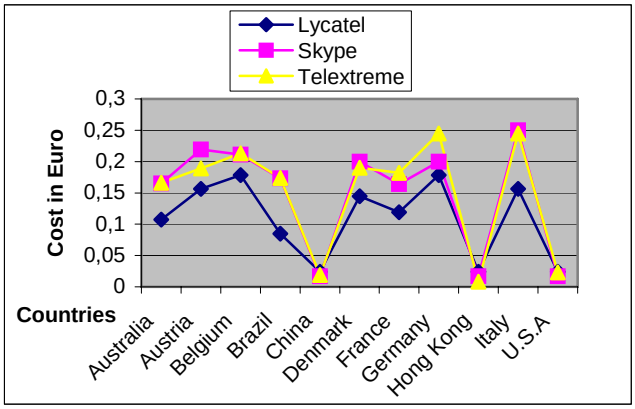

Fig. 2.7. Connections cost analysis made of Italy for cellular phones of several countries of the 3 cheaper operators

Thus, the products should be connected on hybrid forms among themselves (Man et al., 2005). A centralizing product should be used in order to organize the best connection route for the development of international telephony. LCR based on software or hardware is suggested.

The analysis of the conventional system indicates that this is totally far from the perspectives of ideal utilization, because the cost is much superior to the other existing systems, so that it could lose part of the market, considering also the variety and the intransigent marketing of the new products (Wuyts et al., 2004; Krishnamurthy et al., 2004, 2005). In the following paragraph we try to explore the reasons for such a market distortion, by analyzing the price cap.

2.5 Price Cap – Existing Development by the Scale Economy

In this paragraph it is shown how nowadays a portion of the value created by companies in the telecommunication sector derives from inefficiencies in regulation (figure 2.1), leading to significant asymmetries between competitors. These failures are deeply analyzed in the following section of the chapter.

Based on scale economies, costs have decreased due to the amount of production (Cachon and Harker, 2002). Even in the telecommunications area, it is directly linked to the product in an individual and applied way. For each kind of service, the responsible organ (communication agency) rates the values based on the Price Cap equation, developed in the United States and brought to Europe in the 90's (Cambini et al., 2003). As the telecommunications area is reasonably unknown, the same model created for any service sector of public utility, is applied to this new sector without considering that in the technology area, different products can attend to equal services, taking off the characteristics from the main product or to devalue this one. Grey market creations have lost their organization and quality senses in this sector, with the existence of free-cost VoIP services in the internet network.

The study of Public Utilities is developed to guarantee service quality in several sectors, which exist to aggregate the values of a community (Harris and Kraft, 1997). However, the government and the agency responsible for the telecommunications area are not provided with qualification to develop enough references, which could guarantee the control, and refrain the operators from controlling the market and create their own information style.

The existing models should be urgently adapted with the purpose of organizing the area and to guarantee, not only the quality in the services, but the suitable application of technology with reference to the existing products in the market (Uri, 2001). That way, the clients' assistance could be explored, guaranteeing a true economy scale, where prices are really lowered and competitive with similar products or even with those not regularized by the sector (Parker, 2001).

The evaluation developed until the moment is based on RoR (Rate of Return) (Taylor and Taylor, 1993), where RPI is a proxy of the increase of the costs in the sector and X the efficacy of the company which are the responsible points for the mechanism of the price control of the product:

$$P_t = \left(1 + RPI_t - X\right) P_{t-1} \tag{2.2}$$

The control is based on past development occurred for the previous year of that product in the market (Bernstein, 2001).

The tariff plan, commonly referred such tariff basket, no matter how well developed by the several tariff analysis of the product in this market (Law, 1997), does not analyze in this model the influence of different services, which, by the way, accomplishes the same technology functions with different prices or applications, such as regular phone calls, phone calls used by voice on internet protocols (VoIP), and also international connections via International Call center of voice. These services use technological hybrids systems, which with certain system integration, are able to accomplish the same connection developed by a conventional system of telephony, however with much lower prices (table 5.2.1 and 5.2.2). The prices of these systems are different simply because the telephonic system owns a variable cost based on time of access, with rental payments and connection answer (assistance). The internet system will only demand the rental payment, which is a cheaper fixed value than the one of the telephonic system. With larger capacity and through the use of service integrators, these systems use the maximum of time efficiency by occupation of band with several users.

The tariff basket analysis second Cambini et al. (2003) is:

$$\sum_{i=1}^{t} P_i^t \; q_i^{t-1} \leq \left(1 + RPI_t - X\right) \sum_{i=1}^{t} P_i^{t-1} \; q_i^{t-1} \tag{2.3}$$

There is, however, a deficiency in the service control of technologically different products, which answer to the same functionality, although using an alternate way of access. Inside the sum of the product by the time's quantity of this product, the inclusion of several products is missed, based on the same solution, or a sub-formula that integrates each case separately.

The distribution of technology products in order to reach a very large percentile of clients with telephonic communication is the main marketing objective of the operators of telecommunications, since they need to increase their distribution, which means increase service/product, to improve the economy scale of each region. According to Schmalensee (1989), the degree of Economy of Technological Scale is defined by,

$$\overline{S}(X,Y) = -\left\{ \frac{\sum x_i \left(\partial\varphi \big/ \partial x_i \right)}{\sum y_i \left(\partial\varphi \big/ \partial y_i \right)} \right\} \tag{2.4}$$

This formula changes according to the scale's elasticity, however, always with the same function of X and Y, in other words, the same product, which in the case of the telecommunications sector is a services set. Whether these services are an international, national, local call or a specific service, it will be analyzed separately, and will only be composed at the moment of the total average of the "Index of the relative prices of telephonic services". The influence of the overlapping of services over the same values must be included again for the valorization of every evaluated technology service. Given the limits imposed by price cap, the next paragraph explores the potential solutions.

2.6 Hypothesis of the Interoperability between Telephony and the Internet

The share of value deriving from inefficiencies in regulations is likely to disappear in the next few years, when governments will find new solution. This will emphasize the need for Self-Realization Marketing to retain that portion of customers. In the next pages it is discussed how those inefficiencies could be removed on the base of two hypotheses.

Based on market data researched on the government's telecommunications sources and operators, considering the current revenues and the presence of bad administrations in the local governments, which are not sufficiently aware of technology, there are two possible models to be used: one of them is based on an administrative valuing proposal for the government, and the other is based on the perspective of technology use, given the logistics infrastructure of each company.

The proposals can be used simultaneously, until the regularization model of the government achieves its own maximum performance, one that explores the interaction between strategy and technology from a business point of view (Parker, 2000). The model introduced for each company will always decide for the better structure, until the moment when the model applied by the public administration overcomes the offer terms of the adjacent market.

The importance of the methods application in order to harmonize the system should be underlined, since, economically speaking, companies such as Telecom (Italy), Telemar (Brazil) or AT&T (USA) generate great income distribution that come from direct products (jobs offered to the several local employees), and indirect products (such as outsourcing companies). A decrease of 30% (Economia Magazine, 2006; Molony and Taaffe, 2006) on its invoice of conventional telephony for long-distance and international calls may lead to an economic dysfunction in the country's performance.

It is necessary to analyze and reduce costs to the final clients, however, a logical distribution is also required in the market, to which a company with a structure of some servers controlling the

world's telephony economy (without creating jobs and products to the final consumer) is not interesting. Consequently, there is a space in the market for new companies with enterprising visions.

However, the government must appreciate joint actions so as to rate, in a regular and fair way, the values of the services to be rendered, guaranteeing their quality and maintaining a regular economy for clients' satisfaction.

2.6.1 – First Hypothesis: Under-estimation of IP technology by the operator.

Landline operators in the telecommunications market lose clients not only because of the lack of imposition from the telecommunications authority, but also because of the unfair distribution of the telephonic calls' cost, which are not fair either. In other words, the Price Cap applied is now considered obsolete, not using the development of VoIP technology as its base. The same long distance call (Taylor and Taylor, 1993) can now go through the physical network of data, which uses a better price for internet operators than the telecommunications operators, focusing on price solution (Cottrell and Koput, 1998).

The network is now sub-divided into two or three parts. The local area, near the client that links and/or receives the calls is the only point with payment of rates and utilization of the telephonic common physical net, while the international or national part of long distance calls uses the network (VOIP), sharing the transmissions with several other different clients' bands and service schedules. This way, the operators have alternatives to diversify and design models of *Self – Realization Marketing* for each new release, since there is not a quick actualization to new developments and services with dynamic and complex convergences.

The existing rental cost by the internet system or dedicated link can be distributed (divided) among several clients and even among operators, which could make the network to take precedence of called out and also points of virtual and shared communication, which means lower costs and apparent connection for the client and the government.

2.6.2- Second Hypothesis: Over-estimation of IP technology by the operator.

The landline and mobile operators agree with the development process because, even if they lose a significant amount of clients in general, the loss of these clients are, on a percentile base, economically recovered by the double selling of the services. In other words, according to Cambini (2003), Telecommunications sector lost an average of 30 % of long distance calls in the last 4 years (considering the period from 1998 to 2002). However, this numeric value is exactly the same as the existing value in the previous years, which means that the same billions of minutes that existed in 1998 were still on in 2002. Even though there was a drop of 30 %, there was also an increase in the quantity of total clients (Cambini, 2003, page 106, table 8). In

percentile, the equal numeric value and the amount of money made are much higher than before. Even though the cost of the tariff is lower (because of the existing economy scale), the rentals' value has increased considerably, even more than the local inflation itself.

The operator also has an excuse for the government: the percentile loss previously described in so many books and articles, which didn't seem to care about the growth of the market in numeric values, but only in percentile ones. Without base reference, a clients' loss generates automatically an increase to the maintenance costs of the network, which serves as data for requesting the rising of the rental to the government. With a percentile loss over the system and with a personnel's and technological infrastructure that guarantees assistance quality by the safety rules and consumers' well-being, operators are engaged in requesting the rising of fixed values, even if these values can be eliminated by them, as they do with promotions and other services through marketing techniques (Cespedes, 1993; Goldsmith et al., 2005).

The presented case is under the control of values that do not consist of the real legal attribution, allowing the operator to have a maximum autonomy and, therefore, change its costs very frequently as a way of promotion or market safety. By acting like this, it does not allow economy to evolve around the client, which would be the right thing to do. On the contrary it keeps modifying this economy according to its own wishes and commercial interests, depending on the market moment.

In general, the operator always wins because it changes the supply form of the services, and instead of fighting to keep its long time clients on the same existing conventional voice system it insists in keeping a clients' numeric value, which has existed for 6 years. The price of the tariff is lower. However, the rental (which is the biggest profit of the company) is now higher and guarantees a much superior numeric value than the one that existed before.

The government sees the exact amount of clients the operators own, and the rates are applied correctly and realistically on each one of them. However, the technology used by operators is indifferent for them, since, instead of making money with their amount of clients, they will save money. Also, they will use the same strategy as the hybrids operators: both systems. Also, even if the costs do not lower for the clients, they will lower for the operators. The VoIP technology can compact 2 times more the communication than the technology of common voice, which guarantees that the operator can charge by the conventional system and have profits from the reduction obtained in the infrastructure: instead of making a transfer to their clients, they just keep the "profit" within their own system.

It can be inferred that the operator makes 4 times more money, because it keeps its clients with the general costs (invoice), reduces its infrastructure costs and technological devices with the VoIP technology, sells data traffic to the internet and call center operators and controls the government when it comes to rentals. All this based on general percentile losses, without passing the reduction on to the clients or reorganizing the Price Cap.

The presented hypotheses alone are not likely to work because technology, as well as medicine, has very specific factors that require a mediator: in the case of medicine, this mediator should be able to inform about which medication one should take, and in the case of technology, this mediator, called System Integrator (Hobday, 2005), would be an intermediary entity specialized in the area. Doctors, for example, would work as a central point between the government and its rules, based on utilization and application of market. The operators should have their services applied to the society (considering the ideal solution for each client), and suppliers, who own the products that generate the necessary solution for this problem, should find out the necessary characteristics to integrate the market and its real needs.

Figure 2.8 introduces the analysis of the steps that should be taken by the mediator of the technological area. This system integrator cannot be linked to any of the parts interested in this market, in other words, it cannot be linked to the government, the operators or to the vendors. Just like a doctor, the mediator must establish contact with all parts in order to be updated with the new modern technologies. This specialist's critical sense, however, must be high enough to define which product and which solution are the best for each kind of client or situation. Similar Algorithms are presented by Thieme et al. (2000) for decision and selection of new products' development (NPD).

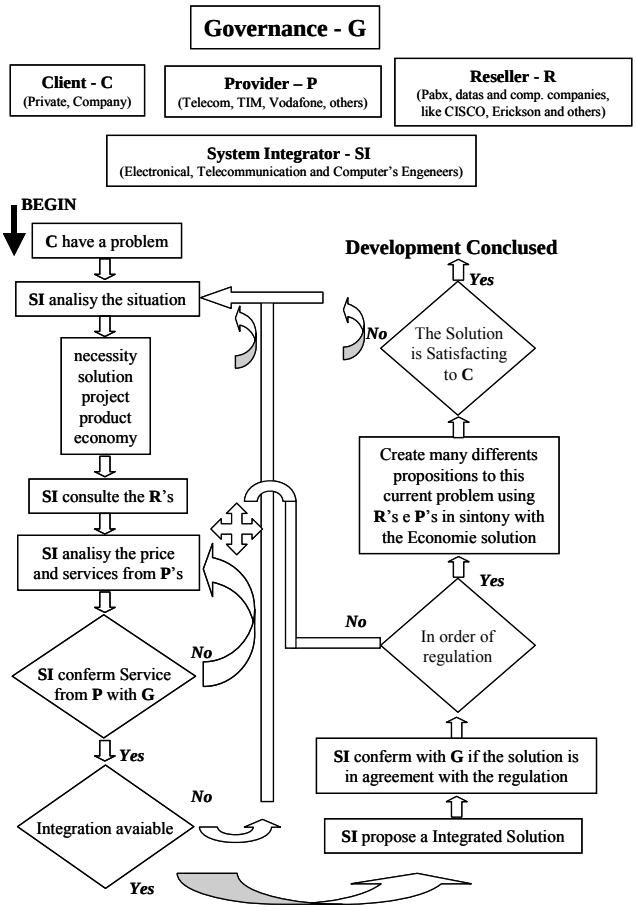

Fig. 2.8. Flowchart of development of a process technological with System integrator.

Based on the nonexistence of a true System Integrator in the current telecommunications market, the space for self-realization marketing is created. As seen in figure 2.8, the amount of information and analyses that should be accomplished for the decision of placing, for example, a PBX or a router to do establish VoIP communication with a certain operator, is very complex to be visualized by a simple client or the system user.

2.7 SOLUTIONS

The forecast of a strong model for new technologies is clear and evident in the chapter developed. The model of *Self - Realization Marketing* presents all the process of failures and disorganized structures by public utility policies which leave a very high margin to client disorientation proposals and the market's high technological solutions providing a poor appliance of the *Self - Realization Marketing.*

Thus, the ideal would be to keep the quality of these already existing services. This time, with the maintenance of the scale economy, lowering prices according to the larger utilization of the services by the clients and based on a good that does not have to be placed as the highest priority in the society.

It is also important no to jeopardize the companies of extraordinary services such as free software VoIP, although those need to be in synchrony and harmony with the rest of the communication services. The senseless difference of costs between landline and cellular calls in relation VoIP's calls does need to be organized.

In order to achieve the above suggested changes, two proposals were made, based on hypotheses developed in item 2.6.

2.7.1 – Propose I

Based on the data informed in items 2.3 and 2.4 and by the hypothesis of item 2.6.1, it is necessary to organize the formulas of Price Cap and indexes of telecommunications, so as to be different from other public utility sectors where, generally, the products can be particularly divided within their sectors, such as transportation, energy, among others. In the telecommunications area, the differentiated services of data or voice compete among themselves, based on the convergence of technologies in search of a common base, that now need a new status.

Models must be created, due to the influence among the several sectors in the networking area, telephony or television, so that they superimpose themselves over Price Cap (without setting it apart) as a product for telecommunications. The main difference is that inside the telecommunications network, there are several products that can generate different forms of services, however with the same purpose. That is the main characteristic of the growth of the

VoIP system, since when connected to the internet; its cost will be only the one that concerns the connection rental.

A detailed proposal of this analysis is not introduced in this study, since a researches' set would be necessary, with specific managerial information. A supposition of the inclusion of the points is evaluated and described below by equation 2.5.

As seen in equation 2.2, the increase of the costs in the sector evaluated by RPI should carry in counts an average pondered of the several products, with the same services or integrated solutions, where the factors should converge for:

$$P_{t+1} = \left\{\left(1 + RPI_t - X\right)P_{t-1}\right\} x\, \delta \tag{2.5}$$

Where;

$$\delta = \frac{\sum P_i \, x \, q_i}{\sum q_i} = \frac{\sum_{i=1}^{n} \left(P_{FT} \, x\,\%_{IT} + P_{MT} \, x\,\%_{IT} + P_{NT} \, x\,\%_{IT} \right)_i}{\sum_{i=1}^{n} \left(\%_{IT}[FT] + \%_{IT}[MT] + \%_{IT}[NT] \right)_i} \tag{2.6}$$

With,

δ = Constant of normalization from the different technologies with a product influence.
δ ≤ 1 always.

FT = Fixed Telephony (Landline)

MT = Mobile Telephony

NT = Network Telephony

IT = International Telephony Zone

i = countries or zones to call

The price of the product seen in equation 2.2 will now be modified to t+1, where the price is automatically transferred to the up coming year, based on values applied to the market in the previous year and about the convergence of the current year with regard to RPI. Thus, coming to equation 2.6 which expresses an average between global value and the differentiated quantity by executed services, of different products or by a services and solutions set for the same specification.

2.7.2 - Propose II

The second hypothesis generated by item 2.5.2, is a little more complicated, leaving the specific country regulations open. The common base to be applied will be presented. The proposal of figure 2.8 should be developed. It actually proposes an algorithm or the image of a System Integrator as the regulator and social articulator of the technology and rules imposed to the market. The problems described in the self-realization marketing, developed in figure 2.2, tend to be softened by the application of a self-realization creation of the purchase of the products. This time, however, with the inclusion of an epistemological marketing, in other words, with the knowledge on the market for the client and user in general.

The components of value creation, which will define where the market is, are described by formula 2.4 and defined by item 2.6, so that they can be controlled by the government, which is responsible for regulating and authorizing.

In general, technologies updated should be incorporated into government decisions, and the correct utilization of Price Cap should now be validated by the new value of RPI in the market, according to Knittel's structure (2004), which is a statistic solution based on dynamic prices. The costs are now defined by an user-operator infrastructure with the usual telephony, and among operators or regions using VoIP, which will considerably reduce the price of the long distance connections.

Figure 2.9, introduces, in a logic form, the cut of the voice transmission old system via satellite, such as for terrestrial cable (fiber), where the means will remain the same, however the technology will be modified for long distances, based on a largest compression of the VoIP technology. That way, it is possible to generate a lower tariff to the consumer, given the re-evaluation of Price Cap, which takes the operative costs into account. Also, given the increment of the technology, these costs should lower the applied values considerably. In conclusion, VoIP technology must be legalized.

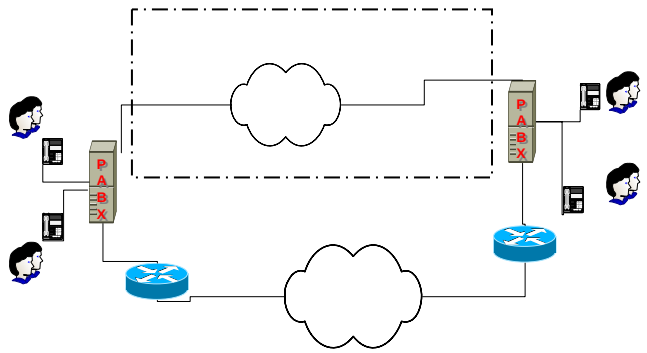

Fig. 2.9. Utilization diagram of the technology VoIP as a norm for long distance calls

By modifying the operational cost of the operators and by lowering the value of the traffic, self-realization marketing could be accomplished on the utilization of the long distance calls,

indicating now the need for more communication and guaranteeing the right use of them. Once this is done, the client won't be paying for a service he doesn't really know, but for a product that is really used and which is legalized by authorities.

Thus, the formula of the introduced product is maintained, based on equation 2.1, 2.2 and 2.3 and it is also possible to deliver work with a loyal competition considering the other services available on the market.

2.8 CONCLUSION

This study has suggested a new perspective based on Self-Realization Marketing to analyze value creation process by telecommunication companies. In particular it has been shown that new technological solutions and convergence market effects can be emphasized by transforming them into new self-realizing realities and benefits for clients. At the same time this chapter has widely demonstrated that Self-Realizing Marketing can offer suitable solutions to those companies actually taking profits of the inefficiencies of regulations. As a matter of fact this chapter has discussed different solutions that governments are likely to adopt in the next future, thus removing artificial advantages for some competitors.

Nonetheless at this moment we have to register different government's rates and values of the operational costs in each country. On this hand a serious problem is also launched and the scientific community is aware, since the main issue is not what's happening now, neither what occurred ten years ago. The point is what may happen in the next two / three years, since some market ruptures may generate serious economical problems in a global way.

Finally even if it is still not certain when regulations will be changed in different countries, telecommunication companies have to start now to apply more advanced Self-Realizing Marketing strategies to extract more market value out of the technological convergence, instead of pursuing just a sum of new technologies within a single product.

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SECTION TWO

RESIDENTIAL AND PERSONNEL TELECOMMUNICATIONS USAGE

Chapter 3

Devotion and Latest Users: iPhone Case

Chapter 3 - Devotion and Latest Users: iPhone Case

Objective: The technologic service's growth and convergence have been expanding and modifying the use of products and services in the telecommunications sector generating a new market and expanding their target through different characteristics of usage. The study developed presents qualitative research by the netnographic study based on consumers and their behaviors concerning iPhone which is a mobile device from Apple with many integrated features and convergence in services. The utilitarian and social/hedonic factors were evaluated presenting the market in the sector with new service characteristics. This would attract new groups of users to its base and, each time, diversifying the kind of marketing used in the sector. The possibility of service's power stroke to reach so many different users, based on the quantity of products in one device, demonstrated the increasing behavior classified as a sort of enjoyment factor rather than the typical need for work related needs or utilitarian use. The study suggests that even utilitarian users have their hedonic and social factors identified in their consumption patterns. Hedonic and social consumers believe that these mobile devices are utilitarian by the intrinsic hedonic factor involved, being defined by the authors as social usefulness behavior.

Key-Words: Technology Convergence, Netnography, Consumer Behavior, Hedonism, Utilitarian and Social Presence.

3.1 INTRODUCTION

Technology usage in the market has been adopted more and more frequently by hedonic consumers who prefer utilitarian products having complementary factors suggesting enjoyment, hedonism and social use. Social perspective is a clear tool used to present the product to make the accessory a part of the body (Katz and Sugiyama, 2006). Many factors contribute to this research. Because integration is part of a model to reach different users based on their needs, many services convergent on the product would have many different users. For example, the contribution from design investments may manifest itself as performance measures for increased profitability, increased turnover, lower production costs, higher productivity of users, reduced support and service costs, a higher degree of customer satisfaction and loyal customers (Gemser et al., 2007).

Another important factor is the haptic information in the product, where consumers touch in order to gain a better sense of the product, and then place it in shopping carts; other consumers spend more time exploring products with their hands before ultimately making a purchase (Peck and Childers, 2003).

The iPhone proposes all these factors and others sub-factors that created an explosion in the launch period, reaching two general kinds of consumers: (1) the devoted consumers, which are the connections between the consumer and the brand, reaching a level of loyalty so intense that it survives poor product performance, scandal, bad publicity, high prices, and absence of

promotional efforts (Pimentel and Reynolds, 2004); (2) technology's latest social users, where people use mobile technologies as tools in their daily life in terms of tool-using behavior and the relationship among technology, body, and social roles and the rhetoric and "meaning-making" that occur via social interaction among users (and non-users) (Katz and Sugiyama, 2006).

Generally speaking, all these factors are attributed to the iPhone because integration allows the quantity of convergent services. Second Heath and Soll (1996) stated that when a given expense could be assigned to multiple categories, people may have some leeway for hedonic posting, which means posting items in a way that satisfies short-term interests and skirts the budget.

This chapter shows a brief description of the methodology developed, informing the kind of data used. It describes key factors that have developed into the devotion towards the iPhone, or need for use. IPhone would present these factors as subjects showing texts from the database used, as well as presenting the authors' interpretation based on their experience and literature review in this area. Finally, it finishes with a discussion and conclusion about the social inference in the market and technology product, plus a new proposition of usage in the technology products as substitution based on different models of use.

3.2 METHOD

The iPhone was defined as the product to be studied analyzing the social presence in the technology sector based on its recent launch and adoption to the market (Bass, 1969), mobile technology device (e.g. very well known by almost all of actual consumers), the high technology involved, the great success in the market selling within the few months after being launched, and the high price proposed that created a separate group of consumers. Qualitative research was developed which was used as database nethnografic information downloaded from discussion sites concerning the iPhone. It was thoroughly researched by the author who uncovered actual sentiment concerning iPhone users based on needs, satisfaction, consumer behavior, and product decision.

The best site found was the Apple website which was created to make an area available where users could discuss their satisfactions and dissatisfactions with Apple's products. It soon became a tool to maintain good relations with customers, as well as a means of improving the features and correcting the bad ones.

About 30 pages worth of written posts were used (Appendix I). It was placed in a file where it occupied 2/3 of its possible contents and leaving the other third for research codes and results. Table 3.1 presents research data developed with information about the site used, the dates it was collected, and key words, as well as others pertinent points.

Table 3.1. Primary Data from the Research Developed.

Name of Website	EverythingiCafe (Apple's Forum about theirs products)
URL	http://www.everythingiphone.com, changed to http://www.everythingicafe.com/
Date of research developed	From September 08 until September 15, 2007
Total Threads Checked	5 Threads about satisfaction, beauty, fashion and correlates arguments from iPhone.
Key Words Searched	Awesome, Fashion, Useful, Beautiful, Pretty, Quality

The threads were defined by keywords inserted in the research. Each keyword returned with many different threads and discussions. The discussions were decided on after some readings to verify which thread would contribute the most to this research.

Table 3.2 presents the number of threads which resulted from the key words used, as well as the kind of posts evaluated. The research was differentiated by dissatisfaction which was then followed by a feeling of devotion and protection to the brand as a product.

Table 3.2. Threads Division Supporting the Research Needs and Method Used.

Serial Number	Name of Thread	Subject Line	No of Unique Posters	Total of Postings	Words
1	Fashion Statement	So it's a great phone, but is it a 'fashion' phone?	4	4	242
2	Evaluating the iPhone	What's makin' you keep your iPhone?	27	38	3721
3	Bored with the Features	A month and a half later... Anyone else bored of the iPhone?	48	64	4755
4	Utility vs. Beautifulness	The iPhone is just a mediocre phone, albeit a pretty one.	19	37	4707
5	Surprised with this Device	This phone is friggin' awesome!!!!!	10	12	339
Total			108	155	13764

Based on consumer behavior, devotion, and innovation, they created subjects describing the usage and decision to purchase the iPhone, supposing it was due to a developed behavior towards high technologies in the market. Several posts were presented correlating the literature given to support the existent theory.

Concerning the database and the method presented, there were 10 subjects generated (distinct environmental behaviors) explaining the factors that influenced consumer behavior towards iPhone usage. It is believed that this influence is not just relevant to the iPhone product, but to other smart phones in general due to high technologies which have lots of integration in products and convergence in services. These subjects were created based on the interpretation received from the threads and were then evaluated based on the existent literature. The comments evaluated were interesting because of the kind of research using netnographic data which were uncovered where there was a possibility to see such transparent behavior. It differed from results a questionnaire or interview styled research form made directly with each respondent would have given. In the discussion site, the respondents were spontaneous without any fear of word usages.

The work proposes that the influence of use increases with the hedonism and social aspect of usage from each new technology launch in the market. Figure 3.1 show the proposition based on hedonism and social presence.

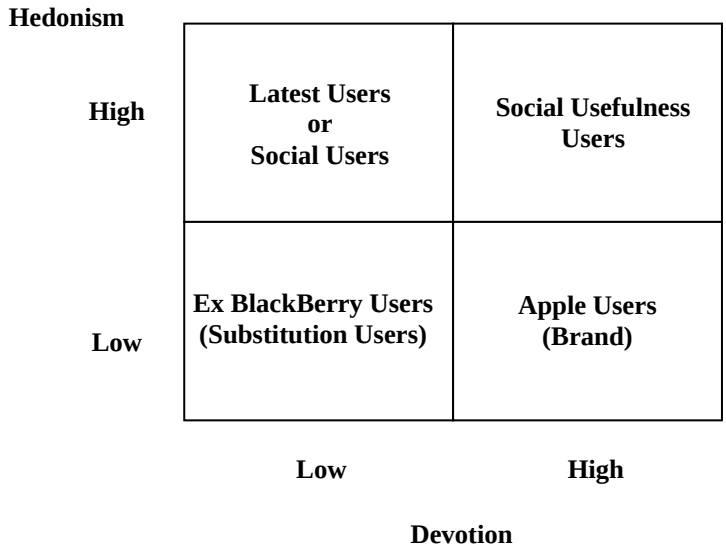

Fig. 3.1. Matrix of Social Behavior to New Technologies Launched. A comparison with the iPhone usage and an approach to the new technologies usage.

The subjects clearly presented the consumer behavior to the iPhone. It introduced a proposition which many other technologies in the market followed dealing within the context of hedonism or social desire. The matrix presented shows what happened as the new iPhone users bought their devices. Some consumers switched from other brands of mobile phones due to little devotion for any particular brand and low hedonism. Other consumers were completely devoted

to the Apple brand, having low hedonism therefore justifying only the features that worked well. The latest users are constantly looking for new launches and are indifferent to the brand as long as they have the newest technologies not yet in circulation in order to be the first to market. The last group of consumers had high devotion for the brand and high hedonism, which are the majority of users, and had a prior experience with iPods and Macs products who could finally receive their mobile phones from the same Apple brand manufacturer. These Social Usefulness Users also had a high utilitarianism intrinsic value in their usage but not enough to justify their use. Because most of products are expensive, they had to be justified based on brand and utility as well as social or hedonic utility.

From each subject theme made they described the significance based on the study and included texts from the transcript showing how they expressing their experiences. From the text they identified where the page and line was taken out of the content. The subjects were disposed in increasing numbers proposing the smallest influence to the lowest in numbers and then vice versa.

3.3.1. Justifying the value paid: The value had to be good because it was expensive. So then how does the technology adoption to expensive products create devotion?

"So me personally I knew what I was getting into before I bought mine. Being a person who builds their own computers, I tend to wait and read reviews/comments from the everyday people before buying the next great piece of electronic or part that may cost you 600 bucks. I personally have been extremely satisfied with my iPhone and love it". P8, L33-40.

"Anyone else have the same thoughts? If Apple doesn't come out with an update soon (and none of the security update bs), then I'm going to switch back to the Blackberry". P9, L38-40.

"Did you come here to gloat about the price cut? I am sure there are web sites that cater to MS folks, maybe even Zune fans. Try them out, why don't you". P27, L4-6.

Second Okada (2005) stated that the hedonic posting created a sense of guilt based in the high price paid, so the consumers had to justify their consumption proving that the purchase was necessary. Brucks et al. (2000) showed how price and a good name brand defined quality that could result in choice justification.

3.3.2. All-in-one bundling: All-in-one bundling is when many resources are integrated into the same device. The market shows a presence of need for these kinds of products and services (Nunes et al., 2000).

"Great phone (sound, call quality, responsiveness, ease of use…I know the speaker phone sound level makes it useless but I rarely use speaker phone." P6, L52-56

"For a long time, I wondered, "Why can't I have one device for listening to mp3's, making phone calls, and taking decent pictures…That lack of an all-in-one device is what kept me out of the blackberry and ipod camps for so long." P9, L5-9
"I'm keeping track of calendar items, lists (in notes), weather, getting on the web from time to time, and using text messaging and AIM nearly every day. Oh yeah, and I get the occasional phone call too" P14, L44-48

"No other phone on the market comes to offering the features… in one package" P3, L 53-54

"I don't need to carry my phone and ipod anymore." P7, L24

Harris and Blair (2006) described the proportion of consumers choosing a bundle over separate components as being higher for consumers with high knowledge uncertainty than the consumers with low uncertainty. Therefore, most people didn't have any prior knowledge about the phone. Even Apple consumers weren't prepared for this new launch that included so many integrations and had such an innovative proposition. The product's beautiful design and innovativeness left consumers completely hypnotized due to all of the features, colors, and lack of knowledge concerning how to use it and what to use it for. The literature shows how important it is for current consumers to compare and own equipment with several features (Cieslak and Winkle, 2004).

3.3.3. Next Generation of Smart Phones: Most connections are through internet connectivity, but the iPhone has a particular kind of use that is a dedicated link for each service desired with information and applications available on the screen. So you don't have to connect to the respective link for weather, YouTube, e-mail, news and other functions (Funk, 2004) because this connection has been made. Individual icons with an interface appropriate for use were also created by the iPhone developers (Mukherjee and Hoyer, 2001). Integration of voice, data, and image make it easy to use the product based on prior knowledge and experience so a new kind of use of multimedia technology was developed.

"Love the Maps application…, Love the full blown HTML…" P2, L28-31

"Google maps. It is great and very easy to use." P7, L1

“and right now what is keeping me is that phone is cool, does an OK job in the SLC, Utah area at being a phone, the videos were great on my last trip, and maps is very nice” P3, L19-22

“I finally get email and internet on my phone!! Plus I’ve never had video iPod before.” P8, L18-19

“The iPhone is stable and does everything it's supposed to do flawlessly. It will do a lot more eventually. Safari is great. Except for my car, I'm always on wifi, so speed isn't a factor. I love the fact it will pick up on any wifi network available.” P6, L32-35

Second Kim et al. (2005) stated that convergence represented an important trend in information technology (IT), so all the features that have been integrated have generated an expansive group of users with different needs. Most of them are impressed with all their usage and the diffusion of innovation behind the product (Danaher et al., 2001).

3.3.4. Enhanced Aesthetics: The design, modernism and presentation of the product in the market are the key points because the view is directly connected with a social need. The quality and value of the product are evaluated based on the image of the product even if this product has some perceived risk (Snoj et al., 2004).

“This phone has already changed my life and I've only scratched the surface... I LOVE IT.” P29, L53-54

“I’m keeping my iphone because it’s sexy and a great conversation starter!” P8, L12-13

“Is more than a hip than a fashion phone” P1, L30

“On the basis of the OS and the tech that binds all the nuances of this phone together as a package... I get it, it really is amazing and groundbreaking in it's execution and design.” P21, L57-59

Gemser et al. (2006), already cited, presented the importance of design in technology products, and it is clear by the posts that there was a connection through the design and social presence because of how the device was used.

3.3.5. Haptic Experience: The innovation of the touch screen and the possibility of use of the iPhone in the stores made the difference in the advertising world. It also considered prior

knowledge, even if this experience had been made for only a few moments, because some familiarity was created.

"Plus, admit it, that commercial where the guy is watching Pirates of the Caribbean, looks up a sushi restaurant, and touches the number to make reservations is just cool!" P9, L23-26

"Dude, you were using a demo! My iPhone works way better in the real world than the demo did in the store. … Once again it sounds like user error rather than device failure." P23, L34-42

"I really miss my blackberry 8800. the keyboard on the iPhone just flat out sucks compared to a keyboard u can feel with ur hands and type much easier". P17, L1-3

"The iPhone doesn't even have basic features that were available 5 years ago. A phone that is touch screen and has visual vmail will come out shortly and it will have mms and everything else the iPhone can't do. The iPhone is the most over-hyped product in 20 years." P17, L37-41

"The technology of the touch screen far surpasses anything thing out there on any phone on the market" P28, L58-60

Kim et al. (2005) have considered the touch screen as a more probable type of input equipment for the future. Peck and Childers (2003) presented the importance of the touch screen in its purchase and use. The difference made by Apple was based on innovativeness. Even with some of its problems and new features, they launched several innovations before their competitors (e.g. the touch screen for example), so strategically they had enough time to correct their problems as well as still being considered the first to market.

3.3.6. My iPod Even Makes Phone Calls: Is it a phone or a new device? Most people talk about the features and almost nobody talk about the phone call quality, coverage, etc. The Apple Company tries to sell it as a mobile device (Neelamegham and Chintagunta, 2001), but the users are not certain about that yet. The choice is based on enjoyment (Nowlis et al., 2004).

"Me? I like my iPhone. It's a nice device (that marginally passes as a phone) that needs to have some issues addressed (especially that whole phone part.) It has the potential to be something much more than it is right now if the messiah, er... I mean Steve Jobs... will allow some 3rd party tinkering. As I've said before, it's a phone and a piece of technology. It serves me." P19, L20-26

"The best IPod I've owned…; It's just damn sexy" P2, L50-53

"The best iPod ever… it is more beautiful than any phone/iPod I've ever seen." P6, L42-46

"I still have a great phone/ipod/email/Safari, etc that fit my needs very nicely" P7, L53-54

"Great phone (sound, call quality, responsiveness, ease of use…except for AT&T's dropped calls." P6, L52-53

As Gemser et al. (2006) said, Apple invested considerably in design by citing the stylish iMac computer. The iPhone is seen in the same way where Vrdoljak and Vrdoljak (2000) talk about the strategic convergence to the technology market, it is clear that the market involved is much more than a simple mobile phone user base, but it involves the hedonic, social, utilitarian aspects, as well as any people who are fascinated in innovative technology.

3.3.7. Video & Music Store: More than an iPod, albums and video designs are downloaded and updated to the user.

"Having used virtually all of the smartphone products in various iterations available over the past six years, I can say that, at least for my needs, the iPhone is inferior to nothing. Indeed it does what it does better and more intuitively than any device I've used to date." P13, L40-44

"Play movies and music (music onboard or by stream)" P28, L26

"Gorgeous Huge Screen - There's nothing bigger or clearer out there on the market. Built in iPod - Need I mention Coverflow, video and music. I'd trade ringers and games for the ability to watch an episode of Entourage or the full movie 300 on my phone." P12, L58-63

The sequence of use from the iPod to the iPhone is clear in the research realized because many consumers previously owned an iPod and substituted new devices that were launched. Adelaar et al. (2003) presented how consumers using the broadband internet were listening to music, watching the music video, and then instantly purchasing the featured music, which actually had been made possible through the use of mobile phones, and in particular, the iPhone. The market involved is not about the product but about the convergent services (Fuerst et al., 1994/1995) as the music store planted itself in a little mobile device.

3.3.8. Apple Stuff: Direct connectivity of the iPhone with Apple products as the last launch from the brand didn't make a selected group of users because, besides being a product for Apple maniacs, it also is a product for the latest social technology users.

"I didn't buy mine on iDay, … I personally have been extremely satisfied with my iphone and love it." P8, L27-40

"I look at my iPhone the same as my iMac. When I first got it, even checking mail on my 20" screen was fun. Playing WoW was awesome. Now it is still a great experience, but I'm used to it. I appreciate it for its design and ease of use. I wouldn't trade my Mac for a Dell (any PC) and I wouldn't trade my iPhone for any other cellphone." P13, L22-27

"One factor that makes it unique is the seamless way that it interoperates with the Mac. … It is the best cell phone that I have ever owned, and among the best small computers that I have ever had. And it's a cool device." P21, L4-9

"If apple keeps making phones…I'll …never own another phone…" P4, L30-31

Cowley and Mitchell (2003) described consumers who organize brand knowledge hierarchically with brands linked to the appropriate subcategories, which are, in turn, linked to the product category. Therefore, many consumers used Apple because they had an experience before with the brand and other products creating some familiarity, prior knowledge or even devotion capable of supporting and inciting the use of the new device (Coupey et al., 1998; Hoch, 2002; Pimentel and Reynolds, 2004).

3.3.9. Latest Users: It is not enough for the latest users to own a product, but they have to be the first. In one uncontrolled search to be updated or technologically integrated, the users purchased the device just for hedonic posting and not for need or utilitarian use. They are predicting that the product will be used in its entirety (Nunes, 2000).

"For some that did do the homework the answers were not always presented in an obvious manner, which as an early adopter can hurt. A person buying now can make a far more educated purchase then us first day'ers", P5, L23-26.

"I didn't buy mine on iDay, … I personally have been extremely satisfied with my iphone and love it", Page 8, Line 27 – 40.

It is clear by the posts evaluated that many technological people were concerned with the possibility of owning the best equipment ever launched. They aren't concerned with the risks on successive product generations based on consequences or losses (Saakjarvi and Lampinen, 2005), but just owning and showing the device (Belk, 1988). Brunner (1996) showed in his PhD thesis many behaviors of consumerism based on psychological needs as represented here.

3.3.10. Social Usefulness: To make it apart of the user's persona, it has to be an enjoyable and fun device. Its utility is to be used as a social or enjoyment tool.

"It's fashion only because every celebrity will have one soon." P1, L26-27

"This is the most enjoyable smart phone I ever used." P7, L19

"This baby can do so many things. I impress the hell out of people all the time with it. We went on vacation and thanks to my iphone we found restaurants, shopping, etc." P16, L5-8

Social use as the hedonic behavior is present in all threads evaluated. In some threads it was found more directly and in others people addressed their need indirectly explaining, or trying to explain, that the device was necessary (Jokela, 2004). They justified it as useful for their needs (Okada, 2005). In general, it is proposed that mobile devices have been recognized as social devices (Katz and Sugiyama, 2006). Therefore, when one talks about the iPhone, the social behavior is intrinsic in its features, design, and proposition as a mobile phone product.

3.4 Discussion and Conclusion

Choice is the technology marketing value evaluated in this chapter. Choice is shown through devotion and the technological seeking social users. In some moments it shows that these behaviors are separate, while in others the decision of the purchase has been directly influenced, represented as adoption, use, or replacement.

The chapter is focused on one particular product from a particular brand, known as iPhone, which has an incredible quantity of features (Thompson et al., 2005), technology, convergence, and integration. It makes available connectivity as internet access, weather, games, synchronization (SYNC), YouTube, Google maps, and other important search features including digital camera, e-mail, MP3, MP4 (video), and downloads, among many other things. All these features and services were cited by consumers in different ways, focusing on interest based convergence and hedonic usage. The key features which aided in the decision to acquire

the iPhone were the style, design, display, and multi-touch interface (which was an innovation to the sector at the launch moment). Many competitors followed their lead a few weeks later.

It is evident that the device is not a simple mobile phone, but it is not yet clear what kind of device it actually is. Maybe the iPhone name is a particular product without direct competitors, but by some partial individual services. Consumers are more concerned with enjoyment involved than with the existent communication features. Many of these consumers complain about dropped calls or failed coverage, but still have no dissatisfaction.

The chapter cannot suggest that these mobile phones users, specifically smart phone users, are only hedonic, even based on the literature review that this proposes, but it can assert that most users evaluated are more hedonic than utilitarian. So it helps with a proposition to the new products developers, informing that utilitarian products can be used and can be replaced for both usage with some particular integration and substitution of use.

Different use for different users is the most important factor for the development of a new market, which proposes two important thoughts: (1) the quantity of integrations have to be preferential in hedonic features (Okada, 2005), supporting both consumers, hedonic and utilitarian, increasing the product market to this sector; (2) consumer devotion is a possible extension to brand equity based on loyalty to this case (Pimentel and Reynolds, 2004), so it is clear that others brands with a good perspective in the market can use this study for their NPD programs. It creates innovative devotion with convergence in their prior products.

It concludes that the social presence for the product is high (Katz and Sugiyama, 2006), being presented directly in some consumers and intrinsically in others which try to show (justify) some utilitarian use for this device in order to own the product as a technologic possession (Belk, 1988). The users have shown that the phone was enjoyable and even necessary if it was either a toy or a utilitarian product, demonstrating that the product is hedonic but is also utilitarian. In this chapter it defined this as “social usefulness” because utilitarianism evaluated in some moments was the product of a toy and hedonic device. So the device use was defined for their consumers as hedonic where the utilitarianism is in this case hedonic.

It suggests new research using qualitative and quantitative research with other technological products and other sectors. It would evaluate the social or hedonic presence in the utilitarian products. It would be interesting evaluate in full detail the usage of products after some changes are made such as the increase of features, the integration of different systems, analyzing adoption, and substitution, based in the competitor market. The utilitarianism as a social factor would also be important to measure, proving that some users have hedonic and social sense, which was presented by the authors as “social usefulness behavior.”

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Chapter 4

Utilitarian versus Hedonic and Social Technologic Values

Chapter 4 - Utilitarian versus Hedonic and Social Technologic Values

Objective: Each time, the preference construction to technology products shows more consumers adopting the new technology usage in their lives. This chapter presents that products with multi-functionality or integrations, have excited much more the interest in this market, even with these integrations being hedonics and having justified their usage as utilitarian. The work analyzes factors of technologic integration, hedonic and utilitarian behavior, decision interference based on price, decision changes based on budget, and relations with brands and buying or receiving as a gift. The technology evaluated is the one used in new mobile devices with different integrated services such as internet, wireless, music, video and photo camera. It presents that even with these services integrated and having least quality than individual products in the market, the difference guaranteeing the decision of purchase is given by the integration of many different services updated in the new devices.
Key-words: hedonism, utilitarianism, technology preference, integration.

4.1 Introduction

The great advances in the telecommunications market are reflected in mobile communication devices. The Mobile Phone, for example, has been updated day by day using Systems Integration and Technology Convergence (Vrdojak and Vrdojak, 2000; Taylor et al., 1999; Kim et al., 2005) as tools, connecting all possibilities of services in one unique product. The all-in-one device (Nunes et al., 2000) allows the consumer not only to communicate by voice, by text, and by video but also to listen to music, manage schedules and calendars and stay abreast of breaking financial, political and social news. It has been working very well, but not by some different technique used or some specific marketing tools, but by the simple use of psychology over the consumerism in our actual market (Brunner, 1996) based on needs and desires of consumers.

As a result, these devices have grown to be more than utilitarian devices, because technology products have been offered more generically and less utilitarian. So, people decided to use these devices as tools to enjoyment and pleasure. According to Katz and Sugiyama (2006) people use mobile technologies as tools in their daily life, making part of their body as a personal piece of their dresses. This raises interesting questions regarding the value placed by consumers on the hedonic and utilitarian benefits of these devices as well as the conditions under which these values are formed.

4.2 Convergence Versus Usage

The products have changed with the technology convergence offering all access in different communication services in one way, and the systems integration offering a product with all tools integrated. The smartphones as are called (Jokela, 2004) were launched with video camera

using the mp4 format, music with mp3 format, internet connection, e-mails access and download of programs, music and services simultaneously. The digital cameras, which are each time more powerful, were integrated and are being updated constantly in the mobile devices, as well as the video cameras. Interactivity games with good quality based on java program (Funk, 2004) have been applied also. Payment access and private network using the same java program, wireless connectivity and other user interactivity programs, have generated in these devices more mobility to m-commerce accomplishment, so there is why they are called all-in-one.

The great vision of business in the convergence market was not made to create different services in one system or device, but to insert a lot of different services together (Kim et al., 2005), confusing people's experience with their real knowledge about the product (Hock, 2002) and generating an inability to exploit the benefits of convergence available in these products. The fact that one owns many utilities in the same product has increased the difficulty of a prior conception about the use of each service separately and together (Nunes, 2000). It is improbable that any consumer will make a clear and correct prediction of use against cost benefit before buying a new model with new integrations.

4.3 THEORY APPLICATION

This work concerns the quantification of the technology preference of consumers and the usage of these products, presenting that in the most of the cases these products are used or acquired by enjoyment and social presence behavior (Okada, 2005; Katz and Sugiyama, 2006). Even being very useful, mobile phones have been losing their utilitarian property to be set up as a second utility. Consumers have been using these devices with different proposition than the ones they were created for.

Some researches supporting the possibility of a choice are presented, in which consumers prefer technologies that offer more, rather than fewer features (Harris and Blair, 2006) even if the complexity of the evaluation process is increased. This preference for integrated products – that are products with several distinct technical benefits integrated in one device – is expressed even among those consumers who already possess the separate and distinct devices, looking at these features by the diversity in services and the enjoyment that these ones can provide (Nowlis et al., 2004). Even though this seems plausible due to increased benefits such as convenience, portability and mobility, the trade-offs in quality and price are not so obvious.

For example, it was suggested that smartphones consumers search these mobiles with digital camera, internet and music resource, and other similar integrated features, even when they have all these products as a separate device. The justification is clear and is defined by them as a utilitarian factor. Many consumers are focusing to own all-in-one integrated, explaining that they can go out without carrying 3 or 4 different devices, thus having mobility with this choice.

When these integrated products are created, it is almost impossible to incorporate quality of service in a 2.5-inch mobile phone comparable to a 50-inch television screen (Snoj et al., 2004). The quality of the photography made by a mobile phone compared to other made by a digital camera, both from a good brand, and having the same megapixel value, is not the same, because the lenses cannot be compared. One is made for a device with a specific work and the other one with an integration objective. To type a message in a pc keyboard and in one little mobile phone is also not something applicable and adequate to be compared. So, why were these services, applications and integrations in a mobile phone created?

Technically explaining, there is a real mobility factor in these ensembles integrated with the opportunity factor. This way, these new intelligent mobiles were developed to give new opportunities, which even without a digital camera on the street I can take photographs of some unexpected occasion or of something not planned using my mobile phone. It won't be the most important picture to me, or some professional picture, but it would be something unexpected that the user would have access to.

Users waiting for a train or a bus in the station, going to work or coming back to their houses, can listen a music with their mobiles, can verify if the game has begun in the television, or else see what is happening in that exact moment watching the news on their mobiles. The difference is that the MP3 Player has more capacity to store music than a mobile phone. The user's house has a better television to see games or news, as well as every kind of specific product that was created with a specific quality for that service.

Since the level of quality and capacity cannot be compared (Neelamegham and Chintagunta, 2004), the hierarchical relationship between the features in an integrated device differs sharply from devices that are specialized along limited technical functions. So, the features integrated in a mobile phone are complements and not priorities. So, to guarantee the same level of quality in these features, it would be necessary to increase the price to an inaccessible value. Other important point is that the device is one piece only to all utilizations, and when this one falls or breaks by utilization, it is not only one piece of equipment lost, but all of them. The robustness factor is also not considered by consumers of integrated devices.

With this perspective, why should one own a new mobile phone with 5.0 megapixels digital camera integrated just launched, if the difference of price is too big and the client owns another individual and separated piece of equipment with superior quality to do the same job? The consumers face two factors at this moment: the need to own the most recent device, and the other, to use these integrated features for enjoyment, fun and social attitude, since this new equipment has been made part of their social consume.

4.3.1 Behavioral Factors of Technology Consume

Based on integrations and the quantity of features in these devices plus the justification of use, other factors are complementary to explain the different decisions in technology consume. Expensive devices are chosen by consumers with behaviors of enjoyment (hedonic behavior), which consumer's choice is governed by hedonic value, but justified in terms of utilitarian value (Heath and Soll, 1996). This leads to significant differences in usage behaviors. Also, given a choice of different brands at different prices, preference for lower priced brands are more likely to lead to a different set of justifications that a technologically similar brand offered at a higher price (Brucks et al., 2000).

The same occurs when a budget is defined to buy a new product or an update. Two behaviors are noted in this process: (1) hedonic consumers have more attention to multiple categories satisfying their interest of budget (Heath and Soll, 1996); and (2) utilitarian consumers limit their purchase based on product category by their use over quality and guarantee (Cowley and Mitchell, 2003).

Hedonic consumers have chosen their devices based on receiving this product as a gift, purchasing it for a low price, receiving payment promotions, or sharing with the same social group of consumers the same provider (Liu, 2002). Utilitarian consumers have chosen their devices based on quality of service, coverage area, and points that guarantee the quality of communication (Brucks et al., 2000).

The difference between hedonic and utilitarian behaviors is presented in this chapter based on the factor of use and kind of consume, which consumers are updating more frequently nowadays, changing their mobiles or other technological equipments more than it is necessary (Danaher et al., 2001), just to be more updated and own the latest model launched in the market. Other consumers wait for a longer time to own new equipments, but always search for the latest and choose based on social, enjoyment and appearance factors.

4.3.2 Study Evaluation

A series of empirical studies is being planned to address questions that have been raised in the consumer choice literature but have not specifically looked at telecommunications product choices. Given that telecommunications products have evolved from being a strictly utilitarian product to a more hedonic product, the research is aimed to investigate how consumers make and justify their choices and how the preferences affect actual usage behaviors.

Based on Okada's theory (2005) that consumers feel a sense of guilt when preferences are based on hedonic values and the view advocated by Katz and Sugiyama (2006) that mobile devices have become personal and social identifiers, our hypotheses is:

H1: If consumers are not questioned about the utility of their purchase, they prefer bundled products for hedonic reasons; but if asked to justify their purchase, they reverse their preferences.

According to Harris and Blair (2006) consumers feel more secure with bundled products than separated equipments, feeling less risk with equipment that promise multiple benefits. However, due to the integration of multiple benefits, consumers are likely to face difficulties estimating extraction of specific benefit from past usage behaviors (Nunes, 2000). Consumers are not adept to recognizing the diagnosis of their consumption experiences, confusing familiarity with product knowledge (Hock, 2002) so, as a result, consumers are likely to overestimate usage and be willing to pay a higher price.

H2: Consumers' preferences for bundled products are likely to lead to higher estimations of product usage.

Heath and Soll (1996) show that when a given expense is assigned to multiple categories, people may have some leeway for hedonic posting that satisfy short-term interests. Danaher et al. (2001) presents that consumers are searching for updates even not owning the previous version prior to the technologic launched. Brucks et al. (2000) report on use of brand versus price as indicator of quality, so it proposes:

H3: Hedonic value is greater for higher-priced bundled products when the brand's reputation is high and lower when the brand's reputation is low.

It analyzes that alternatives in brand quality and price, should favor alternatives related to product popularity (Simonson et al., 1993) and Liu (2002) presents the characteristics of promotional effects over the brand decision as factors of preference proposing that:

H4: Utilitarian value is lower for lower priced bundled products, brand reputation doesn't matter.

If it fixes a value creating a budget format to the product purchase, it sees that insertion of new attributes increase the sale development when consumers interpret the attributes as benefits (Mukherjee and Hoyer, 2001). Hock (2002) presents consumers engaging in confirmatory reasoning, and so sharing attractive features providing additional support for the initial choice, developing that:

H5: Consumers are willing to spend more than their budget if the bundled product offers a hedonic value in the features because of the preference values focused on hedonism.

According to the Okada's study (2005), guilt and justification are interrelated concepts, not competing theories for explaining the choice of utilitarian over hedonic goods, so it proposes that:

H6: Hedonic value is greater when an object is received as a gift rather than purchased because of lower guilt associated with gifts.

4.3.3 Study 1

Design

The objective of the first study is to benchmark the hedonic and utilitarian values of telecom related products that differ in the degree to which they incorporate multiple technologies. Student subjects were recruited from undergraduate courses in the College of Business for extra credit.

The study was developed to measure individually the hedonism and utilitarianism plus usage for products presented as single attributes and integrated in different levels of mobile phones. This design was applied to 88 undergraduate students at the Northeast University in the US and replied to 70 students in Brazil.

Stimulus

A total of 9 different products were measured with single and multiple features presented. Each respondent received the same questions from the different products evaluating the level of prior knowledge and usage for those products besides hedonism, utilitarianism, valuable values, and others as seen in appendix II. Figures and descriptions of each product were presented before each question improving a particular prior knowledge for each product separately based on common use and knowledge of products very disseminated in the market.

Independent Variables

Hedonism, utilitarianism and risk were used as independent variables to all 9 products presented (basic phone, MP3 player, digital camera, PDA, phone plus MP3, phone plus Digital camera, MP3 plus digital camera, phone plus PDA, and phone with MP3, digital camera and PDA integrated). Based on different kinds of questions measuring the same construct, the reliability analysis was made to integrate two or more questions in one factor or to leave separately as

individual factors. Enjoyment was used as a measure to define hedonism, necessity and value used to define utilitarianism and risk measured itself.

Dependent Variable

Social behavior was used as dependent variable as well as willing to pay. Social was defined by the composition of well off and happiness questions. All questions were measured using the level in a 7 point scale for different questions related with these arguments. The usage evaluation was determined analyzing the prior experience and the usage of each feature based on the consumers' actual mobile at the present time, and at a predict time. It was verified if all functionalities would be necessary and highly used. This should determine the individual usage and also the conjoint usage for a convergent product.

Procedure

The questionnaire applied was developed measuring enjoyment, necessity, value, well off, happiness, risk, and willing to pay, plus the demographic and usage questions evaluating a prior experience with these products based on use by scale and ranking study. The questionnaire database was worked in the SPSS software evaluating the reliability analysis to reduce the less significant results and increase the highly significant results evaluated in the components measured. After this regulation of the database, it was developed the analysis of the regression to the hypothetical theory presented.

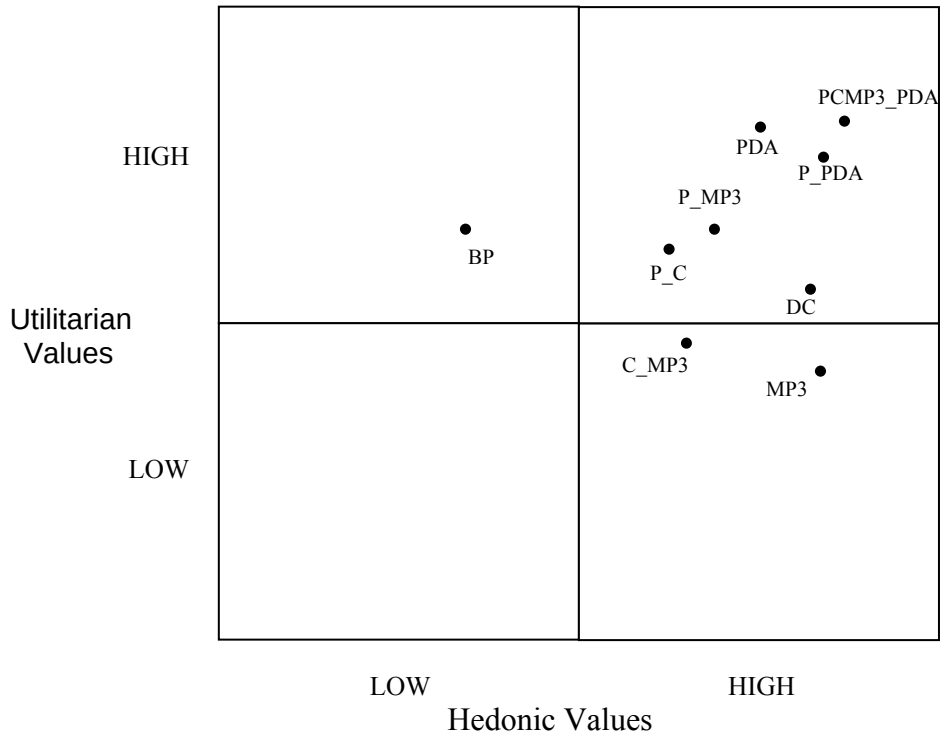

Fig. 4.1 Matrix of Utilitarian and Hedonic Means developed for each Single and Bundled Products.

The representation from the figure 4.1 is presented below:

BP: Basic Phone, DC: Digital Camera, MP3: MP3 Player, PDA: Personal Digital Assistant, P_C: Phone plus Digital Camera, P_MP3: Phone plus MP3 player, C_MP3: Digital camera plus MP3 player, P_PDA: Phone plus PDA, PCMP3_PDA: Phone with camera, MP3 and PDA.

Results

Initially the means for each factor proposed in the procedure were measured. Figure 4.1 presents the matrix of hedonism by utilitarianism positioning the individual products. Table 4.1 presents the values of reliability analysis developed to our constructs defining if it could be possible to create a new factor or should it be necessary to work separately. It was perceived that practically all values of utilitarianism and social behavior were defined by the sum of necessity plus value and well off plus happiness respectively.

Table 4.1 Reliability Analysis Developed to Study 1

Items	Cronbach's Alfa	Cronbach's Alfa Standardized
Basic phone necessity & basic phone value	0.74	0.74
Basic phone well off & basic phone happiness	0.875	0.875
Digital camera necessity & digital camera value	0.365	0.372
Digital camera well off & digital camera happiness	0.805	0.813
MP3 player necessity & MP3 player value	0.629	0.638
MP3 player well off & MP3 player happiness	0.876	0.877
PDA necessity & PDA value	0.801	0.804
PDA well off & PDA happiness	0.876	0.877
Phone plus camera (necessity & value)	0.739	0.741
Phone plus camera (well off & happiness)	0.866	0.868
Phone plus MP3 (necessity & value)	0.843	0.843
Phone plus MP3 (well off & happiness)	0.862	0.862
Camera plus MP3 (necessity & value)	0.737	0.738
Camera plus MP3 (well off & happiness)	0.823	0.823
Phone plus PDA (necessity & value)	0.713	0.723
Phone plus PDA (well off & happiness)	0.775	0.778
Ph plus cam, MP3, PDA (necessity & value)	0.629	0.636
Ph plus cam, MP3, PDA (well off & happiness)	0.806	0.816

According table 4.1 only digital camera, necessity and value, were not computed based on their low cronbach's alfa, presenting their factors individually in the regression. The other values, even the ones with values lower then 0.7, were accepted because they were very close to the reference considerate a marginal significance. Based on this table were created the utilitarian factors from the necessity and value computation and social factors from the well off and happiness computation.

The regression analysis developed using social factor as dependent variable and hedonic and utilitarian factors as independent variables resulted in very good values of significance for all products evaluated, which in some cases, the risk factor had a positive relevance indicating that consumers have a positive association of risk with their preferences of well off and happiness intrinsic to the product. With an R square relatively high of 0.528, the basic phone had significance to hedonism and utilitarianism as seen in table 4.2.

Table 4.2 Regression to basic phone evaluating social behavior with utilitarian and hedonic behavior.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,078	,450		,173	,863
	BPUtilitarian	,487	,091	,482	5,362	,000
	BPEnjoy	,321	,083	,359	3,864	,000
	BPRisky	,123	,077	,148	1,606	,113

a. Dependent Variable: BPSocial

With R square equal 0.601 and 0.776 to Phone plus PDA and phone plus all individual features respectively it can be presented on tables 4.3 and 4.4 the respective regression developed. It is perceived that single products as basic phone, MP3 and digital camera didn't have significance with risk, but in the moment that there are integrated features in the phone the risk improved and the significance was perceived.

Table 4.3 Regression to phone plus PDA evaluating the social behavior with utilitarian and hedonic behaviors and perceived risk.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,223	,615		-,363	,718
	P_PDAUtilitarian	,524	,106	,489	4,954	,000
	P_PDARisky	,125	,049	,205	2,556	,013
	P_PDAEnjoy	,356	,111	,315	3,199	,002

a. Dependent Variable: P_PDASocial

Table 4.4 Regression to phone plus all single features evaluating the social behavior with utilitarian and hedonic behaviors and perceived risk.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1,819	,528		-3,448	,001
	P_DC_MP3_PDAEnjoy	,751	,124	,571	6,058	,000
	P_DC_MP3_PDARisky	,070	,037	,115	1,915	,060
	P_DC_MP3_ PDAUtilitarian	,421	,117	,342	3,607	,001

a. Dependent Variable: P_DC_MP3_PDASocial

Following figure 4.2 was realized the regression to willing to pay as dependent variable and Social behavior as independent variable to phone plus PDA and phone plus all features resulting in significances presented in tables 4.5 and 4.6 respectively.

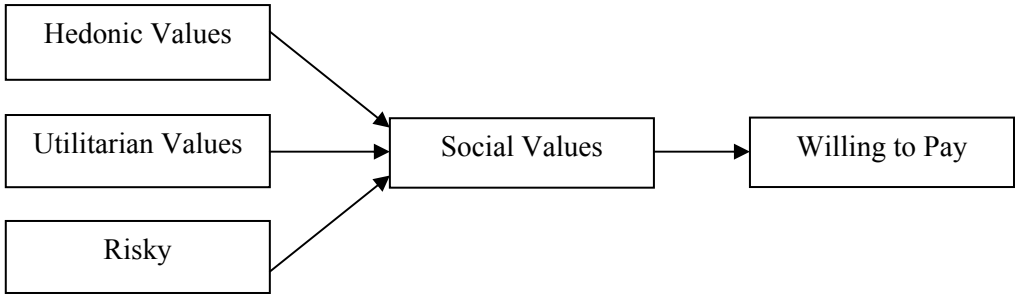

Fig. 4.2 Benchmarking Model developed to technology Products

Table 4.5 Regression to phone plus PDA evaluating the willing to pay with social behavior.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	208,928	382,344		,546	,587
	P_PDASocial	143,581	67,052	,257	2,141	,036

a. Dependent Variable: P_PDAWillingtoPay

Table 4.6 Regression to phone plus all single features evaluating the willing to pay with social behavior.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-205,293	428,119		-,480	,633
	P_DC_MP3_PDASocial	244,133	72,120	,387	3,385	,001

a. Dependent Variable: P_DC_MP3_PDAWillintoPay

Good results for all individual products were found supporting the theory presented and the figure 4.2 developed. No significance was found among the prior knowledge (phone and features usage) with their behaviors, values or preferences.

The mean of valuable values analysis has presented increasing from 4.12 to 6.16 based on new integrated features in the phone confirming preferences for bundled products. Figure 4.1 presents the means of justification for each product evaluated informing that a product with hedonic features is justified as utilitarian even when it is clearly hedonic. This particular acceptance of hedonism, but explaining the product as utilitarian supports moderately the hypotheses 1. In a scale from 1 to 7, the usage of each single feature and each integrated feature were measured presenting means of 5.37, 3.31, 3.21, 3.48, 3.66, 1.52, 1.93, 2.01, 4.04 for usage of mobile, MP3 player, MP3 in the mobile, digital camera, camera in the mobile, PDA, PDA in the mobile, agenda and agenda in the mobile respectively. As these means present low values, this presents that the prior knowledge and experience with this products and their usage is very low, supporting the hypotheses 2 which says that consumers' preferences for bundled products are likely to lead to higher estimations of product usage, because the respondents are estimating that each product will be utilitarian, hedonic and valuable as well.

4.3.4 Study 2

Design

The objective of the second study is to test the hypothesis regarding consumer preference under two conditions: well known brand / unknown brand and high price / low price. In this 2 x 2 subjects design, respondents were randomly assigned to each of the four conditions and asked to rate the offered alternative. This study was applied to different 110 undergraduate students at the Northeast University in the US and after that to 115 students at the North Brazilian University. Figure 4.3 shows the design proposed with the expected interaction. The letter U means the preference usage and inside the commas the symbols hp and up means hedonic preference and utilitarian preference respectively.

In this study it was proposed a low and high price defined by the previous results from study 1. The brand used was Nokia as high brand and Mandarina as low brand with analysis of brand reputation to guarantee these brands design. With these 4 different scenarios defined by the study, the preference should be changed presenting interaction in the research and supporting the hypothesis 3 and 4.

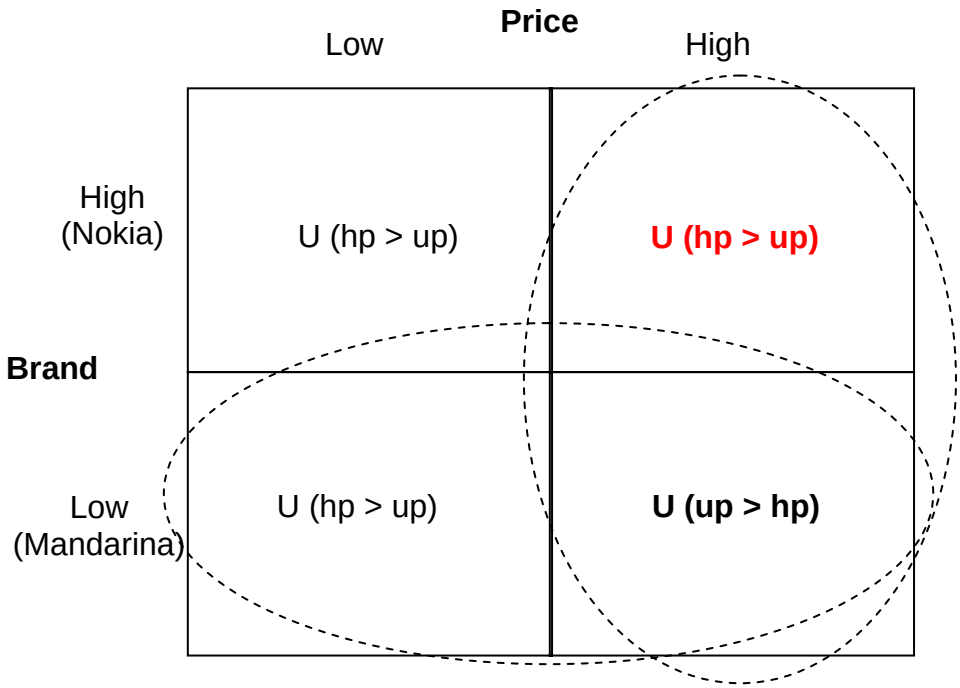

Fig. 4.3 Technology preference between brand and price study matrix.

Stimulus

In this second study, 2 different brands were provided for 4 groups, each group receiving one brand with a different price projected. So the four designs were a Nokia mobile phone costing US$ 600 in Brazil and a LG mobile costing US$ 200 per US respondents, a Nokia mobile costing US$ 130 in Brazil and LG per US$ 50 in US, a Mandarina mobile phone for US$ 600 in Brazil and US$ 200 in US, and a Mandarina for US$ 130 in Brazil and US$ 50 in US. For each product it was given the possibility to choose the desired mobile based on different features from the simplest to the most complex with completely hedonics and utilitarian compositions. In the US, the questionnaire was developed first, so 4 degrees of choice were given proposing two hedonic and two utilitarian integrations. As the results were not good enough because few results were generated for 4 different choices and computing 4 different scenarios plus the size of the analyzed sample, the scenarios were changed. Just two choices in this new scenario were created, being one hedonic (e.g. mobile with MP3 player integrated) and one utilitarian (e.g. mobile with electronic agenda to organize compromises and messages to send and receive from the mobile).

Independent Variables

The independent variables were the choices based on the scenarios of high and low brand and high and low price. Constituted of a 2x2 study, two factors were created defining the scenario

and so was the different questionnaire for each part of the matrix (scenario). The difference of usage from the features should create the significance and the interaction in the proposed study.

Dependent Variable

The same factors seen in study 1 were measured, presenting as dependent variables hedonism, utilitarianism, social behavior, risk and quality of the evaluated product. These factors were presented in form of enjoyment, necessity, usefulness, value, facility to use, happiness, quality and risk. The justification and kind of usage should support the choice developed, explaining the reason and behavior for each choice of each scenario. It is supposed to generate regression and variance analysis for all the contents showing in which way the constructs are being conducted.

Procedure

Separating four scenarios based on our research, each questionnaire contained one designed product with the brand and price proposed plus the composition of two choice possibilities based on their features. Other questions with a 7-point scale were applied requesting usage, enjoyment, perceived quality and the features usage separately. The questionnaires results were developed in the SPSS software and the same pattern was followed to define the significance among the decision parameters.

Results

Following figure 4.4 the regression analysis presenting the significance for each component seen in table 4.7 a, b and c was developed. The R squares for each regression presented in the table 4.7 are 0.30, 0.18, and 0.24 respectively. Some differences in the model presented in study 1 and study 2 can be seen, but it can be explained based on the scenarios developed in which the hedonic and utilitarian values are inserted in the preference block. After a choice of one of presented devices with different features that represent the utilitarian and hedonic values, the other blocks measure the justifications for each choice. The preference has created a new proposition to the model. Table 4.8 shows the correlation among the factors that supported the model and design.

As the choice presents two different values, which in study 1 just the product with single feature or integrated features was measured, the model now create new values appositive the previous study.

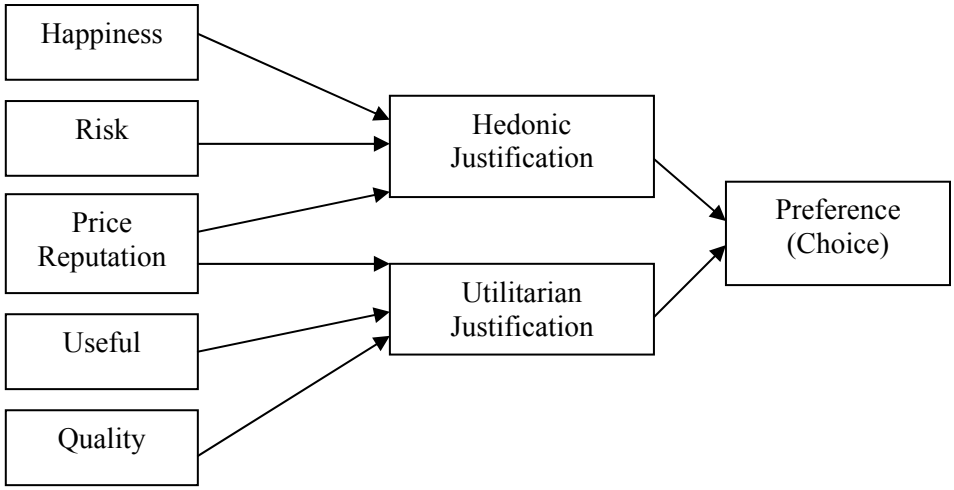

Fig. 4.4 Justification and values studies influencing directly in the preference study model.

Table 4.7 Regressions analysis developed following the studies of brand and price scenarios and hedonic and utilitarian justifications.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,676	,157		10,646	,000
	Enjoyment	,109	,022	,394	4,839	,000
	Necessity	-,103	,020	-,413	-5,081	,000

a. Dependent Variable: Preference

(a) Dependent variable: Preference

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,795	,698		4,004	,000
	Happiness	,442	,107	,372	4,120	,000
	PriceEvaluation	-,151	,089	-,162	-1,697	,093
	Risky	,138	,081	,164	1,703	,092

a. Dependent Variable: Enjoyment

(b) Dependent variable: Enjoyment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,418	1,020		-,409	,683
	PriceEvaluation	,253	,089	,245	2,855	,005
	Usefull	,613	,135	,399	4,543	,000
	Quality	,131	,119	,097	1,103	,273

a. Dependent Variable: Necessity

(c) Dependent variable: Necessity

Anova studies were developed using the 2x2 study to find the interaction among the factors brand and price and were analyzed with and without the co-factor preference. Even if figure 4.5 shows the preference interacting with some change of preference, the statistics analysis show no interaction among the factors using as dependent variables the justification already cited.

For brand as source and enjoyment and quality as dependent variable, a marginal and good significance of 0.081 and 0.003 were found respectively. For Price as source and value, easy to use, quality and risk as dependent variables the significances were 0.007, 0.069, 0.062 and 0.019 respectively. In the interaction of brand and price were found just easy to use and risk having marginal significances of 0.091 and 0.081.

Table 4.8 Correlation table among the justification factors measured for study 2.

Correlations

		Enjoyment	Necessity	Usefull	Valuable	Easytouse	Happiness	Quality	Risky
Enjoyment	Pearson Correlation	1	,055	,189	,211*	,080	,380**	,105	,169
	Sig. (2-tailed)		,574	,050	,028	,413	,000	,279	,081
	N	108	108	108	108	108	108	108	108
Necessity	Pearson Correlation	,055	1	,410**	,174	-,058	,229*	,189*	,096
	Sig. (2-tailed)	,574		,000	,072	,548	,017	,050	,321
	N	108	108	108	108	108	108	108	108
Usefull	Pearson Correlation	,189	,410**	1	,329**	,082	,319**	,222*	-,021
	Sig. (2-tailed)	,050	,000		,000	,401	,001	,021	,826
	N	108	108	108	108	108	108	108	108
Valuable	Pearson Correlation	,211*	,174	,329**	1	,110	,352**	,205*	,052
	Sig. (2-tailed)	,028	,072	,000		,256	,000	,033	,591
	N	108	108	108	108	108	108	108	108
Easytouse	Pearson Correlation	,080	-,058	,082	,110	1	,109	-,015	,175
	Sig. (2-tailed)	,413	,548	,401	,256		,260	,877	,070
	N	108	108	108	108	108	108	108	108
Happiness	Pearson Correlation	,380**	,229*	,319**	,352**	,109	1	,422**	,170
	Sig. (2-tailed)	,000	,017	,001	,000	,260		,000	,079
	N	108	108	108	108	108	108	108	108
Quality	Pearson Correlation	,105	,189*	,222*	,205*	-,015	,422**	1	-,041
	Sig. (2-tailed)	,279	,050	,021	,033	,877	,000		,675
	N	108	108	108	108	108	108	108	108
Risky	Pearson Correlation	,169	,096	-,021	,052	,175	,170	-,041	1
	Sig. (2-tailed)	,081	,321	,826	,591	,070	,079	,675	
	N	108	108	108	108	108	108	108	108

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 4.5 doesn't support the hypothesis 3 and supports moderately the hypothesis 4. The high price row was supposed to increase from the low brand to the high brand what didn't happened. The low price row was supposed to maintain a high value of hedonism what happened even with some decrease indication presented.

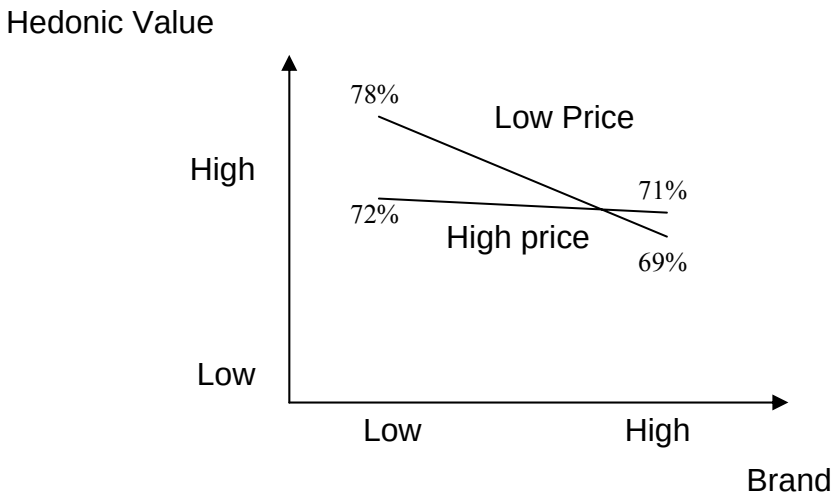

Fig. 4.5 Preference design measured in the questionnaires relating brand and price with hedonic value.

4.3.5 Study 3

Design

The objective of the third study was to test the hypothesis regarding consumer preference under two conditions: gift/purchase and budget/no budget. In this 2 x 2 design, respondents were randomly assigned to each of the four conditions and asked to choose a product among alternatives that vary in the benefits offered. This first part was divided in two sub studies, being one a choice and the other a mobile phone construction. After a choice or construction test respondents were asked to rate the chosen alternative in terms of hedonic/utilitarian benefits as well as estimate the usage of each of the benefits incorporated in the chosen product. These questions were applied to a group of 140 undergraduate students at the Northeast University in the US and reapplied in Brazil with another 116 students. The scenarios were changed as in study 2 because the number of choices didn't result in good significances and evaluations. Figure 4.6 shows the proposed study with the expected interaction to the third study. The letter U means the preference usage, and inside the commas the symbols hp and up mean hedonic preference and utilitarian preference respectively as seen in study 2.

Stimulus

As seen in study 2 and appendix II, 4 questionnaires were developed with 4 degrees of choice. As the results weren't good enough because few results for 4 different choices were developed, and computing 4 different scenarios plus the size of the sample analyzed, just two choices in this new scenario were created, being one hedonic (e.g. mobile with MP3 player integrated for US$ 400) and one utilitarian (e.g. mobile with electronic agenda to organize compromises and

messages to send and receive from the mobile for US$ 270). The budget proposed was US$ 270 for the two questionnaires and no budget for the other two. Following the hypothesis 5 and 6 these prices cited were unequal to evaluate if consumers are willing to spend more than their budget.

Independent Variables

The independent variables were the preference based on the scenarios of with and without budget and buying to themselves (self-choice) and receiving as a gift. Constituted of a 2x2 study, two factors were created defining the scenario and also the different questionnaire for each part of the matrix (scenario). The difference of usage from the features should create the significance and the interaction in the proposed study.

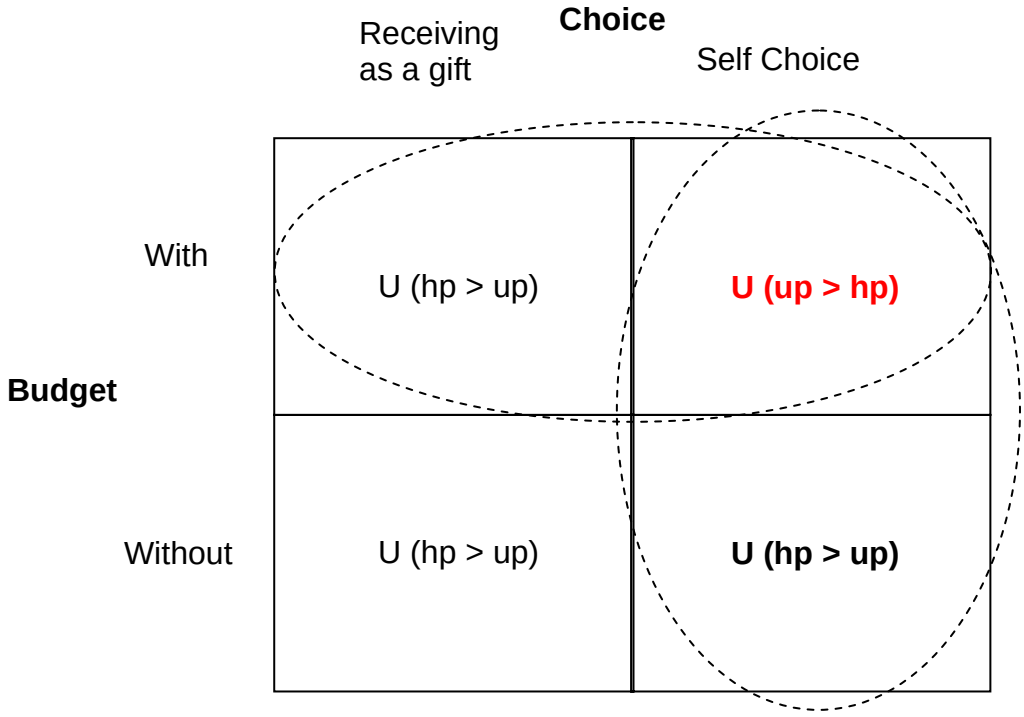

Fig. 4.6 Technology preference between budget and choice study matrix.

Dependent Variable

The same values as seen in studies 1 and 2 were measured, presenting as dependent variables hedonism, utilitarianism, social behavior, risk and quality of the product evaluated. These factors were presented in form of enjoyment, necessity, usefulness, value, facility to use, happiness, quality and risk. The justification and kind of usage will support the choice developed, explaining the reason and behavior for each choice of each scenario. It is supposed to generate regression and variance analysis for all the contents, seeing in which way the constructs are being conducted.

Procedure

Separating four scenarios based on our research, each questionnaire contained one designed product with the budget and kind of choice proposed plus the composition of which device should be chosen based on their features. Other questions with a 7-point scale were applied requesting usage, enjoyment, perceived quality and the features usage separately. The questionnaires results were developed in the SPSS software and the same pattern was followed to define the significance among the decision parameters.

Results

Following the same model of study 2 seen in figure 4.4 it was developed the regression analysis presenting the significance for each component presented in table 4.9 a, b, and c. The R squares for each regression presented in the table 4.9 are 0.45, 0.18, and 0.30 respectively. With different scenarios based on budget and choice identification, the same preference values were presented with different features for each item. The study measures the values in each preference proposed and their justifications in the subsequent questions answered. The preference has created a new proposition to the model. Table 4.10 shows the correlation among the factors that supported the model and design.

Table 4.9 Regression analysis developed following the study of budget and choice scenarios and hedonic and utilitarian justification.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,650	,184		8,977	,000
	Enjoyment	,128	,022	,444	5,866	,000
	Necessary	-,123	,023	-,403	-5,332	,000

a. Dependent Variable: Preference

(a) Dependent variable: Preference

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,837	,955		,877	,383
	Useful	,825	,125	,558	6,624	,000
	Quality	-,062	,101	-,052	-,620	,537
	PriceReputation	-,029	,103	-,023	-,281	,780

a. Dependent Variable: Necessary

(b) Dependent variable: Necessity

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2,565	,975		2,631	,010
	Happiness	,318	,121	,251	2,619	,010
	PriceReputation	,035	,130	,026	,268	,789
	Risky	,118	,091	,128	1,302	,196

a. Dependent Variable: Enjoyment

(c) Dependent variable: Enjoyment

Table 4.10 Correlation table among the justification factors measured for study 3.

Correlations

		Enjoyment	Necessary	Useful	Valuable	EasytoUse	Happiness	Quality	Risky
Enjoyment	Pearson Correlation	1	-,186	-,070	,116	-,157	,264**	,323**	,166
	Sig. (2-tailed)		,055	,475	,236	,106	,006	,001	,087
	N	107	107	107	107	107	107	107	107
Necessary	Pearson Correlation	-,186	1	,546**	,178	,184	,082	,061	-,041
	Sig. (2-tailed)	,055		,000	,067	,058	,400	,530	,673
	N	107	107	107	107	107	107	107	107
Useful	Pearson Correlation	-,070	,546**	1	,326**	,341**	,343**	,207*	-,062
	Sig. (2-tailed)	,475	,000		,001	,000	,000	,033	,524
	N	107	107	107	107	107	107	107	107
Valuable	Pearson Correlation	,116	,178	,326**	1	,018	,392**	,176	,254**
	Sig. (2-tailed)	,236	,067	,001		,853	,000	,070	,008
	N	107	107	107	107	107	107	107	107
EasytoUse	Pearson Correlation	-,157	,184	,341**	,018	1	,024	,036	-,189
	Sig. (2-tailed)	,106	,058	,000	,853		,806	,712	,051
	N	107	107	107	107	107	107	107	107
Happiness	Pearson Correlation	,264**	,082	,343**	,392**	,024	1	,303**	,125
	Sig. (2-tailed)	,006	,400	,000	,000	,806		,002	,200
	N	107	107	107	107	107	107	107	107
Quality	Pearson Correlation	,323**	,061	,207*	,176	,036	,303**	1	,250**
	Sig. (2-tailed)	,001	,530	,033	,070	,712	,002		,009
	N	107	107	107	107	107	107	107	107
Risky	Pearson Correlation	,166	-,041	-,062	,254**	-,189	,125	,250**	1
	Sig. (2-tailed)	,087	,673	,524	,008	,051	,200	,009	
	N	107	107	107	107	107	107	107	107

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Anova studies were also developed for this study evaluating the study 2x2 designed to find the interaction among the budget and choice factors. This analysis was made with and without the co-factor preference. Seeing figure 4.7 the preference has some interaction alone based on some preference change, however the statistics analysis show no interaction among the factors using as dependent variables, the justifications already cited.

For choice source there is no significance for any justification as dependent variable. For budget as source and necessity as dependent variables the significance was 0.043. The interaction of budget and choice had no significance.

Figure 4.7 support the hypothesis 5 and 6, which even when the scenario changes giving a choice with a budget environment, consumers are willing to spend more than their budget

because the bundled product offers a hedonic value. Remembering the proposed design, the scenarios having budget were developed with a budget lower than the hedonic device cost (Appendix II), supporting until certain level the hypotheses 5. In the case of self-choice with budget the hypotheses wasn't completely supported because there is some decrease in the choice, still having 45 % of hedonic preference explaining perfectly the behavior and hypotheses.

Analyzing the rows of gift and self-choice in the figure, the study presents the hedonic value higher in the whole graphic when the device is received as a gift rather than purchased, because of the lower guilt associated with gifts, supporting hypotheses 6.

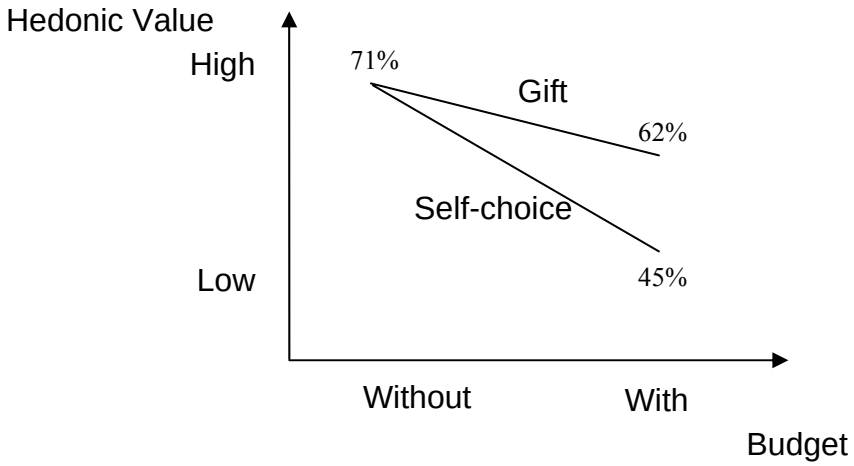

Fig. 4.7 Preference design measured in the questionnaires relating budget and choice with hedonic value.

4.4 Discussion and Conclusion

This chapter introduces three different studies using quantitative research measuring the preference, usage, and frontier factors about telecommunications products as mobile phones with their integrations. The integrations as MP3 player, digital camera, PDA and others, are responsible for changes in the consumers preference based on different created scenarios involving price, budget, brand and self-choice or receiving as a gift.

Study 1 show the benchmarking of a single mobile and separated product as MP3, digital camera and PDA, as well as a mobile phone integrated with these features separately and with all included. In this study, it can be evaluated the usage and preference based on hedonism and utilitarianism that provide some results to develop the two further studies.

Study 2 presents how consumers prefer their devices based on 4 different scenarios (a study 2x2), which involve high and low prices and high and low brands. Now the research tends to stimulate consumers to decide differently in each cell when the scenario changes. Reasonable results were founded.

Study 3 is also a 2x2 study now involving different scenarios using budget and no budget with self-choice and receiving as a gift. As it happened in the previous study, consumers are supposed to change their choice based on the different scenario to agree with our hypotheses. Regular results were founded in this study, but it believes that part of the problem was caused by two choices in one single cell (scenario).

To guarantee a better result, it proposes to create these same studies using studies 2x2x2, and inserting just one product per cell to analyze the variance with single results for their desire based on intensity scale varying from 1 to 7 in the first question. This way, 8 different questionnaires will be created for each study being more dedicated, even if they are hard to apply.

These new proposals (studies) were very interesting to this area and it believes to be very sensitive for future researches and to understand consumers' behavior concerning the usage and preference for this kind of technology.

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SECTION THREE

REGULATION AND EXTRINSIC FACTORS AFFECTING THE TELECOMMUNICATIONS SECTOR

Chapter 5

Telecom Technology and Advanced Consumer Services: The Door to the Competition Based on Regulation

Chapter 5 - Telecom Technology and Advanced Consumer Services: The Door to the Competition Based on Regulation

Objective: Following the behavior, regulation and usage literature, this chapter describes and discusses a marketing strategy used by telecommunications operators to take advantage of inefficient regulation and legislation. The moves of competitive players in this sector are discussed specifically in the context of VOIP services.

From a supply side point of view, technological convergence has allowed several communications service providers with different technologies to offer similar services and benefits. As a result, consumers – both business and residential – have an increased choice of service bundles as well as providers. Existing regulations however constrain/free specific suppliers which create differences in business opportunities and strategies. A theoretical discussion of the competitive environment concludes that the economic benefits of technological convergence accrue differentially due to three factors: technological advancements, regulation failures and consumer inability to exploit the benefits of convergence.

5.1 INTRODUCTION

Currently, most US communications companies have become integrated (Shelanski, 2007), offering television, internet, and voice communication (telephone) by one unique connection (Nunes et al., 2000). Telecom providers with large investments in physical infrastructure are able to take advantage of regulatory failure and maximize their revenues, creating unfair competition between voice communication (landline or mobile) and internet companies. To guarantee a fair competitive environment in this sector, a strong regulatory policy should be developed for VOIP services because in the IP networks, voice and data traffic look similar in their transmissions (Maeda et al. 2006). In the future, regulation will have to address how to harness technological advancements in delivering public benefits as well as avoiding market failures.

The convergence in the telecommunications services have sped up a lot of the market growth and commercial transactions in different sectors (Shin, 2006). With the technology use development by users and companies using these new tools daily as indispensable equipment to the evolution and control of their business, many products and services were deviated to work in the integrated way with convergence in competitor's companies (Blackman, 1998). This chapter presents an integration and convergence denomination used for different purposes. The first one, the Systems Integration (SI) as seen in chapter 1 and 2, would be the integration of different technologies where a product would be capable of developing services of two or more products (Hobday et al., 2005). The second, Technology Convergence (TC), would be the convergence among different services or the convergence to different routes (Pathak, 2005), where communication of the same quality, such as a landline network having two or more providers,

creates competitiveness because of the need to chose one or many providers simultaneously. These possibilities and/or needs were developed based on the kind of existing call, being local, interurban, international, mobile, among others, which have their prices differentiated by the schedule of each different provider.

In joining different services and providers for voice communication using landline, mobile communication, and voice over internet protocol (VOIP), one product with three different services can be used by the quantity of differentiated providers for each kind of service (Xavier and Ypsilanti, 2007), known as TC. The possibilities of many integrations and convergences have developed a very dynamic and aggressive market, where one could communicate from any part in the world to anyone else through different types of technologies (Hameri and Paatela, 2005). There is still the possibility to search the user automatically, such as when a mobile phone is turned off. When this happens, an electronic message would be left, readdressing the call to a landline or e-mail mailbox, leaving a voice message as an e-mail to the user searched. It could also be possible to readdress an internal number to the user company (Fenton et al., 2000) in the case of the system being integrated with the enterprise system DECT (Digital Enhanced Cordless Telecommunications).

All these prospects are no longer just possibilities but reality, which in this competitive market known as telecommunications, providers take advantage of new integrations already developed to use internally, joining together to reduce costs without transferring any advantages to the consumer (De Boer et al., 1996; Carpenter and Lapuerta, 1999). The telecommunications companies are basically divided in radio, television, landline, mobile, internet, and network companies. Inside these companies are some of the particularities that can be found in the television sector. For example, existing free television systems using the appropriated frequency spectrum and cable TV selling their access by different kinds of technologies. In the cable TV market (Bittlingmayera and Hazlett, 2002), television is not usually distributed solely via cable due to the availability of satellite, fiber optics, or wireless with one determined, authorized frequency, a decoder, and a specific antenna to receive the transmission.

A lot of the information is difficult to qualify by normal users, which are the reasons for the existing regulations that authorities use to organize the usage of these services, defined as public utilities services (Trebing, 2004; Sappington, 2005). The main focus of this chapter presented is to reference that the regulation departments are not sufficient to attend the minimum specification related with the quality and competitiveness in the telecommunications sector. The authority of regulation from the department of transport, for example, don’t have serious problems with the technology in their areas because of the level of low complexity the telecommunications sector is very high. Another problem in the telecommunications sector is the fact it is still growing and developing new technologies that are not necessarily known and simple for the common market to understand.

Some miss-regulation is directly connected to the VOIP service, which, even though it's known for many users and has been long in market, it is not yet regulated and can't have its international legislation appropriated to define quality, usage, costs, taxes, and fees, among others. This is because it was explained by some international authorities departments that the VOIP is an added value service and not voice communication service (Cohen et al., 2005). The high development of technology (Jussawalla, 1999; Pathak, 2005) has been used by telecommunications providers taking advantage of its quality to reduce costs and maintain the previous price to the consumers without any transference of savings to the market.

As long as the VOIP was used as a tool to make a few consultations and connections between PCs, there is an experiment time of technology or an added value cited, but in the time that these connections became a TC, it needed to be replaced in the middle of conventional voice communication. This created an adjunct value and reduced costs that were not transferred to the consumer. This service used the same conventional voice service authorized to the telephone companies so it would be regulated and controlled.

Technologically, the long-distance communications were effectuated by the digital data compression model applied in PSK (Phase Shift Keying), which serve to transport voice communication. Currently, the best quality for the sort of technology is in the compacted digital form still in use today. It transmits 120 voice channels by a 2 MB data or voice communication channel (Fennel Jr. and Gobioff, 1983). With the same 2 MB communication channel, a data communication system which converts voice to data trafficking as VOIP (Korzeniowski, 2001), it can transmit up to 240 voice channels simultaneously. This way, it is the same cable connecting between two buildings to guarantee a voice communication for 120 people at the same time. After that, by inserting a new technology of transmission, the same cable would be able to send double the amount of voice communications.

Since the VOIP is not regulated, there is no way for the regulation departments to know which type of protocol is being used by the provider's companies (Liu et al., 2005) in order to develop their communication, so it leaves the possibility that among long-distance communications, any provider that has fiber optics, cable, satellite, or some band of satellite communication, they can develop double the calls, or can reduce their bands, maintaining the same quantity of clients.

Supposing that the mobile phone companies also have long-distance intercommunication between states, they won't need to share anymore their communications with the landline providers. It can now guarantee the use of VOIP to develop part of their communications and reduce costs without any regulation or reduction of price to the consumers.

If, for example, a user in Boston makes a call directly from his mobile phone when this one is situated anywhere in California, this call will pass just through Bostonian and Californian mobile towers because the connection between coasts would be developed by VOIP. With this

transaction the interurban connection used a cheap service (VOIP) that was not transferred to the user and wasn't controlled by any sort of regulator.

Fees are charged through conventional communication. What occurs is a reduction of the large infrastructure costs which remain inside so the provider saves. It is generally irregular due to the competitive nature of the market using the conventional systems (Peha and Tewari, 1998) if they have transferred some savings to the consumer.

The high quantity of TC and SI present in the market (Lee, 2007) are responsible for the technology usage unknown and lack of regulation by competent authorities so many different combinations of connectivity can be developed. This is because of the government evaluations of each service as a separated product. The convergence among services and competitors of each service make it possible to provide new services with a reduction of costs for the providers. Communications are not yet seen as an integrated tool, so separately the services work with quality and logistics, but these kinds of uses diversify the evaluation of communication.

Watching the technology consumers usage most of them use technologies for hedonic reasons as seen in chapters 3 and 4, but both hedonic and utilitarian consumers expend more than they need, because the technology became too complex (unknown) based on the large quantity of integrations and convergences in communications. The regulator should guarantee an update usage cost to general customers in way of to produce a systematic price for each kind of communication in each one of available providers.

The chapter will be divided into the following parts. First, the chapter will provide an overview of the developments in the telecommunications sector and the blurring of competitive boundaries between technologies, service providers, and usage applications. Second, regulations that govern deployment and pricing of service bundles will be briefly reviewed. Third, the theoretical analysis of the competitive environment will be presented in terms of these three factors: technological advancements, regulation failure, and consumer knowledge of convergence. The consequences of these factors will be presented in the context of VOIP services. Finally, implications for regulatory reform and the impact on competitive behavior will be presented.

5.2 SYSTEMS INTEGRATION (SI)

5.2.1. Long-distance Landline

Landline service providers have as responsibility to provide voice and data communication in the metropolitan (local) regions and medium and long-distance communications, being regional or within the state (medium distance), among states (interurban), or among countries and continents (international), considered long-distance (Brunekreeft and Gross, 2000). These cross

from authorized and regulated networks by state departments to other authorized departments, or to an internationally regulated department found on the other side of communication.

Between two users in different states or countries, the communication has been developed previously via cable, point to point radio communication or via satellite. The infrastructure is still the same, but with some improvements in some countries such as in the USA in which the cable was improved with the implementation of fiber optics until the client's house in the major of the states (Cox et al. 1993).

The difference in the actual communication was not perceived by the client or by any regulatory department because the change happened in the protocols of communication found inside the metallic pair cables, fiber optics, radio, or satellite links. The information has a new technology capable of compressing the data twice as much as the prior technology, guaranteeing the same service quality (Reynold and Rix, 2001).

For the user, the conventional telephone is still the same because nothing was changed in relation to the protocol for the clients, but rather among the long-distance connections. In other words, the change happened when communication left the telephonic central (PABX) of a provider from a specific state, going to another state, and entering in the internal network of the company (intranet).

This is directly connected with the biggest route of communication which the same optic fiber cable interconnecting two states or countries who now can send double the voice communications simultaneously without improving any of the network infrastructure. This guarantees the operation and prospect of new clients. These changes were only made in the hosts' transmission and reception (gateways) equipment that convert the analog or digital signal's voice into voice signals for internet protocol (IP) (Chen et al., 2007). The need to increase the cable or links via satellite to increase voice and data communication wouldn't be necessary in order to reduce the band use. This communication can also be shared by the same channel of communication as voice, data, and image with little quality control known as quality of service (QoS), to guarantee the priority of transmission (Chen et al., 2007).

Figure 5.1 show at which point the system was modified, providing the interconnection without perception to the user or government. The large transference of data and voice among states now increase in amplitude and integration with the new possibilities.

The communication using satellite links via microwave or underground fiber optics in figure 1 haven't been changed, rather than some of the new equipment in the boundaries among service provider links. The circled parts in the figure are changed to insert the equipments permitting the use of VOIP protocol to reduce the band usage.

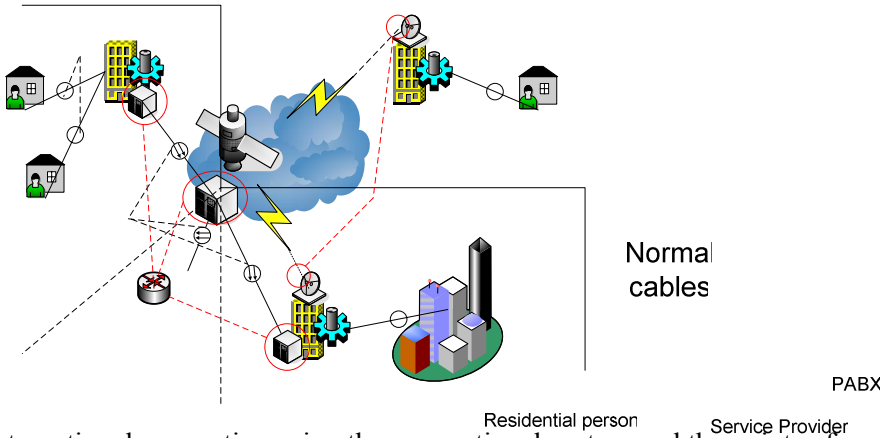

Fig. 5.1. Interstate or international connection using the conventional system and the points of convergence to use the new technology.

5.2.2. Long-distance Mobile Communication

In the beginning the mobile communication industry worked in a local form with mobile providers having towers with cellular antennas which supported communication within the projected cell area. With communication being developed to a fixed or mobile number in another town, state, or country, the mobile provider used the partnership with landline companies to rent and use their physical infrastructure, transporting long-distances communication (fig.5.2).

With the development and improvement of the mobile network, mobile service providers have started to expand their underground infrastructure of interconnectivity (Chou and Liu, 2006) to guarantee their intranet to provide interurban voice connection to their clients rather than the old intranet usage used for administrative information and strategy.

With these implementations, the image of the underground provider has found a place in today's world. The mobile provider has total autonomy concerning certain communications and interconnectivities, leaving the more extreme places with few access points using the shared partnership through rent of a satellite band or fiber optic connection for sporadic use by the mobile provider. Besides not needing more sharing among connections and receiving a call completely autonomously (Blumberg et al., 2006), the mobile companies have inserted the data technology which reduced the necessary band for long-distance voice communication. In this transference of a service to integration of others, the mobile companies have implanted their investments directly in the VOIP technology since their beginning, reducing the transference between two long-distance communication technologies that the landline had.

The dotted line represents the points of modification to guarantee the autonomy of the mobile provider and the transmission of communication with the new technology reducing band. Figure 5.2, a little more complex concerning the use of sharing among providers, shows, dotted the

disconnection of the landline provider assumed by the transference of the infrastructure necessary to develop the long-distance communications by the mobile providers.

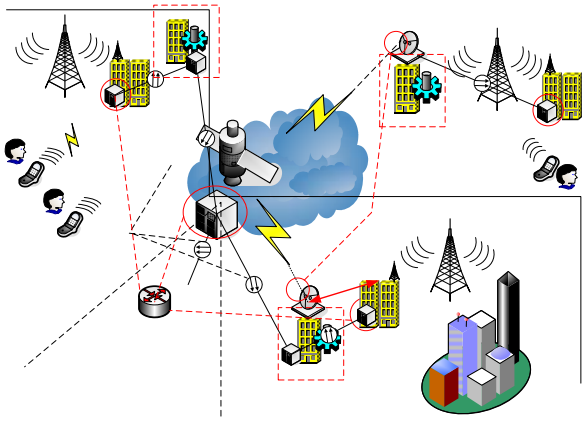

Fig. 5.2. Interstate or international connection using the conventional system, and sharing connectivity between the mobile and landline providers.

5.2.3. Long-distance Integration Companies

Some landline and mobile phone companies that have expanded their infrastructures to provide large scale long-distance consumers who have increased their business selling bandwidth or have rented the use of it (Green, 1999). Small companies, or companies with attendance and reach deficiency, have had a unique solution for the possibility of renting communications among regions of interest from the largest companies. With dedicated links rented, and using connections via fiber optics or satellite, the protocol was the main importance implemented, as well as the boundary host equipment. As the communication sent have to be converted and reconverted in its reception, the quantity of hosts, or communications points crossed, don't matter based on the communication provided without noise, with high speed and high quality (Habib and Chuang, 2007).

The infrastructure of the biggest companies has been optimized (Davies et al., 2004). This is due to a specific service provider having some remnant in the bandwidth or in the schedule of use for the communication. These remnants could be used by sharing their connections with their competitors for a good cheap price, optimizing the band not being used for a profit and non-competing directly with their services. It was therefore a bonus for the company's economic development.

With the high costs of the infrastructure to deal with big countries, such as the USA which includes a large territorial area, companies who had a leading position at the beginning have maintained prominence, optimizing the present structure among providers (Crandall, 1997), trying to reach the maximum of their daily and scheduled efficiency.

Some companies have entered irregularly in the market selling interconnectivity without transferring the long-distance calls fees to the government. These companies operated with VOIP connections for international calls between two landline companies and developed what they call an international voice call center (Klundert et al., 2005). Using an international card, the user calls a free number, hears a digital operator explaining how to develop the call, and dials the other country's number and the call transfers as a local call. Between the countries, this connection across a data link as VOIP technology as well as throughout countries, the transmission and reception are realized between the landline companies and the users.

It is very easy to understand this development because when this call has an output from a fixed number (landline), or a mobile phone from one country, and is received by a mobile number in another country, the number showed in the mobile screen is local and not international because whoever is responsible for developing the call is in a local central with a gateway connected to the other country, but locally effectuating the last route. The original call leaves the user's location to connect with a provider. This provider converts the voice call in the VOIP technology and sends it through the gateway to another provider in other country. The voice communication is reconverted to a conventional voice communication by the other gateway and retargeted to a local location to the user's destination.

5.3 CONVERGENCE NON-REGULATED

Based on the SI presented in the second item of this chapter, and in the services provided by the landline and mobile providers, the service convergence happens by the changing of communication routes, which the voice service providers use on intranet among their branches or partnerships, transmitting voice as if it were data, to long-distance locations. This reduces costs due to the technology applied and by non-taxes applied.

There is no regulation for the VOIP systems so when voice communication crosses the network it's only evaluated when the conventional voice system is used via landline or mobile network. The models developed for price cap regulation and Rate of Return (ROR) regulation don't evaluate the integration among the different technologies (Lewis and Sappington, 1989).

Regulation is worst in the mobile communication industry because, previously, when the system was shared between the landline and mobile providers to long-distance, the regulation department had control of the actual mobile phone calls considered interurban. When a cell phone has been out of its local area, it informs the closest tower its localization and code of use, so whenever a call is made from the area's origin, the tower in that area is obliged to send the data to the landline to connect the two different areas (state or country) sending the voice communication to the tower in the visiting area and retargeting it to the mobile phone provider in the new town, completing the route to the call.

With the autonomous system it is not easy to know where the location of a mobile phone is because only the mobile provider has this information, and without any regulation equipment capable of controlling all calls using a radio frequency does either. This makes the number being called difficult to know as well as where to locate it. The mobile provider could always inform whether or not the number as local call because the technology is a mobile phone, so without any address fixed or any code informing its actual origin.

Different technologies have different regulations, and in some cases, such as with the United States, these regulations change between states as well as federal state, being evaluated totally separately, (Cherry, 2007). Another worry factor in the U.S. is the vertical integration among the providers because many telecommunications providers are providing landline, mobile access, internet and television at the same time. In doing this, their integrations are internal and diversified with many routes for applying different technologic convergences (Shin, 2005; Santos et al., 2008).

The authors believe that technology regulation is not the most important subject to consider, but rather the regulation of everything including the similar services among different technologies. It is possible to develop a voice communication through the internet, it is clear that it is being provided by a telephone company service and not an internet company service or connectivity between branches.

The process of cost from the communication's area would be variable according to the distance and the kind of technology (Zhou, 2003), but this is not occurring through non regulation existing in the sector. It's not possible to compare prices among different technologies, so a voice call made by a landline is different than a call made by a mobile network or an internet connection.

The problem lies in different technologies making the same service and then mirroring companies in other needed services, providing costs advantages in communications among the convergent services. This kind of competition is unfair for small companies because they have just one authorization for one single service.

Figure 5.3 shows the distribution between price and connectivity in this market. The matrix presented in figure 5.3 clearly shows that is impossible to do it separately with each technology to maintain competitiveness, or generate regulation in the voice communication services (Zhou, 2003; Peha and Tewari, 1998; Klundert et al., 2005). These technologies are complementary among them, interacting, converging and sometime being added to guarantee communication with better quality and security, so identical services have to agree upon a convergent regulation.

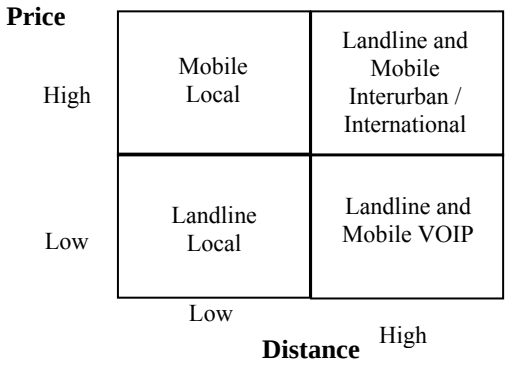

Fig. 5.3. Technology, communication and price matrix.

5.4 COMPETITIVENESS REGULATION PROJECT

Different technologies have different costs based on their different infrastructures and investments that logically make it impossible to correlate the costs or fees being regulated in the same way. However, an average that relates the costs of operation and development should be calculated to define how to tax similar services developed by different technologies.

Competition has been applied by large companies that are still in the market because of their great reach in the sector (Mansell, 1997). But, there is not a fair horizontal competition due to the number of providers which is reducing the number of companies, providing the same services and developing all possible convergences. The more possibilities the companies have concerning convergence, the easier they will be able to deal with the existing regulation, trying to reduce costs in governmental taxes.

There are not any small VOIP companies because there is no regulation in the VOIP service. Mirror companies from the same sector who are outsourced to develop the same market don't have much space because is missing development in amplitude for a specific country. Virtual landline companies (international call companies with determined countries or specific schedules of use and others kind of specialized companies) don't exist because they don't have a guarantee for development in the country.

A couple different projects have been started throughout the world but there still aren't enough. For example, in Italy they have started the Mobile Virtual Network Operator – MVNO (Kim and Seol, 2007), selling mobile communication but without any infrastructure in the sector. These companies are simply introduced to the market using companies who already exist, and by searching and finding offers in the market, the company that offers the best price or partnership will rent the mobile phone numbers and a portion of the communication system.

The MVNO administers the product as a new brand. It's a new mobile company with specific numbers, brands, pre-paid cards, account sites, credit access, and a whole individual system

from a normal mobile company. The technology connectivity still being maintained by the prior telecommunications provider now divides their commercial work. This provider won't greatly matter, but the important thing is to maintain a quantity of users in the provider network which will work efficiently.

Figure 5.4 presents the technologies convergence in different services simultaneous, defining the ensemble market to the actual telecommunications sector. It knows of the limitations and possibilities, as for example, when television will be run by an internet connection (Santos et al, 2008; Shin, 2005), occupying another interesting market (Buskirk et al., 2007). With the Wi-Max advent (Martikainen, 2006), it will be possible to connect through the internet from anywhere with the system coverage, accessing internet bandwidth inside a car, in the middle of the street, using a notebook, PDA, or other wireless equipment (Sanmateu et al., 2002). A small PDA with integrated VOIP software will use voice communication without costs or fees in the sector of telecommunications, based on internet access provided by the Wi-Max. It would be unfair competition in the mobile communication sector, so all these factors would have to be measured when the project takes place in the future market competitiveness.

The factors will be evaluated carefully which make the development of small business and small companies in each area difficult. Specialized companies, developed like this, in small areas that have as many advantages as the other's in that area.

The VOIP, for example, would be regulated as voice communication, which, if developed between two computers by an internet network, would be free of costs because it is an added value service. However, when the VOIP is complementing or integrating other services, with the technology applied in the intranet network of a provider, or integrated to a gateway converter to connectivity with a PABX, it has to compute all communication routes, taxing and charging all communication.

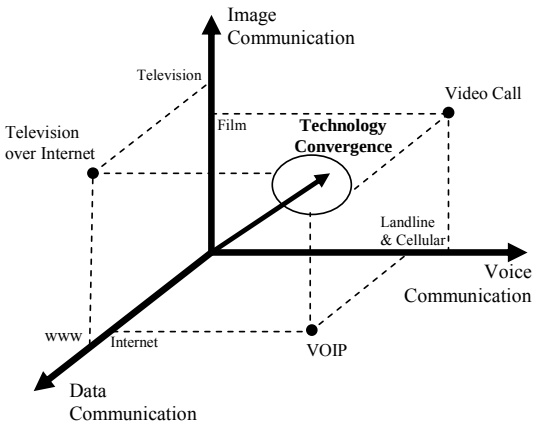

Fig. 5.4. Technology Convergence in the Telecommunications Sector.

Inside the intranet with a guaranteed bandwidth, QoS could be applied guaranteeing the quality of communication. This level of quality doesn't exist yet in the internet, so when a dedicated link develops the communication, it can charge by the service developed. The cost will still be less for the user and will be back profit to the company responsible, as well as guaranteeing a fair competition to both telecommunications companies, that either use or don't use the VOIP technology.

To regulate and to control the protocols which are being used by the telecommunications companies two possibilities proposed by the study.

5.4.1. Propose 1

A managerial network service could be inserted in the service providers network, guaranteeing that all communications would be evaluated in parallel and all protocol related with VOIP would be evaluated automatically as well. It could verify their destinations and origins to compel providers to develop proxies blocking the unauthorized internet voice protocol traffic. If the final IP number is a router without MAC address, this would automatically be a convergence proxy charged by their use. The use of computers using communication via internet, or dedicated without QoS, should be registered by the free software offered, even when the VOIP provider is free without costs.

The only way to maintain and guarantee the order is by registering all software making a commitment to provide the necessary regulating data for each call when it is not targeted to another PC. All systems using VOIP protocol that are not registered or authorized must be blocked in the international network (Cherry, 2005). This way the security of communication and the rules will be guaranteed.

Data links rented or sold to subcontractors should be controlled by the protocol used. Even with the privacy factor, this data will not be read but rather will allow the intranet VOIP between branches. The communication would allow the use of business, development, as well a reduction of internal costs. However, these companies cannot commercialize the bandwidth remainder to sell voice communication to consumers taking advantage of their network.

Two factors should be verified. The first is that when there is not a QoS factor in the internet, it would interpret a professional service without a minimum of communication quality needed in the sector. Research and projects must be taken into consideration because they will guarantee the QoS in the internet, so in a short time this will be a new market also. The second point, already cited, includes the VOIP as an integrative service to the companies having a private data link; however it won't be allowed to commercialize the system without a prior authorization from the responsible authority department in charge of regulation in the telecommunications sector and not internet sector.

5.4.2. Propose 2

Another alternative would be to regulate and charge all long-distance services as VOIP and integrated conventional communication. A provider without the necessary integration to use VOIP should rent this communication from a competitor and receive a deadline to update their infrastructures to provide themselves the technology in the actual market. The item 2.7.2 describes very well how to proceed and define the long distance to be used always with VOIP protocol as seen in the figure 2.9.

The companies would update the market providing the best present technology. Since VOIP already is a technology that's been in the market for some time, it should demand that all providers are updated.

New technologies entering in the market and new protocol of VOIP capable of bandwidth reduction for transmission, which provides new adjunct services, shouldn't be authorized until a commission from the regulation department has decided how to best use this technology. It proposes that new technology should be free to internal use in the companies or in the internet to realize adaptation and market tests. However, the commercialization should be controlled and only companies requiring authorization presenting a cost benefit project or an enlargement of the services to the consumer should be authorized to provide the new technology in the market before the other companies.

Competing companies have the immediate use of the same technology at the moment which is decided by commercialization regulators (Yung-Ching and Tsui-Hsu, 2006), and should be demanded by all providers. In doing this, it will reduce the quantity of users, or integrated companies taking advantage of new technologies without the respective regulation, since every user should use the most current service. The companies not in agreement will be taxed and prejudiced by the practice of low costs with the prior technology (most expensive), because it would be wasting money and efficiency in the market.

5.5 DISCUSSION AND CONCLUSION

This chapter shows how the regulation is important to guarantee a good competition among telecommunications providers allowing that new companies joint it this market inserting new products and technologies. The main problem existent is based on complexity of these technologies which difficult the best use by consumers as seen in previous chapters. These consumers see the bundle as a product where they have many uses integrated, but the regulation evaluate it separately creating rules for each service as an independent system without evaluate that the Systems Integration (SI) and the Technology Convergence (TC) are present in all services providing complements of services with low costs inside of the companies with none or low transference of savings to the end user.

Should be inserted clear rules for whole world on telecommunications, because countries in development don't use the opportunities to reduce costs and get more competitive in the market as made in US and Europe. For example, in Brazil, these costs still high and few companies can work with a good competition based on the existent lobby.

As the use of services with convergence sometimes has propagated an increase of lags and gaps in the correct usage of the technology some attention for the correct use and a regulation more appropriated should be updated constantly maintaining a good use of technology and a fair competition in the market.

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Chapter 6

Social use of Technology, the IP-World and the Future

Chapter 6 - Social use of Technology, the IP-World and the Future

Objective: This chapter consolidates all presented studies previously discussing the results of the founded problems in social usage for the proposed technology studied and the individual users. It contains comparisons from all created developments in this thesis with new perspectives and proposals for future researches. It reflects the systems usage problem existing in the companies described in chapters one, two and five as well as the personal usage problem discussed in the chapters three and four. It also discusses future problems due the introduction of future technologies to the telecommunications sector if it's not well regulated.

Key-words: Technology Usage, Convergence, Regulation and New Developments.

6.1 INTRODUCTION

This chapter comes to join the presented studies related to the technology preference, convergence tendency, the future related with new technology usage, and the regulation of telecommunications sector. Chapters 1 and 2 presented that the facility to integrate solutions and to provide the same kind of services in a different way, factors which are related with the technology, are the intrinsic relationships existent in the sector. The extrinsic factors are related to preferences based on beauty, cost, launch, and innovations of the product besides marketing, which joint the modernization to the need of use not proved to the users.

One tendency of the market is directly connected to the convergence to generate multiple usages reaching several consumers. This way, the user's necessity or preference can be found in these technological products of multiple uses. There are also the users that try to be technologically updated to feel themselves fashion or happy with the product possession (Belk, 1988).

Chapters 3 and 4 cite details of possession (Belk, 1988), devotion (Pimentel and Reynolds, 2004), involving some brand, hedonic values (Okada, 2005), and the need of all-in-one used in the market as bundle products (Nunes et all., 2000; Harris and Blair, 2006). Chapter 1 and 2 also show the bad use of products in the market based on product complexity (unknown usage) related with marketing and technology (Malhotra et. All., 2004; Wuyts et all., 2004), systems integration (Hobday et all., 2005), and the self-realization theory (Wright, 1908). Chapter 5 shows the entire lack of regulation in the telecommunications sector. This deficiency has occurred since a long time ago until our days, relating the interpretation or ambiguous possibility lacks (De Boer and Evans, 1996; Maeda et all., 2006). Concluding the study or as a final decision factor to this chapter, everything cited is resumed to justify a need or a usage when these products don't present themselves as necessaries (Okada, 2005).

Chapter 6 expands the whole qualitative or quantitative concepts previously presented to show a model acting constantly and parallel to the other hypothesis. The complexity involved in the

technology usage is attributed to the kind of technology, the integration of multiple services, and the regulation not well implemented. The calculated values which attribute the maximum and minimum costs for each service should be evaluated in the case when different services result in same results, as for example, when a call is made for long distance between two landlines and between two lines using VOIP. The competition is unfair based on the VOIP services without regulation and considered as an aggregated service to the internet network, instead of common voice communication.

Some linkages should be affected guaranteeing the quality of service and the efficiency, besides being fair for all users and providers. This chapter presents, in a general way, the factors that should compete for implementation, regulation and competition strategy in the telecommunications sector.

6.2 Services Application Model to the telecommunications sector

Based on telecommunications sector, the existent services to communicate voice and data should follow conjoint patterns confirming the contribution of differentiated services to the same communication purposes. Usages, as well as preference, are modeled factors in the process and should be evaluated.

Figure 6.1 presents the model of systems integration and regulation to the telecommunications sector, focusing on sectors related with producer, provider, services, government, and consumers. Figure 6.2 Updates figure 1.7 presented in the chapter 1. This figure was modified including multiple operations in the same provider. This way, besides the LCR among the technologies, the system now compete among providers doubling the routes for each new provider included based on the same solution (See figure 6.3 about multiple routes).

With such inclusions of new routes being made, the correct use of the technology can now be guaranteed, being only attached to the choice desire where design, marketing, fashion, and others, have some influence over the preference. The presented model in the figure 6.1 should be used to evaluate the market and to validate the presence and continuo usage of multiple services, guaranteeing fair prices and adequate competition. The choice based on fashion (Katz and Sugiyama, 2006) would be reduced as soon as the real cost benefit was identified to the consumer.

Regulation models that show real values of quality should be projected to the consumer as rigidity, and cost benefit, identifying what each product can really propose based on the service that will be used.

It is not worth it to demonstrate a mobile having 5.0 mega pixel camera if this feature is not sufficient to present the quality of pictures (details of lens that make some difference from a camera to a mobile are missing).

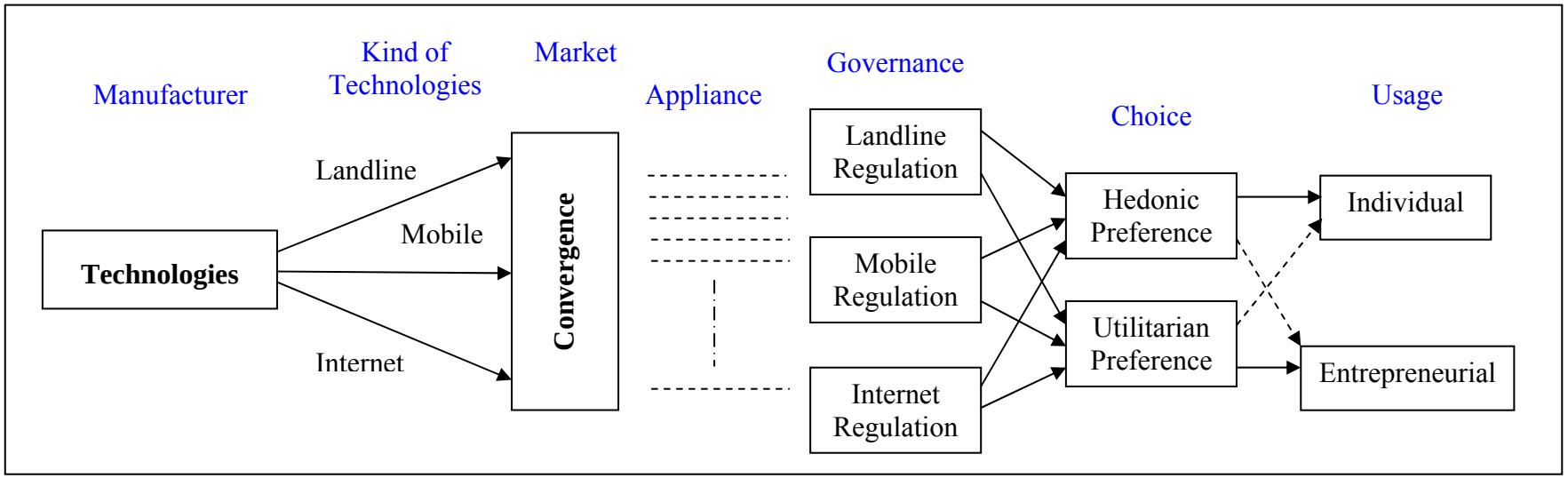

Fig 6.1 Systems Integration and Regulation Model.

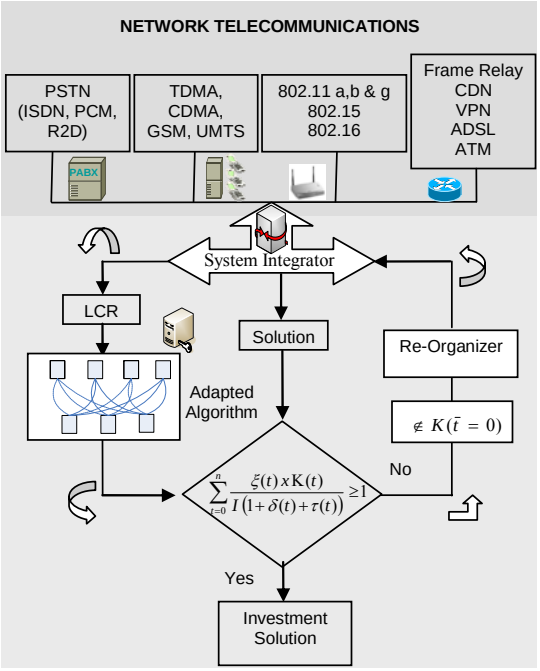

Fig. 6.2 Systems Integration Updated

As in the health area which in some countries have advertisement showing the problems behind the cigarette, the wrong use of the technology should be obligatorily presented, leaving the users updated about the reality existent in each product which they are proposing to purchase.

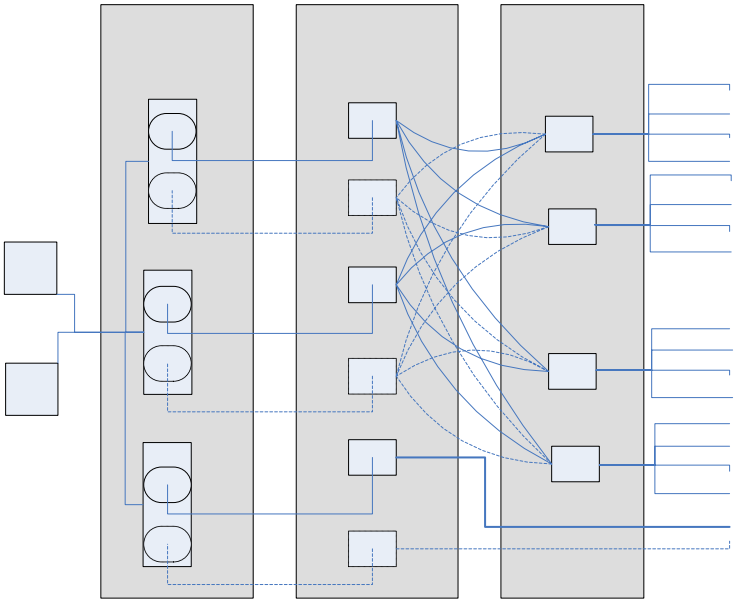

Fig. 6.3 Multiple LCR Diagram

Figure 6.1 proposes the usage of the service regulation instead of the technology, because the usage will decide the applied market and not the technology proposed. The actual regulation

was developed to landline, for example, before this service becomes integrated or not, as well as being converged with different services, so, how to define the cost if I can traffic communication using multiple services. The regulation can be individual for each service, but should foresee the conjoint usage and calculate the integration as seen in the equation 2.3.

6.3 NEW TELECOMMUNICATIONS SERVICES

The telecommunications sector advances faster than the written rules or evaluations. Nowadays, the mobile services tend to 3G systems, while others say that new patterns following the Chinese model WS-CDMA can be the next step. The wireless network called Wi-Fi, reached models that could exceed 100 MB/s based on the 802.11n protocol, but even this new technology will compete in the future with new wireless outdoor models as Wi-Max. The landline has a big doubt, because it is almost impossible to know until where this one will survive. Certainly it is known that every kind of communication will tend to internet protocol (IP), where this new IP world has superior quality and development compared to the conventional systems of voice, data and image. In the future all models of communication are supposed to traffic in the IP network with observed quality of service (QoS), guaranteeing the priorities being effected before any interruption point in the network.

In the actuality, a voice connection using VOIP software inside a PDA with Wi-Max connection can be effected, so, could the Wi-Max compete with the mobile service?

This kind of connection is not current yet, due to the fact that the Wi-Max service doesn't work in several cities, but the technology allows this connectivity, and in the future when PDA companies develop simple environments to users using 802.16 protocol technologies, this competition will start.

Several services should migrate their operation and with this a market prediction should become operational in order not to allow companies to lose their investments after having invested so much in certain markets. It is also a responsibility of the state to predict adjustments to the developed market and not allow an uncontrolled or a disorganized use of technology. Incentives and supports should be predicted guaranteeing sustainability and fair competition in the sector to new and old providers. Figure 6.4 presents a communication model among the branches of a company using voice and data network, and after that using just an IP network for both services.

The determination of which technology to use is based purely on economic analysis, instead of technology source, because it starts from the prerequisite that, technologically, only products with high quality of service participate in the process of choice. Now it evaluates the financial quality analysis that should be the optimization of the service proposed for best performance of cost, as seen in chapter 1.

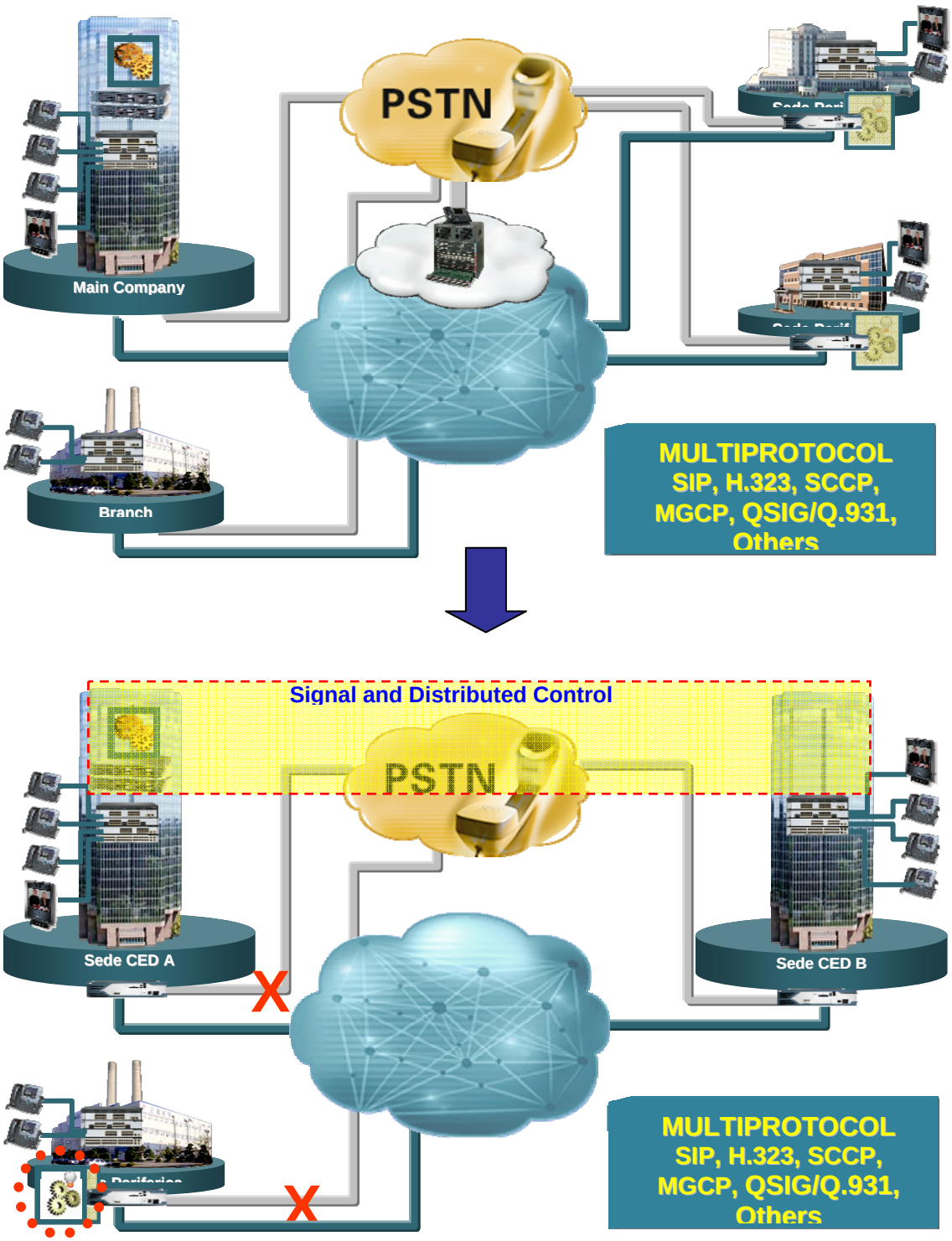

Fig. 6.4 Communication among branches using network and landline separately to decide a future use based on IP.

The application has to follow the company strategy models developing a better routine to a daily local operation. The company administrative process will be better attended when the

technology is developed for its necessity, evaluating which models correspond to a good technologic result deciding later which service economically develops the requested with lower cost.

The individual usage is still a problem, because it cannot push the client into buying something that is the best for the expertise. According to chapters 3 and 4, it evaluates consumers as hedonics; so, these ones prefer their products based on appearance, fashion, market motivation and other similar aspects, which cannot optimize the cost over the usage. The new technologies, developed to individual client groups, should follow the multiple user model where consumers need the device based on its finality which to it was developed, and the new consumers looking for integrations as a decisive factor.

Enterprises which seek to develop more the factors of design, products integration, service convergence, market image of the product and facility of use factors, will reach new targets, expanding their consumers and guaranteeing the development of new products (NPD) as well the update of them.

Computers with small displays shouldn't be easy or good for readings and writings, but a second factor which is the mobility, appears presenting this use as utilitarian. Many users choose new small notebooks based on appearance but justify by mobility. Small mobiles were also chosen by mobility in the past, but with new integrations these ones are justified by the necessity of a good display that guarantees to watch a video, or an internet connection with quality.

In the reality, fashion presents the rules of design, where the product should be pretty but the size will be adapted according the use proposed. There is a good possibility that some products will be substituted by others (Fisher and Pry, 1971) with less utilitarian quality even when the main objective is different.

Technology follows patterns of utilitarianism, hedonism, sociability and market integration, so, these are the main points that should be focused in the market research.

CONCLUSION

This chapter presents an afterthought from the previous thesis chapters, relating the extrinsic and intrinsic factors which have affected directly the decision of the technology usage. The enterprise sector presents answers and conclusions to correct and optimize the company cost-benefit based on updating and integration of services to the sector.

It is presented to the individual consumer that this integration is a result of existing problems based on cost-benefit optimization. As the level of use from individual consumers is low, these consumers have, most of the time, too much technology or integration which doesn't justify the

usage. The companies already have low integration based on the high level of diversified usage, so, these companies have all that is technologically necessary to guarantee their level of daily service and development, but rarely have an optimization in cost related to their complex network.

The technology market tends to be developed for multiple targets creating integrated products and services that logically will try to create new expenses to consumers. In the telecommunications area it is believed that the IP world, communication made entirely by the internet protocol, will be very soon the only and final solution to communication. All services could and will traffic by the network reaching the major existing distances with more adequate speed and costs. Some services will co-exist. However, others should be reduced or even extinguished.

Landline providers for example, should be extinguished in few years since they will adapt their business to sell VOIP and internet links. Mobile providers with their intrinsic mobility will maintain some market. However, with the outdoor wireless network development and the VOIP usage over this network or over Wi-Max network, the competition will provide some risks to mobile providers. Now the competition is on the development of best speeds and bandwidth in the mobile networks and mobility maintenance in the Wi-Max network.

In the actuality, the competition for high bandwidths to traffic in the 3G network is also tending to the new 4G model proposed. This model creates connectivity between 3G and Wi-Max besides other services and integrations. In China, the WS-CDMA starts their space in the market offering higher band in the mobile network trying to introduce their own concepts of 4G. As there is not a modeling to 4G platform neither criteria about the own technology, purposes of service and development marketing have been used to set the mobile market and maintain providers working by the maximum lifetime existent for each technology.

In general, this period should be excellent for the expansion in the telecommunications sector to return, to join techniques of business and marketing with multiple services besides regulation techniques as portability (Bridgman and Barry, 2002), which will guarantee the development of competition to mobile sector.

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FINAL CONCLUSION

The dissertation objectives have been developed successfully. The qualitative studies fulfilled a large part of the existent studies in the area related with the technological and economic points of view. The quantitative studies showed and supported a major part of the hypothesis, leaving some lacks because of clearer and bigger scenarios missing to guarantee the closing of all possibilities. In general, the main study has complemented and presented the extrinsic problems of the technology, as the wicked regulation developed by regulators, the wrong motivation made by the evolved market, and the misinformation developed by telecommunication providers. The intrinsic problems related with the technology complexity, the integration of products, and the convergence of services, were also focused on this thesis with clear ideals and definitions.

The extrinsic and intrinsic conjoint factors that generated usage and preference simultaneously without any relevance about the product or service cost-benefit, besides not providing any efficiency to the desired solution or developed product in the market, were very clear in this thesis and were measured in different ways in the diversified chapters presented.

Chapter one presented the technical construction for our technological solution of the case evaluated, concluding a mathematical formulation that was developed to introduce, in a general way, how to apply the same procedures to other companies without needing too much time or a more complex analysis, based on outline terms of the fixed, mobile and data networks, creating databases for cost information and of data inclusion of the company to be evaluated. In this way, the forecast analysis can be developed to define which solution best adapts to each case analyzed. There is, of course, not only one solution and neither an average proposal, due to the constant developments in telecommunications, but one proposal was inserted.

Chapter two has suggested a new perspective based on Self-Realization Marketing to analyze value creation process by telecommunication companies. In particular it has been shown that new technological solutions and convergence market effects can be emphasized by transforming them into new self-realizing realities and benefits for clients. At the same time this chapter has widely demonstrated that Self-Realizing Marketing can offer suitable solutions to those companies actually taking profits of the inefficiencies of regulations. As a matter of fact this chapter has discussed different solutions that governments are likely to adopt in the next future, thus removing artificial advantages for some competitors.

Chapter three showed that different uses for different users is the most important factor for the development of a new market for individual consumers, which proposes two important thoughts: (1) the quantity of integrations has to be preferential in hedonic features, supporting both consumers, hedonic and utilitarian, increasing the product market to this sector; (2)

consumer devotion is a possible extension to brand equity based on loyalty to this case, so it is clear that other brands with a good perspective in the market can use this study for their NPD programs. It creates innovative devotion with convergence in their prior products.

Chapter four presented three different studies using quantitative research measuring the preference, usage, and frontier factors about telecommunications products as mobile phones with their integrations. Were measured the individual preference based on hedonic and utilitarian values which have contributions from different factors as: prior knowledge, complexity, prediction of usage, price, brand, choice, and budget. Different scenarios being delineated, consumers chose for hedonic products as main use.

Chapter five showed how the regulation is important to guarantee good competition among telecommunication providers allowing new companies to join this market, inserting new products and technologies. The main existing problem is based on the complexity of these technologies which makes difficult the best use by consumers as seen in previous chapters. These consumers see the bundle as a product in which they have many uses integrated. The regulation evaluates it separately creating rules for each service as an independent system without evaluating that the Systems Integration (SI) and the Technology Convergence (TC) are present in all services. The SI and TC are providing complements of services with low costs inside of the companies with low or almost no transference of savings to the end user.

Chapter six concludes presenting an afterthought from the previous thesis chapters, relating the extrinsic and intrinsic factors which have affected directly the decision of the technology usage. The enterprise analysis presents answers and conclusions to correct and optimize the company cost-benefit based on updating and integrating the services to the sector. The individual consumer analysis presents itself having this integration as the main problem based on cost-benefit optimization.

Even if quality and utilitarianism are important factors of intention and preference, fashion and hedonism pretend to be higher as final decision for consumer behavior on most of technology products as seen in this thesis by mobile products and services evaluated.

As the level of usage from individual consumers is low, these consumers have, most of time, too much technology or integration that doesn't justify the usage. The companies already have low integration based on the high level of diversified usage, so, these companies have, most of time, the all necessary technology to guarantee their level of daily service and development but it is difficult to have a cost optimization related to their complex network.

Concluding, the voice communication products and services are not hedonic tools but have been used as such. This way, advertisement campaigns have to be developed to suggest and inform

the real need to use new technologies, leaving consumers free to decide and, companies free to get some profit from this extrinsic value creating new products for new and different uses.