Aalto University
School of Business

Technology-driven industry evolution in the telecom sector: The comparative case of Ecuador

MSc Degree Programme in Strategy

Master's thesis

Jose Valarezo Garcia

2014

Department of Management Studies
Aalto University
School of Business

Aalto University School of Business
Master's Thesis

ABSTRACT

José Valarezo

Technology-driven industry evolution in the telecom sector: The comparative case of Ecuador

PURPOSE OF THE STUDY

The purpose of this case study is to analyze the current situation of the telecom industry in Ecuador and its tendencies as part of the Telecom, Media and Technology TMT industry. The analysis is mainly linked with the effects at the industry and business levels of the widespread of mainstream products and services in the TMT market in the case of Ecuador, benchmarking it with the global context. The case study elaborates on this objective before by addressing the following question: How the widespread of mainstream products and services in the TMT market are and might continue shaping the development of the telecom industry in Ecuador in the next decade and how does it compare to the global environment?

STRUCTURE OF THE STUDY

A brief review of the telecom industry evolution and its present and future challenges are provided in the first chapter, as well as the specificities of the development in Ecuador are introduced in the same chapter. In the second chapter, the predominant approaches about organization development and change are discussed openly with the aim to gain a concise but global perspective in this matter, setting the theoretical framework. Before developing the study case, a compressed review of the telecom ecosystem as part of the TMT industry is provided in chapter three in order to identify the forces driving the industry. Chapter four presents the methodology used in this study and then the case study is developed in chapter five, in which I attempt to depict the current situation of the telecom industry in Ecuador and its tendencies as part of the TMT industry, while reflecting on the theoretical framework presented in the literature review section. Finally a general discussion of the findings and conclusion are provided.

CONCLUSIONS

In this thesis it has been evidenced that the development of the telecom industry in Ecuador has been boosted by the widespread of mainstream products and services in the TMT market including broadband fixed and mobile internet, smartphones, social

networks, HDTV, e-commerce and OTT content. The deployment of next generation networks represents a technological discontinuity that cannot be overlooked by firms, and become determinant for the future performance of firms.

KEY WORDS

Industry evolution, telecom ecosystem, telecom, media and technology industry, information and communication technologies, information society, knowledge economy, disruptive innovations, broadband, next-generation networks, triple play service.

ACKNOWLEDGEMENTS

I want to thank god because he has gave me everything and the opportunity of witting this thesis and of course to my family Vinicio, Gretty, Andrea and Natazha that is my source of motivation and that have supported me throughout my life. I would also like to thank to my good friends Cruzkaya, Mika, Matias, Manuel and Anis that accompanied my studies during my fruitful stay in Finland. Finally I would like to thank to all the staff of Aalto University that shared their knowledge and time with me.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

1. INTRODUCTION

1.1 Background

Despite the history of telecommunications can date back since the use of smoke signals and drums, we can assume that the first engineered telecommunications system was the semaphore system. Certainly these systems before were not scalable for their limited use and cost, thus we can consider the invention of the electric telegraph in Europe during the first decade of nineteenth century as the beginning of a series of technological advancements that have transformed people's lives (Huurdeman, 2003, pp. 14-24).

It was not until the mid of the nineteenth century that the use of the electric telegraph, improved to print the transmitted message, spanned over North America. In the late 1870s the new invention for voice telecommunications, the telephone, patented by Alexander Graham Bell, was rapidly deployed in both sides of the Atlantic with telephone exchanges deployed in every major city in the United States during the first decade since its invention (Huurdeman, 2003, pp. 48-195).

Other important technological advancements constitute the transmission of audio and video over the wireless medium by means of electromagnetic waves which happened during the first and third decade of the twentieth century respectively. These technological advancements gave rise to the radio and television broadcast systems. With the widespread and popular telephone systems, and the introduction of radio and television broadcast systems, the next technological improvements were focused to cope with service coverage during the next decades until around the mid-twentieth century. Microwave links for instance allowed extending the coverage of these systems for long distances and remote areas. Moreover, differentiated services such as paid television service provisioned over coaxial cable, offering a wide variety of specialized channels including sports, movies, music, children, etc., became a strong market practice.

Nonetheless, with all these advancements in place, transatlantic telecommunications constituted the big challenge. Transatlantic commercial telephone service was only possible around 1930s using radio transmission systems which had a limited capacity

until the first transatlantic cable was completed by 1956, which trebled the capacity of transatlantic communications (The Telecommunications History Group, 2014). The next important technological advancement for long-distance telecommunications was the launch of satellites to the earth orbit around 1960s, which in principle improved the reach and coverage of terrestrial antennas. Taking advantage of these characteristics before, satellites served as relay links for long-distance intercontinental telephone service. After some adaptations satellites also served to provide television, Internet access and mobile telephone services.

Now that the Internet and mobile communications have been mentioned, it can be certainly acknowledged that these inventions transformed people's lives. On one hand, mobile communications were developed in 1980s as a solution for mobility over wide areas and internationally. Mobile communications represented a new paradigm that consisted in communications from anywhere at any time. Mobile communications started as a means of voice communication but today can provide all types of telecommunications services over the radio cellular system including telephone, television and Internet (Huurdeman, 2003, pp. 519-540).

On the other hand, around 1970s in the United States the Internet started as a computer network project named ARPANET that allowed digital computer-based terminals to connect remotely and transfer data using the Internet Protocol IP, and today has become the most powerful medium of communication and information. Before the start of the Internet, the commercial telecommunication systems were primarily analog, used dedicated circuit-switched channels to establish connections and offered primarily one-way communications and limited data-based services. Since about 1990s, several data-based services available worldwide are provided with the Internet, including file transfer, email service, and all web-based applications. Taking advantage of the digitalization of communication devices, thanks to the wide development of transistor-based electronics, the Internet employed a totally new logic of switching technology known as packet-switching, which allows using and sharing network resources more efficiently than circuit-switching technologies.

1.1.1 Challenges of next-generation telecommunications

The evolution of the telecommunications industry have provoked certain situations, including a vast data-intensive services and applications available on the Internet, the demand of high-definition television and multimedia services, the existence of various telecommunication systems and technologies and so on, which have required to upgrade the legacy telecommunications networks to the next-generation networks. Acknowledging these issues before, next-generation networks are primarily meant to provide solutions for technology convergence and quality of services (Hacklin et al., 2009). With respect to convergence of technologies the natural evolution clearly seems to be the convergence of telecommunication technologies to All-IP technology, that is, the convergence of all types of telecommunication networks to the Internet Protocol (Talukder et al., 2014). With respect to the quality of services, the main challenge of the telecommunication industry is to cope with the industry technical bottleneck such as the limited user-to-network access speed (Flournoy, 2004).

The access speed has been the industry bottleneck since the beginning of the Internet and mobile communications. In the beginning, the access to the Internet was provided over the twisted pair telephone line, a narrowband technology known as Integrated Services Digital Network ISDN, which resulted enough to provide added value services to the conventional telephone service, such as PBX-like services, but slow to access to the Internet. Soon the so called broadband technologies like Digital Subscriber Line DSL technologies substituted the ISDN technology for accessing to the Internet, which reached much higher access speeds over the same twisted pair telephone line that are still used nowadays. Internet access over coaxial cable networks has been very popular as well thanks to its good access speeds comparable or higher than DSL technologies. However, DSL and cable modem technologies are lagging behind the ever increasing access speeds required by fixed line subscribers, and the spread of Fiber-To-The-Home FTTH technologies has started in the last years. FTTH technologies constitute the main part of fixed-line next-generation networks and are not based on transmission of electrical signals but on conveying information through optical signals propagating over a fiber made of glass that can reach unprecedented access speeds (Corning, 2005).

With respect to mobile communications, the second generation 2G mobile networks were not anymore analog as the first generation 1G mobile networks and therefore achieved better Internet access speed thanks to the higher resolution of digital transmissions against environmental interference and noise. The third generation 3G mobile networks offer an improved access speed thanks to the use of a more efficient access technique and an extended wireless spectrum band. However, the data rates achieved by the third generation 3G mobile networks are not enough to cope with the quality demands of data-intensive and time-sensitive network services and applications like peer-to-peer file sharing, cloud computing, teleworking, high-definition TV, video on demand, multiplayer gaming, and some others. In this sense, next-generation mobile networks, that is, the fourth generation 4G mobile networks, have been developed to support these services and applications before while supporting mobility (Rummey, 2008).

One of the most important characteristics of next-generation networks is that they have the potential to cope with the technical bottleneck of the telecom industry, such as the limited access speed, at a lower total cost of ownership than previous network technologies. Next-generation networks enable the convergence of various transport network technologies into one packet-based high-speed network technology with differentiated quality of service to support high-quality triple play service and to offer unrestricted access by users to different online service providers. This before has important implications at different levels including telecom operators, network users, the information society and the knowledge economy.

Telecom operators can attain higher value of existing customers and increase the rate of growth of network users by offering appealing products and high-quality services at reasonable prices. Next-generation networks enable the convergence of triple play service including telephony, high-definition television and broadband Internet into a single pipe, that is, a single unified competitive telecom network ready to deliver high-quality triple play service at a lower total cost of ownership than previous network technologies. In the same way, network users are technically-wise unlimitedly empowered to become the main source of innovation, creating their own entertainment, enhancing the community interaction, using multimedia communications, getting informed and sharing files, learning and carrying out person-to person commerce and of

course enjoy conventional network services delivered with high quality and improved user experience.

On the other hand, the information society and the knowledge economy can experience fast development as a result of an increment of the network users that become part of them. Next-generation networks technology become strategic for policy makers and society planners in order to pursue their policies and plans effectively and to achieve the desirable environment for the society. Next-generation technologies are shaping the global economy and society, they give rise to new forms of education and bring new opportunities of interaction that can improve lives' standards; however, a clear understanding of how next-generations networks might shape the global environment in the next decade is fundamental for governments to articulate policies and plans with desirable outcomes (Manyika et al., 2013).

1.1.2 Contextualizing development in Ecuador

Ecuador is located in South America and is crossed by the Equator, belonging in this way to the Latin American and Caribbean economic sector. Ecuador is categorized under the upper middle income countries according to the World Bank with Gross Domestic Product GDP of 90,02 USD billions in the year 2013 and a population of 15,74 millions of people living in Ecuador by 2013 (World Bank - Ecuador Home, 2014). However, Ecuador is currently below the region's average and the upper middle income countries' average in terms of Gross National Income GNI per capita.

Based on the data available in the web portal of the World Bank (World Bank - Ecuador Home, 2014), Ecuador has grown 0,78 points faster than the region's average from year 2000 until year 2009 with positive average compound annual growth of 3,8%; and it has grown on average about 1,44 points faster than the region year after year since 2011 until 2013 with positive average annual growth of 5,22%, except in the year 2010 in which it grew 0,34 points below the region's average but with positive annual growth of 3,5%. Furthermore, according to the World Bank, it has been forecasted that Ecuador will grow 1,08 points faster than the region's average from year 2014 until year 2016 with a positive average annual growth of 4,53%.

It should be mentioned that the global financial crisis that affected the region in the year 2009 did not contract the Ecuadorian economy but it decelerated abruptly the economic growth almost to cero. However, the Ecuadorian economy performed better in light if the global crisis than the other developing countries in the region, which could not avoid the contraction of their economies on average (World Bank - Ecuador Home, 2014). Despite this before, Ecuador had a slower recovery from the crisis than the other developing countries of the region which caused that the year 2010 was the only one in which Ecuador grew below the region's average as mentioned before.

Additionally, as it can be noticed, the average annual growth from the year 2014 until the year 2016 of the Ecuadorian economy is expected to decelerate with respect to the years from 2010 to 2013, since the financing of emblematic ongoing hydroelectric and energy projects, that will make Ecuador self-sustaining in terms of electricity, are causing a significant deficit in the State budget (El Telegrafo, 2014). At the moment the only option seems to be contracting more loans to tackle this situation until these emblematic projects start to supply energy in 2016 as planned (El Telegrafo, 2014), which will in turn save important monetary resources to refinance the State budget.

In this sense, the public budget is particularly important for the Ecuadorian economy since the major source of growth in the last years has been the increase of the public expense and investment that has raised from 21% of the GDP in the year 2006 to 44% in the year 2013 (World Bank - Ecuador Home, 2014). This before has been primarily possible thanks to the more efficient tax collection, the renegotiation of the oil contracts with more favorable conditions for Ecuador, and the repurchase of State debt at low price. However, despite these adjustments to the fiscal policy have given good economic results for Ecuador, reducing poverty, measured by income, from 37,6% in 2006 to 24,5% by June 2014 (World Bank - Ecuador Home, 2014), the main objective of the actual government, such as to continue both the stable growth and inequality reduction, is threaten by the volatility of international oil prices and the short amortization of loans.

In order to tackle these treats before, the government urges to capitalize the benefits of the public investments in energy, infrastructure and competitiveness in general. For this aim the government is promoting the change of the production matrix to evolve from an

extractive economy to an industrialized and value added economy. However, to realize this before, apart from better infrastructure and more competitive production factors, the country requires trained human capital and the commitment of the private sector which seems to be the main obstacles for this intent. In light of this, the Ecuadorian economy will depend longer from the oil extraction of new reserves and also the extraction of minerals until the change of the productive matrix becomes true.

On the other hand, with respect to the ICT developments in Ecuador, the World Economic Forum WEF in its "Global Information Technology Report 2014" (Bilbao-Osorio et al., 2014) shows that Ecuador is among the ten countries that is bridging the digital divide much faster than others, but its current ICT development and impact is below the average yet. However, Ecuador scaled 9 positions in the Network Readiness Ranking from the 2013 year report to the 2014, with a net score increment of 0,27 points, which means that Ecuador will be in the next year about the average in terms of ICT development and impact if the tendency continues. With respect to the Latin American and Caribbean region, Ecuador and Peru seem to have started the journey to achieve the development stage of the LATAM countries at the forefront of ICT development in the region such as Chile, Panama and Costa Rica.

For this aim before Ecuador requires to tackle main problems in the current environment that are not letting the sector to unleash its full potential. In this sense, according to the "Global Information Technology Report 2014" one of the main issues in the Ecuadorian environment is the complexity and slowness to start a business and to enforce a contract, as well as the lack of independence and efficiency of the judicial and legal systems. Other important aspects to improve are the mobile coverage, the affordability of telecom services, the usage by individuals and the economic impact of ICT. On the other hand, Ecuador should continue emphasizing in aspects where it is at the forefront in the region such as the government procurement of advanced technology, the availability of venture capital, the international Internet bandwidth, the business innovation capacity, the government ICT usage in general and the social impacts.

In addition to this before, Ecuador should continue improving the efficiency and quality of its education system to achieve higher level of literacy and more solid knowledge in

math and sciences, which will prepare the ground to fully integrate the Ecuadorians to the international knowledge-based society.

1.2 Approach and purpose of the study

The purpose of this case study is to analyze the implications at the telecom industry and business levels of the widespread of mainstream products and services in the TMT market in the case of Ecuador, and benchmark it with the global context. In the literature there are various studies in the context of Information and Communications Technology (ICT) convergence and next-generation networks technologies in which the authors have addressed the subject from both the technological point of view (e.g. Hacklin et al., 2009; IPv6.com, 2008; IMS NGN Forum, 2008) and the business point of view (e.g. Kowalke, 2014; Yovanof & Hazapis, 2008). In an effort to provide a complementary point of view of these previous studies, in this thesis I present a revision of the telecom ecosystem, as part of the TMT industry, in a developing country such as Ecuador, assessing the impulse injected by the widespread of mainstream products and services in the market. The research question that will be addressed in the study is the following:

- How the widespread of mainstream products and services in the TMT market are and might continue shaping the development of the telecom industry in Ecuador in the next decade and how does it compare to the global environment?

In order to address this question before, in this thesis I first present the theories about organizational development and change in the industry in order to acquire a wide perspective of the forces that can be driving the industry development in the case of the telecom sector. Furthermore I provide an explanation of the roles and relationships in the telecom ecosystem as part of the TMT industry as well as the customer and product portfolio specifies of telecom operators in order to better understand the development forces arising from the customer side. Finally I present the findings of the quantitative study of the TMT industry in Ecuador and put it in perspective with the global context by analyzing how the widespread of mainstream products and services in the TMT market are and might continue shaping the telecom industry in Ecuador.

1.3 Limitations

In this study I do not analyze the technical issues and enablers of the underlying technologies, instead I focus on analyzing and evaluating the development of the telecom ecosystem as part of the TMT industry. On the other hand, this study is centered in the telecom industry in Ecuador, which requires focusing our view on the business, economic and social specificities of developing countries such as Ecuador: however, I compare the findings with the global environment based on other third party studies and data available in reports and summits.

One additional limitation of this study is given by its research approach that is, it basis its analysis on quantitative data available from official and specialized sources, but the final discussion and conclusion with respect to the future of the telecom industry in Ecuador is limited to my own synthesis of the findings and not *qualitatively* contrasted with the opinion of local experts or managers that could improve the overall perception.

1.4 Definitions

Industry evolution relates to the changes, modifications, adjustments and advancements that have shaped the industry for the production of goods and services since about the industrial revolution.

Telecom ecosystem relates to the actors, roles and their relationships that shape and sustain the telecommunications industry.

Telecom, Media and Technology TMT industry comprises all the industry sectors involved in the service and satisfaction of telecommunications, information, media and entertainment needs by using technological resources based on electronics.

Information and Communication Technologies ICT constitute computer-based technologies that enable the generation, processing, storage, and access to information together with the technologies that enable conveying multimedia information and all types of information formats over telecommunications networks.

Information society refers to a society that carries out economic, educational, social and cultural activities in great proportion by means of ICT, and uses information as the main object for interaction.

Knowledge economy refers to an economy where the know-how is the fundamental resource for generating value and attaining competitive advantage, and uses in great proportion ICT to create, spread and apply the knowledge.

Disruptive technologies constitute technological innovations that shake the industry, impact in the market significantly and may also influence people's lives.

Broadband relates to the technologies that enable accessing to the telecommunications networks with speeds that satisfy the quality demands of the data-intensive and/or time-sensitive services and applications in the network.

"Next-generation network is a packet-based network able to provide services including Telecommunication Services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers." (International Telecommunication Union, 2004).

Triple play service is a marketing term employed to promote the provision of voice, data and video services by one provider.

1.5 Structure of the study

The present study is structured in six chapters. The first chapter sets the ground for this thesis, the second and third chapters provide the theoretical framework based on the literature review and my own understanding of the topic, whereas in the last three chapters I present the methodology, develop the case study, and provide the discussion and conclusion respectively. In chapter one I briefly revise the history of the telecom industry and provide insights on the present and future challenges of next-generation telecommunications, as well as I describe the current development scenario in Ecuador.

The literature review is then carried out in the following two chapters. In chapter two I discuss the four predominant approaches that explain organizational development and change such as organizational ecology, industry life cycle, strategic management, and innovation and technology. This analysis contributes to understand how research has been focused about this topic, which in turn will provide a more systematic insight about the rationales that govern the industrial development and change. In chapter three

I will describe and explain the roles and relationships in the telecom ecosystem as part of the TMT industry, including the business models and the customer profiles in order to gain a clear view of the main factors that can drive the evolution of the telecom industry.

In chapters four and five I present the methodology and develop the case study respectively. In chapter four, I described the research methods employed in this thesis and provide additional information about the case selection, data collection and its analysis. In chapter five I start to develop the case study by analyzing the findings while reflecting and connecting them with the theoretical framework presented in the literature review and the global context. Finally, in chapter six I conclude and provide a general vision of the tendencies of the telecom industry in Ecuador.

2. ORGANIZATIONAL DEVELOPMENT AND CHANGE

Organizations are social entities that interplay with other organizations and social actors, and therefore are subject to the underlying forces of social change that operate at both the individual and collective levels, where the events causing the changes trace a sequence or cycle of development stages. In this sense, there is no unique theory about the rationales and sequence or cycle of development stages that explain organizational development and change; instead, the theories spectrum addressing this matter is relatively extensive as we will revise soon. In light of this, Van de Ven and Poole in their 1995 paper titled "Explaining Development and Change in Organizations," compressed the spectrum of theories addressing organizational development and change into four theories, depicted in Figure 1, that serve as building blocks to explain the process of change and development of organizations. The four theories include: evolution, life cycle, teleology, and dialectic. As we can see from Figure 1 these four theories have been arranged into a two-dimension chart where the horizontal dimension is the mode of change, representing the rationales that mobilize change, whereas the vertical dimension is the unit of change, representing the individual or collective levels at which the changes operate.

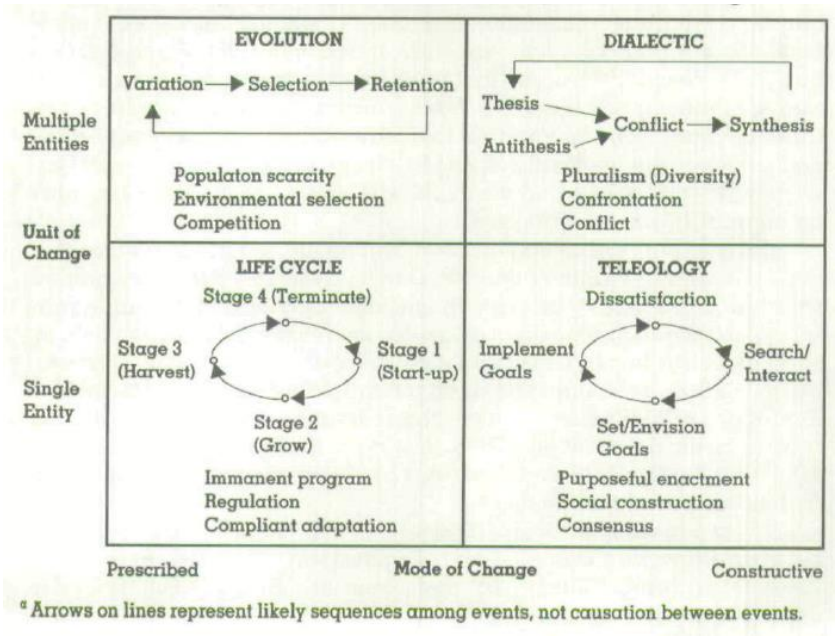

Figure 1. Process Theories of Organizational Development and Change. Source: Van de Ven and Poole (1995).

This first approach shown in Figure 1, the evolutionary approach, explains organizational development and change from an environmental perspective where changes operate at the collective level and are driven by competition pressures, and the organizational development process follows a repetitive cycle of variation, selection and retention that seems to be naturally prescribed. In this sense, the organizational ecology approach is the most prominent field of study in this area (Hall, 1982; McKelvey & Aldrich, 1983; Hannan & Freeman, 1989). The organizational ecology approach relies on the fundamentals of ecological research to link the organizational theories with the practice, allowing in this way higher stringency in terms of basic research criteria such as classifiability, generalizability, and predictability, which are hardly achieved under non-ecological organizational research approaches (McKelvey & Aldrich, 1983).

The second approach shown in Figure 1, the life cycle approach, seems to follow a prescribed mode of change not controlled by firms, similar to the case of the evolutionary approach. The life cycle approach considers certain imminent sequential stages of development, where firms and/or industries first grow and finally decay (Anderson & Zeithaml, 1984; Jovanovic & MacDonald, 1994; Klepper, 1997). It should be noted that the life cycle approach helps to explain the organizational development and change at both the industry and firm level, and it is not necessary linked to the individual level as Figure 1 suggests. In this sense, the life cycle approach is especially applied for the analysis of the industry from a collective perspective.

Under the third approach depicted in Figure 1, the teleological theory, it is sustained that the intentions, strategies and plans of the firms to compete and grow govern the organizational development process. In this sense, the changes are driven by the firms' constructive mindset and purposes about the present and future and not necessary by prescribed patterns, therefore, the teleological approach assumes that the organizational changes are strongly driven by the decisions made at the firm level. Under this view, the strategic management approach is the most prominent field of study in this area, which today seeks to study the fundamentals for sustaining competitive advantage in a market-based economy. Nonetheless, it should be noted that the notions about business strategy started since around 1950s and 1960s with important exponents who contributed with the grounds for what we understand as strategic management today (Drucker, 1954; Selznick, 1957; Levitt, 1960; Ansoff, 1965; Henderson, 1968; Andrews, 1971; Chandler,

1977), and its predominant popularity has continue shaping today's practice with the contributions of other more contemporary exponents (Hofer, 1975; Hambrick et al., 1982; Hambrick & Lei, 1985; Anderson & Zeithaml, 1984; Anderson & Tushman, 1990; Porter, 1985, 1996, 2008; Hill, 1988; Kaplan & Norton, 1996; Kim & Mauborgne, 2004).

Under the fourth approach depicted in Figure 1, the dialectic theory, the organizational development process is governed by the confrontation of ideas, originated in the diversity of thoughts. Under this view, the innovation and technology approach is the most predominant field of study in this area, where firms compete in order to gain the market preference in the products designs, leading to a dialectical confrontation of varied firms' propositions synthetized in the emergence of a dominant design until a new proposition confronts and breaks the existing technological path (Utterback & Abernathy, 1975; Katz & Shapiro, 1985, 1986; Farrell & Saloner, 1985; Anderson & Tushman, 1990; Utterback & Suárez, 1995; Christensen et al., 1998; Koski & Kretschmer, 2006). Therefore, under the innovation and technology view, the organizational changes occur at the industry-wide collective level and are driven by the constructive purpose of innovation and technological progress.

Considering that in this thesis I attempt to explain the development of the telecom sector in Ecuador as an effect of the technological evolution, relying on market analysis more than both an ecological analysis and an analysis of the firm strategies, in the next sections I do not study the fields of organizational ecology and strategic management, instead, I concentrate on the study of the other two areas such as the life cycle approach and the innovation and technology approach, in order to connect the theoretical framework with the analysis of the changes in the telecom sector in Ecuador from a technological evolution and market perspective.

2.1 Industry life cycle

Based on the observations of sales' volumes of industries, many scholars (Anderson & Zeithaml, 1984; Jovanovic & MacDonald, 1994; Klepper, 1997) have acknowledged the fact that the product life cycle PLC, widely used for product marketing purposes, provides an appropriate perspective to describe the evolution of the majority of industries. In this sense, life cycles not only help to determine the natural progress since

its birth until its death of something that is biologically alive, like humans and organism in general, but they also help to describe the evolution of existing things created by humans, like products and their industries. In light of this powerful information that the industry life cycle provides, many firms employ it as a contingency variable to consider the expected industry wide performance when developing their strategic plans.

The change of sales volume throughout the evolution of an industry commonly depicts four distinctive stages known as the introduction, the growth, the maturity, and the decline stages. Through these stages, the sales volume is low in the beginning but grows rapidly until it stabilizes and suddenly declines. Nonetheless, some firms and even industries renew or extend the product life by finding new uses for it, until a new technology or product substitutes it and a new life cycle commences. Similarly to the sales curve, the profits tend to grow throughout the life cycle, even though the prices tend to decrease and then stabilize, thanks to sales growth and the reduction of unit costs through experience curves (Henderson, 1968) and outsourcing of activities. However, in the beginning of the industry life cycle, the high expectations of the many entrants and the low sales generate zero profits or even temporary losses.

In the *Introduction stage* there are few or even a single firm offering a new product that provides an innovative unique set of attributes like for instance use, technology, application, design, performance, and others. The introduction stage can be analogically seen as the embryonic and infancy phases of a human, in which the firms first explore the market to build a trial version of the new product and then continue progressively tuning it based on the market feedback. According to Hofer (1975), during this stage firms strategies are primarily meant to satisfy the buyer experience of the product and to create an awareness and demand of the product through marketing, especially through advertisement. Some firms use a focused marketing strategy to first attract a sort of niche market that are people who like trying out innovations, which are known as "early adopters."

In the introduction stage, the production is commonly done in job workshops at low scale, with a low degree of mechanization of processes, experimenting the production processes and methods. However, in this stage is where first movers start to build competitive advantages by developing strategic relationships with its supply chain. In

this sense, it has been evidenced by Menzel and Fornahl (2009) and by Audretsch and Feldman (1996) that firms tend to locate within geographical clusters to be in close proximity of other firms that provide knowledge and technological support during the emergence of a new industry, this is especially the case of technology-based industries such as those domiciled in Silicon Valley in North America and also the ones located in Europe within the Great Yellow Banana and the Small Nordic Potato described by Koski et al. (2002).

As the name suggests, in the *Growth stage* the output rises at a good pace as the result of the attraction of a mainstream of new consumers to the industry accompanied by a decrease in sales prices. The product design undergoes a phase of stabilization with less product innovations, and the firms start to compete for the market share instead, looking to pursue strategies to position in the market, with some degree of market segmentation, focusing further on the satisfaction of the customer expectations. The production processes are scaled through the use of specialized machinery to cope with the increasing demand, and the supply chains become crucial for the growth of the industry.

In the *Maturity stage* the output growth slows and then stabilizes. In this stage firms tend to reinforce their strategies to position in the market sustainably, refining their management, increasing productivity in labor, improving efficiency in product marketing and distribution, and focusing in processes innovation with the main goal of reducing the overall unit cost and maintaining profit margins. In this stage the market share settles down and the dominant firms compete strongly in further differentiation of their products and support to consumers, seeking for the best cost-value relationship of the product for consumers.

As the name suggests, in the *Decline stage* the industry output decreases as well as profits, however, firms tend to find new uses for the products to extend their life, attaining further profits from them. This decline can be attributed to the reason that buyers find substitutes or better products with architectural innovations that make obsolete the actual one. In this stage the overall profit of the industry is widely reduced and the absorption of competing firms through mergers and acquisitions becomes an options for firms looking to extend the life cycle of a product. However, the decay stage

may also represent a stage of commoditization of the industry, where firms find difficult to differentiate their products, offering them at a low or minimum profit margin.

In general terms, the patterns of the PLC have been described, however, the most interesting pattern that this model allows to describe is perhaps the demographic development of the industry; in other words, the PLC constitutes an important contingency variable that helps to explain the demographic patterns of an industry and to formulate strategic plans according to the stage of the industry life cycle. It is important to notice that the population density curve (e.g. Figure 3) throughout the industry life cycle shows a similar tendency compare to the PLC curve (e.g. Figure 2), that is, there are few firms initially but the number increases rapidly until a turning point where it starts to decline and few firms survive in the long term. However, from Figures 2 and 3, one can notice that the population density curve is not in phase with the PLC curve, instead, the former usually experiments the highest point before the other over the time axis, which seems to be a natural pattern of the industry evolution.

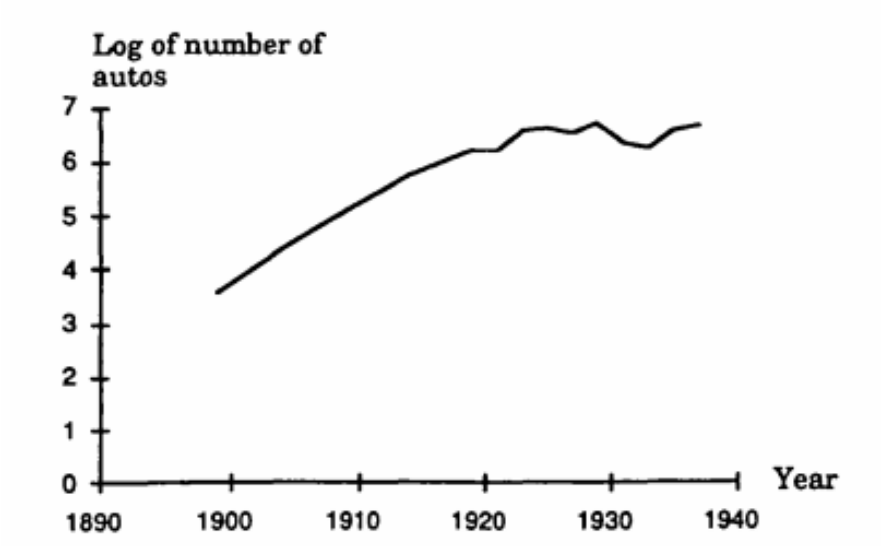

Figure 2. Number of automobiles produced in USA in census years, 1899-1937. Source: FTC (1939, p. 7).

In this sense, in order to characterize organizational populations' behavior, researchers under the organizational ecology perspective have given important attention to vital rates models to analyze the rates of entry and exit of firms within populations, and the conditions for growth and change. In this respect, one of the

most challenging tasks for research is to account for the variables and forces that affect the rates of organizational founding and mortality. Among the various possibilities of variables and forces that affect vital rates of organizational populations, the population density has been the main focus of researchers with the main hypothesis that the changes of a firm's survival and success depend strongly on the population density at the time of founding. In the same line, the mass-dependence model has also been proposed as an alternative of the density-dependence model in order to account for the impact of large organizations (Amburgey & Rao, 1996). In this sense, the density-based analysis has been criticized by Baum and Powell (1995) because of its poor accountability of sociopolitical legitimacy, and therefore, they sustained that it should not account for an ecological approach. Nonetheless, the density-based analysis was considered a valid ecological study approach that has the advantage of generalizability according to Carroll and Hannan (1989).

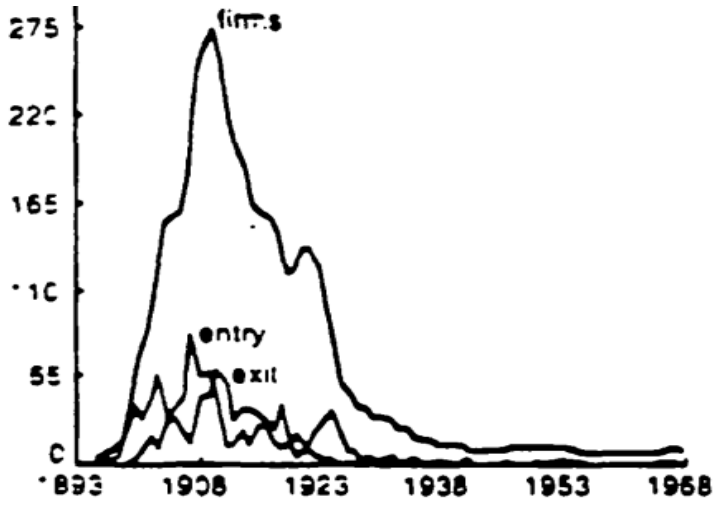

Figure 3. Entry, exit and number of automobile producers. Source: Klepper (1997)

Turning back our discussion to the PLC model, we can observe from these two figures above that in the introduction stage the sales are low, whereas the number of firms entering the industry is high, which can be partially explained due to the high expectations of returns that the new product or industry generates, and therefore, many firms compete to gain the preference in the product design on order to achieve high

sales and returns in the future. One can think that the actual challenges that the industry will face and the capacity required to cope with them are not well dimensioned in the beginning of an industry life cycle, and therefore many firms take the challenge at that point. Another important reason for the rapid growth of the industry population is that product innovations tend to be on a trial-and-error basis, and thus, large firms with R&D departments do not have a clear advantage.

In this sense, despite that the R&D capacity does not represent a clear advantage initially, during the growth stage it certainly does since the product innovations reach a high level of technique, especially in technology-based industries, requiring specialized R&D to cope with the fast pace of development and clear know-how to cope with the scaling production. These facts before together with the raising competition that firms face from an overpopulated industry raises the entry barriers and provokes that many firms incapable to cope with the challenges exit the industry, especially during the slowdown of the overall industry profits, leading to the so called shakeout, that is, the number of firms declines below 70% of the peak number and it does not recovered to over 90% of the peak according to Klepper and Miller (1995).

During the maturity stage, after the shakeout, the market tends to settle down and the number of firms stabilizes. The competition for retaining customers is high and usually focuses on price. In this situation newcomers find it very difficult to take a stake of the non-growing and profit-compressing market; however, few firms take the challenge, especially when the knowledge gets codified since the R&D barriers are lowered. Klepper (1997) noted that there is evidence that suggests that the firms that entered earliest to the industry tend to be the ones that capture the greatest market share and earn the greatest returns on investments.

2.1.1 Is the industry evolution captured by the product life cycle?

I think this question does not have a straight answer but instead it allows developing on the hypothesis about the life cycle(s) that can capture the evolution of different types of industries. This question is particularly important for business leaders in order to understand today's fast changing business environments, which makes it very important in order to sustain a market position.

Klepper (1997) finds that some industries evolution show life cycles that are mostly explained by the PLC, especially through their formative eras in which sales are low initially and many firms enter the industry focusing their strategies in product innovation and market creation, then the output grows rapidly and the entry barriers become higher leading to a shakeout of producers which turns competition from product innovation to process innovation, stabilizing the market. However, despite this model actually describes the evolution of many industries during their formation and development, after the number of firms stabilizes and the market share settles down, some industries experience certain behaviors that are not described by the PLC.

Despite the PLC describes appropriately the evolution of many industries, it does not seem to account for the impact of external environmental forces, such as the entrance of foreign competitors, the international trade, the widespread of the know-how and innovation worldwide, and the network economies. These forces can be observed in some industries, especially through the prolonged maturity stage, as a sort of turbulences with respect to the PLC causing a new impulse of innovations at the product and process levels, the entrance and exit of firms, and the redistribution of the market share.

For instance, in the case of the automobile industry in USA, in which the PLC has been very popular for determining and describing appropriately the formative and development patterns of the industry, the PLC does not capture the turbulences in the industry that occurred after 1960s since the entry of foreign competitors to the market in USA. Klepper (1997) notes that these turbulences were also observed for other products, where similar to automobiles, market shares tended to stabilize in the long term, and first movers took leadership of the markets until challenged by foreign firms.

These patterns not described by the PLC can be partially attributed to the fact that incumbent firms are often victims of inertial pressures after surviving to shakeouts and positioning in the market, since they tend to rely on their de facto standards, dominant designs, and operational efficiencies in order to secure their market share and future profits. However, this is not the case in fast changing business environments which require continual product and process innovation in order to sustain competitive advantage, even when the market seems stable. In light of this, some industries tend to

reach high degrees of specialization to cope with continual innovation and efficiency, and therefore, as shown by Greer et. al. (1999), as an industry grows over time firms find it profitable and strategic to outsource more activities to specialists.

In this sense, Klepper (1997) found that there are various industries with similar patterns that depart from the PLC. He exemplifies some industries like the disposable diapers, petrochemicals, zippers, ATMs, lasers, jets and others that even though their output growth is similar to the PLC, they show evolution patterns very different with respect to the PLC such as continual entry of new firms, adverted or reversed shakeouts, high survival rates of late entrants, non-pronounced first-movers advantage, and eventual loss of market share by leaders to domestic challengers.

According to Klepper (1997), these different behaviors that depart from the PLC take place in industries that reach high degrees of specialization that can be grouped at three industry wide levels such as the innovation of production methods, processes and equipment, the innovation of products, and the submarket segments. The first two groups of firms' specialization are focused on innovation, which in turn has been achieved thanks to the division of labor, letting technical specialists to carry out the innovations of production and products while leaving the marketing/manufacturing firms to take care of creating and supplying the demand. The third group of firms' specialization is focused at the market level, which is achieved by exploiting the needs of niche markets.

It can be observed that the specialization of firms within an industry provides alternative paths for firms in order to become part of it, maybe by providing innovation-driven services to the producers and traders of the final product or maybe by serving a market segment with very specific needs. This can in turn create an industry with more participation and opportunities for continual entry and aversion or reversion of shakeouts, but without clear advantages to first movers and leaders since the industry resources and key factors, like for instance innovation patents, are accessible to challengers. It is clear then that there are some industries for which the PLC seems irrelevant, but from my perspective, it seems that the natural PLC-like evolution of such industries had been interfered by the strategic management of challengers that seek for new modes of participation within an industry.

2.1.2 Investments over the industry life cycle

When we think on a business as an entity with the objective to supply goods and services at a profit and increase the business value for the owners, we need to acknowledge that this task requires efficient and prudent manage of the business resources by managers. When it comes to managing financial resources certainly one of the most challenging tasks for managers is to invest on new products or technologies due to the high risk involved. In this sense, we have discussed before that the R&D demands is one of the main facts that make firms to exit an industry and this can be attributed to the high investments costs that it represents.

According to Kato (2009), the size of the firms affects the impact of R&D investments in different ways. He sustains that large and resourceful firms reduce investment costs and run innovation projects more efficiently thanks to the intangible assets they possess, like the gained experience, know-how, reputation, market information and others. He further develops a model that draws on the probabilities of firms' survival in light of capital investments for competence enhancing technologies, and finds that the major proportion of firms exiting an industry are relatively small firms. However, for investments on new technologies that can be competence destroying, the large firms may be in disadvantage due to inertial pressures, and therefore, may totter and even exit the industry. This suggests that small firms have a better opportunity to succeed in new industries that do not enhance the competences of large ones, while large firms that invest on innovations that enhance their competences are likely to succeed.

If we look at the PLC, we can identify a turning point in the level of investments such as the emergence of the dominant design and the transition towards processes innovation. According to Klepper (1997), when the innovations turns from product to processes, the producers become more confident that investments in the production process will give long term returns and will not become obsolete due to major product innovations. This fact is determinant for producers that undergo on investments in capital intensive methods of production that help to reduce the unit cost and to cope with the market demand. On the other hand, investing in marketing is a constant in the PLC in order to both get more customers and retain old ones. In the beginning, marketing is required to create awareness and to communicate the benefits of the new product, and later on it is

important to attract the main stream of customers and retain them in the long term, which makes marketing investments to be considerable throughout the PLC.

2.1.3 Life cycle as a contingency variable for strategic management

The contingency approach deserves special attention due to the contributions to the strategic management field that it provides (Hambrick & Lei, 1985; Hofer, 1975; Hambrick et al., 1982). The contingency approach obeys to the logic that the success and suitability of different business strategies depend on certain dynamics of competition, and such dynamics can be analyzed with certain degree of generalization. In other words, this approach provides a trade-off between the extreme views such as universal business strategies and situation-specific business strategies (Hambrick & Lei, 1985). The authors cited right before in their 1985 paper "Toward an Empirical Prioritization of Contingency Variables for Business Strategy" noted that the contingency approach requires hypothesizing on the significance of certain promising and prominent contingency variables in the literature out of a wide range of possibilities if we do not want to end in the situation-specific case. In this sense, one hypothesis of Hambrick and Lei (1985) is that the most significant contingency variable is the stage of the product life cycle, and another important hypothesis is that there are two classes of the contingency variables, the primary ones that have the highest significance which include the stage of the product life cycle, consumer versus industrial sector, product differentiability, and technological change, and the secondary ones which include the concentration rate of the industry, purchase frequency, industry imports, share instability, demand instability and dollar importance to customer.

Hambrick and Lei (1985) analyzed the significance of individual contingency variables in terms of their relationship between business performance and strategic attributes as a simple measure of return on investment. The strategic attributes analyzed included aspects of asset mix and utilization, cost efficiency, differentiation, and business scale and scope. In this sense, they noted that the study does not provide a conclusion about the relative significance of individual contingency variables on the field of strategy, but some consideration can be drawn out of it like for instance that the three most significant contingency variables are consumer versus industrial sector, purchase frequency, and stage of the product life cycle, and the results showed that the purchase

frequency variable has apparently higher significance than the stage of the product life cycle. They also suggested that researchers should not mix studies of consumer and industrial sectors, and that strategists should consider the substantial chasm between these two sectors. Technological change, dollar importance to customers, and product differentiation seem to have medium significance, and the rest of variables including demand instability and industry imports have low significance. Moreover, filtering samples for strategic studies based on concentration rates of industries did not seem relevant, and similarly, market share instability of the industry does not seem to be a primary contingency variable when pursuing business strategies. However, they indicated that all these appreciations should be confirmed with further research.

In the contingency approach, there is some degree of classification of contingency variables in two groups such as environmental and non-environmental. Hambrick and Lei (1985) noted that their study was limited to environmental variables considered as the ones that the firms have low control and require to manage. On the other hand, non-environmental variables have also deserved important attention in the contingency approach like for instance market share, product quality, vertical integration, and brand image; out of those market share appears as the most prominent one, which one, from my own perspective, represents an environmental variable since the firms cannot maintain control of it. Profit margins and return on investment have showed to have a positive correlation with market share, and this later has showed to keep a net strong influence in the business performance even with the consideration of other factors related to profitability like for instance market growth, vertical integration, capital intensity, and others (Buzzell & Wiersema, 1981).

A different perspective is that market share does not have an intrinsic value and should not represent a business goal per se, instead, it works on average as a predictor of business performance gained thanks to the success of the products, management, and exogenous events (Rumelt & Wensley, 1981). In this respect, the paper (Hamermesh et al., 1978) suggests that the market share alone does not represent a rule of thumb for predicting business performance since many low share firms in different industries have showed to outperform much larger competitors thanks to their appropriate business strategies with clear products portfolio, price policy, customers management, distribution channels, financing sources and so on. However, to understand better the

implications of the market share as a contingency variable, it should be analyzed considering at least another significant contingency variable like for instance the stage of the product life cycle. This work was performed by Hambrick et al. (1982) who concluded that the business performance and strategic attributes showed by firms have relationship with two predominant contingency variables such as the stage of the product life cycle and the market share, which form a four cells matrix to classify firms that differ from each other.

In practice, out the universe of contingency variables that managers could rely on to assess their strategies, perhaps the stage of the product life cycle is the most popular. Hofer (1975) developed a comprehensive theoretical profile of the implications of the PLC in business strategy. As noted by Anderson and Zeithaml (1984), two important Hofer's propositions should be remarked:

1. "The most fundamental variable in determining an appropriate business strategy is the stage of the product life cycle" (Hofer, 1975, p. 798).

2. "Major changes in business strategy are usually required during three stages of the life cycle: introduction, maturity, and decline" (Hofer, 1975, p. 799).

Hofer's thesis is supported by Anderson and Zeithaml, who provided a thorough analysis of the strategic variables and performance drivers for firms at different stages of the PLC in their 1984 paper "Stage of the Product Life Cycle, Business Strategy, and Business Performance," and as well as Hofer, suggested the use of this contingency approach for strategy formulation and implementation. They suggested that there is no unique set of strategies that can provide the winning formula, but the product life cycle framework provides a contingency approach to formulate strategies according to the evolution of the product and the industry. They found that the strategic attributes that drive and determine business performance during each stage of the PLC vary, and that those strategic attributes can be categorized in groups such as industry, product competition, R&D, production and investment, efficiency, vertical integration, and marketing.

The significance of different strategic attributes throughout the PLC can be evidenced by analyzing few of them like for instance marketing and product competition. During

the introduction and growth stages marketing becomes crucial and requires important investments for creating awareness of the product and demand, but during the maturity stage it becomes more constant with respect to the revenues in order to retain customers. Therefore, marketing investments represent a high cost in the introduction and growth stages that can deteriorate the financial balance in this stage, but it can determine future sales and performance. As another example we can take the case of innovation, where firms tend to compete strongly on the characteristics and attributes of the products during the growth stage, trying to gain the market preference by dominating the product design. In this sense, the emergence of a dominant design may lead to an industry shakeout that becomes determinant for the survival of firms. After the shakeout, the surviving firms turn their innovation focus to process innovations looking mainly at improving operational efficiency during the maturity and decline stages in order to achieve good financial performance.

2.2 Innovation and technology

The expected value of a new product technology certainly plays an important role in attracting users to such technology, as mentioned by Kurkinen (2008). The expected value of a new product technology can even determine a firm's leadership position, especially in markets with significant level of network effects since the adoption of a firm’s product design would leave little market share for other technologies, if any. The expected value of a new product technology can be broadly decomposed in two elements: the stand-alone expected value of the technology and its externalities, a view also supported by Katz and Shapiro (1985, 1986) and Farrell and Saloner (1985). The stand-alone expected value of the technology refers to the expected utility of it in terms of features, services and performance that it offers to the users; whereas its externalities refer to the negative or positive effects that the production and consumption of the technology has in the market. An example of externality is the classical network effect, popularized by Robert Metcalfe for the telecommunications networks case, which constitutes a positive consumption-driven externality that in principle sustains that the value of a network-based service is higher as more people uses it, like in the classic example of the telephone, and nowadays in the case of social networks like Twitter and Facebook that show a more pronounced network effect. It is worth to mention that externalities represent a very important field of study since they can be a source of value,

education, efficiency and other positive effects, but they can also represent a source of inefficiency, damage and other negative effects, like for instance the pollution that the production or consumption of certain product can cause to the environment.

Managing the expectations of a new product technology is crucial, especially in light of a potential network effect. Network effects typically lead to indirect network effects, like for instance increased availability of complementary products and technologies, in which case, an appropriate expectations management can achieve higher availability of compatible complementary products. This before in turn would further increase the expected value of a new product technology. In this sense, major firms clearly run with advantage at creating expected value since they will perceive higher expectations from potential users thanks to the firm's reputation. However, even though more than one strategy in order to create big expectations can be used, they are just expectations that require to be capitalized into superior market shares and profit margins. Therefore, an important question in this point is how can firms capture the market attention and capitalize innovations and potential network effects for dominance?

Certainly there is no unique approach to address this question before, instead, there are several considerations that should be taken into account for the aim of capturing the market attention and capitalizing innovations and potential network effects for dominance. In order to structure our considerations in this subject we can begin analyzing the innovation model provided by Utterback and Abernathy in their 1975 paper "A Dynamic Model of Process and Product Innovation." The main hypothesis that they proposed in their study is that the characteristics of the firm's innovative process and its innovation attempts will correspond with the stage of development of the firm's production processes and its strategy for competition and growth. This before suggests that there exist mutual relationships between the capacity of a firm to innovate with its competitive strategy and the development of its production processes. Utterback and Abernathy (1975) sustained that these relationships before are evidenced in statistical information in the literature.

According to the authors mentioned right before, the relationship between the characteristics of the firm's innovative process and its innovation attempts with the firm's strategy for competition and growth is due to the forces that drive the business

environment and market behavior. In this sense, firms are subject to the environmental forces and the most appropriate thing that they can do is to strategically manage the business to compete and grow, which in turn requires the firm's innovative process and its innovation attempts to be correspondent with the business environment. Whereas, the cause of the relationship between the characteristics of the firm's innovative process and its innovations attempts with the stage of development of the firm's production processes is not clearly identified by Utterback and Abernathy (1975); nonetheless, inferring from the process and product innovation models described by them, the cause of the relationship between the characteristics of the innovative process and the stage of development of the production processes can be attributed to the emergence of a dominant design in the industry.

The product and process innovation model proposed by Utterback and Abernathy (1975) is depicted in Figure 4. From the model graph, it can be broadly identified three stages of development based on the course of the innovation rates at both the process and product levels. These stages of development were related to the production process in the model proposed by Utterback and Abernathy (1975); however, inferring from the model description, and even according to the same authors of the model, these stages also keep correspondence with the progress of the sales volume, which suggests that the innovation model has in turn correspondence with the product life cycle model. In the beginning stage, the predominant rationale of the firm's innovative process is maximizing product utility in order to attract the market, thus, the rate of product innovations is high. The variations of product design, service and performance attributes are focused on the satisfaction of customer needs and expectations, which is why the authors refer to this type of innovation as performance-maximization product innovation. On the other hand, the production process at this stage is flexible to the changes required for product innovation, and is based on workshop jobs and partly on general purpose machinery, which is why the authors of the model called it the uncoordinated process. Moreover, according to them, the technological advancements do not trace the path of innovation in the beginning stage, instead, the search of the satisfaction of market needs does.

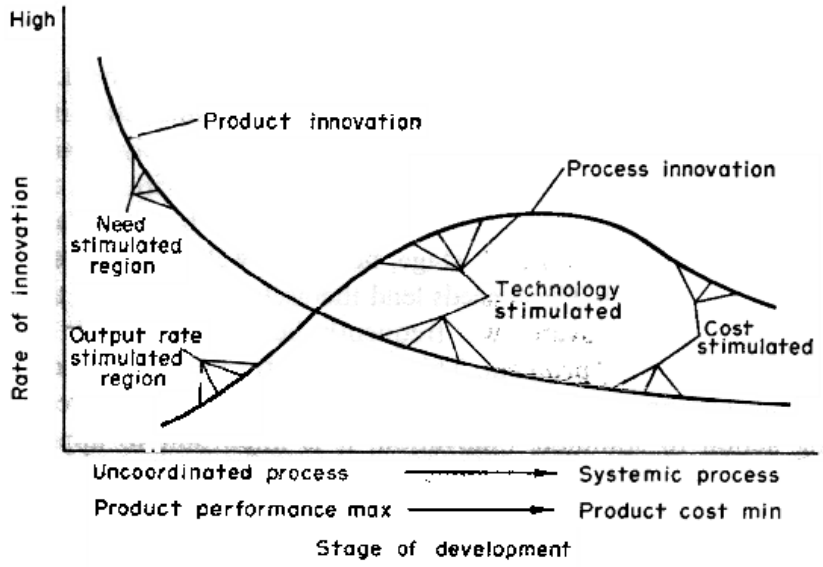

Figure 4. Innovation and stage of development. Source: Utterback and Abernathy (1975)

With the progress of the innovative process, firms' get higher visibility of mainstream buyers and the market needs become less uncertain, which together with the greater diffusion of the new product usage and its utility gives rise to a new stage of development characterized by a transition of the innovative process course. The lower market needs uncertainty allows firms to focus on providing advanced and/or more optimal technological solutions to the emergent dominant design, and at the same time, to standardize the general attributes of the product, reducing in this way the innovations at the product. On the other hand, the success of the firms' growth strategies, targeting the potential mainstream of buyers, depend strongly on the firms' capacity to upgrade the production process in order to meet the technological requirements of the emerging dominant design and also to scale production to cope with the increasing market demand. As a result of this before, the production process becomes greatly mechanic and automated, and the majority of the innovation attempts gradually center in the improvement of the production processes technologies.

Based on the analysis of the production process, the last stage of development that is identified by Utterback and Abernathy (1975) in their innovation model corresponds to the systemic production stage. In this stage, important capital investments are required in order to attain high returns out of the established dominant design being already adopted by the mainstream of buyers, as well as to cope with strong price competitions

by reducing the production factors cost through economies of scale and scope. At the same time, the production processes reach a high level of integration, seeking to reduce production costs through the improvement of efficiencies in the production processes. This high integration of the production processes makes it very costly to introduce technological innovations to them since the change in a single process may require the upgrade of several ones. This before, together with the necessity of amortizing the capital investments and attaining high returns of the innovation, changes the rationale of the firm's innovative process course from technology-driven towards costs-minimization.

It is important to notice in this point that according to Utterback and Abernathy (1975), the firm's innovative process faces two important barriers. The first barrier obeys to the natural uncertainty of the innovative product success in attracting the market and creating demand, which happens during the beginning stage of development. On the other hand, the second barrier obeys to the fact that a successful new product may eventually substitute an existing one or simply change certain consumer habits that affect the consumption of other different products, which occurs during the two later stages of development. In addition to these two barriers mentioned by Utterback and Abernathy (1975), an additional important aspect of product innovation such as compatibility should be noted as it is addressed by Katz & Shapiro (1985). Compatibility requirements may impede the flourish of a potential breakthrough innovation since users cannot reap the benefits of a new technology if there is a lack of compatible products. Acknowledging this before, managers strategically manage market expectations and attempt to coordinate the innovation path and compatibility requirements with other firms in a way that the return potentials of an innovation are actually capitalized by firms.

2.2.1 Dominant designs

The study of dominant designs and de-facto standards is particularly important in terms of industry evolution as it provides better understanding of the influence of technology evolution as a main force in a competitive environment affecting the firms' survival and success (Utterback & Suárez, 1995). Generally speaking, a dominant design represents a technological option that has achieved significantly higher preference in the

marketplace than others, and which technological features become de-facto standards. In this sense, the origins of the concept of dominant design may be attributed to Utterback and Abernathy, who provided the fundaments of the dominant design concept through their innovation model proposed in their 1975 paper "A Dynamic Model of Process and Product Innovation," which one was analyzed previously. At this point, perhaps the most important question to address is how dominant designs emerge? Various studies in the field of dominant designs and technology evolution (Anderson & Tushman, 1990; Utterback & Suarez, 1993, 1995; Christensen et al., 1998; Koski & Kretschmer, 2006) shed lights about how dominant designs emerge, suggesting in various ways that it does not merely depend on the success of the technological development; in practice, it also depends on other aspects like the buyers' value dimensions, governments' interventions, possession of collateral assets, industry externalities, and firms' strategic maneuvers.

About technology evolution, Anderson and Tushman (1990) noted that at that time there was few work done about the nature and dynamics of technological change, and, with the aim of tackling this theoretical and empirical scarcity, they proposed a model to explain the rationales of technological change, which is depicted in Figure 5. According to them, technological change follows a cyclical model in which two eras can be distinguished: ferment and incremental. The ferment era is characterized by the technological variation that originates from a technological breakthrough or discontinuity. In this era, the technological variability is intense in the beginning but starts to decrease gradually with the emergence of a dominant design that appears as a result of a selection process. When a certain technological option is significantly preferred in the marketplace over others, that is, a dominant design has emerged; the next era of the cyclical innovation model starts to take place, which is characterized by incremental technological innovations.

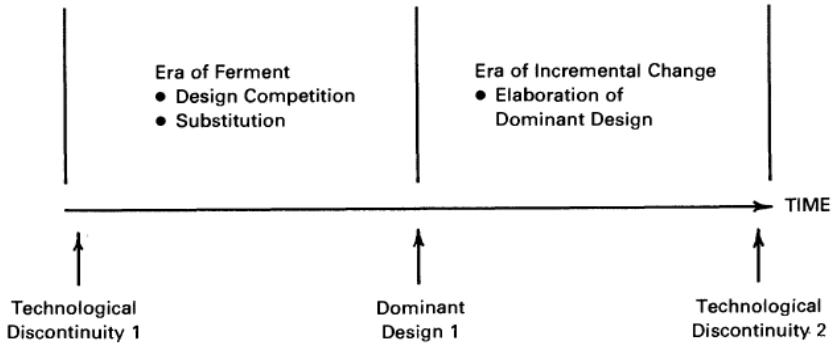

Figure 5. The technology cycle. Source: Anderson & Tushman (1990)

Anderson and Tushman in their 1990 paper "Technological Discontinuities and Dominant Designs" carried out a longitudinal study of the cement (1888-1980), glass (1893-1980), and minicomputer (1958-1982) industries in order to test eight hypotheses about the nature and dynamics of technological change based on their proposed cyclical model. They argued that the repeated patterns of technological evolution are driven by two main events such as the occurrence of technological discontinuities and the emergence of dominant designs. In this sense, technological discontinuities, also termed interchangeably as breakthrough technologies by Anderson and Tushman (1990), can be defined as technological changes that arise at undetermined intervals in the industry and break the continuation of established technological paths and/or regimes in exchange of new ones that provide some advantage in the marketplace like quality or cost. Technological discontinuities depart strongly from incremental innovations that characterize product classes, and commonly arise as technological changes in architectural configurations at the underlying processes or the products themselves; however, the state of the art of a technological discontinuity at the moment that they occur never becomes a dominant design, instead it just represents the initial state of an era of strong technological variability in the industry.

Anderson and Tushman (1990) sustained that dominant designs are the result of a selection process that operates over the technological variability initiated with a technological discontinuity, which is called the era of ferment in the technology cycle since the major technological advancements take place in this era. They sustain that with the emergence of a dominant design, the technological features of that design become a de-facto standard in the industry, closing the evolution cycle with the

retention process after the periods of variability and selection. They also sustained that dominant designs always lag behind the technical frontier at the time they emerge, but with its emergence, expected minor incremental innovations trace the technological progress until a subsequent discontinuity takes place, which constitutes the era of incremental change. They also indicated that the adoption of a single standard with the emergence of a single dominant design, after a technological discontinuity, always peaks sales. Sales are further stimulated by lowering prices through intense capital investments in mass and efficient production thanks to the lower technological and market needs uncertainty. However, the emergence of a dominant design can be impeded in environments with strong intellectual property rights protection, in which situations its emergence is a matter of strategic choice for the protected innovating firm.

Moreover, Anderson and Tushman (1990) noted that technological discontinuities can be either competence-enhancing or competence-destroying, acknowledging the fact that the expertise and assets to manage technologies that preceded a discontinuity either contribute to manage the new technological order or just become obsolete. Therefore, incumbent firms attempt to establish dominant designs that enhance their competences, providing them an advantage over new entrants that are less competent than them in the current technological order; whereas new entrants attempt to establish dominant designs that leave obsolete the competences of incumbent firms to manage previous technologies. They also noted that the era of ferment following a competence-destroying discontinuity is longer than the era of ferment following a competence-enhancing discontinuity, which may be attributed to the time that it takes to learn to manage a new technological order when the previous knowledge and skills become obsolete.

Despite this model before provides a fundamental model of technological change that is based on the emergence of a dominant design after a technological discontinuity, the situations in which a dominant design will not emerge after a technological discontinuity are not openly addressed by Anderson and Tushman (1990). For instance, it would be interesting to analyze in which situations competition that arises from positioned firms, in order to extend the life of the preceding technological order in light of a competence-destroying discontinuity, may impede the emergence of a dominant design. The authors before mentioned that the life of a technological order preceding a

technological discontinuity may be extended through the intensification of incremental innovations. However, one can think on other situations that may impede the emergence of a dominant design after a technological discontinuity, like for instance the establishment of price wars between the substituting technologies, the resistance to change from the preceding supply network, and the possession of collateral assets.

On the other hand, Koski and Kretschmer (2006) addressed the dynamics and nature about the type of innovations that become part of a dominant design and the competing factors that stimulate their emergence for the case of the mobile phone industry during the years from the early 1980s onwards. In this sense, they distinguished two broad types of innovations, vertical and horizontal innovations; where innovations of the core technology or existing features of the product that arise based on technological improvements are considered as vertical innovations, whereas the addition of new features to the product are considered as horizontal innovations. According to them, firms may temporarily differentiate vertically and horizontally, but if the innovations are successful in the marketplace, imitators will follow them and make them part of the dominant design. This before suggests that the main force that drives innovators is to differentiate in the marketplace. Koski and Kretschmer (2006) found that after a new core-system appeared in the mobile industry, such as 2G and 3G handsets, firms compete on vertical innovations focused on quality improvements of the system technology, which creates higher demand until the technology becomes mature enough and the high level of standardization of the dominant design leaves small room for differentiation in the market, leading to unprofitable price competition. Before being trap in risky price competitions when the technologies starts to reach high levels of maturity, the firms will start to innovate horizontally in order to differentiate in the market.

From the study done by Koski and Kretschmer (2006), one can identify a transition phase from vertical to horizontal innovation-based competition with the emergence of a dominant design. As mentioned before, firms compete on vertical innovations after a technological discontinuity, but as long as a dominant design emerges, the vertical innovations start to decrease gradually and competition focuses on horizontal innovations. This logic suggests a dominant design is mainly shaped by vertical innovations occurring after a technological discontinuity that compete for the market

preference and horizontal innovations that occur during the transition phase that provide some initial degree of differentiability after the standardization of the dominant design. They sustained that after the emergence of a dominant design, firms still continue to innovate vertically, especially with the purpose of keeping almost cero the learning costs associated with the use of the next product version and thus retain their customers, which is known as lock-in strategy. However, horizontal innovations are more frequent and seem to be more important after the emergence of a dominant design in order to keep the firm's market position and attract new customers.

On the other hand, another important matter to consider about dominant designs are the strategic choice that firms face in light of a de-facto standardization process. In his 2004 paper, Marcus Ehrhardt acknowledges the importance of assessing the opportunities and threats when adopting a de-facto standard in order to succeed, especially in markets driven by network effects. He sustained that situational factors to be analyzed when adopting a de-facto technology include: the internal resources of the firm, the technology/product related criteria, and the external/market related factors. The constellation formed by situational factors determine different competitive positions, which require different positioning strategies with respect to the adoption of a certain de-facto technology. For instance, establishing a de-facto industry standard on a stand-alone basis requires a firm to possess the sufficient resources and competences and a strong reputation so that the expectations that the technology will be an industry-standard is big. In this situation before, developing or adopting industry standards are the two options depending on the existence or not of internal firm resources.

In addition to the firm's internal resources, product-related and external-related factors to consider include the attractiveness of the product compare to competing ones, the regime of appropriability, and the importance and strength of network effects, which could determine whether a proprietary standard or open standard should be supported. In light of this complexity, the existence or not of previous standardization trajectories of similar product family would ease the decision of choosing a strategy in a de-facto standardization process. On the other hand, even when considering these situational factors mentioned before, it is not clear when the needs of mainstream customers that sustain the firm's business come to the scene and how they affect the strategic choices of a firm on a de-facto standardization process, if it does. In this sense, one may think

that a firm should not only consider situational factors to take strategic choices in light of a de-facto standardization process, but it should also align its strategic choices in this matter according to its competitive market strategy that has attracted its current mainstream customers. However, this perception before is not as simple as it sounds since it requires to consider the effects of potentially disruptive innovations that are not seen by the current mainstream customers.

2.2.2 Disruptive innovations

Disruptive innovation is a matter that deserves special attention when it comes to attaining a leadership position in an industry, especially in technology-driven industries. Disruptive innovations represent new value configurations that create new markets or boosts currently irrelevant ones, and ultimately disrupts existing markets, based on successful business models that are normally enabled thanks to the technological advancements. Disruptive innovations are fundamentally different from the concept of technological breakthroughs or discontinuities, incremental innovations, and vertical and horizontal innovations discussed with respect to the technology cycle and dominant design in the previous section. These type of innovations before can be classified as sustaining innovations since they do not create new markets neither boost currently irrelevant ones, they just sustain existing ones even though they have the potential to change, revolutionize, or impulse the performance trajectories and business models of established products in the industries. Therefore, disruptive innovations are fundamentally different to sustaining innovations since these first create new markets or boost currently irrelevant ones, and ultimately disrupt existing markets.

According to Bower and Christensen (1995), protecting the emergence of a potentially disruptive innovation requires creating a separate different organization, to manage the emerging business, from the one managing the mainstream customers of the existing businesses. In this sense, in their 1995 paper they wrote that "every company that has tried to manage mainstream and disruptive businesses within a single organization failed". This is because mainstream customers of existing markets are not willing to try out disruptive innovations since they generally do not meet their overall needs when they just appear. Managing both mainstream and disruptive businesses is not an easy task given that "well-managed" firms normally are stuck in costly and rigid structures

focusing on the needs of their mainstream customers of their existing businesses and do everything in order to sustain those existing business units. However, they do not know how to explore and capitalize the potential of emerging markets while exploiting the existing ones, which may require to let some existing business units to die and see new ones to flourish. In this sense, new entrants, especially small start-ups, seem to achieve better results when it comes to explore new markets according to Bower and Christensen (1995).

On the other hand, something that would be interesting to know is whether the common believe that disruptive innovations are needed when the physical boundaries become constraints for further performance improvements, under which situation new technologies that enable these improvements would be a true success, actually drives the majority of disruptive innovations. However, with the appearance of disruptive innovations, something that is usually evidenced is that companies that did not identify and move to future technologies on time fall behind the ones that went with the wave. But if the movement towards the adoption of new technologies is hasty and the market is hard to wake up, imitators will have time to react and pioneers will lose their competitive advantage.

2.2.3 Appropriability regimes and complementary assets

The ability to capture rents out of innovation strongly depends on the ability to limit the chances of rivals to benefit out of them. Innovators must look after management strategies to secure the biggest part of the pie if they do not want to see imitators or players in the supply chain of the innovation to do so; however, not all innovations are viable as the costs and risks for trying to secure their returns may not be worth it. In this sense, it is certainly important to consider the nature and the actual stage of the innovation in order for the innovator to adequately build value and capture the returns from the innovation. Furthermore, an innovation can be easy or hard to protect from imitators or followers depending on its nature, thus, managers may draw upon intellectual property rights and strategic maneuvers to protect it from imitators. Even though in certain cases legal resources may not suffice to impede imitators to follow a successful innovation, in tight appropriability regimes they can give time to the firm to mature a dominant design and acquire complementary assets in order to capture the

greatest returns from the innovation. However, in loose appropriability regimes the risk to lose revenues taken by imitators is big since they will overtake the innovation to their favor if the innovator does not assert the dominant design of the product (Teece, 1987).

Based on Teece (1987), once a dominant design emerges, competition turns to economies of scale and specialized complementary assets become significantly critical in the supply chain. This before suggests that the possession of complementary assets may provide competitive advantage over rivals that are not capable to access them or to integrate them. Ceccagnoli and Rothaermel in their 2008 book chapter "Appropriating the returns from innovation", remarked the importance of owning complementary assets in order to profit out of innovations. According to them, complementary assets can be divided into generic and specialized. Generic assets refers to the assets that do not need to be adjusted to the innovation and can be contracted in the market such as general purpose machinery; whereas, specialized assets are those with dependencies to the innovation such as customized services. In this respect, manufacturing skills satisfying the market demands is a crucial complementary asset to profit out innovations, and the lack of necessary manufacturing skills conduce to poor company performance as evidenced by Ceccagnoli and Rothaermel (2008). Moreover, they sustain that large-scale manufacturing skills conduce to economies of scale and production experience, which in turn influences dominant-design markets.

In this point, it can be noticed that the ability to capture the returns from innovation seems to depend mainly on the underlying appropriabilty regime and the ownership of complementary assets. In the existence of tight appropriability regimes, when the required complementary assets are generic, innovators capture most of the value; whereas, when specialized complementary assets are required, the value is shared between the innovator and the owners of specialized complementary assets. This before suggests that an innovator lacking of necessary specialized complementary assets may find itself obligated to cede significant fraction of the innovation rents to the owners of the specialized assets if it wants to profit ultimately. In such situations, establishing strategic alliances and/or joint ventures may be a better way to go for the innovator when it is not self-capable. Moreover, licensing the innovation to other firms and letting them to produce and commercialize the innovation in exchange for royalties may be a good option, especially if the innovation requires specialized complementary assets.

On the other hand, depending on the innovator's capabilities and the nature of its complementary assets, developing and commercializing the innovation may be done by the innovator itself by integrating the value chain vertically, which would in turn enable the innovator to capture most of the innovation rents. However, in the existence of loose appropriability regimes, major returns from innovations may leak away from innovators if they are easy to imitate and manufacture. In such situations, customers capture most of the value from innovations that are easy to imitate and manufacture since the market becomes highly competitive, even when the innovator manages to vertically integrate its value chain.

2.2.4 Exploiting and exploring

In the paper "Exploration and Exploitation in Organizational Learning" written by James March (1991), the author addresses very important points concerning the inability of major firms in established markets to come up with innovations that enable them to lead future markets. In this sense, the article suggests that the inabilities of incumbent firms to lead future markets have their roots in their cost structures as they allocate most of the resources to incremental innovations that sustain the present demands of the mainstream customers and very scarce resources to disruptive innovations that create future demand. Commonly managers focus at reducing costs and refining existing assets utilization, achieving economies of scale and scope in order to improve profits but face big challenges when it comes to creating sustainable growth. In this sense, investing in assets with stable rents is logical, attractive, and safe for managers on-board; however, this strategy before entails to an imbalance in the innovation portfolio. A balanced innovation strategy should seek for a trade-off between innovations that sustain the present demand with the ones that create future demand. The question is how to effectively manage to achieve a balanced innovation strategy? O'Reilly III and Tushman in their 2004 paper "The Ambidextrous Organization" provide us some guidance to address this question before, basing their thesis on the idea that a sustainable business depends on its ability to exploit the opportunities of the exiting business and to explore new ones.

According to them, the Ambidextrous Organization seems to successfully achieve both profitability and growth by employing two separate business units, one for the existing

business and one for the emerging business, each one with its own structures, procedures and cultures, but integrated at the senior managerial level. The authors argue that this type of organizations are good at sharing experience between the business units without overwhelming entrepreneurial minds with rigid and efficient methods of operational units. They note that there is evidence of organizations that are successful in exploiting the present and exploring the future, which ones share important characteristics aligned with the ambidextrous organization model. In this respect, successful implementations of ambidextrous organizations require managers capable to objectively meet the needs of very different kind of business units as well as management teams conveying clear and unbreakable vision. They argue that successful implementations of ambidextrous organizations significantly depend on the ability of the senior management team to adopt this model. However, more work should be done with respect to the type of collaboration that should exist or not between other hierarchical levels in the ambidextrous organization like for instance the horizontal collaboration between the junior managerial levels of the separate business units.

On the other hand, a successful exploitation and exploration strategy also depends on the ability of the management team to be tuned with the Research & Development department. The diversification of development projects will definitely affect the firm's performance projection, and therefore it requires careful decision making of the mix of different types of development projects. Once the real potentials and risks of a set of development projects are assessed, capital constraints ultimately constraints the decision making of the "right balance" of different types of development projects in order to sustain the short-term business and enable long-term growth. However, the firm's management skillset can be easily overlooked when deciding the R&D portfolio investments. The best R&D portfolio balance and return, based on real options analysis and R&D portfolio mapping approaches (McGrath and MacMillan, 2000, 2002), should be contrasted with the managerial complexity caused by the portfolio mix. Usually firm's core competences and assets heavily influence the attractiveness of R&D projects that require similar competences and resources as it allows leveraging economies of scope. However, R&D projects requiring similar management routines and skillset to the existing ones in the firm may lead to higher firm performance than those requiring similar core competences and resources (Gino et al., 2006). Therefore, achieving a

balanced innovation strategy requires looking at various aspects including, the firm's resources, complementary assets, appropriability regime, and managerial skillsets along with the forces prevailing the paradigm of the dominant design.

3 TELECOM ECOSYSTEM

In very dynamic business ecosystems such as the telecom ecosystem it is common that some players may take predominant positions within the business ecosystem and others may become mere business enablers and supporters. In the telecom industry, players must be aware of the opportunities and threats that the digital convergence unleashes by looking at their role in the medium term. In this sense, the digital convergence has its two major axis of development in one hand on the convergence of telecom networks into a single one controlled by a large company, and, on the other hand, in the battle for the operating system dominance (Hämmäinen et al., 2013).

3.1 Operators and industry sectors

Operator is a general term that defines a firm running certain operations required to provide a service or to support the provisioning of it. In the telecom market, telecom operators are fundamental for sustaining the industry and keeping it running, and their main mission is to provide connectivity for local, regional and international communication, supporting in this way the provisioning of legacy telecom services such as telephone, television and radio, but also of online services based on the Internet. In this sense, telecom operators take care of fundamental functions in the telecom industry including connectivity, quality, mobility, security, convergence, charging, which functions are supported and enabled by network equipment sellers. However, in this study we analyze the telecom industry as part of a wider ecosystem such as the Telecommunications, Media and Technology TMT industry that not only focuses on the satisfaction of telecommunication needs, but also on the satisfaction of information, media and entertainment needs using technological resources based on electronics. In this sense, other players that enable the generation, management and consumption of TMT services, including sellers of computers and devices, producers and aggregators of content, Internet intermediaries and IT service and software providers, are part of the ecosystem (Péladeau et al., 2011, 2013).

From this wider perspective before, the TMT industry functions can be disaggregated into more specific roles that relate to each other in other to enable the generation, delivery and consumption of the services as shown in Figure 6 (ECOSYS, 2004; Hämmäinen et al., 2013). The figure below provides a reference model that depicts the

roles and relationships in a typical telecom operator ecosystem, emphasizing the industry functions required to satisfy the communication, media and entertainment needs. However, it does not depict the relationship of the players satisfying the information management needs since IT service and software providers are needed ubiquitously in the value chain in order to enable the functioning of proper information technology platforms that support the generation, delivery and consumption of the services. Additionally, the model shows in yellow color the parts and portions that correspond to the roles and interfaces related to wholesale business, that is, the business-to-business sales, whereas the ones colored in green correspond to the roles and interfaces related to retail businesses, that is, the business-to-consumer sales.

In the TMT industry, firms have specialized to play certain roles in the ecosystem, having as a result different firms dominating different industry sectors; however, it is common to have firms operating in more than one industry sector ((Péladeau et al., 2011, 2013). Among the principal actors in the industry we have: network equipment vendors, computers and devices vendors, content providers, Internet intermediaries, IT service and software providers, and telecom operators. Here, the common focus and scope of these different industry sectors are described:

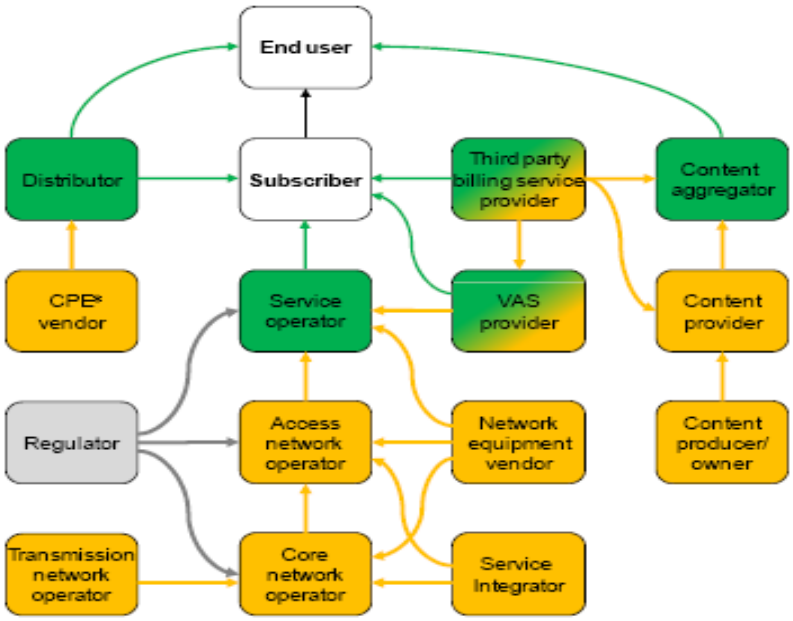

Figure 6. Roles and Relationships in the Telecom Operator Ecosystem: Reference Model. Source: ECOSYS (2004); Hämmäinen et al. (2013)

Network and service operators: In this industry sector we find the firms generating revenues by providing voice, data and video services through fixed and mobile networks, including the satellite and cable broadcast networks providing paid services such as television (Péladeau et al., 2011, 2013). In this sense, the infrastructure providing end-to-end connectivity is commonly integrated by three parts such as the access network, the core network, and the transmission network as depicted in Figure 6. The operation of these three types of networks, together with the integration of the end-to-end network service, constitute the core competence of telecom operators. Of course, the operation of these three different networks is commonly split among different firms. For example, ISPs focus on the operation of the access networks, taking care of the service provisioning to the end user, whereas other telecom carriers provide the upstream connection to the Internet, taking care of the core and transmission networks. Additionally, as part of the telecom operators' competences, we find the retail sales and service management that include the management of the offerings portfolio, service quality, charging and billing, customer care, value added services, and in some cases the sales of users' devices as part of the portfolio offerings. In this sense, telecom operators share an important stake of the TMT market, taking care and supporting very important technological functions such as connectivity, quality, mobility, security, convergence; but also taking care of the customer relationship management at the end user level.

Network equipment suppliers: In this sector we find the firms developing, fabricating and selling network equipment for telecom operators and firms with high-scale networking needs. The core competence of network equipment vendors is to provide network infrastructure solutions to telecom operators, occupying in this way a very specific place in the vertical wholesale telecom market. For this reason before, network equipment vendors face strong bargaining forces from telecom operators that have the market power arising from the end-users demand side, which has driven this industry segment to the fire competition of cost leadership players (Gyllerup & Björnsjö, 2012). However, network equipment vendors are crucial for the technological evolution of the telecom industry since they carry out the development of next-generation network technologies to tackle two important industry challenges such as the access speed and the networks convergence to one All-IP solution (International Telecommunication Union, 2004), which developments constitute main enablers for the continuous industry

growth. Considering this before, as well as the accumulated know-how of network equipment vendors and their property rights over their networks and systems solutions, network equipment vendors have an important position in the telecom industry, assuring their space in the vertical market.

Media and content providers: This industry sector includes the firms generating revenues from the content production, aggregation, and/or transmission (Péladeau et al., 2011, 2013). Among the various types of contents we can find movies, TV shows and series, music, news, books, and games. Apart from the firms in the gaming industry, firms in this industry sector have big opportunity to increase revenues with the ongoing growth of On-Demand content consumption on smart TVs, laptops, tablets, smartphones, normally enabled by the Internet.

Internet companies: In this industry sector we find the firms generating revenues by facilitating electronic transactions, providing over-the-top OTT content, and intermediating in general between people and merchants through search engines, social networking, e-commerce and web portals which may support chatting apps, email service, telematics or a combination of them. As this list before evidences, Internet companies have shown to be a major source of innovation, offering a wide range of creative solutions and applications to the end users, where the clear dominants are Google and Facebook (Bloomberg Visual Data, 2014). It should be noted that firms positioned in the software industry, owning and developing operating systems for users, have started the expansion to the intermediation industry by enabling the convergence of online services into their online platforms, especially in the case of mobile devices.

Computers and devices vendors: In this industry sector we find the firms generating revenues from the development, fabrication, and sale of personal computers and devices such as handsets, computers, tablets, televisions, game consoles and their peripherals and gadgets including smart watches, glasses and others. This industry sector is strongly influenced by the operating systems battle driving the evolution of the user interfaces; therefore, the firms owning and developing operating systems are main part of the evolution of the consumer device market (IDC, 2014). Furthermore, in this industry sector we can also include the firms developing, fabricating, and selling specialized

hardware that supports information systems for work including workstations, servers, storage hardware, printers, and low-scale networking hardware.

IT service and software providers: In this industry sector we find the firms generating revenues from the provision of professional services for the customization, implementation, integration and/or management of information systems for enterprises as well as from the development and sale of software. It should be noted that computer hardware is a main value component of the solutions provided by IT firms since such solutions require computer hardware for work including workstations, servers, storage hardware, printers, and networking hardware. Additionally, it should be noted that IT services are more often delivered and managed on the cloud (Dorota, 2010). An example of the companies occupying different TMT industry sectors is provided in Table 1.

SECTOR	COMPANIES WITH MEANINGFUL MARKET SHARE IN THE SECTOR WORLDWIDE	COMPANIES WITH MEANINGFUL MARKET SHARE IN THE SECTOR IN ECUADOR
Network and service operations	AT&T, NTT, Verizon, China Mobile, Telefonica, Deutsche Telekom, Vodafone, Orange, Comcast, America Movil, China Telecom, DIRECTV, Liberty Global, Teliasonera	Claro (Conecel S.A. subsidiary of America Movil in Ecuador), Movistar (Otecel S.A. subsidiary of Telefonica in Ecuador), CNT movil (public company), Grupo Tvcable, DirecTV, Telconet, Puntonet, Level 3
Computers and devices	Apple, Samsung, Hewlett-Packard, Dell, Lenovo, Fujitsu, ASUS, Acer, LG, Toshiba, Huawei, Nokia, HTC	Cartimex, Tecnomega, Electrosiglo 21, Sony-Inter, Megamicro, Novisolutions, Grumanher, Alphacell
Network Equipment	Alcatel-Luncent, Ericsson, Huawei, NSN, Cisco, ZTE	Huawei, Ericsson, Intcomex-Cisco, Nokia Solutions and Networks, Alcatel-Lucent, Andeantrade, Digitec
IT services and Software	IBM, Hewlett-Packard, Microsoft, Orcale, SAP, Symantec, Accenture, Fujitsu, NEC, Computer Sciences, Cap Gemini, Infosys	Tatasolutions, IBM, Binaria Systems, Descanserv, Avnet, Akros, Adexus
Media and content	News Corp, Thomson Reuters, Time Warner, Viacom, Walt Disney	El Universo, El comercio, Canal 10, Televisión del Pacifíco, Red Telesistema, Teleamazonas, Telenacional, Granasa, Multicines, Cinemark
Internet companies	Google, Tencent Holdings, Facebook, Yahoo!, Baidu, Groupon, AoL, IAC InterActiveCorp, Amazon, Netflix, Alibaba, eBay, Roku, Dropbox	Mercado Libre, Plusvalia, Despegar, Reinec

Table 1. Firms with meaningful market share in each TMT industry sector in Ecuador and Worldwide

Based on this description of the industry functions and sectors it can be noticed that the telecom operators occupy a predominant space of the value chain (Péladeau et al., 2011,

2013), and thus have a strong participation and influence in the TMT industry business models. In this sense, telecom operators providing legacy telecom services, controlling the access to the networks, and charging customers based on service usage or flat-fee subscriptions have usually integrated their value processes into vertical configurations to deliver the service to the end users and to manage the relationships with their customers. However, this legacy vertical integration is not the preferred value chain configuration for business models enabled by the Internet, due to the high and fast growing demand for Internet access and the openness of the Internet to innovators and providers of online services that constitute a main component of the value chain (Courcoubetis & Weber, 2003). In this sense, the Internet gives place to various business models like the legacy usage-based charging and flat-fee subscriptions controlled by the telecom operators that provide access to the networks, but also to different business models that generate revenues based on online advertisement, OTT content provisioning, electronic transactions, and others (Rappa, 2010). Acknowledging this before, the business models enabled by the Internet have changed the Legacy Model of vertically integrated value chains to the Internet Model according to the reference value structure depicted in Figure 7 (Verkasalo et al., 2008; Hämmäinen et al., 2013).

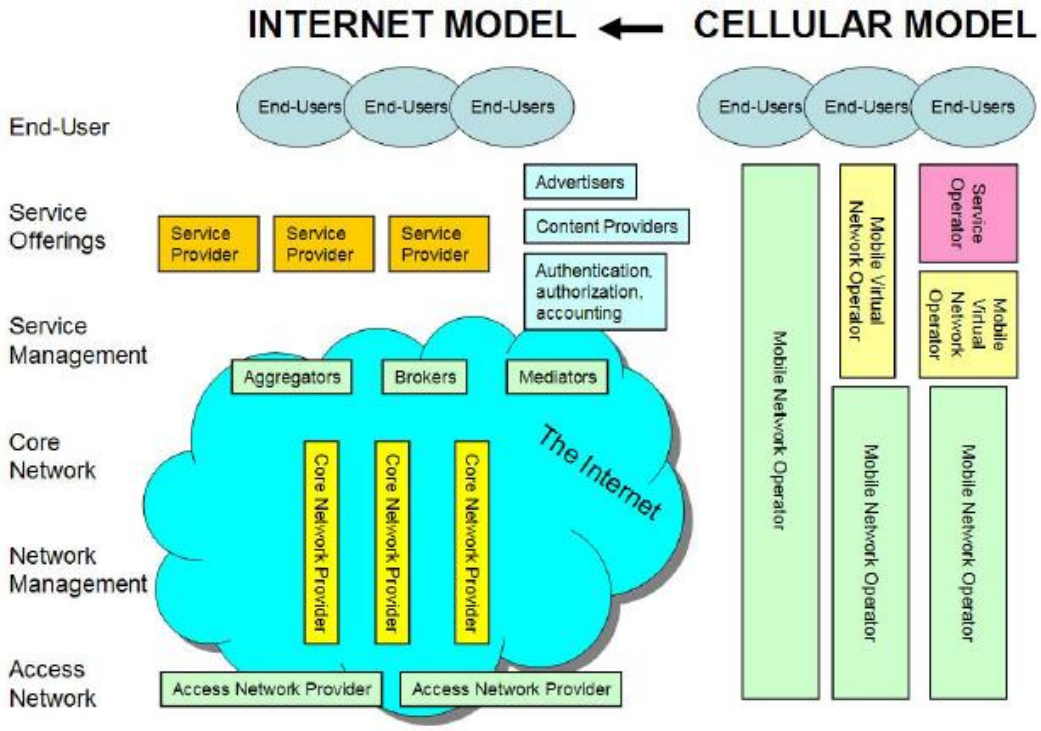

Figure 7. Change in Ecosystem Structure. Source: Verkasalo et al. (2008); Hämmäinen et al. (2013)

On the other hand, in addition to the changing value configuration of the Internet model, the mobile industry have used a fragmented value chains in some geographical markets since about two decades, as shown in Figure 7. Under this fragmented value-chain model, a firm not owning the mobile access network infrastructure, known as Mobile Virtual Network Operators MVNO, takes care of the operations related with the end-user retail business including the customer care, service offerings and network services management; whereas the incumbent mobile operators owning the mobile access networks, also known as real operators, generate additional revenues, apart from their end-user retail business, by using their exceeding network capacity to provide wholesale wireless access to MVONs. This model before mainly responds to the government actions to reduce the market power of strong oligopolies, where customers have few alternatives and just take the prices set by incumbent mobile operators. By pushing incumbent mobile operators to let their exceeding capacity for rent, social planners look that other firms use the leased capacity to offer telecom services to end users, procuring in this way more alternatives in terms of services and prices for the end users. Nonetheless, this approach may be initiated from the side of the incumbent mobile operators in very specific cases, especially when the revenues arising from the rents of MVNOs offset the marginal utility arising from their own end-user customers. Moreover, the value chain can be further fragmented when roles taken by the MVNOs are divided among two or three firms where one of them typically assumes the roles of managing the service offerings and customer care and the other handles the network services management (Kiiski, A., 2007).

Moderating the market power of oligopolies is an important task of social planners considering that the telecom markets have consolidated into strong oligopolies in almost every segment including telecom operators, equipment vendors, device vendors and content providers. In the case of telecom operators, the market concentration may be a consequence of the changes in the business environment originated with the privatization of the telecom operators in several countries, which triggered the potential of the global telecom market thanks to higher investments to improve the capacity, coverage and quality of the networks. On the other hand, the privatization gave birth to telecom operators that expanded globally, exploiting the economies of scale and scope, brand and other assets. Looking to achieve economies of scope, telecom operators have

also expanded their offerings portfolio from providing a single type of service to full services.

Due to their strong market dominance and the high entry barriers to the telecom operator business, large telecom operators have capitalized their opportunities to maximize profits into important empires very well valued in the stock markets. However, the changes in the telecom ecosystem structure shown in Figure 7, driven by the business models enabled by the Internet, have gradually played in favor of the consumers who have benefited from a wider range of online services, increasing the consumers surplus and the competition in the telecom industry in general. Furthermore, the increasing data-intensive online services based on the Internet, like for instance streaming traffic, have increased the traffic volume in the networks in an increasing manner following an exponential curve, whereas the revenues have increased in a decreasing manner following a logarithmic curve (Hämmäinen et al., 2013). This fact before represents a big challenge for mobile operators that have required more bandwidth in the electromagnetic spectrum to cope with the increasing traffic and have increased the prices for Internet traffic in order to moderate the usage. Despite the challenge of the increasing mobile Internet traffic, telecom operators seem to be comfortable with the ratio tendency between revenue and traffic volume for other services like mobile voice and Short Messaging Service SMS. Of course it is important to notice that the ratios between revenue and traffic volume of different type of telecom services do not follow any clear relationship (Hämmäinen et al., 2013).

Another important challenge that telecom operators face in consolidated markets is to retain customers. Churn forces are stronger in oligopolies with subscriber-based business models since customers are more aware of the offerings of the other service providers. Given these particular competition settings of concentrated markets, firms typically support their strategic decisions based on game theory analysis in order to assess the potential net benefit of such moves (Brandenburger & Nalebuff, 1995). In this sense, the main parameters for the game theory analysis are the ones driving the profit such as the subscribers base, the Average Return Per User ARPU, the OPerational EXpenditure OPEX, and the Capital Expenditure CAPEX that relate to the profit according to the following formula:

Profit = Subscriber * ARPU – OPEX – CAPEX

Generally speaking, the main driver of profit maximization has been the increment of the subscriber base since the profit margins have lowered with the time, but it is important to notice as well that the ARPU is related with the service usage per user, which has also significantly increased with the time, contributing in this way to generate higher revenues. However, the cost components are also important parameters for profit maximization, where the OPEX is usually higher than the CAPEX. It is important to consider that in the OPEX we should include the customer acquisition, marketing and handset subsidies costs, whereas in the CAPEX we should include the spectrum license cost. This tendency between the OPEX and CAPEX predominates in the widespread Internet Service Provider ISP business, and is more pronounced for the case of ISP not located in the United States since the upstream ISP cost is very high. However, has changed gradually with the constructions of new international links and data centers that bypass the US-located Tiers.

3.2 Customers

The customers' portfolio of telecom operators can be broadly classified into two main groups such as enterprises and consumers. Enterprises, more generally speaking organizations, may require a set of ICT services and equipment with some degree of customization whereas consumers, more generally speaking individuals, commonly require standard telecom services with possible bundling of services and personal devices. In this sense, telecom operators require different management strategies and systems for enterprise and consumer customers in order to take care of various value drivers such as offerings portfolio and marketing, customer relationship, cost and billing, and network and service quality.

3.2.1 Enterprise customers

Enterprises strongly depend on ICT services and equipment to operate and manage their business processes. In the market there are various alternatives to solve ICT needs of enterprises; however, it may become a complex task to determine suitable solutions and implement them considering several decision criteria including technological performance, compatibility, integrability, upgradability, total cost of ownership, but

specially the level of market uncertainty. In light of this before, firms may opt to rely on consulting and advisory services to determine suitable solutions and implement them in the firm. In this sense, ICT solutions designs have to take into account the umbrella of services, systems, and equipment available in the market that include telecom services, intranet solutions, information solutions, infrastructure and application software, specialized hardware for work, mobile phones and devices, computers and others that have been classified in the previous section. For instance, the firm Microsoft serves the infrastructure and applications software industry segments but is not in the intranet equipment segment, whereas the firm Cisco provides intranet equipment solutions but does not provide infrastructure and application software solutions. The fact that there exist various vertical segments in the ICT industry, where not all the same vendors compete and serve in all the segments, makes the decision-making task to determine suitable solutions subject to the prevailing market uncertainty that arises from competition for design and standards dominance and its side effects such as products compatibility and complementarity (Hämmäinen et al., 2013).

From the telecom operators' side, the ICT needs of enterprises are served at four broad levels of offerings such as: access services, managed services, carrier services, and colocation services. Access services mainly include standard fixed and mobile subscriptions for voice, data and video services provisioning, with the standard roaming service for mobile subscriptions. Access services are commonly complemented with the provisioning of enhanced information and communication security features like for instance anti-virus and firewalls. Targeting to satisfy the information and communication needs of enterprises, telecom operators also provide managed services which may include, on one hand, Internet-based managed services like for instance web and email hosting, Virtual Private Network VPN support, Voice over IP VoIP, videoconference, video surveillance, unified communications, GPS-based and telematics services, and, on the other hand, non-Internet-based services like for instance the Centrex System that provides PBX-like services to offices hosted and managed centrally by the telecom operator. In this sense, the scope of application services seems to be unlimited with the development of the Internet of Things and may reach a high level of customization to assist in task automation and control to enterprises and organizations in general, improving productivity and effectiveness.

On the other hand, carrier services may be divided in two groups such as network-layer and transmission-layer services (Hämmäinen et al., 2013). Network-layer services are typically meant for Internet Service Providers ISP in order to satisfy the interconnection and transit demands with other ISP, commonly transnational Tier 2 and Tier 1 ISP (Winther, 2006). Network-layer services are also employed to satisfy the demand of enterprises for two-way communications over the Internet to remote private networks or terminals. On the other hand, transmission-layer services are typically meant to satisfy the high data rate demands of enterprises to connect their offices at fixed locations, as well as to satisfy the demand of other telecom operators to connect their switching centers.

The last type of services in the telecom operators' portfolio are the colocation services meant for firms that highly depend on ICT services to operate like for instance ecommerce businesses, social network websites, banks, media streaming websites and others including the same telecom operators that may find more efficient to use collocation services to cover certain geographical markets than running their own sites in order to provide the service to their clients. The typical functions provided with collocation services consist in lockable space in data centers with electricity, connectivity, cooling, backup, redundancy and physical security facilities to host ICT equipment that stay under the constant monitoring of data center engineers in order to guarantee the uninterrupted operation of these functions outsourced. Therefore, colocation services consist on providing housing, hosting and management of ICT hardware and systems of enterprises with high demands of communication and information services. In this sense, cloud services should be included in this segment considering that it would mainly represent a collocation service managed through the web (Dorota, 2010).

Based on these four broad levels of service offerings of telecom operators, the different ICT needs of enterprises can be served. In this sense, not all firms require the same set of services and therefore telecom operators typically segment the market to manage the customer relationships accordingly. A logical segmentation can be done based on the number of employees in the enterprise, the location of the enterprise, and the ownership of the enterprise (Hämmäinen, 2013). With this classification, the telecom operator can manage its customer relationships with more effectiveness. For instance, firms with a

large number of employees will be logically offered lower prices than the ones in the price list that the telecom operator maintains for small firms, and for this end a request-for-proposal RFP usually takes place. Additionally, when firms are located in multiple sites, the telecom operator maybe required to support VPN services, and maybe also multi-operator VPN services when the sites are in different countries or continents. Finally, private customers request the service based on demand and have flexible purchase processes, whereas governmental entities usually request the service based on the budget availability and have regulated purchase processes (Hämmäinen, 2013).

A more refined segmentation can be done based on the nature of the business, that is, whether its ICT needs are continuous, eventual or occasional; and whether the business critically depends on network infrastructure to operate. In this sense we can find that some organizations require continuous network-based services, like for instance universities, which become important customers for the business sustainability; whereas other customers that require eventual and occasional network-based services, like for instance promoters of concerts, may be important for the business for marketing purposes (Hämmäinen, 2013). Additionally, some firms not only require continuous ICT services, but they actually require permanent and uninterrupted services to support critical business processes and therefore be able to operate, like for instance ecommerce businesses, social network websites, banks, media streaming websites and others. Acknowledging all this before, the first three levels of offerings including access, application and network-layer services are usually meant to satisfy the ICT needs of small firms, whereas all the five levels of offerings are normally used to serve large firms including the same telecom operators.

Something that should be noted is the fact that, on average, the highest rate of network-based services usage occurs internally in the firm for the communications among employees, where the most popular services include email, voice and messaging. The usage of connectivity services to access to external resources or to communicate with people outside the firm represent the next level in terms of service usage rate. Finally the direct interaction between employees and the ICT systems of the firms shows the lowest frequency in terms of service usage profile. In this sense, an important parameter for firms to consider in order to decide for a certain ICT solution is the total cost of ownership per employee of the different technological options that satisfy needs and

align with the firm strategy. The total cost of ownership is composed by the direct and indirect costs. The direct cost is composed by the capital expenditure in the hardware, software and their upgrades and supplies that integrate the system, the labor cost to manage the systems and to support their operation and necessary developments, and finally by the fees arising from the telecom operators for the provisioning of connectivity and network-based services and other possible fees arising from outsourced services, cloud services, contracts for support and maintenance and others. The indirect cost arises from the training and learning efforts required to get the staff to effectively use the ICT resources, the effects of the satisfaction or dissatisfaction of employees with such resources, and finally the unproductivity arising from planned or unplanned downtime of the systems (Hämmäinen, 2013).

In light of all these facts like the vertical segmentation of the ICT industry, the telecom operators' offerings, and the total cost of ownership of solutions, making a decision of the right approach to meet the technological needs of the firm is not a simple task when the functions required are critical to support the business operations. Given that most of the ICT functions are integrated into networks, the main issue in this sense is how to manage network-based services, for which telecom operators become strategic partners. In this sense, the major concern to determine suitable solutions is the level of market uncertainty, which will determine the levels of centralization and distribution of the management architecture. For instance outsourcing email and web hosting services may be a suitable solution that benefits from the economies of scale achieved by the service providers thanks to the low market uncertainty. Under this approach the service is managed centrally with high stability. However, when the market uncertainty is high, firms may take a proactive approach by experimenting on distributed architectures that provide higher flexibility.

In terms of efficiency, the ICT industry is perhaps facing a paradigm shift with respect to network-based services, where firms are opting to use configurable and usage-based priced cloud services that go beyond isolated SaaS solutions rather than operating their own ICT infrastructure and even outsourcing non-traditional network-based services that in many cases result in costly Service Level Agreements SLAs. One of the main advantages of cloud services is that they reduce the capital and operational expenditure for ICT functions since firms pay according to the service usage instead of buying fixed

assets, usually underused during their lifetime, and maintaining and operating legacy infrastructure that do not deliver new capabilities (Dorota, 2010).

3.2.2 Consumer customers

Consumer customers in general are subject to various value drivers that build their experiences towards a product and a firm; where these value drivers can influence the customer behavior and thus become crucial to fuel growth and sustain the business in the long term (Gentile et al., 2007; Duncan et al., 2013; Yan et al., 2004). Knowing the consumer behavior is the main task of the people managing customers in the firm such as marketing, sales and customer care staff. A satisfactory customer experience, that is when the customer expectations are met or exceed, can become the most important asset for the firm sustainability and growth. In other words, a happy customer will purchase again and again from the same firm and will recommend other people to buy the product. Therefore, the questions are what value drivers matter for building the customer experience and how do we get a happy customer?

Answering these questions is not easy because customers value more than product utility, they also create sensations, emotions and feelings about a product and firm when they get to know about the product, select, purchase, use and get after-sales support. Firms usually target these processes before as the key elements of customer experience and therefore develop strategies to build that experience. In this sense, a popular practice among the marketing and sales strategies has been to manage touchpoints as a means to build satisfactory customer experience under the belief that showing care is good enough to keep the customer happy. Despite touchpoints are important to manage transactions they may create a misleading impression of a satisfied customer as noted by Duncan et al. in their 2013 article titled "The Truth About Customer Experience." Creating a comfortable and careful relationship with customers is important but does not usually solve the client pain points.

In this sense, a good starting point to address this problem above is to understand the cyclic process of value creation. The value creation process begins with the identification of the market needs which are then translated into firms' offerings that constitute value propositions based on their customer behavior knowledge. On the other side, customers select a product based on their perceived utilitarian and hedonic value of

the product; however, they usually show further value expectations of the product that should be realized by the firms in order to continue with the value creation process cycle with a new value proposition. In other words, firms should go along with customers throughout their whole experience journey of the product, as noted by Duncan et al. (2013), and in this way they will identify the client pain points, or expectations, and satisfy them in a new cycle of value creation.

Nonetheless, these cyclical processes of value creation would work better in perfect markets, but the telecom operator market is usually governed by mature oligopolies with very large firms competing to retain their customers through strong lock-in strategies, overlooking the customer expectations many times. In this sense, the value creation process for the consumer customers in the telecom market may become a one way process where telecom operators make their value propositions and the customers select among the locking and confusing telecom operators offerings based mostly on hedonic perceptions than well-informed utility perceptions. Perhaps this logic before obeys to the high information asymmetry that there exist between the service provider and the consumer customer in the telecom market as explained by Stiglitz (1989). This information asymmetry gives telecom operators space to maneuver with lock-in strategies, especially to mobile operators, that typically offer bundles contracts of services and equipment for minimum terms with high switching costs.

The fact that there exist high information asymmetry in the telecom market not only allows operators to develop lock-in strategies while attaining high profits, but also to maximize the producer surplus in many cases, especially in developing markets where the digital gap is still broad. Producer try to maximize the overall profit by analyzing the cross elasticities of services, that is, how much a change in price of a certain service may affect the demand of another service. On the other side, the consumer customers try to maximize their net benefit, and therefore their consumer surplus, by selecting the offering that gives them the best trade-off between utility and price, of course according to their needs. However, this is not a straight forward task since the price list of products bundles and traditional stand-alone services are not linear, especially in the case of mobile operators. Consumer customers may face some confusion when they subscribe for telecom services provision since they do not only have to choose from the nonlinear offerings of the a single telecom operator, but from multiple firms' offerings, usually

three or four, that may increase the confusion, but at the same time gives the chance to them to attain higher surplus thanks to competition, of course if switching costs do not limit the selection process.

In this point it is important to notice that in the telecom market there are strong network effects that intervene in the utility equation. Telecom access services that are not subject to person-to-person communications like the television, are not subject to direct network effects; however, telecom access services that require person-to-person communications like the fixed or mobile telephone, face strong network effects, especially due to interconnection costs. This means that the perceived value of consumer customers increases when the number of users of the same network increases, which usually becomes a crucial aspect when selecting telecom access services, especially if the majority of people that are communicating frequently with are subscribers of the same network. Network effects are determinant for the consumer market consolidation (Katz & Shapiro, 1985). As a telecom operator`s subscribers base starts to grow, the firm may experience two important points of equilibrium of the offer and demand driven by the network effect. One point occurs in an early growth phase, which constitutes an unstable equilibrium since any negative feedback, usually induced by the one or a combination of the Porter's five forces effects, may bring a firm or the market to failure, but if not, the positive network effect will induce an stable growth of the subscribers base until it reaches a second point of equilibrium that is stable and is normally not subject to risks of firm or market failure (Courcoubetis & Weber, 2003).

On the other hand, internet access service per se is generally not subject to network effects since users do not perceive any additional value in the number of users subscribing with the same firm because they pay a flat price for unlimited usage and not according to usage or interconnection. However, internet-based network effects are mainly exploited by content providers such as social network firms like Facebook, Twitter and WhatsApp. Actually, social networks have triggered unprecedented network effects, surpassing access-based network effects for voice service, given the enormous worldwide popularity and group forming features, which today enjoy the highest preference in terms of medium of communication among people. In this sense, according to Metcalfe's Law, the value of a network enabling two-way communication, like the telephone and data networks, increases with the square of the number of users in

the network N; whereas, according to Reed's Law, the value of a network enabling group forming communication grows exponentially with the number of users in the network and is equal to 2^N when the number of users is large. Therefore, traditional telecom operators perceiving the majority of their revenues and profit out of access services subscriptions cannot overlook the risks of churn considering this dominating preference of communications through social networks, and therefore, they require to suitably manage the customer relationships through their whole journey, including four important processes for customer retention such as customer care, offerings portfolio, purchase process, and network and service quality.

4 RESEARCH METHODS

4.1 Comparative case study approach

The case study approach has certainly be a widely used method that helps to operationalize concepts, theories and models to real world cases, which in turn allows us to determine the applicability of such frameworks, finding out whether we understand the reality, and to look forward to possible scenarios (Yin, 2014). In addition, the purpose of carrying out a **comparative** case study of Ecuador is to exemplify how the widespread of mainstream products and services in the TMT market are and might continue shaping the telecom industry in Ecuador, considering the specificities of a developing country such as Ecuador and comparing it objectively with the global environment.

4.2 Case selection

In this thesis I have chosen as a target of study my home country Ecuador considering that this is the place where I live and that I strongly believe that developing countries such as Ecuador must emphasize and take advantage of the opportunities of ICT to shorten the development gap. The development of the telecom industry is therefore a main factor for getting integrated into the international information society, and in turn, gaining competitive advantage by fostering the knowledge economy.

4.3 Data collection and analysis

The main purpose of the selected research methodology is to enable to quantitatively and objectively depict the current situation of the TMT industry in Ecuador and its tendencies, to then compare the findings with the global context and reflect about them based on the theoretical framework. This comparison and reflection before will provide us a benchmarked and supported view about how the widespread of mainstream services and products in the TMT market are and might continue shaping the telecom industry in the next decade in Ecuador.

In this sense, looking to answer the research question I have employed a quantitative research approach that includes data from two hundred fifty five (255) firms according to the following steps:

a) I gathered ICT statistical information of Ecuador in order to identify the main drivers of development of the telecom industry in Ecuador as part of TMT industry. This information helped to evidence the widespread of mainstream services and products in Ecuador including mobile broadband Internet, fixed broadband Internet, smartphones and tablets, social networks, High Definition HD Television, e-commerce and OTT content.

b) I gathered financial and population information of firms domiciled in Ecuador participating in the local TMT industry in order to determine important parameters for the analysis including revenue, operational margin, CAPEX investment, market share, prices and firms' population that help to describe the development of the telecom industry in Ecuador and its tendencies according to the main parameters of the models presented in the theoretical framework.

c) I revised the financial reports of the companies in order to filter, classify and tabulate the data acquired according to the different sectors of the TMT industry, so that the information in the case of firms that operate in more than one industry sector or segment gets classified and tabulated with the least error possible. I also analyzed the website of the firms to assess the main products and services that they offer, and in some cases I also called the companies to confirm in which sector(s) the firm operates.

d) I analyzed the findings by comparing them to the global context. For this intent I used as reference model the article "The 2013 Value Shift Index: Slower growth, subtle shifts" (Péladeau et al., 2013), which provides a quantitative analysis of the size of the global TMT industry, its growth tendencies and an insight about the value shifts among the different industry sectors. Based on this article before, I benchmarked my findings about the TMT industry in Ecuador with the global context. It is important to mention that the results in the article of reference are based on a sample that accounts

for the 60% of the universe according to the authors; whereas, in this Thesis the used sample accounts for about 93% of the universe.

e) Apart from presenting the information about the TMT industry according to the article of reference "The 2013 Value Shift Index: Slower growth, subtle shifts," I disaggregated the revenue of the Network and Service Operations industry sector into the different types of telecom services offered in this sector including access, managed, carrier, and colocation services, which were described in the previous chapter. This separation helped to evidence the tendencies of each segment of the Network and Service Operations industry sector, and to realize the leading segment of the whole TMT industry as we will see later on.

f) Additionally, to provide a complementary comparison in terms of per capita development I used the information available in web portal of The World Bank as well as the annual ranking of The Networked Readiness Index provided in the "Global Information Technology Report 2014" of the WEF (Bilbao-Osorio et al., 2014) to put in context the per capita findings.

4.3.1 Sources and Timeframe

Financial Information: The main source of the financial information of companies in Ecuador depicted in the figures and tables in the next chapter was the web portal of the Superintendence of Companies and Securities of Ecuador (SUPERCIAS, 2014), which maintains the most complete data base of Annual Reports of Companies, including detailed Financial Statements and Notes of mercantile associations in Ecuador. Another main source of financial information was the web portal of the magazine EKOS (Ekos, 2014), an Ecuadorian magazine specialized in research on the economy and markets in Ecuador. EKOS provides financial rankings considering revenue, profit, and taxes as well as a classification by industry sector of companies in Ecuador, which served as a starting point for the classification of companies in this Thesis. However, in order to accurately classify the companies into each industry sector I further confirmed the products and services that each company offers by analyzing the notes of the financial statements, looking at the company website, and calling the company to ask about its portfolio of products when it was necessary.

Moreover, I used the web portal of the official Tax Office of Ecuador (Servicio de Rentas Internas SRI, 2014) in the few cases where the information of EKOS did not match the information of the Superintendence of Companies in order to confirm which one was correct. It should be mentioned that the only financial information available from the official web portal of the Tax Office of Ecuador is actually the tax calculated for each company for each year; however this information served to confirm whether the information from the Superintendence of Companies is correct or the information from EKOS when there was a difference between them, since the Tax Office is the first entity where a change of financial information of a company gets registered.

For the analysis of the financial information of the Companies in Ecuador I covered the years from 2010 to year 2013 given that the beginning of this decade marks an important point in the TMT industry in Ecuador with the widespread of mainstream products and services including mobile broadband Internet, fixed broadband Internet, smartphones and tablets, social networks, High Definition HD Television, e-commerce and OTT content. It should be noted that all the figures and tables showing financial information of the telecom industry in Ecuador, like revenue, profit, market concentration and CAPEX investments, represent the original work done in this Thesis. However, with the aim to clearly distinguish which figures/tables represent original work and findings and which ones are just supporting information I have clarified this in every figure in the next chapter.

ICT Statistics in Ecuador: The main source of the ICT statistics in Ecuador shown in the figures and tables in the next chapter was the web portal of the National Secretary of Telecommunications of Ecuador (SENATEL, 2014), which maintains the most complete data base of the statistics of the evolution of the different telecom services in Ecuador in terms of number of subscribers, market penetration, installed infrastructure, and prices which are disaggregated in some cases by provinces, by technologies and/or by service providers. This data provided insight about the main drivers of development in the telecom sector as we will see in the next chapter.

Another important source of ICT statistics in Ecuador in terms of usage and market penetration of telecom and information services and products is the National Institute of Statistics and Censuses of Ecuador (INEC, 2014). This source before provided

important data about the market penetration of mobile phones and smartphones as well as the usage of social networks in Ecuador as main drivers of development of the TMT industry.

It should be noted that for the case of the figures of ICT statistics in Ecuador presented in the next chapter the timeframe of the data includes the years since the beginning of the 21st century until the year 2014, depending on the figure, in the same timeframe that they are presented by their corresponding original sources such as National Secretary of Telecommunications of Ecuador (SENATEL, 2014) and National Institute of Statistics and Censuses of Ecuador (INEC, 2014). The fact that these figures of ICT statistics in Ecuador include information before the year 2010 gives us a wider perspective of the evolution of the telecom industry in Ecuador where the main drivers of development can be pinpointed. In addition to this before, in the introduction part of this Thesis I briefly went through the history of the telecommunications since the industrial evolution with the aim that we get an overall perspective of the past and present situation of the telecom industry and its tendencies.

Population Information: The main source of the population information of companies in Ecuador depicted in the figures in the next chapter was the web portal of the Superintendence of Companies and Securities of Ecuador (SUPERCIAS, 2014), which maintains the most complete data base of the legal status of companies including the foundation and dissolution of companies, the current number of active companies corresponding to each economic sectors based on their core business activities. Furthermore, the National Secretary of Telecommunications of Ecuador (SENATEL, 2014) also provided the population evolution of Internet Service Providers ISP in Ecuador which represents the segment of the telecom industry in Ecuador with the highest activity in the last decade.

4.3.2 Limitations of the data

One of the possible limitations of the data is that some companies that operate in more than one TMT industry sector do not disaggregate the revenue by sector, in which cases a fair estimation is required. In the case of the Network and Service Operations industry sector, the data was not disaggregated according to the different service segments analyzed like fixed telephony, mobile services, carrier services, and fixed Internet

access in the case of the public enterprises such as CNT EP and ETAPA EP; therefore, fair estimations of these disaggregation was done, keeping coherence with the data found in the budget statements of the aforementioned public enterprises.

Furthermore, it should be noticed that the data of the 255 firms included in this study account for about 93% of the total TMT industry revenue, and the remaining 7%, that account in its majority to Small and Medium Enterprises SME, was fairly estimated independently for each industry sector based on the information about the sector-specific firms' population for micro, small, and medium enterprises and their corresponding revenue range available in the web portal of the Superintendence of Companies and Securities of Ecuador (SUPERCIAS, 2014). It should be noted as well that the summations of values in the tables and figures in the next section may not coincide with the totals due to rounding errors.

5 A COMPARATIVE STUDY OF THE TELECOM SECTOR IN ECUADOR

The TMT industry in Ecuador is on average developing faster than worldwide, but its current development is yet behind the average according to the findings of this study, which seem to be consistent with the ranking of The Networked Readiness Index provided in the Global Information Technology Report of the World Economic Forum WEF (Bilbao-Osorio et al., 2014). According to Table 2, the TMT industry grew 10,03% from year 2010 to year 2013 in the case of Ecuador, and of 6,26% worldwide taking as reference the year 2010. A similar thing occurs if we compare the Gross Domestic Product GDP of the Ecuadorian economy with the global GDP, inferring in this sense that on average both the Ecuadorian economy and TMT industry are growing significantly faster than worldwide. In this sense, it can be observed as well that the global TMT industry is growing slightly faster than the global GDP, whereas, the Ecuadorian TMT industry is growing about the same pace than its GDP, taking as reference the year 2010. It should be noted that the GDP and TMT revenue are considered at purchaser's prices, that is, they are not calculated with reference prices of any given year; therefore, the inflation may introduce some variation in terms of real growth, however, the comparisons between Ecuador and the global context are rather fair considering the similarity of the evolution of the inflation rate in Ecuador compared to the World (World Bank – Inflation Data, 2014).

Another important finding from Table 2 is that on average a person in Ecuador spends more percentage of his or her income in TMT products and services than a person in the world, especially in telecom services as it will be seen further on. If we analyze this fact before together with the 2013 ranking of Ecuador in The Networked Readiness Index, it may suggest that the access and consumption to TMT products and services among the Ecuadorian population is a fair measure of the income distribution inequality. However, we could also say that we are in an ongoing journey to reduce the digital gap worldwide considering that both the Ecuadorian and global economies and TMT industries are growing much faster than the global population.

With respect to the data of the global TMT industry, it should be remarked that it has been taken from the reference article "The 2013 Value Shift Index: Slower growth,

subtle shifts" (Péladeau et al., 2013). In this sense, further on we will see Figure 19 which depicts the development of the global TMT industry expressed in terms of revenue. From the aforementioned figure, it will be noticed that the industry sector corresponding to Electronic Components is not included in the study of the Ecuadorian industry, considering that this is a specialized high-tech sector with low or at least very modest expectations for growth in Ecuador. Therefore, the industry sectors considered in the totals below are the ones described in theoretical section and include: Network and Service Operations, Network Equipment, Computers and Devices, IT Services and Software, Media and Content, and Internet Companies.

GENERAL PARAMETER	SPECIFIC PARAMETER	2010	2011	2012	2013	CAGR
GLOBAL	GDP (USD billions)	$ 64.552,74	$ 71.448,83	$ 72.908,41	$ 74.909,81	5,09%
	POLULATION (millions)	6883,51	6964,64	7043,11	7124,54	1,15%
	TMT (USD billions)	$ 3.988,00	$ 4.282,00	$ 4.656,00	$ 4.784,00	6,25%
ECUADOR	GDP (USD billions)	$ 67,51	$ 76,77	$ 84,04	$ 90,02	10,07%
	POLULATION (millions)	15,00	15,25	15,49	15,74	1,61%
	TMT (USD billions)	$ 5,15	$ 5,79	$ 6,44	$ 6,86	10,03%
RELATIONSHIPS	WORLD AVERAGE OF TMT REVENUE PER CAPITA	$ 0,58	$ 0,61	$ 0,66	$ 0,67	5,04%
	ECUADORIAN AVERAGE OF TMT REVENUE PER CAPITA	$ 0,34	$ 0,38	$ 0,42	$ 0,44	8,29%
	GLOBAL TMT REVENUE WITH RESPECT TO THE GLOBAL GDP	6,18%	5,99%	6,18%	6,18%	0,00%
	ECUADORIAN TMT REVENUE WITH RESPECT TO THE ECUADORIAN GDP	7,63%	7,54%	7,66%	7,62%	-0,03%

Table 2. Development benchmark in the TMT industry in Ecuador with respect to the World (Own elaboration and findings).

5.1 Value drivers and development factors of the TMT industry

Mobile services

Certainly the mobile industry gained momentum in Ecuador since the launch of broadband mobile Internet and the further upgrades to 3.5G technologies like High-Speed Downlink Packet Access HSDPA. The year 2010 marked a turning point in the mobile industry in terms of mobile data subscriptions as shown in Figure 8. In this sense, the dominant mobile operators such as Conecel S.A., a subsidiary of América Movil, with its brand CLARO, and Otecel S.A., a subsidiary of Telefónica, with its brand MOVISTAR, continue providing the service with 3.5G network technologies until the local regulator negotiates the new spectrum band for the upgrade of the network to 4G

technologies that will enable at least ten times faster data access. In this sense, despite 4G technologies have been widely deployed in other countries, the dominant mobile operators seem to be patient to wait the moment to unleash the new network technology if they reach an agreement with the local regulator, which it should be said, has granted the spectrum band for the deployment of the 4G mobile networks only to the national telecom company CNT EP, owned by the state, in an attempt to gain the early adopters to their customer base that is very reduced in the mobile segment. Despite 4G networks have been developed in various geographical markets, the actual potential of these technologies in developing countries is yet to be understood considering the much higher market penetration of mobile subscribers than fixed subscribers. Therefore, this technologies should be carefully tracked in the as a potential disruptive innovation.

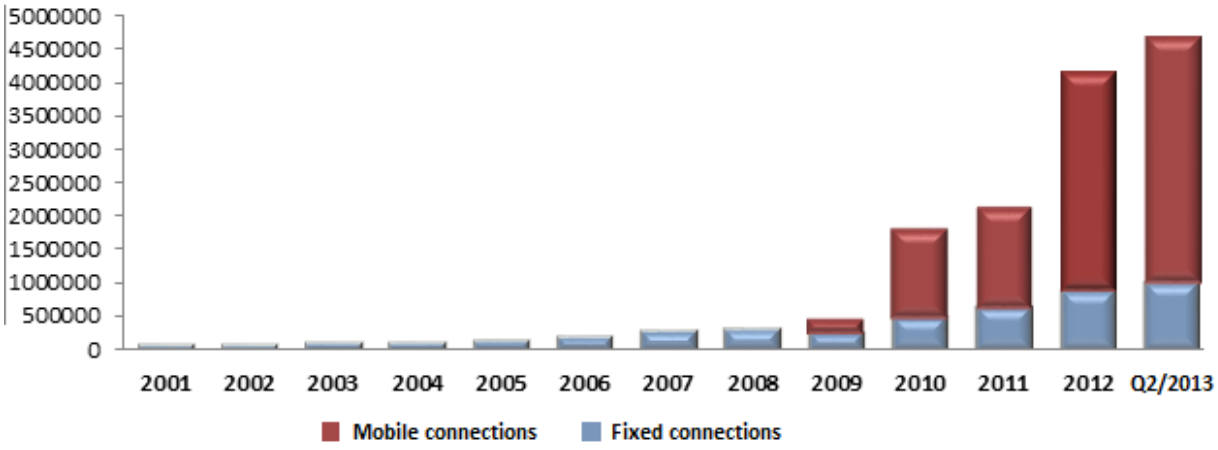

Figure 8. Number of mobile and fixed data/internet access subscriptions in Ecuador, 2001-2013. Source: SENATEL (2014)

On the other hand, it should be said that mobile operators have strategically monetized the scarce spectrum by gradually increasing the price of mobile data, allowing in this way to cope with the increasing demand. On the hand, mobile operators have been employing prepaid and postpaid promotions of mobile voice for calls to the same operator, decreasing on average the net effective price per minute but increasing the consumption. This consumption incentives seem to have sustained growth of the mobile voice segment as it can be seen in Figure 9.

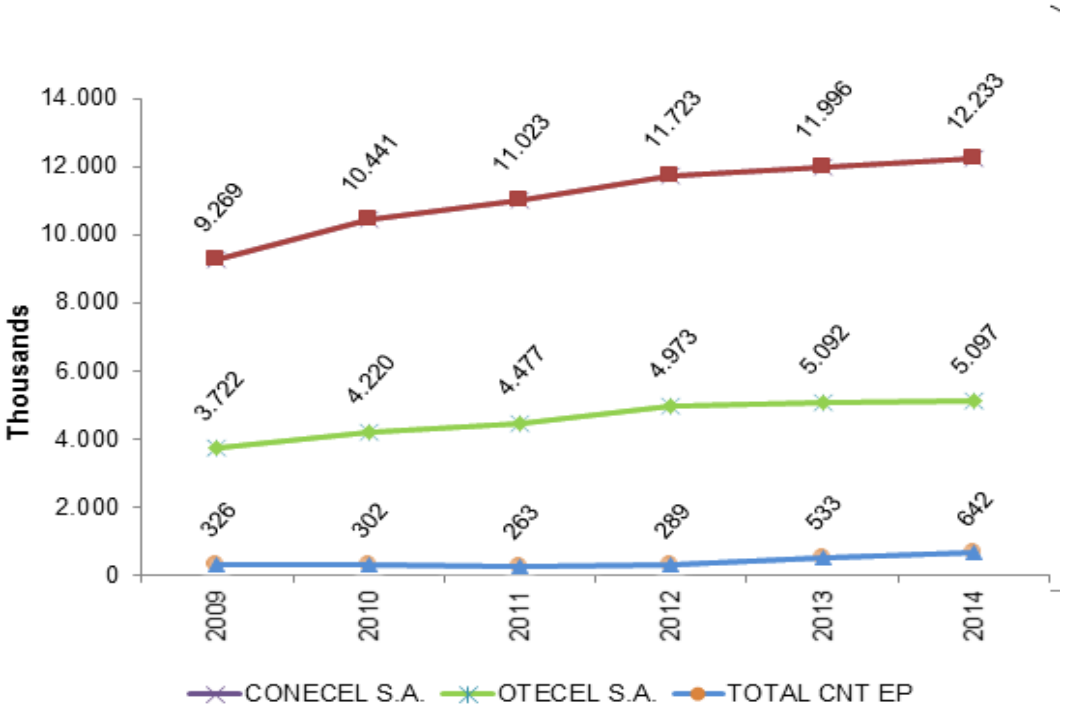

Figure 9. Number of subscribers of mobile voice service in Ecuador from 2009 to 2014. Source: SENATEL (2014)

Fixed Internet access

Similar to the mobile data access, the growth of the fixed internet access service has been favored with the widespread of broadband technologies like cable modem and xDSL as shown in Figure 10. These technologies before became the standard in the fixed Internet industry for years until the next generation optical fiber networks have started to be widely deployed. Thanks to the emergence of cable modem and ADSL as dominant broadband technologies, the fixed Internet access segment has experienced stable growth, and more capital-intensive investments have been performed given the lower technological uncertainty. After the stable growth experienced in the last decade in this industry segment, the introduction of next-generation fixed networks, such as optical fiber networks, represent a technological discontinuity for this industry segment. Despite the current developments of Fiber-To-The-x FTTx technologies do not exploit the full potential of the available bandwidth, firms cannot doubt to gradually migrate their networks to these new optical fiber technologies if they do not want to miss the wave for the next-generation triple play services that can be offered within a converged network.

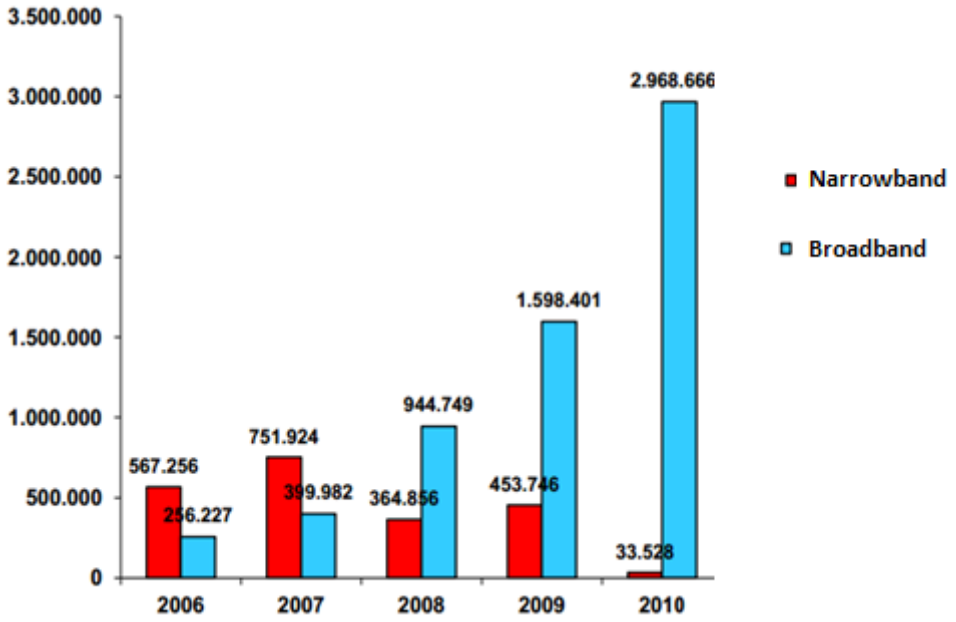

Figure 10. Internet users by type of technology access in Ecuador, 2006-2010. Source: INEC (2010)

Another important fact that allowed the development of the fixed Internet access service is the decreasing prices as shown in Figure 11. It can be said that the present and future development of this segment has been guaranteed since the reduction of the 2 Mbps downlink access speed to close to 18 USD for home Internet. This price before has become a benchmark in the local market and has obligated to Internet Service Providers ISP to refine and extend their services portfolio for enterprise customers that on average are much less price sensitive customers. In this sense, high data rates with certain service level agreements are offered to the market experiencing a good growth potential, especially with the deployment of fiber optic technologies up to the home, providing a physical medium with a bandwidth capacity that can support all current and future services and applications. Moreover, the provision of wireless routers and access points for homes and offices, as part of the fixed Internet access service, has also boosted sales.

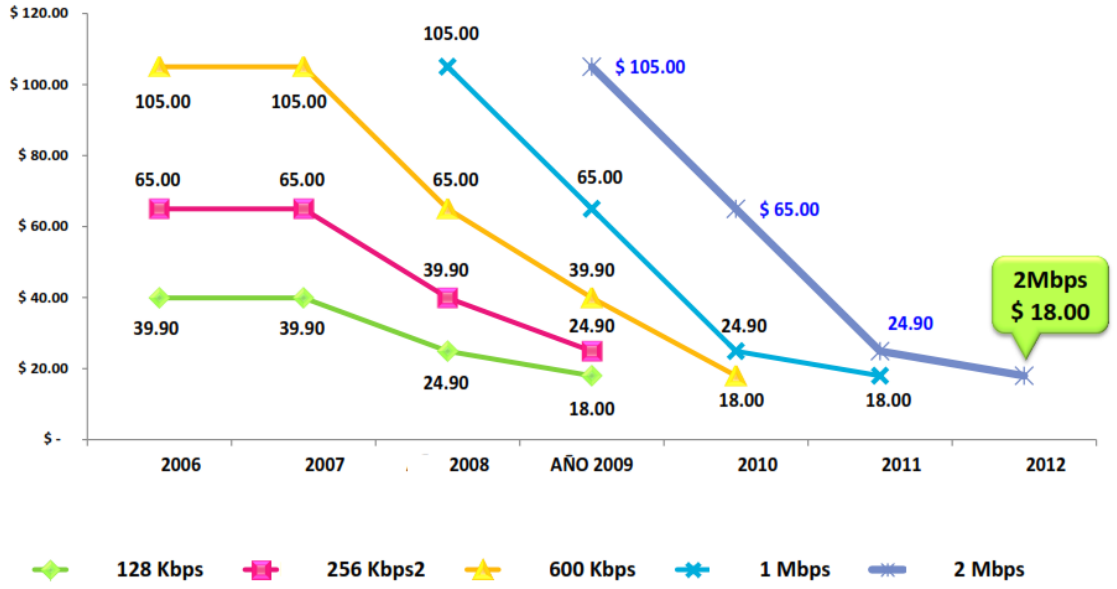

Figure 11. Flat fees of different data rate plans of the telecom operator CNT EP, 2006-2012. Source: Regalado (2012)

It should be mentioned as well that the ultimate driver of development in this industry segment is actually the need people to be part of the information society and knowledge economy, in which situation the access to the Internet satisfies the learning, information, communication, entertainment, and work needs.

Smartphones and devices

A main driver of the overall TMT industry evolution is certainly the widespread of smartphones that enable the use of a wide selection of applications and services, including internet browsing, email, social networks, telematics, videogames, multimedia streaming, mobile commerce, and many others. Smartphones provided the user for the first time with an appealing interface capable to support different type of services over the network and by itself, unleashing in this way an important growth in the computer and devices segment that has been accompanied with the fast introduction of tablets to the market. In this sense, the firm Apple has dominated the product design arena, standardizing the attributes of smartphones, tablets and slim light-weight laptops. As it has been widely evidenced, the technology giant has generated revenues not only from the high end market but also from other market segments at premium prices thanks to their permanent focus to be at the fore-front of the product design.

In the case of Ecuador, the market penetration of smartphones has been growing at a good pace of about 50% year after year as it can be seen from Figure 12 that shows the percentage of the population having an activated mobile phone or not, and the percentage of the ones whose mobile phone is a smartphone. In this respect, the mobile industry, including the mobile phones segment and devices, have entered in a new industry cycle since the introduction of smartphones, having already acquired the mainstream market in developed countries and an important part of the mainstream customers in developing countries such as Ecuador.

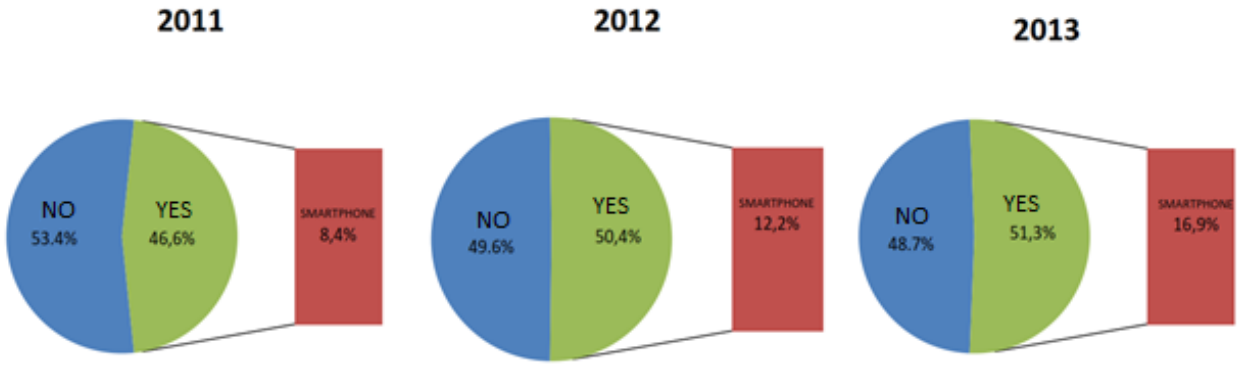

Figure 12. Smartphones market penetration in Ecuador, 2011-2013. Source: INEC (2013)

On the other hand, it should be said that this new cycle of growth of the devices industry would not be possible without the development of open source software led by technology leaders such as the case of Android of Google, which allows that other firms also generate revenues out of the standardized product attributes, given by the emergence of a dominant design, without taking much risks of developing proprietary software and challenging the dominant firm such as the case of the firms Samsung, HTC, LG, Huawei and others. Under this development model the strategies of appropriability do not secure the biggest stake of pie, and even more, attempting to prioritize the protection of mere technological progress in order to secure returns, instead of pioneering in new business models and product designs, may lead to wrong strategies for growth. Therefore, attempting to secure returns relying on appropriability regimes should be carefully analyzed from a wider context and not only based on the short term benefits as it has been analyzed in the theoretical framework; even more if

we realize that the production assets, and other complementary assets including the distribution network, are not the major concern for the business success nowadays considering the increasing capacity and low labor costs of some economies in Asia and the strategic alliances that can be established to compensate some complementary assets.

It can be said beforehand that the future developments of the devices industry seems to find its continuity in the development of applications and interoperability of mobile devices with multimedia devices that work together seamlessly in a connected home environment.

Social networks

Social networks in Ecuador have already capture users of every age from 5 years on, and its everyday usage is increasing. This information before can be partly evidenced in Figure 13 that illustrates the size of the population in Ecuador, the number and percentage of people over 5 years old, the number and percentage of people having an activated mobile phone, the number and percentage of people having a smartphone and the number and percentage of people using social networks. The tendency in Ecuador seems to follow the global tendency, especially in developed countries, where social networks are the preferred means of communications. In this sense, the overall TMT industry has delighted to follow this trend by incentivizing the use of social networks, like telecom operators, and by integrating their services with social networks in order to reach a target audience. Therefore, social networks also represent a main driver of development since the users preferred this means of communication, which may eventually substitute other services like for instance the short message service SMS with the widespread of Instant Multimedia Messaging IMM, like WhatsApp messaging service, that enables presence status and group forming that have great user acceptance.

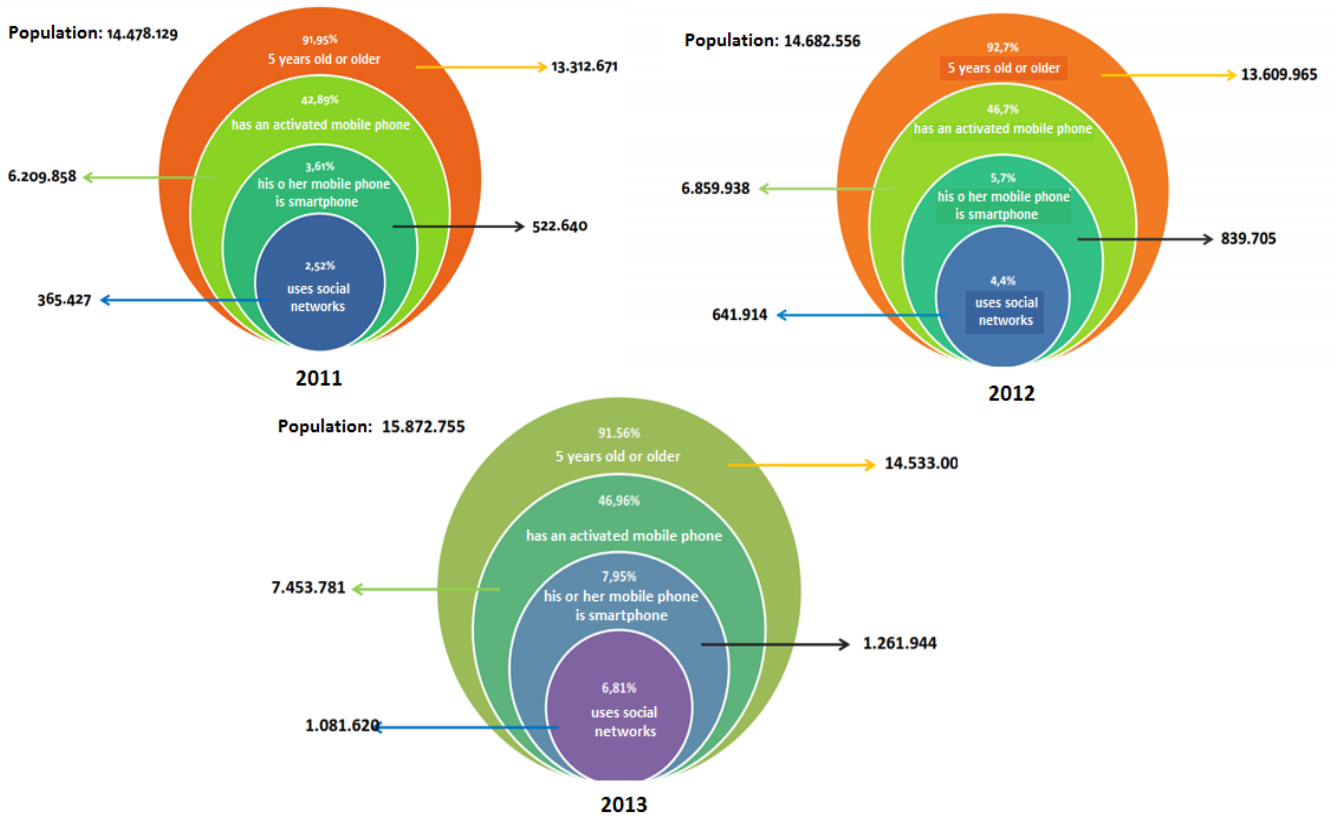

Figure 13. Usage of social networks in Ecuador, 2011-2013. Source: INEC (2011, 2012, 2013)

Fixed telephony

With respect With respect to prices, Figures 10, 11 and 12 illustrate the evolution of the tariffs for mobile voice service per minute. From Figure 14 and 15 we can see that the prices for voice service from fixed to mobile networks have reduced on average to about half of their initial price, with only one operator having the minute price higher than 14 USD cents. It can also be evidenced that the lowest tariff for fixed to mobile voice service is offered by the state-owned telecom operator CNT EP, which attains more than 80% of the fixed telephony market share, thanks to the lower interconnections fees.

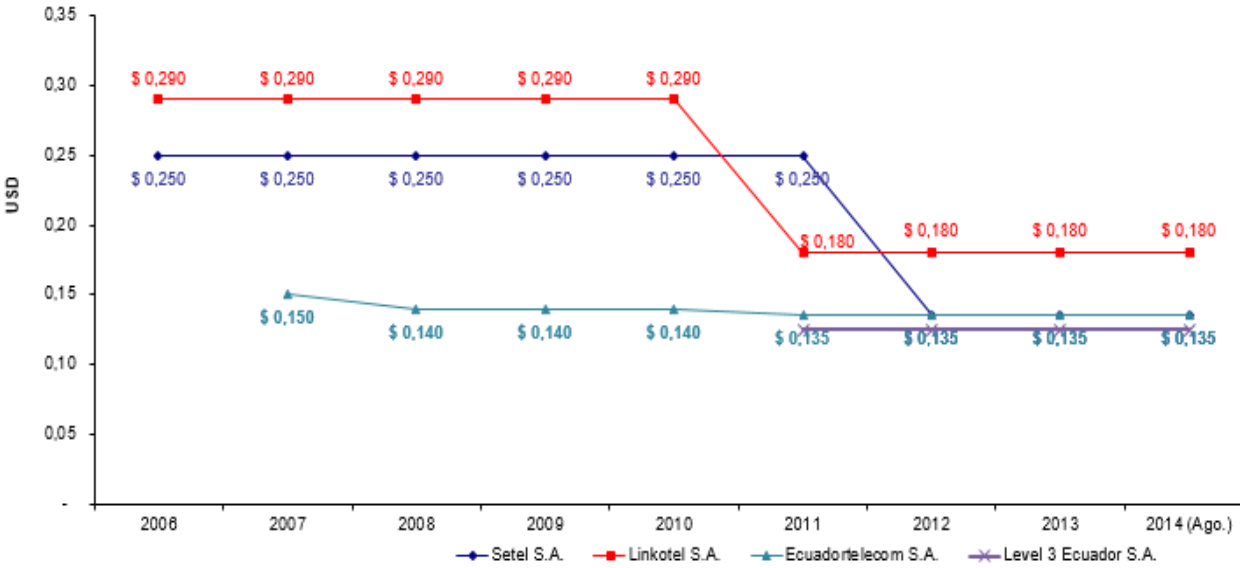

Figure 14. Tariffs evolution of fixed to mobile voice service in Ecuador, 2006-2014 (privately owned operators). Source: SENATEL (2014)

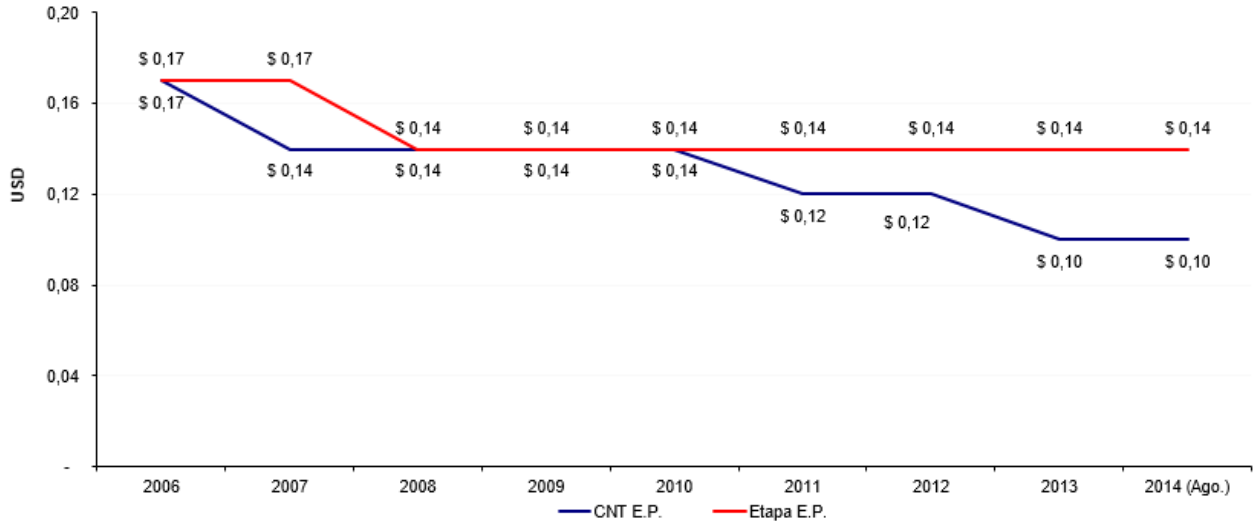

Figure 15. Tariffs evolution of fixed to mobile voice service in Ecuador, 2006-2014 (state-owned operators). Source: SENATEL (2014)

Additionally, Figure 16 shows us the evolution of the maximum and minimum tariffs established for mobile voice both for prepaid and postpaid services. From the figure it can be observed that tariffs of prepaid service have reduced to about the third part of their initial price, which has been a fundamental factor to sustain the growth of the mobile voice segment, despite that the postpaid mobile voice service has remained the with about the same initial price.

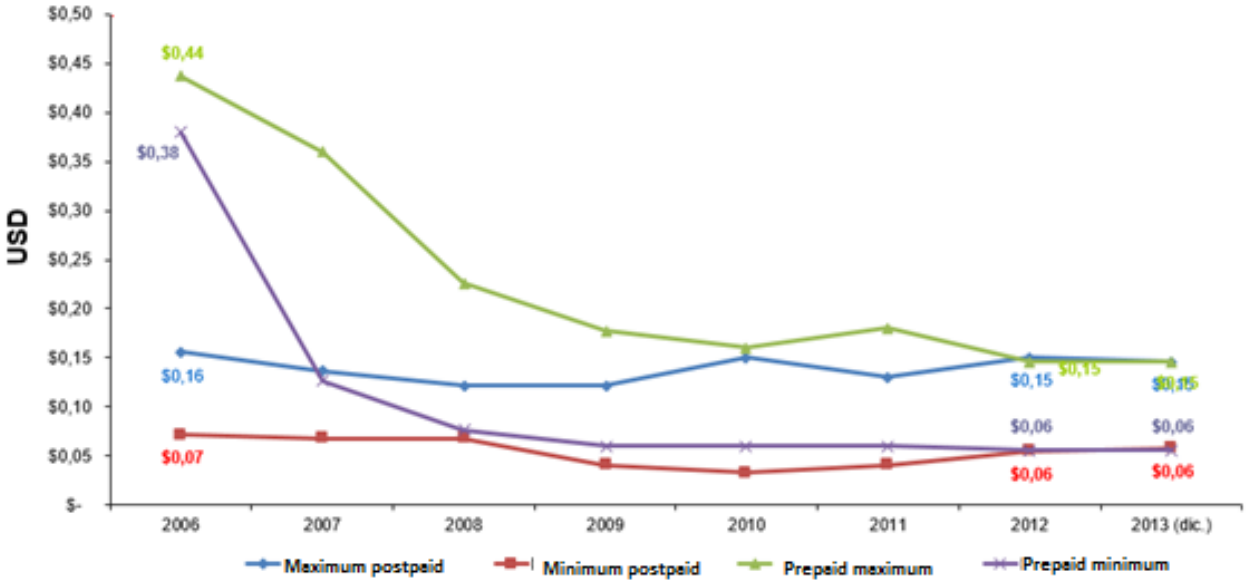

Figure 16. Tariffs evolution of mobile voice service in Ecuador, 2006-2013. Source: SENATEL (2014)

One last chart that deserves the analysis with respect to telecom services prices is the evolution of the tariffs for local fixed telephony. From the Figure 17 it can be observed that the tariff increased about twice its initial value in the year 2001, which may be attributed to the assurance of profits. However, later on the prices have remain rather stable, which may suggest that a decrease in price will not necessarily increase the consumption since fixed telephony has become a commodity. On the other hand, the decrement of tariffs from fixed to mobile voice has indeed increased the consumption of this service given that it is not seen as a commodity product and is actually highly useful.

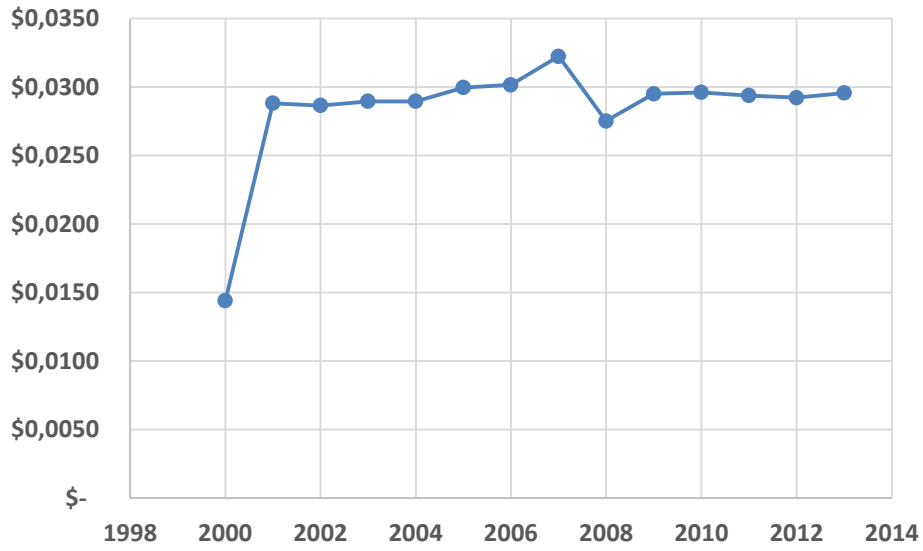

Figure 17. Tariffs evolution of fixed telephony (average) in Ecuador, 1998-2014. Source: SENATEL (2014)

Pay TV

Despite there a little evidences on what is truly causing the tremendous growth of pay TV subscribers, that in the year 2013 accounted for a 44,96% growth, and a market penetration of 22,73% (Ekos, 2014) and the year 2012 accounted for about 89% growth (SUPERTEL, 2014), it can be said that this increment finds its roots in the widespread of High-Definition HD television, and the offer of non-HD TV plans at a lower prices targeting the market segment with low purchase power. From the user experience side, the important set of HD channels offered by telecom operators have captured the attention of consumers who appreciate the significant improved visual experience. It may be said as well that another important driver of value in the pay TV industry are the international sports competition such as the World Cup of 2014 that generates high expectative in the people that do not want to miss it. In this sense, the sports channel seem to account for an important value stake in this TMT industry sector. It should also be mentioned that the low entry barriers of this industry segment, as well as the inexistent network effect, allows that other resourceful players successfully enter the industry such as the case of the state-owned operator CNT EP that in only few three years since it started operating in this segment in the continental area has surpassed, in terms of number of subscribers, some incumbent operators in this segment like GRUPO

TVCABLE, to stand just behind the leading operator in this segment such as DIRECTV (SUPERTEL, 2014).

E-commerce and OTT content

Despite these services seem to have gained the attention from the early adopters and started to gain the attention from mainstream users, they are still in their embryonic phases in the Ecuadorian market. In the case of e-commerce, this service started to gain momentum with the promotion a low-cost carrier services to buy products from abroad, especially from the USA, and receive them at home in Ecuador without paying tax for products with sales price below 400 USD and weight below 4 kg. However, this incentive to e-commerce has been affected very recently by the imposition of a new State tax for the aforementioned type of purchases. Nonetheless, e-commerce services should definitely be mentioned as potential driver of development in the next decade in the Ecuadorian TMT market (El Comercio, 2014).

Similarly to the case of e-commerce, OTT paid content seem to have started its growth journey in Ecuador with the popularity among early adopters of Netflix services, and therefore it should be mentioned as potential driver of development in the next decade in the Ecuadorian TMT market. Even more, OTT content should be carefully considered by firms since it has the potential to revolutionize the content market, including the pay TV segment, and it may even disrupt the market given the enormous potential of interaction that the smart TVs can provide. In this sense, firms must understand the threats and opportunities that disruptive innovations attain, which has been revised in the theoretical part of this thesis.

5.2 TMT industry development in Ecuador and Worldwide

Centering our view in the TMT industry, Table 3 shows us the growth rates of the different sectors and the absolute monetary growth. From the table 3, we can also observe that the sectors of the TMT industry in Ecuador that grew over its overall growth are the network and service operations, network equipment, computer and devices, and the Internet companies, whereas, the IT services and software, and the media and content sectors grew behind the overall industry growth; however, every industry sector in Ecuador grew faster than its corresponding industry sector worldwide.

	WORLWIDE			ECUADOR		
REVENUE	CAGR	ABS. DIFF	CAGR	CAGR	ABS. DIFF	CAGR
TELECOM, MEDIA AND TECHNOLOGY	2010-2013	2010-2013	2012-2013	2010-2013	2010-2013	2012-2013
Network and Service Operations	4,42%	$ 225	0,33%	11,27%	$ 955	10,28%
Network equipment	8,90%	$ 298	1,93%	14,01%	$ 179	7,35%
Computers and devices				11,80%	$ 228	-1,05%
IT services & Software	4,98%	$ 145	6,26%	5,55%	$ 193	3,10%
Media and Content	6,87%	$ 73	4,66%	7,69%	$ 143	3,75%
Internet Companies	17,92%	$ 55	11,90%	58,65%	$ 13	86,94%
OVERALL	**6,26%**	**$ 796**	**2,73%**	**10,03%**	**$ 1.712**	**6,64%**

Table 3. CAGR and absolute revenue growth in Ecuador and Worldwide, 2010-2013 (Own elaboration and findings).

From Table 3 it can observed that in the data gathered from (Péladeau et al., 2013), the computer and devices sector has been accounted together with the network equipment sector, considering that they both represent sector producing and commercializing hardware products. Nonetheless, for this study I have separated these sectors since the network equipment sector alone provides insights of the investments done in the network and service operations sector, which constitutes the main sector of this study. In this sense, it would be interesting to know the shares of the network equipment sector and the computers and devices sector in the global industry and compare it to Ecuador in order to know how these sectors are developing; nonetheless, I analyze more about this further on when we revise the CAPEX investments of telecom operators.

On the other hand, from Table 3 it can be also observed that the growth rate of the network and service operations, network equipment and computer and devices from year 2010 to year 2013 are significantly higher with respect to global industry, and moreover, are close to each other. This before suggests that these TMT industry sectors in Ecuador are *coevolving* and entering a maturity phase in the mobile Internet industry if we consider that telecom operators are investment more as it can be inferred from the growth rate of the network equipment sector. However, with respect to the smartphones and devices sector it can be foreseen that the future growth of this section will depend on the evolution of the prices to make it more affordable for the low end market.

On the other hand, as it can be calculated from Figure 18 and Figure 19, the greatest share in the TMT industry, both in Ecuador and Worldwide, went to the network and service operations, with 50,8% and 38,64% industries shares respectively in the year 2013 (the electronic components sector of the global TMT industry is not considered for these calculations). With respect to the electronic products section, they account for

about 28% share of the global industry in 2013 and for the same relation in the case of Ecuador the share is about 27%, if we add the computers and devices sector with the network equipment sector. In this respect, it should be mentioned that in (Péladeau et al., 2013) the electronic products sections seems to include all types of electronic equipment, which suggests that they have included electronic products that are not necessarily meant for communication and information purposes like for instance home appliances and other specialized hardware. However, in this study I do not account for home appliances and others electronic products that are not meant to be used for communication and information purposes.

Another important aspect to observe is that the Internet companies sector accounts for only 0,3% of the total TMT industry in Ecuador in 2013, and much less the previous years, which compared to the 3% share of the global industry in 2013 suggests that this industry sector in Ecuador is in its infancy yet. On the other hand, it is interesting to notice that apart from the network and service operations sector, the only sector of the Ecuadorian TMT industry that maintains a higher share in its industry compared to the global industry is the media and content sector, with about a 10% share in 2013 compared to the 8% share of the global industry. This also suggests that on average a person in Ecuador spends higher percent of his or her income for consuming content than worldwide.

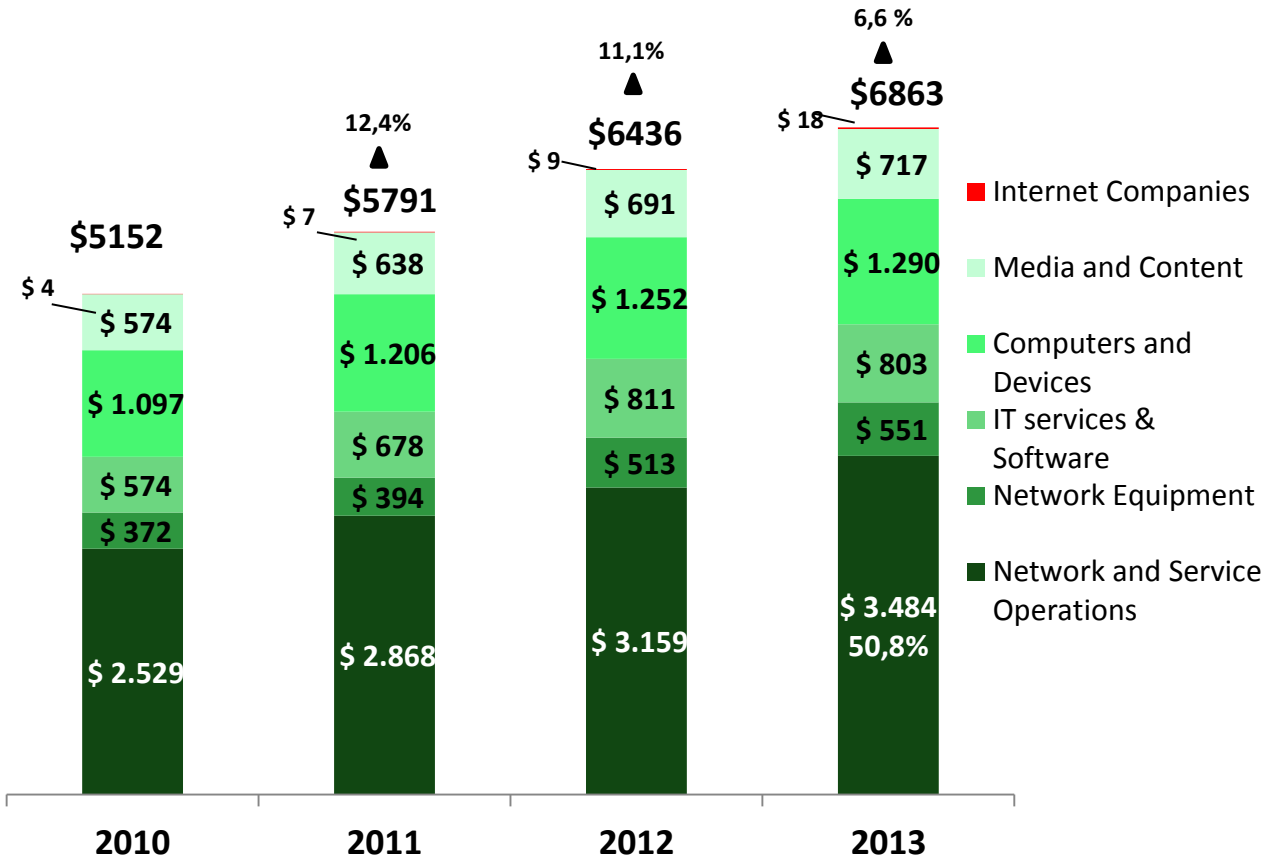

Figure 18. Overall Telecom, Media and Technology TMT revenue growth in Ecuador, 2010-2013 (Own elaboration and findings).

In the case of the IT services and software sector, the numbers show that this sector is significantly behind in terms of industry share for the case of Ecuador compared to the global industry. This may suggest that enterprises need to work more on improving their IT technological infrastructures and digitalization of their processes; however, it may also suggest that, on average, customers and employees are less used to operate in digital environments than worldwide. It is important to remark in this point that all the comparisons of the shares of the different industry sectors between Ecuador and the global environment help to gain insights about the behavior of the industry based on a global benchmark, however, it is important to remember that the overall TMT industry in Ecuador, and each one of its sectors separately, are developing faster than worldwide on average, but its current development state is yet behind the World on average.

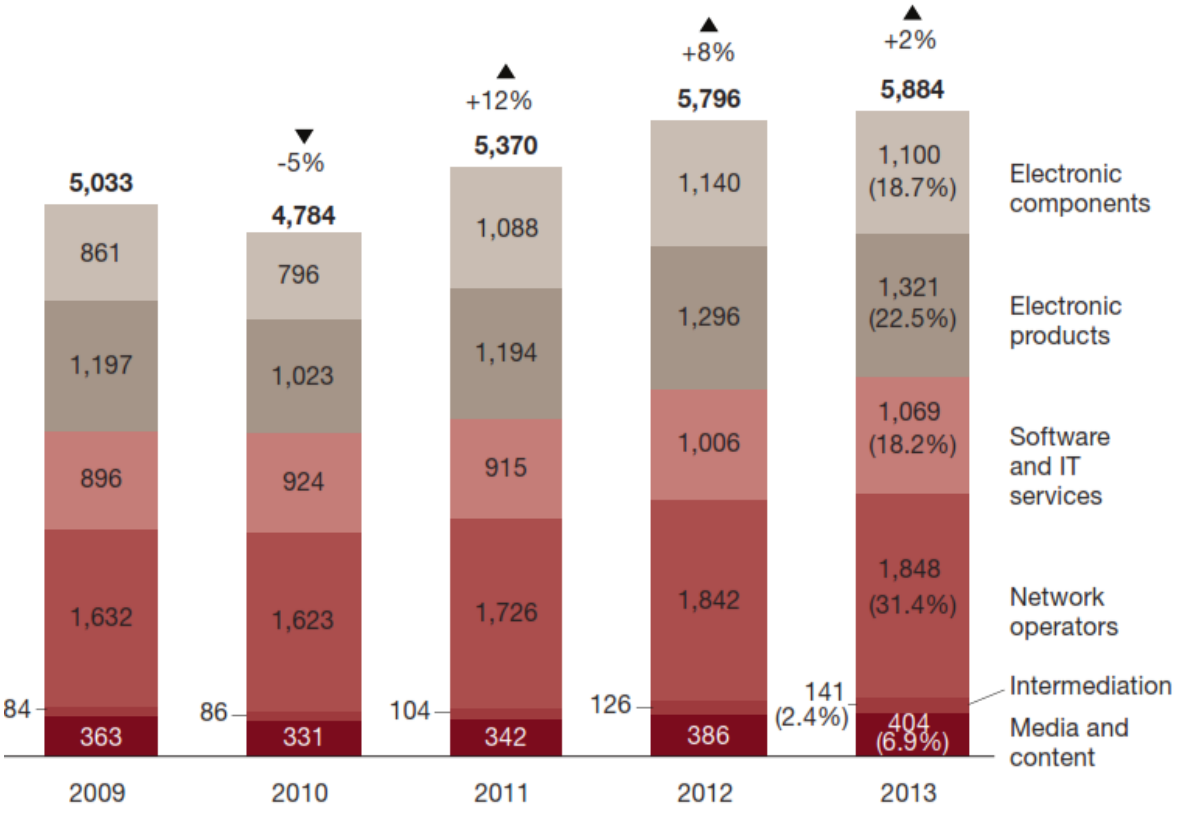

Figure 19. Overall Telecom, Media and Technology TMT revenue growth Worldwide. 2009-2013. Source: Péladeau et al. (2013)

5.2.1 TMT market forces

In the following two sections I will reflect on the different market forces that the different TMT sectors face despite of sharing the same ecosystem. In this sense, the analysis of the operational margin of the different sectors can shed lights on these forces facing each sector. In this respect, Figure 20 shows the operating margins of the different TMT industry sectors from year 2010 to year 2013. In this figure it can be observed that the network and service operations sector attains the highest operational margin and therefore the highest value since it is the largest sector in terms of revenue. This finding does not surprises if we consider that more than 90% of the share of the network and service operations sector is attained by four firms, which reveals the oligopolistic nature of this sector. Of course this situation is not mere strategic management of the firms, but it also obeys to the network effects governing this industry since in principle the voice service is subject to expensive interconnection fees, which on average represents a higher expense than the data service, especially in the mobile industry. This fact before prevents consumers to switch from operators at no cost.

Furthermore, entering the mobile industry is almost totally prevented by the very high investments required, that in the end determine the service quality and the firm performance. This is the case of the firm CLARO that has invested to cover the majority of the Ecuadorian territory, gaining in this way the highest preference and share in the market despite of its higher prices.

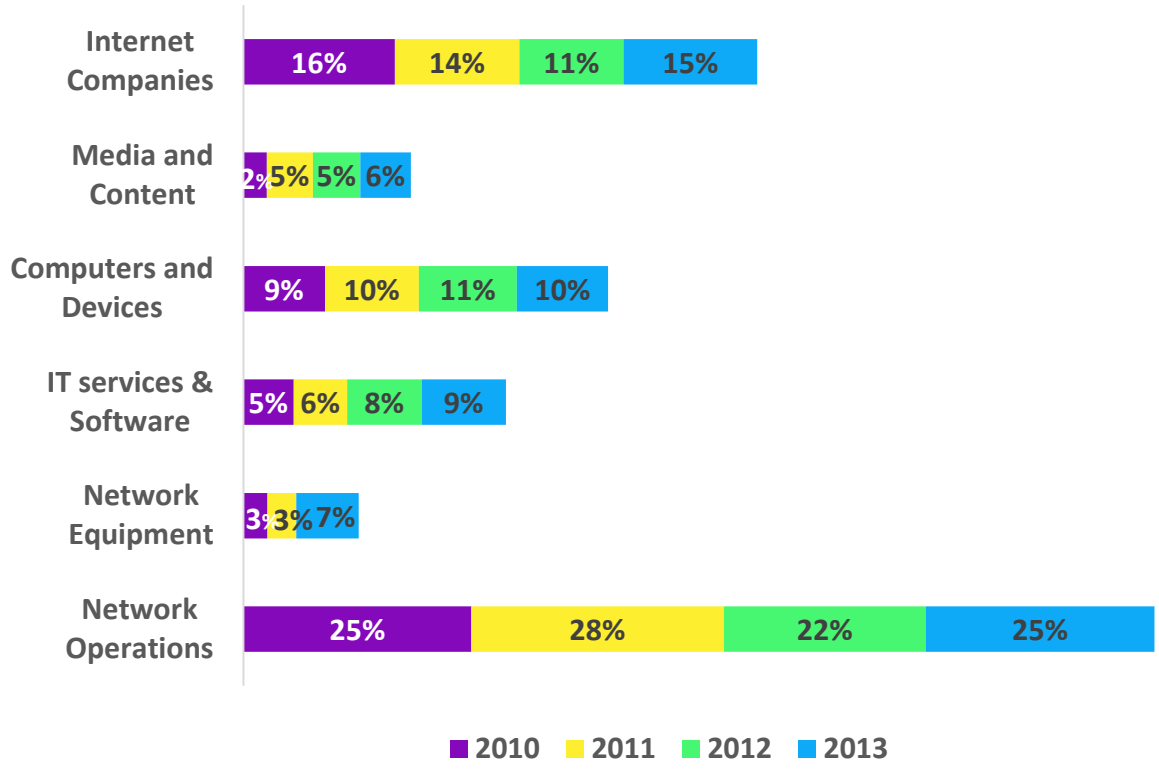

Figure 20. Operating margin of the TMT industry sectors in Ecuador, 2010-2013 (Own elaboration and findings).

On the other hand, we can observe from Figure 20 that, apart from the Internet companies sector and the network and service operations sector, the others show operational margins below the average, especially in the case of the network equipment sector. This finding pin points various rationales of the business environment such as the bargaining force of suppliers and clients and the market strategies. In the case of the network equipment companies, the overall operational margin is governed by operational margin of cost leadership players such as Huawei, which has the highest share in this sector of the Ecuadorian market, offering end to end network solutions as

well as smartphones and tablets. On the other hand, the computer and devices sector as well as the IT services and software sector face strong bargaining forces from clients due to the high competition.

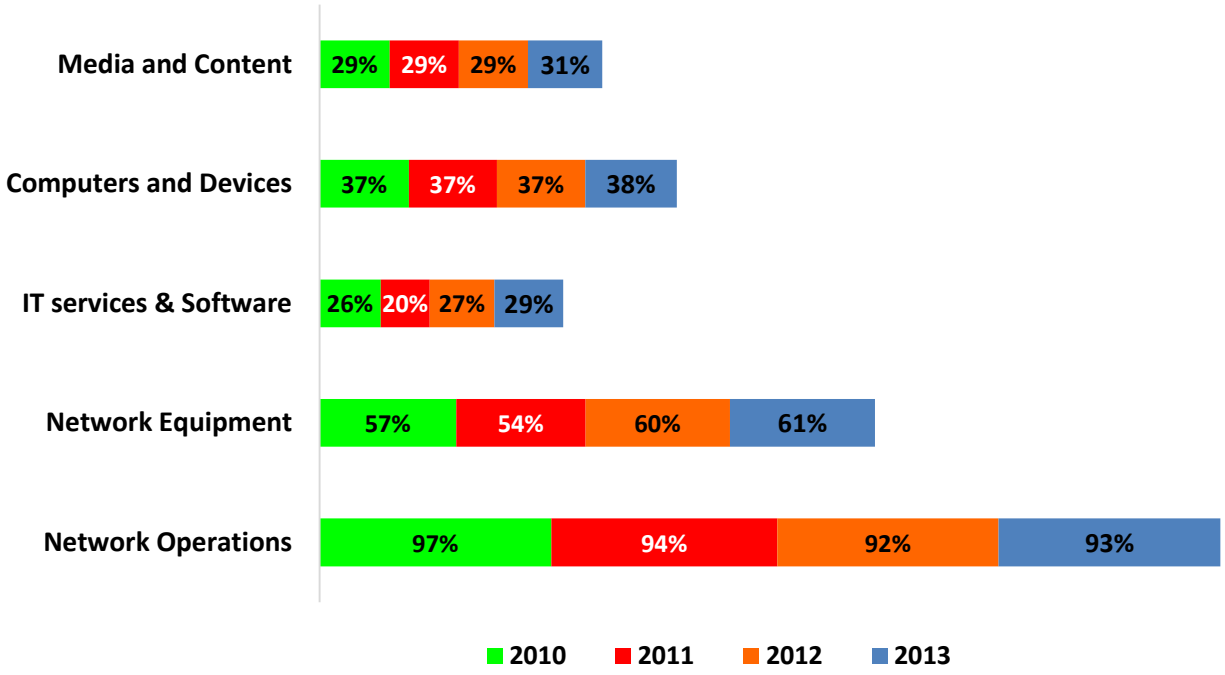

Figure 21. Market concentration of the four largest firms in the different TMT industry sectors in Ecuador, 2010-2013 (Own elaboration and findings).

This before mentioned is further sustained in Figure 21 that shows the high market concentration in the network and service operations sector. Similarly, the computers and devices sector, the IT service and software sector, and the media and content sector show low concentration, which suggest that the bargaining power of clients is high. However, the concentration ratio of the network equipment sector suggests that there is slightly high degree of concentration which may suggest that the operating margins should not be as low as in Figure 20. However, we further sustain that in the case of Ecuador, the cost leadership player is leading the sales in the local market, with a market shale of 26% in year 2013, with an average negative operational margin of -24,3% according to the data available at the official web portal of Superintendence of Companies and Securities of Ecuador (SUPERCIAS, 2014), which is why the overall operational margin of the network equipment sector is low.

5.2.2 Firms population

In this section we present the information available at the official web portal of Superintendence of Companies and Securities of Ecuador (SUPERCIAS, 2014) with respect to the number of companies operating in the different TMT sectors. From the Figure 22 we can see that the sector with the highest number of firms over the time has been the computers and devices sector. This suggests that there are many small companies carrying out retail sales of personal hardware. At the same time, the high number of firms in the computers and devices sector suggest that there almost no entry barriers in this retail business of this sector; however, if we analyze the sector's concentration rate in the previous section we can acknowledged that there are wholesale companies controlling important supply channels, and specially holding quotas of imports of specific restricted products such as mobile phones, that give them an advantage against new comers.

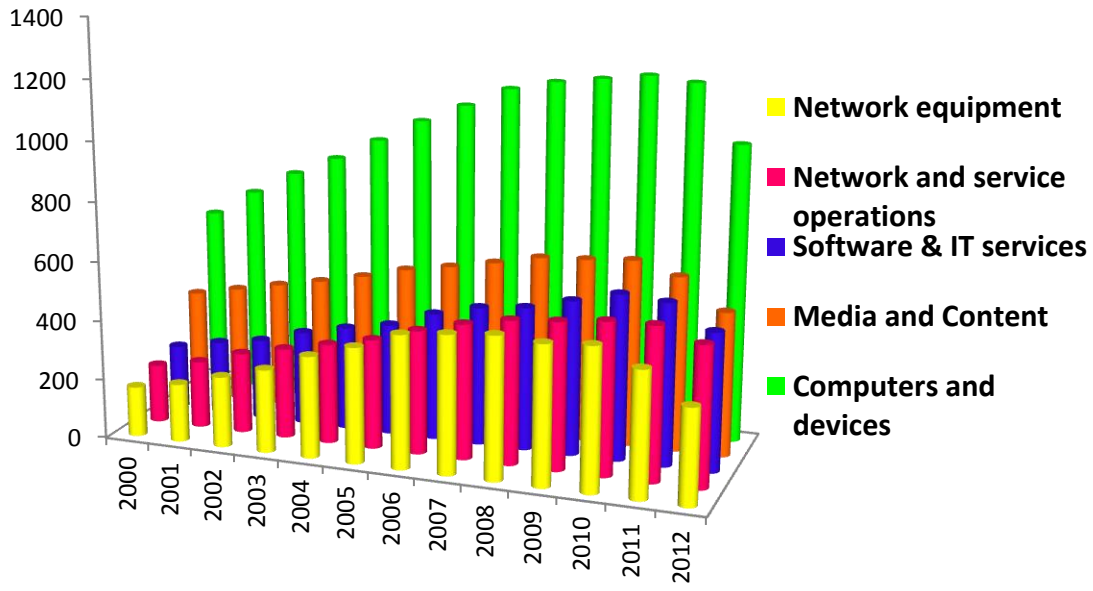

Figure 22. Firms' population for the different TMT industry sectors in Ecuador, 2000-2012. (Own elaboration and findings).

Furthermore, it can be said the overall TMT industry is entering in a maturity phase considering that in every industry sector the number of firms are reducing. This reduction of firms obeys to the environmental pressures that follow a selection process where only the firms that developed the capabilities required to compete and move

forward at the pace of the development wave will survive. Additionally, the Figure 19 helps to explain why the network and service operations sector in Figure 18 a smoother negative slope in than the others. Figure 23 shows a segment-specific life cycle such as the evolution of the fixed Internet access segment that has been boosted by the lower IP interconnect and transit costs thanks to the higher international capacity acquired by carriers. Additionally to this, the widespread of cost-effective wireless access technologies reduces the entry barriers and makes the Internet access business appealing and viable for small enterprises. However, the number of firms is likely to shrink soon in the selection process of the more capable firms with industry level service quality.

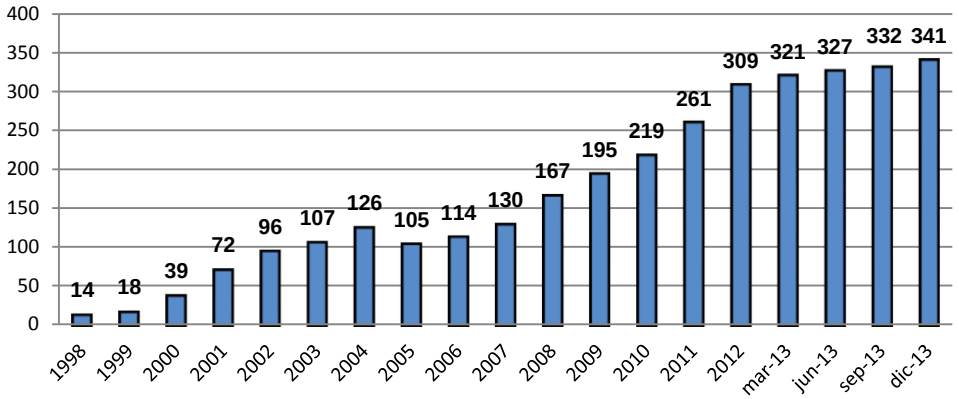

Figure 23. Evolution of Internet Service Providers population in Ecuador, 1998-2013. Source: SENATEL (2014)

5.3 Telecom industry development in Ecuador

In the final part of this study I present and analyze in more detail the findings of the research of the development of the different segments in the telecom industry such as fixed telephony, fixed Internet access, mobile services, pay TV, carrier, colocation and managed services, and localization and telematics services. These services before can be classified into the four groups of services explained in section 3.2.1 as follows:

- Access services: fixed telephony, fixed Internet access, pay TV and mobile services
- Managed services: localization, telematics and managed services
- Carrier services: carrier service
- Colocation services: colocation services

Despite this logical and standard classification before, in Figure 24 I have grouped the services slightly different considering that colocation services are commonly accounted in a single value in the financial statements of the firms, as well as considering that there firms very specialized in the field of localization and telematics. The other service segments such as fixed telephony, fixed Internet access, Pay TV and mobile services are of major interest in this study which is why they have been logically separated. Unfortunately, the financial statements of the firms did not provide disaggregated information in the mobile services and it was not possible to disaggregate this segments in this study. Furthermore, it should be mentioned that in the summation of the total telecom industry turnover, the revenue generated by telecom operators providing radio trunking services is accounted, however that segment has not been depicted in any graph in this study since it only accounts for 0,24% of the total revenue.

From Figure 24, it can be observed that the mobile operators took the lion's share of the telecom industry and also of the TMT industry in Ecuador, followed with great difference by the telephony voice segment and the fixed Internet access. Clearly the fixed Internet access will surpass, or has already done, the fixed telephony sector in terms of revenue considering that as of December 2013 the growth rate of the fixed Internet access segment was 23,24 points higher than the other. It is important to noticed that every segment, apart from telephony voice, grew year after year, which suggests that the telecom industry is facing an ongoing development journey boosted by the widespread of mainstream services and products in the industry such as mobile Internet, smartphones and smart TVs, tablets, high-speed fixed Internet access, HDTV, social networks, and so on that are boosting the overall industry.

As it can be seen from Figure 24, the mobile industry is entering a maturity stage where with sustained growth thanks to the ongoing increase of their mobile data subscribers' base. In this phase, the mobile operators have attracted an important part of the

mainstream consumers of mobile data that account for about 26% of the market penetration as it can be observed in Figure 25.

NETWORK AND SERVICE OPERATIONS	CAGR 2010-2013	ABS. DIFF 2010-2013	CAGR 2012-2013
Fixed telephony	1,12%	$ 12	3,18%
Mobile services	10,66%	$ 558	9,31%
Carrier, colocation and managed services	12,96%	$ 77	9,90%
Localization and telematics	2,45%	$ 9	-8,40%
Pay TV	28,59%	$ 138	33,83%
Fixed Internet access	24,36%	$ 158	19,04%
OVERALL	**11,26%**	**$ 952**	**10,21%**

Table 4. Growth rate and absolute growth in the telecom industry in Ecuador, 2010-2013 (Own elaboration and findings).

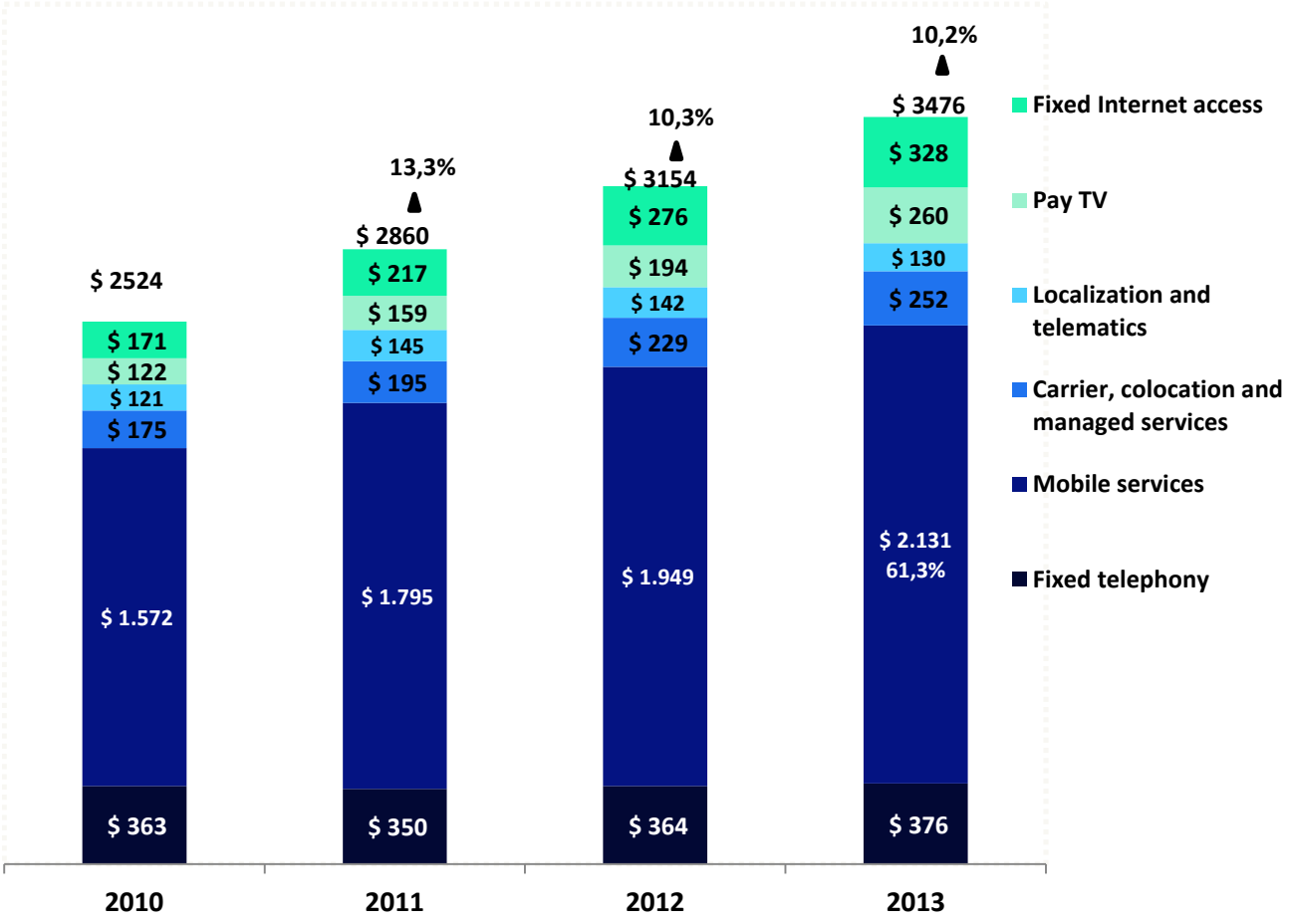

Figure 24. Revenue of different telecom services in the telecom market in Ecuador, 2010-2013 (Own elaboration and findings).

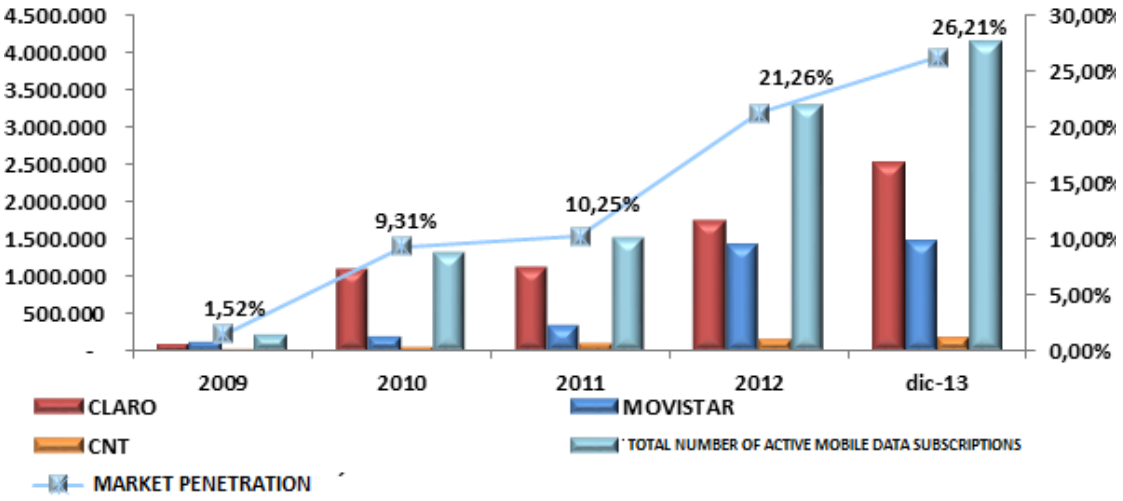

Figure 25. Number of active mobile data subscribers in Ecuador, 2009-2013. Source: SENATEL (2014)

Dominant mobile operators such as CLARO and MOVISTAR have a great opportunity to capture the next big part of the mainstream customers with the launch of 4G mobile data service if they reach an agreement with the local regulator. Next generation technologies will improve the user experience of network-based services on the move, gaining the attention of more demanding customers that are not satisfied with the usage experience with the current mobile access speeds.

On the other hand, we can say that the pay TV segment has started a new industry life cycle with very strong growth rates that finds its origins in the widespread of HDTV and the premium revenues from sports channels, whereas, the fixed Internet access continues in its growth phase boosted since the decrease of broadband access fees. Under this scenario, major firms have started their journey towards the convergence of all types of telecom services, offering triple play service plus mobile services. This race for the dominance of the telecom industry in Ecuador has started already and the main two players of the three largest players have taken important steps toward that goal.

On one hand, the CLARO which has the largest share in the whole telecom industry in Ecuador acquired a local company in 2007 to provide fixed telecom services, including cable TV. Moreover, CLARO also provides satellite TV, closing the full range of access services. On the other hand, the state-owned company has successfully entered the pay

TV segment as it can be seen in Figure 26, where it shows the rapid growth since its beginning that in terms of revenue accounts for about 9% but in terms of subscribers for more than 13%. This growth is expected to continue to consolidate CNT EP in this segment that will continue to be dominated by the firm DIRECTV. In this sense, the current growth rate of CNT EP in the pay TV segment threats the position of the firm TVCABLE, which has lagged behind from a leading position to a non-leading position.

As it has been evidenced, these attempts of incumbent firms to diversify their product portfolio has become a predominant approach in the telecom industry in Ecuador in light of the underlying market forces that the convergence of services, enabled by next generation networks, unleash. However, it should be noted that this diversification approach has been carefully implemented by incumbent firms that continue exploiting their mainstream business segments such as the case of CNT EP and CLARO, which scenario is consistent with the theoretical framework about exploration and exploitation presented in the literature review.

Turning back our view to the telecom market tendencies in Ecuador, Figure 26 shows that the market share in the pay TV segment is significantly unstable, which in turn suggests that the pay TV segment is in its growth stage of the life cycle according to the model described in the theoretical framework. In fact, the growth in the pay TV subscribers accounted to 44,96% in 2013 (Ekos, 2014), and to about 89% in 2012 (SUPERTEL, 2014).

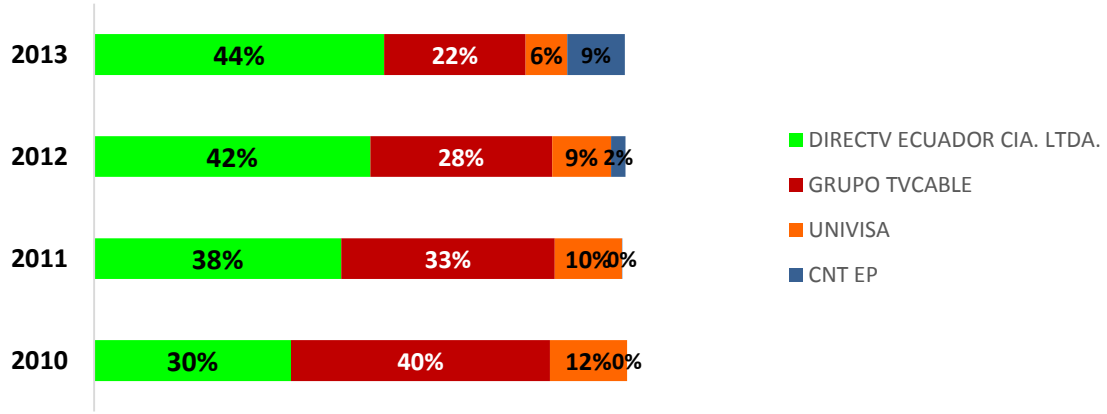

Figure 26. Market concentration in the pay TV segment in Ecuador, 2010-2013 (Own elaboration and findings).

Turning back our view to the tendencies in the telecom market in Ecuador, the fast growing rate of CNT EP in the pay TV segment gives it a predominant position in the Ecuadorian telecom industry considering that it already dominates another industry segment such as the fixed telephony segment, with about 85% of the market share, which will very likely sustain its growth thanks to the convenient price of fixed to mobile voice services. Furthermore, CNT EP holds the highest share in the fixed Internet access segment as shown in Figure 27 and has gained the preference from lower income customers that were not targeted before. Under this scenario, CNT EP has an excellent position in the fixed access market, and may take advantage of this important customer base in order to attract customers to its mobile segment portfolio that faces big challenges to start a sustainable growth.

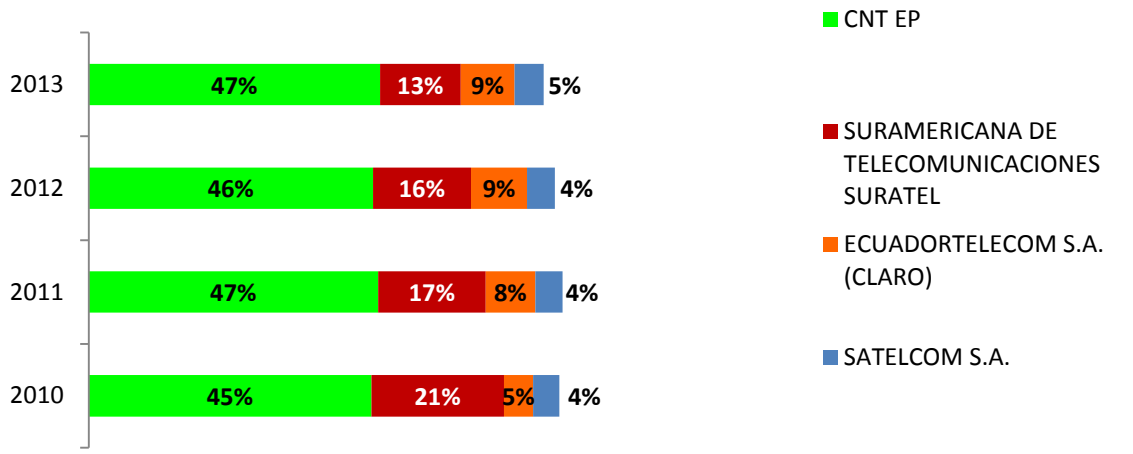

Figure 27. Market concentration in the fixed Internet access segment in Ecuador, 2010-2013 (Own elaboration and findings).

In this sense, CNT EP has a great disadvantage in the mobile industry where it faces strong network effects that prevent other customers to switch to their first in the market 4G mobile service. In practice, taking a higher share in the mobile market seems to be a much difficult task considering not only the strong network effects of mobile voice service, but also the high investments required to improve the coverage of the CNT EP network. In this sense, Figure 28 provides an insight of the CAPEX investment in relationship with the revenue of the major telecom firms in Ecuador. Clearly, the stream of investments have not decay as a result of the low market uncertainty in terms of

technology paths and mainstream products and services in the market, which is consistent with the theoretical framework about investments over the industry life cycle.

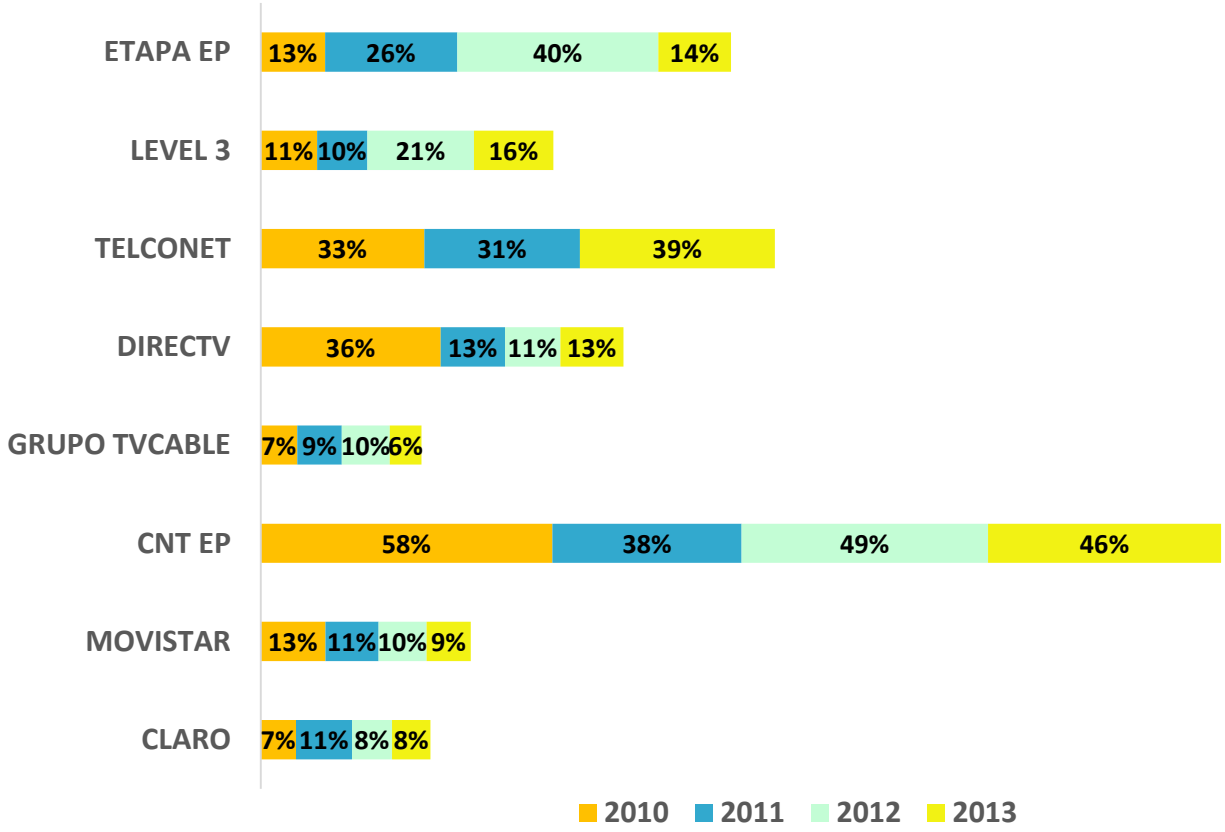

Figure 28. CAPEX investments of the major telecom operators in Ecuador, 2010-2013 (Own elaboration and findings).

Figure 28 reveals the very important investments that CNT EP is doing, which will certainly traduce in a higher participation in the fixed market segments such as telephony, pay TV and internet. It should be noted from Figure 21 that the state-owned enterprises, CNT EP and ETAPA EP, are the ones with the highest CAPEX investments in the telecom industry together with the private firm TELCONET. However, with respect to the mobile industry it has shown to be very unlikely to overcome the network effect barriers, under which situation the dominant firms have a clear advantage over the challenging enterprise CNT EP. This before means that the fixed and mobile *access* markets will be further dominated by the major telecom operators including CLARO, MOVISTAR and CNT EP; leaving the carrier, colocation and managed based services for specialized telecom operators including TELCONET and LEVEL 3; whereas, the

localization and telematics services will remain dominated by specialized firms that already attain very high market concentration.

6 CONCLUSIONS

In this thesis it has been evidenced that the development of the telecom industry in Ecuador has been boosted by the widespread of mainstream products and services in the TMT market including broadband fixed and mobile internet, smartphones, social networks, HDTV, e-commerce and OTT content. The deployment of next generation networks represents a technological discontinuity that cannot be overlooked by firms, and become determinant for the future performance of firms. In the case of the mobile industry, the deployment of 4G mobile networks represents a big opportunity for mobile operators and its potential is not well foreseen considering the much higher market penetration of mobile subscribers than fixed subscribers. At the moment, the value drivers of mobile Internet have, in great proportion, relied on the usage of social networks and instant messaging services.

On the other hand, the smartphones and HDTV segments in Ecuador are expected to continue its stable growth considering their actual market penetrations, unless other external factors prevent sales. However, in the case of the smartphones segment, sustaining growth will depend on the evolution of prices in order to make these products more affordable for the low end. On the other hand, in the case of e-commerce and OTT content, the actual potential of this services are not well foreseen as well, especially considering the habits and culture of people; nonetheless, the first steps have been taken in this respect showing a promising development of these services that have the potential to disrupt the commerce and content sectors.

On the other hand, the diversification of the product portfolio of incumbent firms to offer the wide range of access services, that is, triple play service plus mobile service, is giving its first results, with the consolidation of the state-owned enterprise CNT EP in the fixed segment on one hand, and the consolidation of the brand CLARO, subsidiary of American Movil in Ecuador, in the mobile segment on the other hand. In this scenarios, the carrier, colocation and managed based services will be naturally dominated by specialized telecom operators including TELCONET and LEVEL 3, having as well as a relatively new player in this arena the incumbent mobile operator with the brand MOVISTAR, subsidiary of Telefonica in Ecuador, in the managed

service segment; whereas, the telematics services will remain dominated by specialized firms that already attain very high market concentration.

REFERENCES:

Aldrich, H. E. & Fiol, C. M. (1994). Fools Rush in? The Institutional Context of Industry Creation. *Academy of Management Review, 19(4): 645-670.*

Aldrich, H. E. (1979). Organizations and environments. Englewood CliHs, NJ: Prentice Hall.

Ancona, D. et al. (2007). In Praise of the Incomplete Leader. *Harvard Business Review.*

Anderson, C. R. & Zeithaml, C. P. (1984). Stage of the Product Life Cycle, Business Strategy, and Business Performance. *Academy of Management Journal, 27(1): 5-24.*

Anderson, P. & Tushman, M. (1990). Technological Discontinuities and Dominant Designs: A Cyclical Model of technological Change. *Administrative Science Quarterly, 35: 604-633.*

Andrews, K. (1971). The concept of corporate strategy. Richard D. Irwin, Homewood.

Ansoff, Igor *Corporate Strategy* McGraw Hill, New York, 1965.

Amburgey, T. L. & Rao H. (1996). Organizational Ecology: Past, Present and Future Directions. *Academy of Management Journal, 39(5):1265-1286.*

Audretsch D. B. & Feldman, M. P. (1996). Innovative Clusters and the Industry Life Cycle. *Review of Industrial Organization, 11: 253-273.*

Baum, J. A. C, & Powell, W. A. (1995). Cultivating an institutional ecology of organizations: Comment on Hannan, Carroll, Dundon, and Torres. *American Sociological Review, 60: 529-538.*

Bilbao-Osorio, B., Dutta, S. and Lanvin, B. (2014). The Global Information Technology Report 2014. World Economic Forum.

Bower, J. & Christensen, C. (1995). Disruptive Technologies: Catching the Wave. *Harvard Business Review*.

Brandenburger, A. M. & Nalebuff, B. J. (1995). The Right Game: Use game theory to shape strategy. *Harvard Business Review, 73(4): 57-71.*

Buzzell, R. D. & Wiersema, F. D. (1981). Successful Share-Building Strategies. *Harvard Business Review*.

Carroll, G. R. (1988). Ecological models of organizations. Cambridge, MA: Ballinger.

Carroll, G. R. & Hannan, M. T. (1989). On using institutional theory in studying organizational populations: Reply to Zucker. *American Sociological Review*, 54: 545-548.

Ceccagnoli, M. & Rothaermel, F. T. (2008). Chapter 1 Appropriating the returns from innovation, Technological Innovation: Generating Economic Results (Advances in the Study of Entrepreneurship, Innovation & Economic Growth). Emerald Group Publishing Limited, 18: 11-34.

Chandler, A. D. (1977). The Visible Hand: The Managerial Revolution in American Business. Harvard University Press.

Chermack, T. J. & Bernadette, K. K. (2007). The Use of and Misuse of SWOT analysis and implications for HRD prof*essionals. Human Resource Development International, 10 (4): 383-399.*

Christensen, C. M., Suárez F. F., and Utterback, J. M. (1998). Strategies for Survival in Fast-Changing Industries. *Management Science, 44(12): 207-220.*

Courcoubetis, C. A., & Weber, R. R. (2003). Pricing Communication Networks: Economics, Technology and Modeling. Wiley.

Dorota, K. (2010). Beyond the Cloud: Tieto approach to enterprise cloud services. Telecom Forum, Aalto University.

Drucker, P. (1954). The Practice of Management. Harper & Row.

ECOSYS (2004). Techno-ECOnomics of integrated communication SYStems and services: Business models in telecommunications. Deliverable 3. The CELTIC Initiative.

Ehrhardt, M. (2004). Network effects, standardization and competitive strategy: How companies influence the emergence of dominant designs. *International Journal of Technology Management, 27: 272-294.*

Farrell, J. & Saloner, G. (1985). Standardization, compatibility, and innovation. *The Rand Journal of Economics, Mount Morris, 16(1): 70.*

Federal Trade Commission (1939). Report on the Motor Vehicle Industry. Government Printing Office: Washington DC.

Flournoy, D. (2004). The Broadband Millennium: Communication Technologies and Markets. International Engineering Consortium Publication, United States of America.

Garud, R., Jain, S., and Kumaraswamy, A. (2002). Institutional entrepreneurship in the sponsorship of common technological standards: The case of Sun Microsystems and Java. *Academy of Management Journal, 45(1): 196-214.*

Gentile, C., Spiller, N., and Noci, G. (2007). How to Sustain the Customer Experience: An Overview of Experience Components that Co-create Value With the Customer. *European Management Journal, 25(5): 395-410.*

Gino, F., Pisano, G., Sorell, M. R., and Szigety, M. (2006). R&D Portfolio Strategy, Diversification and Performance: An Information Perspective. *Harvard Business Review.*

Gyllerup, M. & Björnsjö, A. (2012). Network Equipment Providers – Restoring Investor Trust. Accenture.

Greer, C. R. et. al. (1999). Human resource management outsourcing: The make or buy decision. Academy of Management Perspective, 13(3): 85-96.

Hacklin, F., Marxt, C., and Fahrni, F. (2009). Coevolutionary cycles of convergence: An extrapolation from the ICT industry, *Technological Forecasting & Social Change, 76: 723–736.*

Hämmäinen et al. (2013). Service and Network Operators. Operator Business course lectures. Comnet, Aalto University.

Hämmäinen et al. (2013). Operators' Enterprise Customers. Operator Business course lectures. Comnet, Aalto University.

Hannan, M. T. & Freeman, J. (1977). The Population Ecology of Organizations. *American Journal of Sociology, 82(5): 929-964.*

Hannan, M. T. & Freeman, J. (1989). Organizational Ecology. President and Fellows of Harvard College. First Harvard University Press paperback edition, 1993, United States of America.

Hambrick, D., MacMillan, I., & Day, D. (1982). Strategic attributes and performance in the BCG matrix—A PIMS-based analysis of industrial-product businesses. Academy of Management Journal, 25: 510-531.

Hambrick, D. C. & Lei, D. (1985). Toward an Empirical Prioritization of Contingency Variables for Business Strategy. *Academy of Management Journal, 28(4): 763-788.*

Hamermesh, R. G., Anderson, m. J., and Harris, J. E. (1978). Strategies for Low Market Share Businesses. *Harvard Business Review.*

Hill, C. W. (1988). Differentiation Versus Low Cost or Differentiation and Low Cost: A Contingency Framework. Academy of Management Review, 13(3): 401-412.

Hofer, C. W. (1975). Toward a contingency theory of business strategy. *Academy of Management Journal*, 18: 784-810.

Huurdeman, A. (2003). The Worldwide History of Telecommunications. Wiley-Interscience publication, United States of America.

INEC (2010). Information and Communication Technologies ICT 2013. National Institute of Statistics and Censuses of Ecuador.

INEC (2011). Information and Communication Technologies ICT 2013. National Institute of Statistics and Censuses of Ecuador.

INEC (2012). Information and Communication Technologies ICT 2013. National Institute of Statistics and Censuses of Ecuador.

INEC (2013). Information and Communication Technologies ICT 2013. National Institute of Statistics and Censuses of Ecuador.

Jovanovic, B. & MacDonald, G.M. (1994). The Life Cycle of a Competitive Industry. *Journal of Political Economy, 102(2): 322-347.*

Kaplan, R. S. & Norton, D. P. (1996). The Balanced Scorecard: Translating Strategy Into Action. Harvard Business School Press, Boston, MA.

Kato, M. (2009). The role of investment efficiency in the industry life cycle. *Industrial and Corporate Change, 19(1):273-294.*

Katz, M. L. & Shapiro, C. (1985). Network externalities, competition, and compatibility. *The American Economic Review, 75(3): 424-440.*

Katz, M. L. & Shapiro, C. (1986). Technology adoption in the presence of network externalities. *Journal of Political Economy, 94: 822-841.*

Kim, W. C. & Mauborgne, R. (2004). Blue Ocean Strategy. Harvard Business Review.

Kiiski, A. (2007). Impacts of virtual operators on mobile market. Licentiate thesis, Helsinki University of Technology, Finland.

Koski, H., Rouvinen, P., and Ylä-Antilla, P. (2002). ICT Clusters in Europe: The Great Central Banana and the Small Nordic Potato. *Elsevier, Information Economics and Policy, 14(2): 145-165.*

Koski, H. & Kretschmer, T. (2006). Innovation and dominant design in mobile telephony. ETLA Discussion Papers, The Research Institute of the Finnish Economy (ETLA), No. 1012.

Klepper, S. & Miller, J.H. (1995). Entry, Exit, and Shakeouts in the United States in New Manufactured *Products. International Journal of Industrial Organization, 13: 567-591*.

Klepper, S. (1997). Industry Life Cycles. *Industrial and Corporate Change, 6(1): 145-182.*

Kurkinen, L. (2008). Externalities and Effects in High-tech Industries: Supporting the Evolution of a Technology. Bachelor Thesis, Helsinki University of Technology.

Levitt, L. (1960). Marketing Myopia. Harvard Business Review.

Manyika, J., et al. (2013). Disruptive technologies: Advances that will transform life, business, and the global economy. McKinsey Global Institute, McKinsey & Company.

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science, 2(1): 71-87.*

McKelvey, B. & Aldrich, H. (1983). Populations, Natural Selection, and Applied Organizational Science. *Administrative Science Quarterly, 28 (1): 101-128.*

McGrath, R. G. & MacMillan, I. C. (2000). ¿Assessing technology projects using real options reasoning? *Research Technology Management, 43(4): 35-50.*

McGrath, R. G. & MacMillan, I. C. (2002). Crafting R&D Project Portfolios. *Research Technology Management, 45(5): 48-59.*

Menzel, M. P. & Fornahl, D. (2009). Cluster life cycles – dimensions and rationales of cluster evolution. *Industrial and Corporate Change, 19(1): 205-238.*

Mintzberg, H. & Waters, J. (1985). Of Strategies, Deliberate and Emergent. *Strategic Management Journal, 6(3): 257-272.*

Nelson, R. R. & Winter, S. G. (1982). An evolutionary theory of economic change. Harvard University Press, Cambridge, Massachusetts

O'Reilly III, C. A. & Tushman, M. L. (2004). The Ambidextrous Organization. *Harvard Business Review.*

Péladeau, P., Benzin, T., and Sarrat, F. (2013). The 2013 Value Shift Index: Slower growth, subtle shifts. PricewaterhouseCoopers.

Pfeffer, J. M. (1993). Barriers to the advance of organizational science: Paradigm development as a dependent variable. *Academy of Management Review, 18: 599-620.*

Phillips, A. (1971). Technology and Market Structure. Lexington Books: Lexington, MA.

Péladeau, P., Friedrich, R., Benzin, T., and Sarrat, F. (2011). Value Shifts in the Telecom, Media, and Technology Industries. Booz & Company.

Porter, M. E. (1985). Competitive Advantage. Free Press.

Porter, M. E. (1996). What Is Strategy?. *Harvard Business Review.*

Porter, M. E. (2008). The Five Competitive Forces that Shape Strategy. *Harvard Business Review.*

Rawson, A., Duncan, E., Jones, C. (2013). The Truth About Customer Experience. *Harvard Business Review.*

Regalado, C. (2012). Management Results. Corporacion Nacional de Telecomunicaciones.

Rumelt, R. P. & Wensley, R. (1981). In Search of the Market Share Effect. *Proceedings of the Academy of Management.*

Rummey, M. (2008). IMT-Advanced: 4G Wireless Takes Shape in an Olympic Year. *Agilent Measurement Journal, 6: 51-60.*

Selznick, P. (1957). Leadership in Administration: a Sociological Interpretation. Evanston, IL: Row, Peterson.

Smith, A. (1776). An Inquiry into the Nature and Causes of the Wealth of Nations. W. Strahan and T. Cadell, London.

Stiglitz, J. E. (1989). Chapter 13 Imperfect information in the product market. *Handbook of Industrial Organization, 1: 769-847.*

Talukder, A., Garcia, N., and Jayateertha, G. (2014). Convergence Through All-IP Networks. Pan Stanford Publishing, United States of America.

Teece, D. J. (1987). Chapter: Capturing Value From Technological Innovation: Integration, Strategic Partnering, and Licensing Decisions. Technology and Global Industry: Companies and Nations in the World Economy. National Academy Press, Washington D.C.

Utterback, J. M. & Abernathy W. J. (1975). A Dynamic Model of Process and Product Innovation. *Elsevier, Omega 3(6): 639-656.*

Utterback J. M. & Suárez, F. F. (1993). Innovation, competition, and industry structure. *Research Policy, 22(1): 1-21.*

Utterback J. M. & Suárez, F. F. (1995). Dominant Designs and the Survival of Firms. *Strategic Management Journal, 16: 415-430.*

Witt, U. (2006). Evolutionary concepts in economics and biology. *Journal of Evolutionary Economics, 16: 473-476.*

Yan, L., Wolniewicz, R. H., and Dodier, R. (2004). Predicting customer behavior in telecommunications. Intelligent Systems IEEE, 19(2): 50-58.

Yin, R. K. (2014). Case Study Research: Design and Methods, fifth edition, Sage Publications, United Sates of America.

Yovanof, G. & Hazapis, G. (2008). Disruptive Technologies, Services, or Business Models?. *Wireless Press Commun, 45: 569-583.*

Van de Ven, A. H. & Poole, M. S. (1995). Explaining Development and Change in Organizations. *Academy of Management Review, 20(3): 510-540.*

Verkasalo, H., Lindqvist, K., and Hämmäinen, H. (2008). Scenario Analysis of Mobile Voice Services Market. *Proceedings of IEEE Services Computing Conference.*

Zollo, M. & Winter, S. G. (2002). Deliberate Learning and the Evolution of Dynamic Capabilities. *Journal of Organizational Science, 13(3): 339-351.*

ELECTRONIC REFERENCES:

Bloomberg Visual Data (2014). Industry Market Leaders: Internet Media. Accessed on 10/2014 from:
http://www.bloomberg.com/visual-data/industries/detail/internet-media

Corning. (2005). Broadband Technology Overview. White Paper. Accessed 7/2014 from:
http://www.corning.com/docs/opticalfiber/wp6321.pdf

Corporacion Nacional de Telecomunicaciones CNT EP (2014). Financial Results 2013. Accessed 5/2014 from:
http://www.micnt.com.ec/images/Pdfs/lotaip/G2.pdf

Corporacion Nacional de Telecomunicaciones CNT EP (2013). Financial Results 2012. Accessed 5/2014 from:
http://soy.cnt.com.ec/pdfs/lotaip/G2.pdf

Corporacion Nacional de Telecomunicaciones CNT EP (2013). Financial Results 2011. Accessed 5/2014 from:
http://soy.cnt.com.ec/pdfs/lotaip/G1.pdf

Ekos (2014). The Business Portal. Accessed 10/2014 from:
http://www.ekosnegocios.com/negocios/

Ekos (2014). Clients of paid TV increase. Accessed 11/2014 from:
http://www.ekosnegocios.com/negocios/verArticuloContenido.aspx?idart=3095

El Comercio (2014). E-commerce centers in Quito, Guayaquil and Cuenca. Accessed 10/2014 from:
http://www.elcomercio.com.ec/tendencias/comercio-electronico-ecommerce-emprendimiento-internet.html

El Telegrafo (2014). Investment in Megaprojects will be reflected in 2016. Accessed 10/2014 from:
http://www.telegrafo.com.ec/economia/item/inversion-en-megaproyectos-se-vera-reflejada-en-2016.html

Henderson, B. (1968). The Experience Curve. Boston Consulting Group. Accessed 8/2014 from:
https://www.bcgperspectives.com/content/Classics/strategy_the_experience_curve/

IDC (2014). Smartphone OS market share. Accessed 10/2014 from:
http://www.idc.com/prodserv/smartphone-os-market-share.jsp
International Telecommunication Union (2004). Definition of Next Generation Network. Accessed 5/2014 from:
http://www.itu.int/ITU-T/studygroups/com13/ngn2004/working_definition.html

IPv6.com (2008). Next Generation Networking. Accessed 5/2014 from:
http://ipv6.com/articles/general/Next-Generation-Networking.htm

IMS NGN Forum (2008). IMS NGN Report Card. Accessed 5/2014 from:
http://www.imsforum.org/files/IMS-Report-Card-Nov08.pdf

Kowalke, M. (2014). Local Government Leverages Value of Next Generation Broadband. Alcatel-Lucent. Accessed 5/2014 from:

http://next-generation-communications.tmcnet.com/topics/service-provider/articles/377944-local-government-leverages-value-next-generation-broadband.htm

INEC (2014). Web portal of the National Institute of Statistics and Censuses of Ecuador: ICT. Accessed 10/2014 from:
http://www.inec.gob.ec/sitio_tics/

Rappa, M. (2010). Business Models on the Web. Managing the Digital Enterprise. Accessed 10/2014 from:
http://digitalenterprise.org/models/models.html

SENATEL (2014). Web portal of the National Secretary of Telecommunications of Ecuador: Statistics. Accessed 10/2014 from:
http://www.regulaciontelecomunicaciones.gob.ec/biblioteca/

Servicio de Rentas Internas SRI (2014). Web portal. Accessed 10/2014 from:

SUPERCIAS (2014). Web Portal of the Superintendence of Companies and Securities of Ecuador. Accessed 10/2014 from:
http://www.supercias.gob.ec/portal/

SUPERTEL (2014). Web Portal of the Superintendence of Telecommunications of Ecuador: News. Accessed 10/2014 from:
The Telecommunications History Group (2014). Virtual Museum. Accessed 5/2014 from:
http://www.telcomhistory.org/vm/scienceLongDistance.shtml

Winther, M. (2006). Tier 1 ISPs: What They Are and Why They Are Important. IDC, White Paper. Accessed 10/2014 from:
https://www.us.ntt.net/downloads/papers/IDC_Tier1_ISPs.pdf
World Bank (2014). Ecuador Home. Accessed 10/2014 from:
http://www.worldbank.org/en/country/ecuador

World Bank (2014). Inflation data. Accessed 10/2014 from:
http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG

ANNEX I

FIXED TELEPHONY ACCESS		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	CONCESIONARIO	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	CNT EP.	$ 312,62	$ 296,21	$ 301,68	$ 305,08	-0,81%	25,10%	-20,80%	23,84%	27,70%
2	TEVECABLE S.A.	$ 1,89	$ 2,15	$ 2,48	$ 2,70	12,62%	24,38%	10,26%	12,65%	9,71%
3	SATELCOM S.A.	$ 2,38	$ 3,04	$ 3,71	$ 4,34	22,17%	22,62%	10,31%	-8,89%	9,41%
4	ECUADORTELECOM S.A. (AMERICA MOVIL)	$ 11,94	$ 12,08	$ 16,22	$ 21,39	21,45%		-29%	-35%	-84%
5	SERVICIOS DE TELECOMUNICACIONES SETEL S.A.	12,56	$ 13,07	$ 14,37	$ 14,75	5,50%	9,63%	53%	12%	9%
6	LINKOTEL S.A.	$ 0,56	$ 0,57	$ 0,63	$ 0,64	4,55%		-72,66%	-74,55%	-86,86%
7	ETAPA EP	$ 20,61	$ 22,03	$ 23,60	$ 25,07	6,76%	3,76%	23,64%	25,87%	29,19%
8	LEVEL 3 ECUADOR LVLT (GLOBALCROSSING)	$ 0,72	$ 0,82	$ 1,39	$ 1,69	32,90%	9,27%	10,00%	13,83%	17,56%
9	GRUPOCORIPAR S.A.	$ 0,01	$ -	$ -	$ -	-100,00%		-667,86%	-3085,82%	-131,04%
	TOTALS	$ 363,29	$ 349,97	$ 364,08	$ 375,66	1,12%				

MOBILE SERVICES		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	CONCESIONARIO	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	CNT EP.	$ 51,00	$ 56,00	$ 75,00	$ 89,00	20,39%	25,10%	5,62%	23,84%	27,70%
2	Conecel S.A. (AMERICA MOVIL)	$ 1.067,46	$ 1.224,38	$ 1.297,18	$ 1.431,52	10,28%	33,93%	41,27%	43,79%	36,07%
3	Otecel S.A. (TELEFONICA)	$ 453,73	$ 514,95	$ 576,84	$ 609,98	10,37%	25,08%	22,55%	19,35%	18,38%
	TOTALS	$ 1.572,19	$ 1.795,33	$ 1.949,02	$ 2.130,50	10,66%				

CARRIER, COLOCATION, AND MANAGED SERVICES LIKE VPN, VIDEOCONFERENCING, VoIP, VIDEO SUREILLANCE		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	CONCESIONARIO	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	TEVECABLE S.A.	$ 0,27	$ 0,43	$ 0,53	$ 0,69	36,72%	24,38%	10,26%	12,65%	9,71%
2	SATELCOM S.A.	$ 0,26	$ 0,46	$ 0,63	$ 0,94	53,48%	22,62%	10,31%	-8,89%	9,41%
3	CNT EP.	$ 60,00	$ 64,00	$ 59,00	$ 67,00	3,75%	25,10%	5,62%	23,84%	27,70%
4	PUNTONET S.A.	$ 9,92	$ 11,11	$ 13,51	$ 15,32	15,59%	8,25%	9,74%	4,27%	4,90%
5	ECUADORTELECOM S.A.	$ 4,03	$ 5,33	$ 6,19	$ 8,51	28,29%		-28,83%	-35,44%	-83,93%
6	ETAPA EP.	$ 0,15	$ 0,25	$ 0,38	$ 0,48	47,56%	9,33%	34,62%	34,70%	34,79%
7	LEVEL 3 ECUADOR LVLT (GLOBALCROSSING)	$ 17,70	$ 20,63	$ 20,65	$ 21,26	6,30%	9,27%	10,00%	13,83%	17,56%
8	GRUPO BRAVCO CIA. LTDA.	$ 5,04	$ 5,78	$ 6,78	$ 7,94	16,36%	16,37%	4,78%	10,74%	14,28%
9	MEGADATOS S.A.	$ 6,77	$ 7,08	$ 6,84	$ 8,37	7,33%	5,80%	10,78%	-14,08%	3,93%
10	OTECEL S.A.	$ 3,26	$ 3,75	$ 4,72	$ 11,70	53,11%	25,08%	22,55%	19,35%	18,38%
11	SERVICIOS DE TELECOMUNICACIONES SETEL S.A.	$ 0,93	$ 0,74	$ 0,71	$ 0,57	-15,06%	9,63%	53,11%	12,27%	9,08%
12	SURAMERICANA DE TELECOMUNICACIONES SURATEL	$ 7,58	$ 6,99	$ 6,95	$ 7,77	0,83%	15,16%	9,26%	17,81%	14,27%
13	TELCONET S.A.	$ 39,24	$ 48,62	$ 74,91	$ 71,72	22,27%	13,44%	41,72%	11,07%	12,51%
14	TRANSNEXA S.A. (TRANSELECTRIC)	$ 7,09	$ 6,48	$ 8,55	$ 10,93	15,52%	1,46%	4,73%	1,92%	0,08%
15	TELEFONICA INTERNATIONAL WHOLESALE SERVICES ECUADOR S.A.	$ 6,59	$ 6,76	$ 8,62	$ 9,97	14,80%	10,13%	24,69%	5,65%	15,04%
16	AT&T GLOBAL NETWORK SERVICES ECUADOR CIA. LTDA.	$ 4,26	$ 3,68	$ 4,13	$ 5,17	6,67%	0,00%	8,28%	-5,68%	-18,51%
17	BRIGHTCELL S.A.	$ 1,35	$ 2,32	$ 4,85	$ 1,87	11,47%	2,14%	4,57%	2,35%	2,22%
18	OTHERS	$ 0,30	$ 0,52	$ 1,20	$ 1,63	75,80%	9,88%	10,00%	10,74%	9,71%
	TOTALS	$ 174,74	$ 194,93	$ 229,15	$ 251,84	12,96%				

TRUNKING SYSTEMS		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	OPERADOR	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	BRUNACCI S.A.	$ 0,52	$ 0,38	$ 0,30	$ 0,26	-20,63%		-13,15%	-47,74%	-19,97%
2	COMOVEC S.A.	$ 0,05	$ 0,10	$ 0,09	$ 0,09	21,64%		-15,44%	-61,48%	-162,83%
3	MARCONI S.A.	$ 1,00	$ 0,90	$ 0,93	$ 0,93	-2,39%		5,34%	-21,68%	2,55%
4	MONTTCASHIRE S.A.	$ 1,40	$ 1,20	$ 1,10	$ 0,97	-11,51%		-40,36%	-45,70%	-14,00%
5	MULTICOM TELEMÓVIL S.A.	$ 2,06	$ 5,03	$ 2,60	$ 5,58	39,40%	7,89%		2,94%	-7,02%
6	RACOMDES S.A.	$ 0,25	$ 0,31	$ 0,38	$ 0,49	25,15%		0,71%	-3,57%	7,52%
	TOTALS	$ 5,28	$ 7,92	$ 5,40	$ 8,32	16,37%				

SATELLITE-BASED AND TELEMATICS SERVICES		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	OPERADOR	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	COMSATEL S.A.	$ 1,67	$ 2,00	$ 2,00	$ 3,44	27,24%	3,5%	13,49%	1,90%	0,81%
2	CARRO SEGURO CARSEG	$ 28,02	$ 31,33	$ 29,87	$ 27,54	-0,57%	5,0%	7,21%	6,08%	9,05%
3	SHERLOCTEC SOLUTIONS S.A.	$ 9,23	$ 14,14	$ 12,69	$ 13,91	14,65%		23,35%	19,33%	49,04%
4	ROAD TRACK ECUADOR CIA. LTDA.	$ 23,75	$ 27,43	$ 29,23	$ 33,04	11,63%		2,75%	4,22%	2,98%
5	GLOBAL TELEMATIC SOLUTIONS GTSECUADOR CIA. LTDA.	$ 46,15	$ 52,88	$ 49,01	$ 37,44	-6,7%	4,1%	0,71%	-0,10%	0,81%
6	RAPTORMOBILE SERVICIOS SATELITALES CIA. LTDA. (BANTECDI)	$ 1,27	$ 2,83	$ 4,79	$ 0,77	-15,36%				2,26%
7	MEDIANET SA	$ 3,01	$ 3,37	$ 4,94	$ 5,65	23,36%	3,7%	-0,02%	0,40%	4,65%
8	TECHNOLOGY EQUINOCCIAL TECCIAL S.A.	$ 0,58	$ 0,57	$ 0,74	$ 0,60	1,14%		51,94%	11,95%	8,87%
9	ZUNIBAL S.A.	$ 1,49	$ 3,35	$ 1,92	$ 1,44	-1,13%		13,26%	0,08%	-5,10%
10	OTHERS	$ 5,76	$ 6,90	$ 6,76	$ 6,19	2,45%	6,4%	5,34%	4,33%	3,61%
	TOTALS	$ 120,93	$ 144,80	$ 141,95	$ 130,02	2,45%				

PAY TV		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	OPERADOR	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	DIRECTV ECUADOR CIA. LTDA.	$ 36,81	$ 59,99	$ 81,97	$ 115,20	46,28%	7,23%	6,40%	8,34%	-6,01%
2	CNT TV		$ 0,10	$ 4,23	$ 22,87	#¡DIV/0!	25,10%	5,62%	23,84%	27,70%
3	TEVECABLE	$ 21,91	$ 23,38	$ 24,39	$ 25,88	5,71%	24,38%	10,26%	12,65%	9,71%
4	SATELCOM	$ 26,45	$ 28,41	$ 29,57	$ 30,33	4,67%	22,62%	10,31%	-8,89%	9,41%
5	CABLEUNION	$ 2,86	$ 4,83	$ 6,70	$ 7,32	36,79%	12,43%	12,76%	10,57%	7,66%
6	UNIVISA	$ 14,36	$ 16,29	$ 17,51	$ 16,53	4,81%	2,96%	3,00%	7,56%	6,17%
10	OTHERS	$ 19,69	$ 25,60	$ 29,60	$ 41,46	28,17%				
	TOTALS	$ 122,08	$ 158,59	$ 193,97	$ 259,59	28,59%				

FIXED INTERNET ACCESS		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	NOMBRE DEL PERMISIONARIO	2010	2011	2012	2013	2010-2013	2013	2012	2011	2010
1	CNT EP	$ 77,68	$ 100,98	$ 126,23	$ 154,00	25,62%	25,10%	5,62%	23,84%	27,70%
2	ECUADORTELECOM S.A. (AMERICA MOVIL)	$ 8,04	$ 17,34	$ 25,00	$ 28,45	52,38%		-28,83%	-35,44%	-83,93%
3	ETAPA EP	$ 3,95	$ 7,52	$ 10,96	$ 13,61	51,04%	9,33%	34,62%	34,70%	34,79%
4	TELCONET S.A.	$ 4,50	$ 6,50	$ 10,50	$ 12,00	38,67%	13,44%	41,72%	11,07%	12,51%
5	PUNTONET S.A.	$ 3,07	$ 4,80	$ 6,61	$ 8,57	40,80%	8,25%	9,74%	4,27%	4,90%
6	MEGADATOS S.A.	$ 3,39	$ 3,42	$ 4,87	$ 9,66	41,77%	5,80%	10,78%	-14,08%	3,93%
7	SURAMERICANA DE TELECOMUNICACIONES SURATEL	$ 36,45	$ 37,53	$ 43,52	$ 42,69	5,41%	15,16%	9,26%	17,81%	14,27%
8	TEVECABLE S.A.	$ 7,86	$ 9,44	$ 11,89	$ 13,69	20,32%	24,38%	10,26%	12,65%	9,71%
9	SATELCOM S.A.	$ 7,24	$ 9,45	$ 12,37	$ 15,48	28,83%	22,62%	10,31%	-8,89%	9,41%
10	SERVICIOS AGREGADOS Y DE TELECOMUNICACIONES NETWORK SATNET S.A.	$ 3,65	$ 1,48	$ 1,39	$ 1,19	-31,17%	0,84%	13,62%	16,94%	22,45%
11	SERVICIOS DE TELECOMUNICACIONES SETEL S.A.	$ -	$ -	$ -	$ 1,70	#¡DIV/0!	9,63%	53,11%	12,27%	9,08%
12	LEVEL 3 ECUADOR LVLT (GLOBALCROSSING)	$ 4,45	$ 4,75	$ 5,19	$ 4,78	2,41%	9,27%	10,00%	13,83%	17,56%
13	UNIVISA	$ 0,10	$ 0,39	$ 0,89	$ 1,89	166,37%	2,76%	3,00%	7,56%	6,17%
14	NEW ACCESS S.A.	$ 1,63	$ 2,48	$ 4,25	$ 6,08	55,09%	10,03%	9,18%	6,85%	15,38%
15	PANCHONET S.A.	$ 2,11	$ 2,15	$ 2,30	$ 3,17	14,53%	8,52%	14,29%	15,87%	8,35%
16	TRANSTELCO S.A.	$ 3,62	$ 4,57	$ 5,02	$ 5,47	14,75%	11,52%		1,48%	-4,45%
17	OTHERS	$ 3,03	$ 3,93	$ 4,92	$ 6,00	25,62%	9,63%	10,26%	11,67%	9,56%
	TOTALS	$ 170,77	$ 216,74	$ 275,91	$ 328,43	24,36%				

	OVERALL	$ 2.529,26	$ 2.868,28	$ 3.159,47	$ 3.484,37	11,27%				

ACTIVE NETWORK EQUIPMENT INCLUDING PROFESIONAL SERVICES*		SEGMENT REVENUE				CAGR	OPERATING MARGIN (PROFIT BEFORE INTERESTS AND TAXES OVER REVENUE)			
No.	CONCESIONARIO	2010	2011	2012	2013	2013	2013	2012	2011	2010
1	HUAWEI DE ECUADOR	$ 88,10	$ 62,73	$ 131,48	$ 142,75	17,45%	6,9%	-19,74%	-11,09%	-0,40%
2	ERICSSON DE ECUADOR C.A.	$ 11,17	$ 7,40	$ 11,34	$ 11,46	0,86%	1,1%	23,4%	7,0%	14,7%
3	ECUATRONIX	$ 4,93	$ 3,54	$ 3,90	$ 4,12	-5,81%	3,6%	-5,1%	-1,2%	-0,9%
4	BT SOLUTIONS LIMITED	$ 2,71	$ 3,50	$ 3,15	$ 7,77	42,06%	24,8%	22,6%	12,8%	9,4%
5	ANDEANTRADE	$ 5,81	$ 7,25	$ 14,35	$ 18,96	48,33%	7,4%	3,4%	3,8%	4,6%
6	ALCATEL-LUCENT ECUADOR S.A.	$ 21,97	$ 32,97	$ 51,68	$ 52,02	33,28%	11,5%	3,6%	3,9%	5,1%
7	NOKIA SOLUTIONS AND NETWORKS ECUADOR S.A.	$ 38,06	$ 40,03	$ 42,10	$ 38,52	0,40%	6,5%	5,5%	7,4%	2,4%
8	INTCOMEX DEL ECUADOR S.A.	$ 64,00	$ 76,90	$ 83,56	$ 100,52	16,24%	3,4%	1,6%	1,9%	1,9%
9	ZTE CORPORATION	$ 3,46	$ 5,22	$ 14,65	$ 30,53	106,64%	1,5%	2,2%	2,4%	2,2%
10	DIEBOLD ECUADOR S.A	$ 8,46	$ 13,77	$ 11,43	$ 13,01	15,43%	24,7%	28,6%	20,9%	19,7%
11	PROTECO COASIN S.A	$ 4,96	$ 8,99	$ 11,88	$ 9,94	26,08%	1,4%	2,6%	2,0%	0,7%
12	OFICINA COMERCIAL RAYMOND WELLS CIA. LTDA.	$ 8,51	$ 24,15	$ 22,79	$ 6,69	-7,71%	11,7%	25,1%	17,0%	6,8%
13	SIAEMICRO ANDINA S.A.	$ 4,90	$ 5,25	$ 7,30	$ 7,04	12,84%	13,8%	22,8%	16,1%	5,5%
14	SERTELINTE S.A.	$ 1,75	$ 2,69	$ 2,84	$ 4,87	40,66%	0,4%	21,6%	15,4%	5,5%
15	MARTEL CIA. LTDA.	$ 4,57	$ 5,11	$ 6,67	$ 8,12	21,12%	8,1%	9,86%	5,11%	6,04%
16	DIGITEC S.A.	$ 7,17	$ 7,50	$ 8,41	$ 16,36	28,46%	6,5%	5,24%	5,71%	0,34%
17	PERMONSA S.A.	$ 4,78	$ 6,94	$ 8,33	$ 7,02	23,61%	2,4%	2,74%	1,95%	-6,11%
18	SERVICIOS Y SOLUCIONES INTEGRALES SERVIHELP S.A.	$ 0,83	$ 1,27	$ 1,81	$ 1,83	30,15%	7,1%	5,13%	2,96%	2,48%
19	ADVICOM CIA. LTDA.	$ 1,18	$ 1,39	$ 4,06	$ 3,64	45,57%	3,3%	4,00%	1,12%	0,04%
20	TELECOMUNICACIONES FULLDATA CIA. LTDA.	$ 1,64	$ 2,48	$ 2,00	$ 1,86	4,29%	6,45%	-0,73%	2,40%	-1,95%
21	OTHERS	$ 82,84	$ 74,90	$ 69,45	$ 63,89	-8,29%	6,5%	4,6%	3,9%	2,4%
	TOTALS	$ 371,80	$ 393,98	$ 513,18	$ 550,92	14,01%				

INTERNET COMPANIES		SEGMENT REVENUE				CAGR	OPERATING MARGIN			
No.	CONCESIONARIO	2010	2011	2012	2013	2013	2013	2012	2011	2010
1	BROLOG	$ 0,05	$ 0,11	$ 0,55	$ 1,20	188,45%	-19,2%	-3,29%	-85,89%	5,34%
2	SERVICIOS ONLINE S.A.S. DESPEGAR.COM		$ 0,13	$ 0,46	$ 2,20		20,5%	4,35%	6,99%	
3	MERCADOLIBRE	$ 1,10	$ 1,55	$ 1,71	$ 1,95	21,03%	52,3%	54,46%	46,18%	50,55%
4	REINEC	$ 0,32	$ 0,38	$ 0,42	$ 0,52	17,57%	1,9%	-0,03%	3,99%	3,46%
5	OTHERS	$ 2,94	$ 4,34	$ 6,28	$ 11,74	58,65%	11,2%	2,2%	5,5%	5,3%
	TOTALS	$ 4,41	$ 6,51	$ 9,42	$ 17,61	58,65%				

IT SERVICES THAT INCLUDE HARDWARE, SOFTWARE AND UNIFIED COMMUNICATION SOLUTIONS FOR ENTERPRISES		SEGMENT REVENUE				CAGR	OPERATING MARGIN			
No.	CONCESIONARIO	2010	2011	2012	2013	2013	2013	2012	2011	2010
1	DATAFAST CIA. LTDA.	$ 6,83	$ 8,61	$ 9,85	$ 11,18	17,9%	11,8%	13,8%	18,0%	9,2%
2	MOVILWAY ECUADOR S.A.	$ 3,08	$ 16,35	$ 26,98	$ 3,16	0,9%	3,2%	-0,3%	-2,1%	-6,4%
3	CRONIX S.A.	$ 11,22	$ 10,06	$ 2,56	$ 2,56	-38,9%	0,0%	-4,1%	-0,4%	3,1%
4	CORPORACION ZEDECUADOR S.A.	$ 1,69	$ 3,14	$ 4,98	$ 3,94	32,6%	15,2%	0,0%	34,9%	7,7%
5	AMERICAN CALL CENTER S.A.	$ 10,59	$ 13,21	$ 15,07	$ 17,96	19,3%	11,1%	10,2%	10,7%	13,0%
6	TATASOLUTION CENTER S.A.	$ 48,47	$ 53,66	$ 63,17	$ 82,33	19,3%	27,6%	13,3%	12,6%	18,0%
7	IBM DEL ECUADOR C.A.	$ 36,02	$ 44,26	$ 72,34	$ 61,89	19,8%	12,1%	15,2%	8,8%	11,4%
8	SOLUCIONES INTEGRADAS SOLUTIONS S.A.	$ 4,00	$ 6,43	$ 6,41	$ 6,00	14,5%	10,2%	3,1%	-8,8%	-0,9%
9	DESCASERV ECUADOR S.A.	$ 37,61	$ 11,56	$ 45,18	$ 31,16	-6,1%	8,6%	15,8%	9,2%	12,9%
10	BINARIA SISTEMAS S.A.	$ 17,04	$ 21,96	$ 26,20	$ 30,83	21,9%	6,0%	5,2%	5,1%	3,3%
11	AVNET TECHNOLOGY SOLUTIONS ECUADOR S.A.	$ 14,92	$ 29,83	$ 31,39	$ 29,19	25,1%	5,5%	6,8%	4,6%	3,8%
12	AUTOMATED CASH MANAGEMENT SOLUTIONS S.A.	$ 2,37	$ 2,28	$ 1,25	$ 0,75	-31,8%	9,2%	34,8%	5,2%	9,6%
13	AMADEUSGLOBAL ECUADOR S.A.	$ 2,56	$ 2,58	$ 2,90	$ 3,01	5,5%	12,3%	5,5%	2,6%	-92,1%
14	AKROS CIA. LTDA.	$ 26,36	$ 27,58	$ 28,56	$ 24,38	-2,6%	3,2%	2,8%	2,1%	1,2%
15	ADEXUS S.A.	$ 4,45	$ 5,54	$ 12,62	$ 16,18	53,8%	7,0%	6,1%	3,4%	3,1%
16	KRUGER CORPORATION S.A.	$ 2,73	$ 3,21	$ 5,58	$ 6,70	34,9%	17,5%	13,2%	4,8%	3,4%
17	SISTRAN ANDINA SISTRANDI S.A.	$ 1,98	$ 1,69	$ 1,80	$ 0,55	-34,8%	9,1%	11,4%	6,7%	10,7%
18	GRUPO MICROSISTEMAS JOVICHSA	$ 3,54	$ 4,70	$ 5,75	$ 6,99	25,5%	5,9%	3,5%	6,7%	4,8%
19	BUSINESSMIND S.A.	$ 4,07	$ 4,81	$ 5,68	$ 5,88	13,0%	8,2%	4,1%	0,3%	2,5%
20	ELECTROLAB CIA. LTDA.	$ 1,85	$ 3,49	$ 3,00	$ 4,08	30,2%	8,8%	4,7%	9,5%	3,2%
21	UNIPLEX S.A.	$ 2,20	$ 3,95	$ 3,52	$ 4,06	22,7%	8,4%	5,2%	4,9%	3,0%
22	COMPUHELP S.A.	$ 2,37	$ 2,59	$ 3,14	$ 3,64	15,4%	4,4%	5,7%	2,4%	4,7%
23	NEXT STEP C.A.	$ 1,95	$ 0,30	$ 1,47	$ 0,91			6,7%	10,0%	0,3%
24	SERVICIOS DE INGENIERIA DEL ECUADOR S.A. SERINDEC	$ 1,53	$ 1,96	$ 2,52	$ 2,58			6,0%	-12,8%	-15,9%
25	GESTORINCSA S.A.	$ 1,93	$ 1,79	$ 2,12	$ 2,04			5,3%	-2,7%	19,0%
26	MODINTER S.A.	$ 2,19	$ 2,57	$ 2,43	$ 2,56			0,9%	3,5%	3,1%
27	SERVICIOS Y SOLUCIONES SOLINSER S.A.	$ 1,75	$ 1,83	$ 2,18	$ 2,00			11,2%	5,7%	5,5%
28	TEAMSOURCING CIA. LTDA.	$ 2,73	$ 3,23	$ 3,34	$ 3,11	4,4%	11,9%	23,2%	31,6%	30,5%
29	DESARROLLO INTEGRAL DE SOLUCIONES EMPRESARIALES DIR	$ 1,65	$ 1,64	$ 1,51	$ 1,84			3,5%	10,7%	11,2%
30	ONDU SOLUCIONES TECNOLOGICAS S.A.	$ 1,59	$ 1,62	$ 1,60	$ 1,68			8,2%	3,5%	3,0%
31	SOPORTE LIBRE FREESUPPORT CIA. LTDA.	$ 0,44	$ 0,53	$ 1,44	$ 1,05			14,2%	4,9%	0,9%
32	BANRED S.A.	$ 10,67	$ 10,94	$ 11,54	$ 11,10	1,3%	15,6%	16,5%	17,9%	20,3%
33	SONDA DEL ECUADOR ECUASONDA S.A.	$ 12,48	$ 12,40	$ 15,62	$ 17,13	11,1%	13,6%	11,4%	5,4%	6,7%
34	MARKETING & TECHNOLOGY MARTEC CIA. LTDA	$ 4,42	$ 6,54	$ 8,24	$ 8,54	24,6%	5,3%	6,5%	3,4%	5,1%
35	PLUS SERVICES S.A CORPSERVIPLUS	$ 2,87	$ 4,11	$ 8,93	$ 12,46	63,1%	7,9%	13,9%	4,3%	5,7%
36	CIBERCALL S.A.	$ 0,89	$ 2,82	$ 9,36	$ 8,64		0,7%	3,0%	2,6%	1,7%
37	UNISCAN CIA. LDTA.	$ 3,31	$ 3,44	$ 4,56	$ 5,30	17,0%		4,3%	7,0%	5,7%
38	SINETCOM S.A SOLUCIONES INTEGRALES EN TECNOLOGIA	$ 2,17	$ 3,94	$ 5,01	$ 4,09	23,5%	5,9%	9,7%	6,3%	3,3%
39	ECUASISTEMAS	$ 1,44	$ 2,85	$ 3,13	$ 1,97			9,0%	8,3%	0,4%
40	COMSUPPLIES S.A.	$ 6,58	$ 6,29	$ 4,55	$ 3,88		1,8%	2,6%	1,9%	1,9%
41	ENLACE DIGITAL ASESTRAL CIA LDTA	$ 3,25	$ 4,24	$ 4,56	$ 0,16	-63,3%	0,0%	3,0%	3,1%	4,1%
42	PROTECOMPU C.A.	$ 4,95	$ 7,36	$ 10,32	$ 10,00	26,4%	10,3%	11,7%	17,8%	15,3%
43	DIGITALTEAM S.A.	$ 0,64	$ 1,19	$ 0,91	$ 1,47			10,0%	-1,4%	5,9%
44	INACORPSA DEL ECUADOR S.A.	$ 16,49	$ 20,71	$ 25,63	$ 28,40	19,9%	3,5%	7,2%	7,3%	4,0%
45	ANECTIS S.A.		$ 4,96	$ 9,46	$ 15,18		3,0%	2,3%	1,0%	
46	COBISCORP ECUADOR S.A.	$ 8,83	$ 9,73	$ 12,58	$ 11,56			5,3%	-17,4%	-19,0%
47	CONTROLES S.A.	$ 0,83	$ 7,41	$ 5,65				21,6%	13,6%	5,5%
48	SISMODE SISTEMAS MODERNOS DE ETIQUETADO CIA. LTDA.	$ 3,57	$ 5,16	$ 10,02	$ 8,64	34,3%	1,5%	3,1%	3,2%	4,2%
49	ASICECUADOR S.A.	$ 2,62	$ 3,72	$ 6,63	$ 5,91	31,1%	9,1%	7,0%	6,7%	6,6%
50	CESA DEL ECUADOR TECNOCESA S.A.	$ 0,73	$ 5,31	$ 0,40	$ 0,27			-102,5%	0,6%	-18,2%
51	GENSYSTEMS S.A.	$ 3,61	$ 3,81	$ 5,31	$ 7,60	28,2%	4,5%	3,9%	5,4%	6,1%
52	CORESOLUTIONS S.A.	$ 3,33	$ 4,32	$ 4,45	$ 5,75	20,0%	11,7%	8,4%	13,0%	11,7%
53	AVP. SISTEMAS S.A.	$ 2,73	$ 2,14	$ 2,39	$ 5,28	24,6%	7,0%	7,3%	8,3%	3,5%
54	SINERGYHARD CIA. LTDA.	$ 1,72	$ 3,35	$ 2,78	$ 4,47	37,5%	6,0%	8,2%	6,6%	3,5%
55	HIGH TELECOMMUNICATIONS SOCIEDAD DE TELECOMUNICACIO	$ 2,20	$ 3,41	$ 4,67	$ 5,06	32,0%	12,6%	10,7%	8,7%	11,1%
56	ANIXTER COLOMBIA S.A.S	$ 0,60	$ 3,80	$ 6,07	$ 5,25				2,0%	-25,3%
57	INTELLICOM INFORMÁTICA Y AFINES CÍA. LTDA.	$ 1,42	$ 2,65	$ 3,20	$ 2,14			2,0%	4,5%	2,3%
58	INFOPRONT S.A.	$ 0,32	$ 2,78	$ 3,17	$ 0,57			20,8%	13,1%	5,5%
59	REDPARTNER S.A.	$ 2,68	$ 4,07	$ 4,22	$ 4,13	15,5%			0,2%	-0,6%
60	TELECOMUNICACIONES A SE ALCANCE TELALCA S.A.	$ 3,30	$ 4,50	$ 4,25	$ 4,12	7,7%		3,7%	6,9%	3,2%
61	SOLUCIONES TECNOLOGICAS SOLTEFLEX S.A.	$ 2,87	$ 2,97	$ -	$ 3,78	9,6%	10,8%	-1,0%	14,4%	6,0%
62	REDCOMPUT S.A.	$ 2,18	$ 2,08	$ 2,23	$ 2,60			3,4%	2,7%	2,7%
63	CONEXIÓN TOTAL S.A. COTOT	$ 1,07	$ 3,37	$ 1,44	$ 1,81			12,5%	1,9%	3,9%
64	MILESTONE TECHNOLOGIES CIA. LTDA.	$ 2,63	$ 3,10	$ 3,10	$ 2,76			7,4%	17,7%	10,0%
65	TECNOLOGIA DE INFORMACION HIPER S.A	$ 2,23	$ 1,75	$ 2,44	$ 2,87	8,8%	13,9%	20,4%	12,9%	6,6%
66	NEXSYS DEL ECUADOR	$ 24,40	$ 29,53	$ 37,93	$ 55,19	31,3%	2,9%	2,9%	2,9%	3,0%
67	MICROSOFT DEL ECUADOR S.A.	$ 5,62	$ 6,17	$ 6,04	$ 8,20	13,4%	23,2%	21,42%	24,25%	3,33%
68	BIGBRANCH S.A.	$ 7,76	$ 10,68	$ 7,28				-8,52%	1,24%	2,35%
69	COBISCORP ECUADOR S.A.	$ 8,46	$ 9,73	$ 12,58	$ 11,56	11,0%		5,26%	-17,35%	-19,03%
70	COMWARE	$ 8,97	$ 16,04	$ 11,90	$ 11,59	8,9%	10,0%	-1,21%	8,76%	2,74%
71	C.O.R.L.A.S.O.S.A.	$ 1,72	$ 2,10	$ 2,24	$ 2,79			20,03%	12,98%	6,90%
72	COTECNA INSPECTION S.A.	$ 2,14	$ 2,18	$ 1,75	$ 1,71			0,94%	15,04%	5,67%
73	SERVICIOS PROFESIONALES CIMA-E S.A.	$ 1,51	$ 1,87	$ 2,44	$ 3,18			35,33%	14,44%	23,49%
74	STRUCTURED INTELLIGENCE DEL ECUADOR S.A.	$ 3,76	$ 3,95					-29,29%	-24,44%	-26,24%
75	TECNOLOGIA AVANZADA DEL ECUADOR TECNOAV C. LTDA.	$ 2,83	$ 3,41	$ 5,99	$ 5,32	23,4%	8,3%	3,30%	2,88%	1,62%
76	OTHERS	$ 125,91	$ 124,34	$ 119,65	$ 116,06	-2,7%	8,4%	6,1%	5,2%	3,8%
	TOTALS	$ 574,42	$ 678,18	$ 811,16	$ 802,68	11,8%				

CONSUMER DEVICES (NOT INCLUDING HOME APPLIANCES)		SEGMENT REVENUE				CAGR	OPERATING MARGIN			
No.	CONCESIONARIO	2010	2011	2012	2013	2013	2013	2012	2011	2010
1	CONECEL S.A. (CLARO)	$ 190,56	$ 210,00	$ 212,00	$ 245,00	8,7%	33,93%	41,27%	43,79%	36,07%
2	OTECEL S.A. (MOVISTAR)	$ 67,42	$ 61,62	$ 61,54	$ 59,88	-3,9%	25,08%	22,55%	19,35%	18,38%
3	CNT EP	$ 5,00	$ 6,20	$ 9,00	$ 26,08	73,4%	25,10%	5,62%	23,84%	27,70%
4	TECNOPLUS CIA. LTDA.	$ 2,17	$ 2,78	$ 1,89	$ 3,58	18,2%	1,12%	-0,20%	0,89%	2,92%
5	TECHCOMPUTER CIA. LTDA.	$ 2,56	$ 2,94	$ 3,23	$ 2,93	4,6%	2,73%	1,95%	1,59%	7,02%
6	BRELDYNG S.A.	$ 3,08	$ 4,19	$ 5,98	$ 6,75	29,9%	1,04%	2,48%	-0,13%	-0,59%
7	TELECUADOR CIA. LTDA.	$ 4,83	$ 4,44	$ 6,94	$ 5,77	6,1%	10,57%	10,88%	5,29%	6,82%
8	MASTERPC CIA. LTDA.	$ 3,26	$ 4,42	$ 4,72	$ 5,36	18,0%	0,93%	2,31%	0,99%	1,76%
9	SISTEMAS Y SERVICIOS ERAZO C.A.	$ 2,34	$ 3,47	$ 4,13	$ 7,97	50,5%	1,25%	3,20%	1,53%	1,79%
10	ENTERSYSTEMS LATINOAMERICA DE COMPUTADORAS & SISTE	$ 4,46	$ 5,26	$ 4,64	$ 4,31	-1,1%	0,93%	0,92%	3,42%	2,81%
11	TRIONICA COMPUTACION CIA. LTDA.	$ 2,87	$ 3,39	$ 3,69	$ 3,69	8,7%	2,17%	4,43%	4,03%	3,36%
12	NOVISOLUTIONS CÍA. LTDA.	$ -	$ 3,06	$ 8,45	$ 12,92		1,32%	5,46%	1,95%	
13	GALO ROSERO Y ASOCIADOS INGENIERIA Y SISTEMAS CIA. LT	$ 2,37	$ 2,67	$ 5,48	$ 5,03	28,5%	1,59%	7,92%	0,93%	0,56%
14	CARTIMEX S.A.	$ 75,78	$ 88,65	$ 98,77	$ 95,73	8,1%	2,29%	2,71%	5,49%	4,24%
15	COMPUTADORES Y EQUIPOS COMPUEQUIP DOS S.A.	$ 25,88	$ 34,11	$ 42,16	$ 43,12	18,6%	0,02%	1,36%	3,87%	4,28%
16	ELECTRONICA SIGLO XXI ELECTROSIGLO S.A.	$ 79,03	$ 92,65	$ 93,02	$ 94,91	6,3%	2,69%	3,07%	3,11%	4,12%
17	TECNOMEGA C.A.	$ 74,88	$ 82,63	$ 89,54	$ 91,92	7,1%	3,21%	3,50%	4,11%	3,40%
18	SONY INTER - AMERICA S.A.	$ 19,40	$ 30,90	$ 31,14	$ 66,48		1,88%	0,30%	1,34%	3,41%
19	MEGAMICRO S.A.	$ 35,97	$ 38,16	$ 42,82	$ 42,15	5,4%	2,82%	2,72%	2,62%	1,84%
20	ALPHACELL S.A.	$ 9,57	$ 21,54	$ 25,34	$ 27,02	41,3%	5,11%	5,39%	4,14%	4,15%
21	REPRESENTACIONES CELULARES GUERRERO & RODRIGUEZ CI	$ 18,08	$ 18,17	$ 17,73	$ 22,45	7,5%	4,10%	3,48%	2,29%	4,74%
22	GRUMANHER S.A.	$ 27,25	$ 29,48	$ 28,20	$ 26,02	-1,5%	2,00%	-0,31%	-1,07%	-1,52%
23	SUPERMERCADO DE COMPUTADORAS COMPUBUSSINES CIA. L	$ 9,88	$ 13,11	$ 16,76	$ 16,46	18,5%	1,46%	9,13%	0,83%	0,75%
24	SUPTRONIC S.A.	$ 16,02	$ 18,22	$ 17,43	$ 20,19	8,0%	0,05%	2,07%	-0,04%	0,55%
25	ARTEAGA & CORDOVA TELECOMUNICACIONES CIA. LTDA.	$ 6,42								0,67%
26	TELEFONIA CELULAR MIO TECELMIO CIA. LTDA.	$ 1,63	$ 3,01	$ 4,47	$ 8,61	74,2%	1,05%	1,47%	2,86%	2,97%
27	PINCOMPUTERS C.A.		$ 3,25	$ 3,27	$ 8,91		0,45%	1,39%	1,26%	
28	VISIONMARKET S.A.	$ 4,85						0,21%	-1,15%	
29	IDC INTERAMERICANA DE COMPUTACION CIA. LTDA.	$ 4,64	$ 5,18	$ 4,66	$ 6,19	10,1%	3,07%	3,99%	0,89%	1,75%
30	COMPAÑÍA DE SISTEMAS DE COMPUTACIÓN NEOCOSIDECO S.A.		$ 5,29	$ 6,50	$ 6,52		1,84%		3,06%	
31	RACSO S.A.	$ 5,59	$ 6,86	$ 5,74	$ 7,62	10,9%	0,13%		1,07%	0,89%
32	INFORMATICA Y SISTEMAS DIGITALES DINFORSYSMEGA S.A.	$ 3,40	$ 3,40	$ 5,93	$ 7,86	32,2%	2,42%	2,51%	1,76%	1,46%
33	CELLSHOP S.A.	$ 11,28	$ 11,77	$ 8,58	$ 5,80		2,07%	0,72%	0,94%	0,94%
34	PLANETSOUND PC CIA. LTDA.	$ 4,37	$ 5,40	$ 4,33				1,56%	1,55%	2,03%
35	CELULAR TRADE S.A. CELTRADE	$ 3,19								1,05%
36	ALLXERCOMP SERVICIO DE COMPUTACION CIA. LTDA.	$ 7,58	$ 5,97	$ 5,35	$ 5,04		1,79%	2,71%	-0,67%	1,11%
37	DIGITALCITY S.A.		$ 3,51	$ 3,31				1,55%	3,14%	
38	COMPUMILLENIUM S.A.	$ 2,28	$ 1,87	$ 1,90				0,54%	0,06%	0,46%
39	INTELEQ S.A.	$ 7,17	$ 9,77	$ 10,15	$ 11,24	16,2%	0,89%	7,42%	2,24%	0,14%
40	REPRESMUNDIAL REPRESENTACIONES INTERNACIONALES CIA.	$ 4,24	$ 8,26	$ 11,22	$ 10,02	33,2%	1,80%	3,60%	2,50%	3,22%
41	SEPROTEICO S.A.	$ 2,07	$ 3,62	$ 10,51	$ 8,32	59,0%	9,74%	13,10%	0,40%	0,70%
42	SUPERGRUPSA S.A.	$ 2,58	$ 7,04						0,99%	0,68%
43	IMPORTADORA AXXELCORP CIA. LTDA.	$ 1,59	$ 2,27	$ 3,19					0,99%	0,68%
44	JHIELIZ S.A.	$ 8,50	$ 8,88	$ 7,97	$ 7,13	-5,7%	0,56%	-0,05%	0,48%	4,91%
45	CINTI COMP CIA. LTDA.	$ 11,24	$ 9,64	$ 8,25	$ 7,28	-13,5%	0,96%		1,55%	3,11%
46	LIDENAR S.A.	$ 1,63	$ 6,29	$ 7,25	$ 5,33	48,4%	4,88%		1,25%	1,04%
47	CEDIBA & COMPANY S.A.	$ 14,30	$ 15,11	$ 18,11	$ 4,55	-31,7%	0,44%	0,43%	-2,33%	0,17%
48	SEMLER S.A.	$ 3,74	$ 3,44	$ 3,15	$ -			0,47%	-0,50%	0,23%
49	COMPUTADORA SAN EDUARDO S.A. COMPSESA	$ 6,27	$ 11,65	$ 5,60	$ 3,78	-15,5%	1,59%	1%	9,97%	3,83%
50	TECNOLOGIA LINCOLN LIBERTY GROUP CIA. LTDA.	$ 2,11						0,0067	9,97%	3,09%
51	SOLUCIONES COMPUTACIONALES BITLOGIC S.A.	$ 2,57	$ 2,66	$ 3,73	$ 3,68	12,7%	3,80%	0,0129	8,58%	3,37%
52	SERVICIOS INFORMATICOS Y ENLACES INFOLINK CIA. LTDA.	$ 3,31	$ 4,03	$ 2,70				5,14%	-9,15%	-11,96%
53	REMANSER S.A.	$ 2,04						5,14%	-9,15%	-9,98%
54	ASESORES DE COMPUTACION ASCOMSA SA	$ 2,38	$ 2,97	$ 2,70				5,14%	-7,59%	-8,25%
55	FIRST COMPUTER SERVICE FCS S. A.	$ 1,34	$ 2,44	$ 3,63				4,65%	-6,61%	-7,61%
56	SMART SYSTEMS DEL ECUADOR S.A.	$ 2,00	$ 1,56	$ 1,68				5,09%	-6,07%	-6,77%
57	ROBALINO & POLIT IMPORTADORES CIA. LTDA.	$ 3,60	$ 3,99	$ 4,25	$ 3,55	-0,5%	0,85%	5,09%	-6,07%	-6,77%
58	TECNICOS EN MANTENIMIENTO Y ACCESORIOS TECMAN CIA. LT	$ 3,04	$ 4,34	$ 3,62	$ 3,54	5,2%	2,54%	5,73%	-4,91%	-5,77%
59	DURAPOWER CIA. LTDA.	$ 2,08	$ -	$ 2,56				6,11%	-4,31%	-4,94%
60	LATINCOPIERS CIA. LTDA.	$ 1,61	$ -	$ 2,47				6,37%	-3,81%	-4,52%
61	SISTEMAS DE COMPUTACION SYSTEMBOARD S.A	$ 2,12	$ -	$ 2,44	$ -			6,07%	-3,42%	-3,96%
62	MEGULTRA S.A	$ 2,70	$ 2,85	$ 3,04				5,69%	-3,55%	-3,79%
63	CORDOVA REYES CIA. LTDA.	$ 3,21	$ 3,42	$ 3,53	$ 3,39	1,8%		5,21%	-3,22%	-3,54%
64	CADENA MENOSCAL TECHNOLOGICAL COMMUNICATION GRID	$ 0,27	$ 2,83					5,21%	-3,22%	-3,51%
65	SOLUCIONES INFORMATICAS DEL FUTURO SIFUTURO S.A.	$ 4,66	$ 4,13	$ 3,26	$ 3,33	-10,6%	3,30%	5,03%	-2,77%	-3,05%
66	CELULARES GAMVAL S.A.	$ 5,58	$ 2,51					5,03%	-2,77%	-2,65%
67	AVEMIL S. A.	$ 0,56	$ 2,51	$ 1,04				4,97%	-2,49%	-2,59%
68	LPADAR CIA. LTDA.	$ 4,67	$ 4,08	$ 3,69	$ 3,01	-13,6%	3,99%	4,78%	-2,20%	-2,35%
69	HABATECH S.A.	$ 3,01	$ 2,50	$ 1,52				4,78%	-1,87%	-1,84%
70	LUIS MANZANO SISTEMAS INFORMATICOS Y REPRESENTACIO	$ 3,22	$ 2,48	$ 2,17				4,58%	-1,77%	-1,71%
71	COMPUMOVI S.A.	$ 1,72	$ 2,34	$ 2,60	$ 2,96	19,8%	1,35%	4,49%	-1,69%	-1,63%
72	HIPERCELL CIA. LTDA.	$ 10,80	$ 9,62	$ 4,28	$ 2,92	-35,3%	18,84%	4,69%	-1,35%	-1,31%
73	COSIDECO C LTDA	$ 8,85	$ 2,60	$ 4,08	$ 2,91	-31,0%	1,72%	4,47%	-1,27%	-0,99%
74	MARMOL COLIMBA PC-EXPRESS CIA. LTDA	$ 2,37	$ 2,44	$ 2,43				4,47%	-1,29%	-0,96%
75	SERIMTEC PC ECUADOR S.A.	$ 2,48	$ 2,43	$ 2,30				4,60%	-1,11%	-0,81%
76	FAST TECHNOLOGY FE&T CIA. LTDA.	$ 1,70	$ 2,41	$ 1,98				4,57%	-1,06%	-0,75%
77	XEROX DEL ECUADOR S.A.	$ 19,91	$ 22,46	$ 25,19	$ 28,31	12,4%	6,25%	0,97%	1,07%	6,02%
78	OTHERS	$ 192,35	$ 189,09	$ 186,58	$ 182,84	-1,7%	1,88%	4,47%	0,89%	0,69%
	TOTALS	$ 1.097,48	$ 1.206,23	$ 1.251,51	$ 1.290,36	5,5%				

MEDIA AND CONTENT		SEGMENT REVENUE				CAGR	OPERATING MARGIN			
No.	CONCESIONARIO	2010	2011	2012	2013	2013	2013	2012	2011	2010
1	DISTRIBUIDORA DE SERVICIOS DE ENTRETENIMIENTO DISENTV S.A.	$ 3,85	$ 3,40	$ 1,07	$ 0,48	-50,04%	12,5%	-2,64%	-1,67%	-0,26%
2	TELEVISION ECUATORIANA TELERAMA	$ 2,71	$ 3,61	$ 4,08	$ 3,97	13,57%	1,0%	-15,56%	-40,13%	-104,04%
3	COMPAÑIA ANONIMA EL UNIVERSO	$ 55,24	$ 59,70	$ 62,61	$ 56,79	0,93%		3,94%	4,91%	8,81%
4	EDITORES NACIONALES GRAFICOS "EDITOGRAN" S.A.	$ 6,00	$ 15,77	$ 26,25	$ 39,84	87,96%		-2,36%	-42,78%	-71,48%
5	MESSAGEPLUS S.A.	$ 3,07	$ 2,70	$ 2,81	$ 3,12	0,54%	4,5%	7,87%	4,97%	3,91%
6	LATINOAMERICANA DE CONTENIDOS ADICTONES CIA. LTDA.	$ 3,36	$ 3,69	$ 6,81	$ 9,77	42,73%	66,0%	82,23%	62,10%	42,72%
7	FOREVER MUSIC S.A.	$ 0,68	$ 0,97	$ 1,03	$ 1,15	19,14%	23,5%	23,51%	21,02%	6,28%
8	RELAD S.A. (CANAL UNO)	$ 10,62	$ 15,01	$ 12,61	$ 12,36	5,19%	3,4%	5,78%	4,18%	1,40%
9	CANAL UNO S.A. (CANAL UNO)		$ 0,66	$ 0,82	$ 1,95		2,6%	2,97%	-1,02%	-12610,79%
10	TELEVISORA NACIONAL COMPAÑIA ANONIMA, TELENACIONAL C.A.	$ 20,58	$ 20,77	$ 27,12	$ 24,38	5,81%	6,5%	3,48%	4,95%	6,59%
11	RADIO CARAVANA S. A. (CARAVANA TELEVISION)	$ 1,37	$ 1,85	$ 1,67	$ 2,16	16,39%	5,1%	8,78%	3,30%	4,50%
12	MUVESA C.A. (RTU)	$ 0,26	$ 0,59	$ 0,65	$ 0,81	46,05%	4,9%	2,47%	1,47%	-52,03%
13	ORGANIZACION ECUATORIANA DE TELEVISION ORTEL S.A. (TELESI	$ 2,58	$ 4,71	$ 4,50	$ 3,78	13,58%	4,2%	7,70%	6,15%	-3,67%
14	ECOTEL TV CIA. LTDA.			$ 0,54	$ 0,71		25,4%			
15	TELEVISION DEL PACIFICO S.A. TELEDOS (TELEVISION DEL PACIFICO	$ 24,90	$ 27,60	$ 30,77	$ 41,64	18,70%	0,4%		1,03%	4,45%
16	E.P. RTVECUADOR (ECUADOR TV)	$ 21,50	$ 24,73	$ 33,59	$ 31,22	13,24%				
17	MANAVISION S.A (CANAL 9)	$ 6,75	$ 7,04	$ 8,46	$ 9,93	13,73%	9,8%	6,27%	-5,39%	0,88%
18	SISTEMAS GLOBALES DE COMUNICACION HCGLOBAL S.A. (OROMA	$ 0,17	$ 1,36	$ 2,90	$ 3,93	184,87%		1,89%	-3,67%	-1,40%
19	TELECUATRO GUAYAQUIL C.A. (RED TELESISTEMA)	$ 18,65	$ 23,14	$ 30,77	$ 32,56	20,41%	6,1%	6,35%	6,65%	6,61%
20	CENTRO DE RADIO Y TELEVISION CRATEL C.A. (TELEAMAZONAS)	$ 32,95	$ 37,27	$ 38,87	$ 30,97	-2,04%		7,05%	16,82%	-19,98%
21	TELEAMAZONAS GUAYAQUIL S.A. (TELEAMAZONAS GUAYAQUIL)	$ 3,61	$ 3,52	$ 3,56	$ 3,59	-0,19%		0,75%	3,55%	-4,82%
22	CORPORACION ECUATORIANA DE TELEVISION S.A.	$ 39,67	$ 40,46	$ 41,76	$ 35,69	-3,46%	7,6%	3,51%	3,24%	-0,62%
23	CADENA ECUATORIANA DE TELEVISION (CANAL 10) CETV	$ 36,42	$ 44,21	$ 51,79	$ 71,68	25,32%	5,1%			11,42%
24	GRUPO EL COMERCIO C. A.	$ 51,60	$ 52,66	$ 53,96	$ 52,10	0,32%		6,35%	6,80%	0,00%
25	EDITORIAL MINOTAURO S.A. (LA HORA)	$ 6,45	$ 6,56	$ 6,45	$ 5,83	-3,31%	1,4%	2,48%	2,42%	0,11%
26	GRAFICOS NACIONALES S.A. GRANASA (DIARIO EXPRESO, EXTRA)	$ 24,63	$ 25,89	$ 26,54	$ 27,02	3,14%	8,7%	8,55%	8,60%	6,68%
27	EDITORES E IMPRESORES EDIMPRES S.A. (DIARIO HOY)	$ 8,48	$ 8,09	$ 7,26	$ 3,56	-25,12%		-43,15%	-10,90%	-4,72%
28	EDIASA S.A. (EL DIARIO)	$ 6,75	$ 7,04	$ 8,46	$ 9,93	13,73%	9,8%	7,25%	5,79%	4,89%
29	EL MERCURIO CIA. LTDA.	$ 5,79	$ 5,66	$ 5,85	$ 5,51	-1,64%	32,5%	44,53%	32,49%	29,02%
30	EDITORES NACIONALES SOCIEDAD ANONIMA (ENSA-VISTAZO)	$ 10,75	$ 10,98	$ 11,03	$ 9,63	-3,60%		-3,28%	2,70%	0,17%
31	EMPRESA DE COMUNICACIONES VIA SATELITE EMCOVISA SA (REVI	$ 4,01	$ 3,89	$ 4,22	$ 3,73	-2,38%	2,1%	-6,76%	1,79%	1,60%
32	SPORTV S.A.	$ 1,70	$ 4,11	$ 4,65	$ 9,02	74,42%	3,0%		7,59%	5,53%
33	EL HERALDO C.A.	$ 2,54	$ 2,49	$ 2,65	$ 2,60	0,78%	29,6%	18,08%	16,90%	21,77%
34	EL TIEMPO CIA LTDA	$ 1,62	$ 1,50	$ 1,69	$ 1,39	-4,98%	1,4%	8,71%	-4,32%	3,36%
35	SABA S.A.	$ 2,02	$ 2,52	$ 1,72	$ 2,37	5,47%	6,8%	5,37%	5,42%	6,13%
36	RADIO CONCIERTO GUAYAQUIL S.A.	$ 1,79	$ 2,36	$ 1,96	$ 0,95	-19,04%	2,1%	-16,60%	4,54%	5,30%
37	STARGROUP CIA. LTDA.	$ 3,68	$ 4,35	$ 4,70	$ 5,43	13,85%	13,4%	5,13%	5,43%	18,52%
38	MULTICINES S.A.	$ 20,45	$ 25,48	$ 24,68	$ 26,56	9,11%	21,2%	24,71%	28,28%	24,04%
39	CINEMARK DEL ECUADOR S.A.	$ 13,84	$ 17,47	$ 19,59	$ 20,97	14,86%	10,2%	10,10%	12,42%	11,99%
40	LINKTEL S.A.	$ 2,19	$ 3,78	$ 1,26	$ 1,04	-21,98%	1,0%	2,18%	5,90%	3,03%
41	HCJB LA VOZ DE LOS ANDES		$ 3,98	$ 4,10	$ 4,15					
42	CABLEVISION S.A.	$ 3,47	$ 3,13	$ 3,47	$ 3,98	4,68%	1,3%			-23,55%
43	OTHERS	$ 107,65	$ 103,48	$ 102,15	$ 99,09	-2,72%	5,6%	5,4%	4,9%	3,4%
	TOTALS	$ 574,35	$ 638,18	$ 691,43	$ 717,34	7,69%				