CATÓLICA LISBON
SCHOOL OF BUSINESS & ECONOMICS
UNIVERSIDADE CATÓLICA PORTUGUESA

Master Thesis

A Business Strategy Case Study

ZON Multimedia towards the future

When it is all a matter of 'fiber'

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Lisbon, January 2012

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Dissertation submitted in partial fulfillment of requirements for the degree of MSc in Business Administration, at the Universidade Católica Portuguesa, 2012

Acknowledgements

First of all, I would like to stress that the development of this Master Thesis was only made possible through the many discussions with Hugo Janes (IRIS and Video club Product Manager of the Product Management Department of ZON Multimedia), who always showed willingness to help. It was through Hugo that several contacts were made and insight into the telecommunications industry and the strategic position of ZON Multimedia was acquired. I am grateful to him. I would also like to thank André Almeida Pinho, the actual manager responsible for ZON Multimedia international issues. Besides, I would like to acknowledge Hugo Enes, SMB Product Management Director at ZON Multimedia for giving me the opportunity to participate in a summer internship at ZON Multimedia which allowed for the establishment of the first contacts required to develop this Master Thesis. Moreover, I would like to show my true thankfulness to Frederico Ágoas for its availability and readiness to help, and to those whose name I shall not mention here but also contributed decisively to this final result.

Naturally, I am also deeply indebted to my advisor, Nuno Magalhães Guedes, for his support, and his guidance all throughout the development of my Master Thesis.

I would also like to thank my sisters, my brother and my closest friends for providing me relaxing moments in between work during these last few months. My last words of gratitude go to my parents, for their unconditional support and patience during my academic life; my Master Thesis is for them.

Abstract

Title: ZON Multimedia towards the future -When it is all a matter of 'fiber'

In 2008, one year after the spin-off from its mother company, ZON Multimedia was facing a new challenge: whether or not to deploy the Next Generation Network (NGN), fiber-to-the-home (FTTH). The exponential growing demand for higher capacity networks, competitive pressure, regulation and government pressure, as well as lower operational costs were the main drivers for the eventual deployment. However, the current ZON Multimedia's technology had yet a high competitive capacity that promised to continue in the next years. The decision to move towards the adoption of FTTH or not is then widely discussed in this Thesis.

Besides the Case Study, this Thesis includes a Literature Review section in which a theoretical basis is laid down for the analysis presented in the Teaching Note section.

From the Case Study analysis it will be possible to understand ZON Multimedia current network technology's advantages and disadvantages as well as the inherent strategic risks associated with the FTTH deployment. Moreover, it will be possible to understand that the high likelihood of ZON Multimedia main competitor moving to FTTH and the marketing strength of the term 'fiber', due to its superior characteristics and its lower operational costs, were undoubtedly food for thought at the time of the decision.

Resumo

Título: ZON Multimedia em direcção ao futuro – Quando tudo é uma questão de 'fibra'

Em 2008, apenas um ano após a ZON Multimedia ter-se separado da sua holding, um novo desafio surgia: implementar ou não uma Rede da Nova Geração (RNG), a fibra-até-casa do consumidor (FTTH). O crescimento exponencial da procura por redes com capacidades mais elevadas, juntamente com a pressão exercida tanto pela concorrência, como pelo governo e regulador, assim como os custos operacionais inferiores aos que as redes actuais traziam, eram apresentados como os principais impulsionadores desta eventual implementação. No entanto, a tecnologia que a ZON Multimedia possuía na altura tinha ainda uma capacidade competitiva que prometia manter-se durante os próximos anos. A decisão de adoptar ou não esta nova tecnologia é então abordada com o desenvolvimento desta Tese.

A estrutura da Tese além de incluir o Caso de Estudo, inclui também um capítulo para a Revisão de Literatura, na qual é apresentada uma base teórica para a análise realizada no capítulo seguinte da Nota de Ensino.

Através da análise do Caso de Estudo será possível apreender quais as principais vantagens e desvantagens que a tecnologia da ZON Multimedia, em 2008, possuía. Assim como, os riscos estratégicos associados à adopção de FTTH. Além disso, será possível de compreender que o avanço, mais que provável, do maior concorrente da ZON Multimedia para a adopção de FTTH, juntamente com força do termo 'fibra' no mercado, foram, sem dúvida, factores que pesaram na decisão.

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List of terms and acronyms

ADSL - Asymmetric Digital Subscriber Line network technology

AdC– Competition Authority (Autoridade da Concorrência) for telecommunications industry

ANACOM – Portuguese Regulator Authority of telecomunications industry (is the AdC)

ARPU – Average Revenue Per User

Bandwidth - Amount of data that can be transmitted through a broadband internet line.

Churn rate - Rate at which customers voluntarily leave the service

DTH - Direct to Home broadcast

DTTV - Digital Terrestrial Television

DOCSIS protocol - Data Over Cable Service Interface Specifications protocol

Download - Process in which the user receives data from the internet provider

FTTB – Fiber-to-the-Building

FTTH – Fiber-to-the-Home

FTTN – Fiber-to-the Node

FTTx – Fiber-to-the-X - generic term to describe any network which metallic cables were all or part replaced by optical fiber in the last mile of the architecture network (it can take the form of FTTH, FTTB, FTTN)

HFC - Hybrid fiber-coaxial network technology

IPTV - Internet Protocol Television

Last Mile - In telecommunications this term describes the neighborhood network infrastructure.

Mpbs – Megabits per second (data rate unit)

ORAC - Reference Offer of Ducts Access (Oferta de Referência de Acesso a Condutas)

Passed Home – Areas in which an operator's network reaches, this term shall not be confounded with the number of clients.

PT – Portugal Telecom

PTM – Portugal Telecom Multimédia

Upload - Process in which the user sends data to the provider.

VoIP - Voice Over Internet Protocol

I. Introduction

At the end of 2008 ZON Multimedia was the leader of the triple play market, the number one in the pay TV market, the number two in the broadband internet access market and the number three in the voice service market. Furthermore, due to its future proof broadband technology, it represented a threat for ADSL 2+ operators. However, this was not an easy industry. There were several issues that made difficult to attain the best market performance. The market was highly concentrated. The broadband internet and the pay TV services were entering the maturity phase with fixed voice entering the declining phase. This was a time of global economic recession. Price wars and lower revenues were then a reality. The existence of a powerful incumbent, Portugal Telecom (PT), which was also ZON Multimedia's main competitor, represented a threat for the remaining market players. The consumption of internet was exponentially growing and the demand for more reliable services was rising. As a response to it, a revolution in the broadband technology was happening all over the world. NGNs, based on fiber optics technology, were emerging. The new technology was expected to deliver much higher capacity than the then current network technologies. This revolution was arriving to Portugal and PT would probably adopt it, but regulation on this issue was not yet well defined. In addition to these issues, a customers' niche, the heavy users, was stealing network capacity from the remaining ZON Multimedia customers' network, creating some constraints in the network's reliability. ZON Multimedia was then analyzing two options: either to anticipate the likely move of PT through the adoption of a next generation network, or to upgrade its network, applying NGN in the specific cases of heavy users.

The development of this dissertation has then as its ultimate goal to provide an understanding of the impact of this technological change in a company's strategy that is inserted in an industry in which this technology has a central role. In order to achieve this goal the dissertation includes three main parts: the Case Study (CS), the Literature Review (LR) and the Teaching Notes (TN).

The CS provides information about the strategic position of ZON Multimedia, the evolution of the Portuguese telecommunication market in terms of technology and key strategic issues. In this section the main competitors and their moves regarding the adoption of that technological change are also presented, as well as the main drivers for the adoption of this technological change. In the LR the strategic concepts and frameworks of relevant theorists which should be helpful for analyzing the questions proposed in the Teaching Notes section are highlighted. Finally, in the TN section an approach for the discussion of the Case Study is suggested. The goal of this section is to give a possible guideline for the instructor to use during class and stimulate the class discussion. This last section is expected to be complemented with the instructor's comments and in-class-discussion.

II. Case study

André Almeida Pinho, 32 years old, director tasked with new product development and product management at ZON TV Cabo, stood in front of his office's window recalling his short but successful company's story. He wondered how he might continue its successful path in such a time of aggressive competition and change in the telecommunication sector.

Established in November 2007, ZON Multimedia was initially known for its TV cable service but quickly conquered the remaining market with its integrated and innovative offer which also included voice and broadband Internet. By the end of 2008 ZON Multimedia, with a business volume of 773, 081 M€, had achieved a leading position in the Triple Play segment.

Yet, in 2008, the technology of ZON Multimedia began to be challenged. The exponential increase in internet data consumption due to the appearance of new services and over-the-top contents was exhausting the cable modem bandwidth and forecasts appointed for a continuous consumption growth. This fact and the almost obvious step forward of PT, its main competitor, to the Next Generation Network (NGN), were reasons enough to be worried about the future.

André Almeida wondered how ZON Multimedia could face this threat, whether it should stick to the ongoing technical upgrade of its current access technology (Hybrid Fiber Coax, the HFC) or if it should anticipate its main competitor's strategy. André Almeida knew that ZON Multimedia was not the company with the highest investment capacity in the market, but he also knew that HFC technology should not be underestimated.

2.1. The beginning

ZON Multimedia is a Portuguese telecommunication company which is listed in the main Portuguese stock market index (PSI-20). See **exhibit 1** for ZON Multimedia's financial highlights in 2008. The name ZON Multimedia resulted from a new identity and a new corporate strategy established as a consequence of the spin-off of Portugal Telecom Multimedia (PTM), currently ZON Multimedia, from its mother company, Portugal Telecom, today its main competitor. The then named PT Multimedia was constituted by Portugal Telecom in the 15th of July of 1999 in order to expand its strategy into the multimedia business.

ZON Multimedia's Triple Play service comprises pay TV by cable or satellite, broadband internet and fixed voice. The three services were inherited from PTM when the company was still part of Portugal Telecom Group. Cable TV was its initial service. The fixed voice service, however, had been launched

in January of 2007, a few months before the spin-off. The distribution of audiovisual material and the operation of cinematographic theaters are the other two businesses that complete ZON Multimedia portfolio. The mobile voice service was launched only in September 2008, extending ZON Multimedia offer. The main goal of integrating these different business areas was to provide a broad number of options to customers and satisfying as many telecommunications and entertainment needs as possible.

ZON TV Cabo, ZON Lusomundo Cinemas, ZON Lusomundo Audovisuais and ZON Conteúdos and their subsidiaries plus ZON Açores and ZON Madeira are the companies that make up the structure of ZON Multimedia and ensure the offer of all these services throughout the Portuguese territory. **Exhibit 2** depicts the simplified structure of ZON Multimedia. During the year of 2008 ZON Multimedia acquired three cable TV companies in order to consolidate its presence in the market.

In the end of 2008, ZON Multimedia had more than 1.500 employees and almost 3 million clients. It was the leader of the Portuguese pay TV market, the second largest internet provider and the third largest player in the fixed voice market. **Exhibit 3** shows operational performance indicators of ZON Multimedia in 2008.

2.1.1. The PTM Spin-Off

The pressure made by the Portuguese Competition Authority (Autoridade da Concorrência, AdC) did herald the PTM spin-off. At that time, Portugal Telecom owned, simultaneously, the old copper cable network with Asymmetric Digital Subscriber Line technology (ADSL) and the coaxial cable network with the cable modem technology. This made Portugal one of the last European countries where cable modem and ADSL infrastructures were owned by the same company. The spin-off would separate those technologies among different owners and their evolution would make the market much more competitive, benefiting the sector. The AdC concern was to stimulate competition with the goal of creating better and more dynamic companies to the consumer's advantage.

The spin-off happened in 2007 after a thirteen-month battle over a hostile takeover from Sonaecom over the Portugal Telecom capital. On the 21st September of that year the new Executive Management Team was named. A new phase of the institutional development of PT Multimedia was beginning. In that meeting the board accepted the resignation of the Executive Management Team president, Zeinal Bava, and the members Manuel Rosa da Silva, Francisco da Silva Nunes and Pedro Durão Leitão. Joaquim Goes, member of the board of directors, also presented his resignation. In the same meeting, the board named Rodrigo Costa as president of PTM, José Pereira da Costa as CFO and Luís Lopes and Duarte Calheiros as members of the executive committee. With this, Portugal

Telecom and PT Multimedia no longer had any members of their respective Board of Directors in common. Thus, from then on PT Multimedia was an independent company with no relation at all to PT.

After the nomination of the Executive Management Team, André Almeida Pinho was one of the first key persons to be invited to move from PT to PTM. He was the Manager of Strategy and Business Development of PT Comunicações and had been a Ford award winner for best MBA student at Insead in 2004. If accepted, the invitation would put him in charge of all the product areas (TV, net and fixed voice) of PTM, presenting him with the stimulating challenge of having to compete against his old employer in a time of significant change in the telecommunication market worldwide.

The level of disruption caused by the spin-off was high. Zeinal Bava, former CEO of PTM and new CEO of PT, met over the weekend with the first and second line PTM directors of several areas and took with him more than 20 managers of the main departments, that is, almost 90% of the PTM managers. A fast process of direct transfer of managers between PT and PTM and the selection and recruitment of a new team of managers were the topics of the day. In the news many wrote that even if the direct transfer was to affect both companies equally, PTM would always be the most disturbed of the two, since it had a less experienced team than PT. In response to these statements, Rodrigo Costa, new CEO of PT Multimedia, speaking to 'Diário de Negócios' newspaper said: 'It was in my expectations that this could happen, I just did not anticipate how many managers would go to PT'. The CEO also took the opportunity to reaffirm that the PTM spin-off was not an arranged deal and that the current situation was an obvious proof of it. Knowing that the transfer of managers had been a voluntary process, Rodrigo Costa also knew that those still at the company were certainly motivated to start working with him in this new challenge. As a matter of fact, PTM was hiring new managers at a record pace, including recruitments made by André Almeida for management positions at each of the key businesses of PTM, since the 1.5 million customers company was virtually on the edge of no day-to-day management capabilities below the board level.

At the general meeting of shareholders held on the 2nd of March 2007 the proposal of Sonaecom was rejected and the hostile takeover was extinguished. On the 14th of November of 2007, PTM made the announcement that from that day on PT no longer held any direct capital participation on PT Multimedia. The spin-off was officially concluded.

On the 27th of November, PTM made the announcement that it would acquire from PT all the network equipment related to cable television for a total of 21.6 M€. Both companies also signed an agreement through which PT would provide to TV Cabo (now owned by PTM) services related to the

network infrastructure by a period of 3 years. This would mean a short to medium term risk to PTM, with the renegotiation expected for late 2010.

In the following January, shareholders approved 'ZON Multimedia' as the new corporate name. A renewed company was born with the ambition to lead the Portuguese telecommunications market.

2.2. The Portuguese Telecommunications market

2.2.1. Triple Play is the name of the game

In the telecommunications market, the triple play service allowed operators to offer at the same time high speed internet access, pay TV and fixed voice. The triple play is the marketing designation given to a single offer that integrates over a unique connection of a single operator all the three services. This integrated offer should guarantee that all the different services provided have equal or even better quality and price than the previously separately sold services.

In Portugal, Cabovisão, a cable operator, was the first company to launch a triple play offer in 2001. The event was assumed to be the starting point for a growing competition in the Portuguese telecommunication sector. At an international level, this integrated service allowed operators to improve customers' loyalty, to reduce costs, to increase productivity and to offer new services. Studies about the triple play offer, conducted by the American cable operator Cox Communications, showed that the churn rate[1] was reduced when the service was provided in a triple play package (**Exhibit 4** depicts the impact of the integrated offer in churn rate results). Moreover, according to it, the customers churn rate in double play packages was 18% lower than in a single play, while in the triple play the churn rate was 48% lower than in the single play.

ZON Multimedia was in the Triple Play market since the voice service had been launched in January 2007. However, the company was not alone. At that time, André Almeida was aware that the Triple Play was a key element of the present and the future of the telecommunications market and that it could be used as a defence tactic in such a competitive environment. All the telecommunication operators with appropriate skills would want to develop this integrated offer in no time.

During the year of 2007 the ZON TV Cabo triple play offer was still a child. However, the multiple play offer in Portugal was gaining an higher prominence with the double play package losing some ground to the triple play offer (**Exhibit 5** presents the subscriptions per multiple package type for 2008). While the triple play enjoyed an increase of 91,34%, the double play increased only 1,54% from 2007

[1] Churn rate: Rate at which customers voluntarily leave the service

to 2008. In the year of 2008 the addition of the mobile voice to the internet, fixed voice and pay TV services brought the quadruple play to the market, but according to ANACOM only one operator was providing it. **Exhibit 6** depicts the multiple play market shares by company in 2008.

André Almeida knew that this strategic vector was essential to conquer and to improve customers' loyalty and consequently to guarantee a comfortable position in the market. Having in mind that PT had entered the triple play service at the end of the first half of June with the pay TV launch, a few months after the ZON Multimedia had launched its integrated offer, André Almeida was ready to lead this game. The ambition of leading the Triple Play market was so present in ZON Multimedia spirit that it was one of the three main elements elected by ZON Multimedia for the strategic plan for 2008-2010. The remaining objectives consisted in achieving the excellence in the relationship between the company, client and operations, and capturing new growth opportunities.

In 2008, the single service was still the offer most picked by customers due to the late appearance of the multiple play. See **exhibit 7** for the subscriptions to multiple play service and single service. But ZON TV Cabo base customers were now adhering to the triple play service at a rate 17% higher than in the previous year. At that moment, 23% of the TV cable customers were subscribing the triple play and the number of customers buying only the single play dropped sharply comparing to 2007. **Exhibit 8** shows the triple play evolution in ZON Multimedia's TV cable base customers (2007/2008). These values made ZON Multimedia the triple play market leader.

André Almeida knew that these results were the outcome of a strategy which included network upgrades and an effort by the marketing team in communicating aggressively the advantages that customers could enjoy with the integrated offer and in highlighting this triple play service against other triple play services in the market. The easiness of installation in cable customers' houses (pay TV clients) of additional services of fixed voice and internet was also a factor that contributed to this performance. A house where the system of cable pay TV was already installed made the process of installation very simple, since it did not involve specific interventions. In fact, this last point gave ZON TV Cabo a competitive advantage compared to its competitor, for whom cable TV was not the main product. Finally, the growing development of access devices (mobile terminals as Smartphone, computers, TVs), in which the three services were more and more convergent, heralded the future growth of triple play.

2.2.2. The three services evolution in an individual perspective

In the telecommunications industry, innovation is a crucial factor for the development and growth of the triple play offer. The greater is the operators' ability to innovate, the more diversified and

competitive will be the integrated offer. Hence, the development of new equipment, features and contents, on a regular basis, has characterized the evolution of the triple play in the market.

The triple play teamed up three services previously considered as being worlds apart. They were gathered for business reasons but their individual evolution is the reason why triple play is able to satisfy customers. Consult **exhibit 9** to understand the main events in each of these service.

2.2.3. Types of broadband access technology

The main area of development and growth in the telecommunications industry is the broadband technology. The adoption of different types of broadband technologies with advanced materials has allowed the emergence of new business opportunities. It was due to the continuous development and improvement of these technologies that operators became able to deliver the complex triple play service over a unique broadband connection, supporting high speed connections. It is in the bandwidth of the broadband connection that the three services run in, being the high speed internet access and television the more bandwidth-demanding and voice the less. It is important to distinguish download and upload[2] speed from bandwidth. Bandwidth is the amount of data that can be transmitted through a broadband line. However, since higher bandwidth means that the user is able to get more data through the same stretch of time, the outcome is that for the user the time taken to view and download contents becomes shorter. Hence, broadband access technology has been seen as a central driver of the triple play over the last years.

Until 2008, the Portuguese telecommunications market was based on two main types of broadband access technologies. The Asymmetric Digital Subscribed Line (ADSL) technology, based on copper cables which evolved to ADSL 2+, and the Cable technology, originally based only on coaxial cables but in the meantime evolved to a hybrid of fiber and coaxial cables (HFC). The main differences between these two technologies were in the broadband network's architecture. **Exhibit 10** presents ADSL and HFC networks' architecture.

Asymmetric Digital Subscribed Line (ADSL)

The Asymmetric Digital Subscribed Line was developed from the copper cable used in the traditional telephone lines. This type of technology allowed the user to surf the internet and at the same time to receive a call through its fixed telephone line. It is the existence of a DSL filter which allows that a unique telephone connection may be used, at the same time, for both Voice and ADSL internet

[2] The download is the process in which the user receives data from the internet provider and the upload is the process in which the user sends data to the provider.

services, with one channel for voice calls and another for internet data. Due to its low capacity, ADSL was not able to deliver video. This fact led to the development of a stronger ADSL technology, the ADSL 2+. This technology eventually replaced the majority of the former ADSL's operators technology.

The Asymmetric designation came from the difference regarding the upload and the download processes. In the case of ADSL 2+, the download speed is much faster than the upload. The maximum theoretical speed achievable is up to 24Mbps for downloading and 1Mbps for uploading.

The distance between the providers' central and the user is a conditioner of ADSL 2+, as this technology works better the closer the user is from the providers' central. Problems of signal quality and speed connection increase along with the increase of distance. In terms of bandwidth sharing, ADSL 2+ is committed to one single user and it is not shared among other users. The development of the Internet Protocol Television (IPTV) made possible for ADSL 2+ operators to offer also the television service, in order to follow the cable operators.

Cable – Hybrid Fiber Coax (HFC)

The Cable technology was born to support Pay TV. Before the nineties, this network was constituted by coaxial cables in its entirety but problems of quality of transmission inherent to this kind of cable material implied some limitations. Hence, operators started to implement fiber optics in the primary network's portions. This would allow offering better service since the optical fiber has higher quality of transmission than coaxial cables. The network architecture gained another name, the Hybrid Fiber-Coaxial (HFC). **Exhibit 11** illustrates ZON Multimedia's HFC architecture network. Since the components required to deploy it were very expensive, fiber optics was adopted only in some portions of the network serving simultaneously a big number of users. However, this evolution was enough to allow cable operators to run also internet and fixed voice services. The Data Over Cable Service Interface Specifications (DOCSIS) protocol and the development of the Voice Over Internet Protocol (VoIP) enabled cable operators to provide internet and voice, respectively.

One of the advantages of the cable coaxial lines is the no dependence on the distance between the customer's home and the providers' central. However, the lines are shared between users that live in the same area, so the greatest the number of users in one area, the lesser the Internet's quality. In order to decrease the networks congestion and increase data speeds, optical node splitting is a regular measure taken by HFC operators. The maximum theoretical speed achieved is about 30 Mbps for downloading and 5Mbps for uploading, although the offer available in the market was actually lower.

Notwithstanding their different limits, both access technologies were confined to their theoretical maximum bandwidth limitation. In 2008, in their hypothetical maximum both could offer 100 TV channels and unlimited voice: they did not have however the same download speed which was 24Mbps for ADSL 2+ operators and 30Mbps for HFC operators.

2.2.4. Competitors

In 2008, besides ZON Multimedia with its ZON TV Cabo brand and the historical operator, Portugal Telecom, with the MEO brand, there were two more relevant players in the triple play market: Clix, from Sonaecom, and Cabovisão S.A.. With the exception of Cabovisão, all operators were listed in the PSI-20 index. **Exhibit 12** shows a summary of the highest speed capacity packages from each operator. Other players such as Vodafone, ONI and AR Telecom were also part of the market but with a market share far less significant. Of these thee players, AR Telecom was the only one with a triple play offer.

PT comunicações from Portugal Telecom Group

At the end of 2008, Portugal Telecom, was already present in several countries. In Portugal this operator was organized in three units: PT Comunicações and PT Prime that ran, respectively, the business of the fixed voice service for residential and enterprise customers, and Telecomunicações Móveis Nacionais (TMN) for the mobile service business. These three units supported a complete portfolio of products and services and contributed with 3 569,17 M€[3] for the total business volume. Besides that, a set of other companies gave technological, financial orientation and telemarketing support to other companies within the group. This strong structure along with a large history and a strong financial muscle put PT as the largest Portuguese operator. To access PT's consolidated financial highlights at 2008 see **exhibit 13**. In fact, PT was the incumbent of the fixed voice network and for several years the only operator to provide the fixed voice service in the Portuguese market. In the end of 2008 the incumbent had around 60,6% of this market. Until 2000, PT was the only owner of the essential network infrastructures required to provide telecommunications services which made the telecommunications market a market controlled by only one player. It was then required that PT opened its infrastructures to other operators in order to allow the existence of those operators. In 2000, with the European process of market liberalization which main objective was to promote competition in the telecommunications market, the incumbent was forced by ANACOM to supply network-access service to other operators, allowing the emergence of new operators.

[3] 53% of the total volume of 6 734,3 €M

The main access technology used by PT was based on the traditional copper cables network, the ADSL, since the cable technology, after the structural separation, had been delivered to ZON Multimedia management. This broadband internet service was first launched in 2002 by the brand SAPO, which in 2007 also launched the first broadband internet mobile service. In 2008, PT evolved its ADSL technology to ADSL 2+ which allowed the development of the IPTV project, permitting the company to enter the triple play market in that year. The management of the triple play was at charge of PT Comunicações. The name chosen for this pay TV service was Meo. Although originally circumscribed to TV related services, it came to be used to name the triple play offer. An aggressive promotion campaign was designed in order to position Meo at the top of preferences. The most successful team of Portuguese comedians of that moment, 'Gato Fedorento' ('Smelly Cat') was hired to produce a big impact. In fact, the investment in TV commercials, during 2008, positioned Portugal Telecom as the eleventh company in the advertisers' Portuguese ranking, immediately followed by ZON Multimedia in the twelfth position.

The launch of video on demand, High Definition TV channels, digital video recording and electronic programming were all features that were added to the IPTV of PT. In that year, PT also gained the Digital Terrestrial Television (DTTV) platform contract which would reinforce PT's multiplatform strategy of national coverage. The Direct to Home (DTH) broadcast was also launched in April as complement to the IPTV offer. In August 2008, from the four triple play packages that PT launched in the market (each one customized to different customers' needs), the most complete package included for a promotional price of 49,54€ , 45 TV Channels, broadband internet with a downloading speed of up to 16Mb, unlimited fixed voice calls, video club and mobile broadband internet. To subscribe this service or get information customers had several options. They could go to one of several PT stores ('PT bluestore') spread around the country or to the PT website, search for a 'ask to be called back' button and wait for that call. There was also a website dedicated to online customer care service, the PT wikicare, in which customers could find support about any issue related to this service.

Yet in 2007, PT started to explore the Next Generation Networks access and begun to test the Fiber-To-The-Home technology (this technological issue will be further approached on page 14). For that it used 3700 houses in the regions of Miraflores and Oriente in Lisbon to which access to the IPTV service and broadband internet of 50Mbps were conceded.

At the end of 2008 around 42,9% of the ADSL 2+'s PT customers had subscribed to the Meo service. The number of Meo customers had increased by 14,9 times, achieving 310 thousand of subscribers or a 13,6% market share in the Portuguese Pay TV market.

Sonaecom from Sonae Group

Sonaecom is a subsidiary of Grupo Sonae and it is responsible for three business units: telecommunications, media and Information System Software area. Its role is to manage in an integrated way the business units in order to create synergies and identify growth opportunities. The main goal of the subsidiary is to conquer the leadership of integrated services.

The Sonaecom business areas of mobile communication and fixed service for business customers were developed by the Optimus brand and the business area of fixed communications for residential customers was developed by Clix. The main network technology of these brands was the ADSL, whose access was provided by PT.

In 2006 Sonaecom started to offer a faster service of ADSL, the ADSL2+ which allowed the company to offer broadband internet with more capacity, fixed voice and IPTV. With the introduction of the IPTV, Sonaecom became able to launch the triple play offer. In fact, Sonaecom was the first operator introducing the IPTV in Portugal in April of that year. The triple play service of Sonaecom was named Clix SmarTV. Its launch promotion strategy was not too aggressive but it was expected to conquer a substantial number of clients. The best triple play package included 47 TV channels, 12Mb of broadband internet and unlimited fixed voice calls at night, all for a monthly price of 53,40€.

The 'home video service' (video-on-demand) with more than 600 available videos was the first value added service launched with the original triple play offer, but in 2007 other services and channels were added to the TV service in order to reinforce the Clix SmarTV. Amongst them were the Electronic Program Guide and the introduction of the main radio channels of 'Rádio Difusão Portuguesa' in the TV platform in addition to the 100 TV channels already available.

In 2008, Sonaecom had a business volume of 952,7 M€. During the year of 2007, one of the most relevant corporation issues was the failure of the hostile takeover of PT. But in the beginning of 2008 the company was already prepared to make an important announcement which would position the company as the first relevant market player offering NGN access. This would allow the Clix brand to offer a speed of 100Mb. The company planned to invest 240 M€ in order to put fiber in more than 1 million homes until 2011.

Cabovisão S.A. from Cogeco Cable

The launch of the triple play service in 2001 made Cabovisão the first operator to introduce this service in Portugal. In 2006 it became a subsidiary of the Canadian group Cogeco Cable. It was through the improvement of its own HFC infrastructures provided by Alcatel that in 2005 Cabovisão

became able to deliver higher speed broadband connection and to add new services to the triple play offer. In the same year, with the launch of the TV channel HD1, Cabovisão became the first Portuguese operator to launch a High Definition TV channel. The main difference between Cabovisão and the other relevant market operators was its geographical approach. Along with some of the most relevant cities, Cabovisão also bet in the regional development, reaching parts of the country where the triple play offer was less present.

In 2007, Cabovisão and ZON Multimedia were the two main players of the Portuguese cable technology. In the Pay TV service the two companies together held 86,6% of the market, with ZON TV Cabo holding the largest percentage with 71,3% against 15,3% of Cabovisão. In August of that year, greater market share and in part technology were the reasons that led ZON Multimedia to ask AdC for the approval of the acquisition of three other Portuguese cable operators, Bragatel, Leiria and Santarém[4] Pluricanal and TVTel. On the other hand, Cabovisão acquired Aveiro Pluricanal.

Propelled by Alcatel networking solutions which strength Cabovisão's network, in July of 2008 Cabovisão triple play offer presented a package with 25Mb of internet speed, the highest speed of the market, 46 TV channels and unlimited voice calls for fixed numbers, for a price of 78,97€. Video on demand, more services and more contents were all future developments that Cabovisão had in mind for the next months. The company was aware of the market trends and its goal was to match the competition's technology offer. In the end of 2008 Cabovisão had a business volume of 161,1 M€.

Due to economic constraints, until the end of 2008 Cabovisão had assumed a low-profile market position in terms of marketing campaigns. But the company knew that with the turnaround of the telecommunications market, the adoption of a stronger marketing strategy would be a future need. However, the company had a communication strategy of proximity and a strong customers' support service. This included a number for technical support, another for service's information and a 'click for call free' website button.

2.3. Changes in the consumption behavior

According to ANACOM, in 2008, the Portuguese market for fixed voice services was showing signs that it was entering declining phase with a slow growth rate. (See **Exhibit 14** for number of fixed voice client's evolution 2005-2008). The number of subscribers and the revenues from this service

[4] Leiria with 42 745 inhabitants and Santarém with 28 760 inhabitants are Portuguese cities on the centre region of Portugal

were declining due to rising competition for conquering or maintaining market share which led to increasing price competitiveness. Those values were also affected by the substitution effect of the mobile voice over the fixed voice. In the period 2007-2008 the fixed voice service seemed to lose its individuality. It became to be mostly sold along with other services. André Almeida knew that the future growth of ZON Multimedia would not depend on selling this service alone.

At the end of 2008, although ZON Multimedia was the third player of the fixed voice market, it was the only relevant player whose fixed voice market share grew (from 2,5% in 2007 to 10,5% in 2008). See **exhibit 15** for fixed voice market shares 2007/2008. The first player of this market, PT, on the other hand, had had a decrease of 6,2% from 66,8% to 60,6%, along with Sonaecom (second player of the voice service) which had decreased by 2,8% from 20,8% to 18,1% in the same period of 2007-2008.

Having in mind that the volume of the mobile service accounted for 66% of total voice traffic volume in the country, in the 2nd semester of 2008 ZON Multimedia launched the mobile voice service.

During the year of 2008, the Portuguese Pay TV service increased over the previous year, achieving 2,3 million subscribers. Its revenues also rose by 13,8% essentially due to the development of the IPTV from PT which was gaining ground in the Pay TV segment by aligning it with a strong DTH offer. For the first time, the number of Portuguese TV cable clients decreased by 1% comparing to the previous year. ZON Multimedia, the leader of Pay TV, was losing market share for its competitors. The company lost 5,7% of the 74% market share held in 2007 and PT gained 8,2% more, achieving 13,6%. **Exhibit 16** shows the pay TV market shares 2007/2008. The competition among market competitors was bringing innovation as well as competitive prices for the market. Operators designed new offers and people were buying. Several new features as interactive TV and new TV contents were conquering people and there were no signs that this behavior would change.

Regarding the Internet service, there was a rise in the number of users and data consumption following an exponential growing demand. In 2008, the world forecasts for 2014 pointed to a data volume consumption of 5 times the then current consumption. As an example of this growing demand, the hosts of online contents like YouTube, in which the user is allowed to download and upload contents, became to accommodate much longer videos than before (hitherto not more than 10 minutes). In fact, the number of hosted videos on YouTube in 2008 was increasing around 20% every month. The capacity needed to store these videos reached almost 45 terabytes which is equivalent to the storage capacity of 5 thousand computers. Other services like Facebook (pictures and videos), iTunes (music), Picasa (pictures), Hulu (video), Amazon (e-commerce) were all contributing to this exponential behavior.

Moreover, the Internet turned out to be more than an information service, becoming a critical infrastructure to almost all sectors of society and an important factor in economic growth. Internationally, operators were already taking measures in order to become able to respond to users' needs. In Portugal, the broadband internet market revenues had increased by 13,1%. ZON Multimedia was the company that gained the biggest slice of the new number of subscribers with an increase of 4,8% in its market share. **Exhibit 17** points out the Portuguese broadband internet market shares. According to ANACOM, in 100 Portuguese people, 25 had broadband internet access (mobile or fixed). Like the foreign operators, Portuguese operators were also concerned with the capacity of their technologies.

2.4. Current Situation (2008-2009) – what to do next?

Architectural evolutions in the access networks were being evaluated in order to face the change of the consumption patterns and the growing competition. The Next-Generation Network access was the term used to name the result of these architectural evolutions. It was defined as a different type of broadband in which one network carries all services in one package but with much more capacity than what the available technologies were then able to reach. The NGN access promised to substitute those current access technologies. In order to obtain the NGN access, the optical fiber was appointed as the crucial material to substitute the metallic cables in the networks' architecture. **Exhibit 18** depicts the advantageous characteristics of fiber optics technology. The generic term for these new networks was Fiber-to-the-x, FTTx. **Exhibit 19** illustrates the variations of FTTx architecture. However, the Fiber-To-The-Home (FTTH) was the chosen by the majority of the Portuguese operators due to its proximity to the end-user.

The theoretical maximum of 24Mb for downloads seemed insufficient to make the ADSL 2+ technology future-proof. In fact, for the copper cable operators only the migration from traditional network access to NGN access would allow a bandwidth evolution; this, however, would demand Greenfield investments in a new network and the complete abandonment of the old one.

On the other hand, the cable operators with HFC network could achieve ultra broadband speed transforming their network in an NGN access if an upgrade of the DOCSIS protocol and some amplifications of the network were made. Thus, the HFC network did not require a disruption of the core technology. If some modifications were made at the level of the Cable Modem Termination System (CMTS/cable headend), an upgrade of the DOCSIS protocol system would allow the bandwidth increase. This, in turn, could ensure a theoretical advantage for these operators regarding growing data consumption and copper cable competitors. As expected, the CMTS/cable headend

suppliers, such as Cisco, ARRIS and Motorola, pushed forward the CMTS, allowing cable operators to increase their bandwidth. This upgrade would grant the designation of NGN access to HFC networks.

Trying to anticipate the market and as result of the CMTS's upgrade, during the year of 2008, ZON Multimedia was able to start the deployment of EURODOCSIS 3.0, in order to replace the current DOCSIS system. This upgrade involved an investment of about 30€ per home. At the time, the company had 2.8M clients and it was estimated that until the end of 2009 the entire network would be upgraded with the possibility of each client to opt for a broadband speed of 100Mb. Besides that, the company was in the process of incorporating the recent acquired companies TVTel which held the biggest national network in FTTH, and Pluricanal Leiria and Santarém, that had 5.000 homes in Santo António dos Cavaleiros[5] ready to receive FTTH.

In the beginning of 2009, Portugal was experiencing an economic recession. The Portuguese government had just announced a fiscal stimulus package of 2.18 billion euros to push forward the economy. The telecommunications sector was considered as a structural pillar for the development of the country and the willingness to develop Next-Generation Networks access all over the country should generate employment and money. It was estimated that, in the short term, the NGNs' development in Portugal would generate a business volume of almost 3 000 M€, creating more than fifteen thousand permanent and qualified jobs and employing, not permanently, 25 thousand people during the infrastructure construction. For this development the Portuguese Prime Minister at the time, José Socrates, informed that a credit line of 800 M€ would be available with the support of the European Investment Bank for all the country's operators who wished to invest in the NGN access with the aim of reaching about 1.5M homes by the end of that year. This NGN investment plan was part of the stimulus package.

ZON Multimedia was comfortable in the market with its cutting-edge HFC technology but kept in mind the increasingly strong FTTH technology. Sonaecom was already implementing its fiber optic network since its announcement on January of 2008. This would allow Clix SmarTV to offer a 100Mb speed. But this was not the main concern of André Almeida since the market share of Sonaecom was smaller than PT's market share.

In the rest of Europe, copper cable incumbents operators were already deploying NGN access like Telecom Italia and British Telecom but many were also expecting government and regulation authority actions (more favorable regulatory treatment). In fact, Europe was lagging behind. In the United States, Middle East, Asia and Australia the support given by these identities was visible. Co-

[5] Santo António dos Cavaleiro is a portuguese parish in the municipaly of Loures with 21 945 inhabitants

financing fiber deployment, or protection of operators' investment were measures that were allowing the fast development of the NGN access and put these regions a couple of years ahead of Europe.

In Portugal, the incumbent was also waiting for a more favorable regulatory treatment of the national regulator. PT was expecting that the decision did not imply the obligation of providing wholesale fiber services to competitors in order to keep some exclusivity in the fiber offering. André Almeida knew that it was a matter of time until its main competitor would announce the deployment of its fiber optic network.

On February of 2009, there were only two operators capable of offering 100Mbps: one package from Sonaecom under the brand Clix and another from ZON TV Cabo. **Exhibit 20** illustrates the different 100Mbps offers (first quarter of 2009).

2.4.1. The decision – two different paths

During the first quarter of 2009 ZON Multimedia had 3M customers and had upgraded 500 000 homes with EURODOCSIS 3.0. While this process was underway, ZON Multimedia extended its offer also to the mobile broadband and added the video club feature to the pay TV service, following the latest market developments.

The company led by Rodrigo Costa had also already 100 thousand cabled homes with FTTH access due to Pluricanal Leiria and Santarém and TVTel but the name 'Fiber' and the decision to advance to FTTH was not yet announced. A short term decision needed to be made before competitors stepped forward. Besides that, the existence of a high concentration of consumption in a small number of clients who were named Heavy Users (HU) (see **exhibit 21** for data traffic consumption by users' segments) became a motive of concern. The HU represented on average 1,5% of the total data traffic and were stealing capacity from the remaining users.

Two options were on the table: either ZON Multimedia moved towards the adoption of FTTH as its main competitor would do (option I) or it would continue to invest in its current strategy of maximizing the HFC potential and using fiber in some cases (option II).

OPTION I – Implementation of a FTTH network

The deployment of a FTTH network would require a high investment of about 3 times the one that would be needed in the second option. The substitution of the coaxial cable network by fiber would be a lengthy process (5 years), slower than the PT substitution (if the incumbent decided to deploy

FTTH) due to PT superior investment capacity. However, the expected operational costs by year would represent only 35% of the ones required to maintain a HFC network, which would make this option attractive. Besides that, there were indications that in the long term this infrastructure could offer innovative services that would not be possible to be replicated by an HFC's infrastructure and which would be relevant to maintain a competitive position.

OPTION II – Maximize the HFC potential but using FTTH in some cases

To run this plan it would be necessary to distinguish two parallel investment's parcels. The first one would consist on CMTS upgrading in order to increase the HFC data transfer capacity to 360Mb. The second part of the investment would be allocated to migrate HFC's heavy users cables to optical fiber cables and would imply 300€ per each heavy user. The investment needed would be 3 times inferior to the investment required for the first option. Besides, the time required to implement this decision would be 2 years. However, the expected operational costs would be high comparing with the first option.

Since this option would require a lower initial investment than the first one, ZON Multimedia would have enough financial space to give up from the PT's wholesale fiber access and build its own. This would cut the strategic risk when renegotiating the contract in late 2010. ZON Multimedia would not depend anymore on the incumbent's infrastructures. Moreover, it could open a new business area, doing the same network-access wholesale service that PT did with ZON Multimedia.

What would be the best path to choose?

Contemplating Lisboa through his window, André Almeida was wondered how long it would take until the HFC technology became obsolete. He knew that it was a matter of time until its main competitor started deploying FTTH, taking with it some of ZON Multimedia's customers in search of the much talked fiber-to-the-home. ZON Multimedia had already taken some decisions to face the exponential consumption demand. The evolution to EURODOCSIS 3.0 was in theory more than able to respond to this need in the next years, but, at the same time, the existence of local heavy users concerned the team. Besides, the market was thinking even ahead. André Almeida, as all the team, was worried about the future success of the triple play. **Exhibit 22** illustrates the triple play market shares on the first quarter of 2009.

The economic context was not the most favorable for anyone and ZON Multimedia had some financial limitations compared to its biggest competitor. However, the decision making team recognized the fiber optics' potential and if the initial investment would be a big parcel, the

operational costs and the services that could be born from the FTTH network would eventually compensate it. They questioned themselves what would be the best decision?

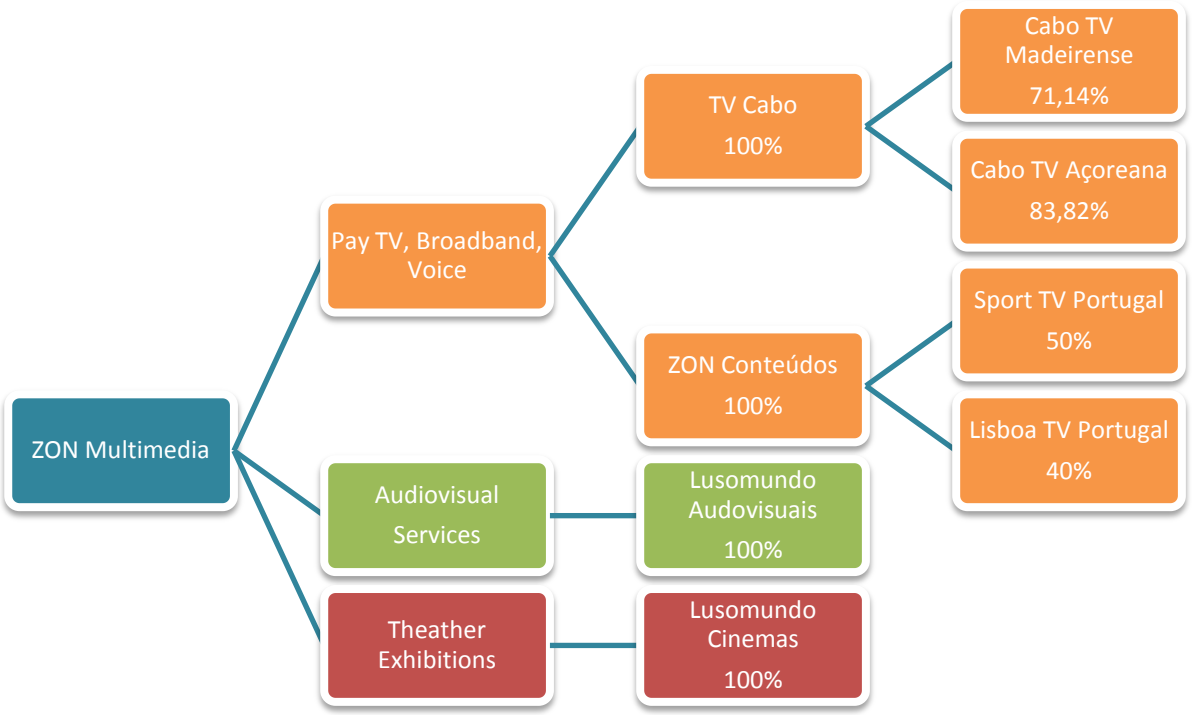
2.3. Exhibits

Exhibit 1 ZON Multimedia's financial highlights 2008

(euro million)	2007	2008
Operating Revenues	715,7	776,6
EBITDA	220,2	244,5
EBITDA margin	30,8%	31,5%
Consolidated net income	49,3	47,9
CAPEX	99,4	145,5
Net debt	23,5	552,5
Earnings per share (€)	0,1596	0,1626
Net debt/EBITDA	0.03	2.3

Source: ZON Multimedia 2008 financial results

Exhibit 2 Simplified structure of ZON Multimedia (30th of June 2008)



Subsidiary	Business
TV Cabo	Management of TV service by cable or satellite, voice service and broadband internet service. The satellite approach is used when the cable is not available in a given area in order to cover all the national territory (rural areas that cable did not reach).
ZON Conteúdos	Production of TV content such as series and cinema channels which are distributed by ZON TV Cabo and the management of advertising space of some of them.
Lusomundo Audovisuais	Distribution of movies, exploration of cinemas, acquisition and negotiation of content rights and video on demand.
Lusomundo Cinemas	

Source: ZON Multimedia Annual Report 2008

Exhibit 3 Operational Performance of ZON Multimedia (2008)

Business Indicators('000)	4Q07	4Q08	4Q07/4Q08	2007	2008	2007/2008
Pay TV, Broadband Internet and Voice						
Passed Homes	2,752.8	2,844.0	3.3%	2,752.8	2,844.0	3.3%
TV cable subscribers[6], of which:	1,547.1	1,525.1	(1,4%)	1,547.1	1,525.1	(1,4%)
Digital TV	382.1	495.8	29,8%	382.1	495.8	29,8%
Premium	840.6	829.9	(1,3%)	840.6	829.9	(1,3%)
Broadband Internet	400.2	479.0	19,7%	400.2	479.0	19,7%
Fixed Voice	83.5	327.1	291,8%	83.5	327.1	291,8%
Mobile Voice	0.0	7.2	-	0.0	7.2	-
RGUs[7]	2,412.9	2,834.3	17,5%	2,412.9	2,834.3	17,5%
RGUs by subscriber	1.56	1.85	18,7%	1.56	1.85	18,7%
Triple Play customers	68.7	250.1	264,2%	68.7	250.1	264,2%
ARPU[8]	31.0	32.7	5,6%	30.8	32.0	4,2%
Net Additions						
TV subscribers	26.3	(14.0)	(153,1%)	67.0	(22.0)	(132,8%)
Digital TV	25.7	50.0	94,2%	111.7	113.8	1,9%
Premium	37.8	(4.9)	(113,1%)	60.6	(10.7)	(117,7%)
Broadband Internet	12.9	28.0	117,1%	38.3	78.8	105,6%
Fixed Voice	29.6	73.2	146,9%	83.5	243.6	191,8%
Mobile Voice	0.0	7.2	-	0.0	7.2	-
RGUs	94.6	144.4	52,7%	300.5	421.4	40,2%
Triple Play customers	20.3	56.7	179,0%	68.7	181.4	164,2%
Cinematographic Theaters						
Revenues per viewer (€)	4.0	4.2	3,1%	4.0	4.1	3,4%
Sold Tickets	2,092.9	2,234.8	6,8%	8,193.4	8,289.0	1,2%
Cinema Rooms (units)	204.0	213.0	4,4%	204.0	213.0	4,4%

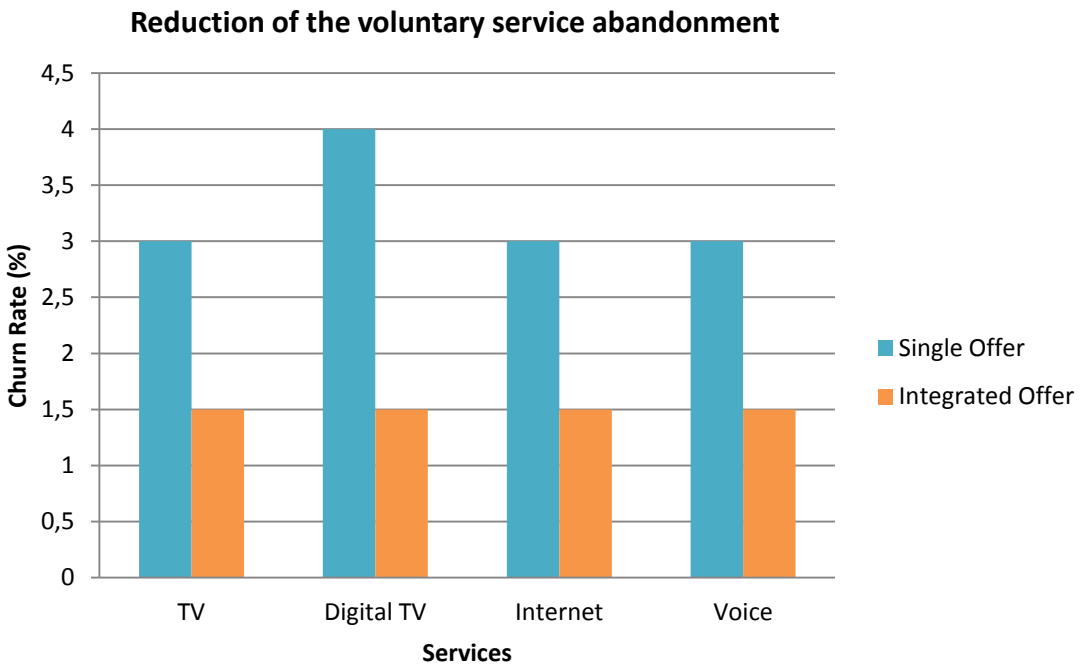
Source: ZON Multimedia Annual Report 2008

[6] The presented numbers refer to the total number of ZON TV Cabo clients for the TV service.

[7] RGUs - Revenue Generating Units – corresponds to the sum of the number of pay TV, Digital TV, broadband internet, fixed and mobile subscribers.

[8] Average Revenue Per User

Exhibit 4 Impact of the integrated offer in churn rate results



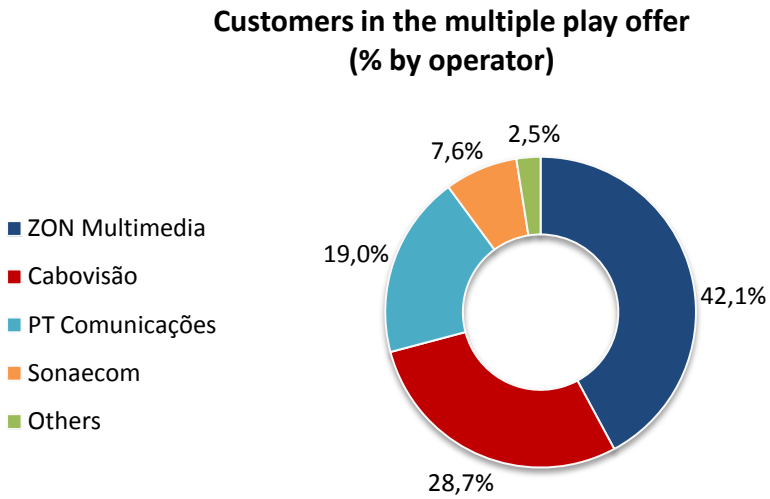
Source: Studies about the triple play offer, conducted by the American cable operator Cox Communications in Promon, Business & Technology Review (2007), *Triple Play, Um fenómeno sem volta na Indústria de telecomunicações*, Brasil

Exhibit 5 The subscriptions per per multiple package type in Portugal (number of customers 2007/2008)

Packages	2007	2008	Var. 2007/2008
Double Play	385 729	391 666	1,54%
Triple Play	179 291	343 051	91,34%
Quadruple Play	0	9650	-

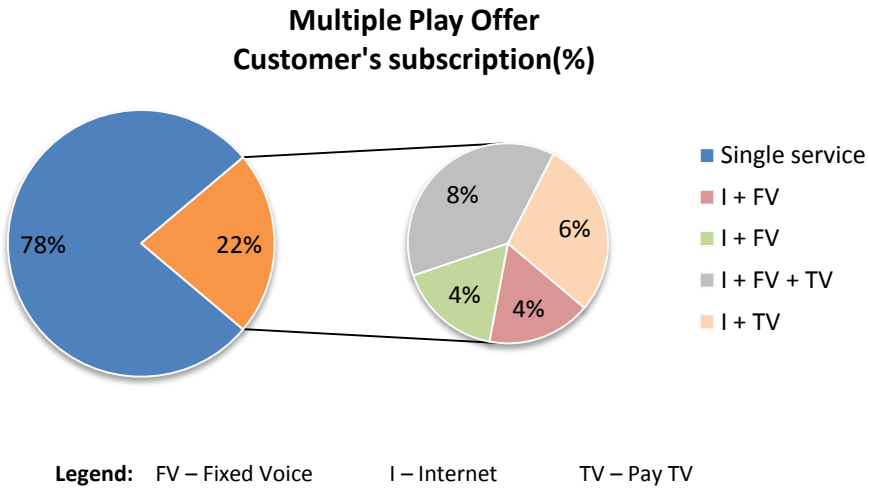
Source: ANACOM, *The state of the Portuguese communications in 2008* (Report)

Exhibit 6 Multiple play market shares by company (2008)



Source: ANACOM, *The state of the Portuguese communications in 2008* (Report)

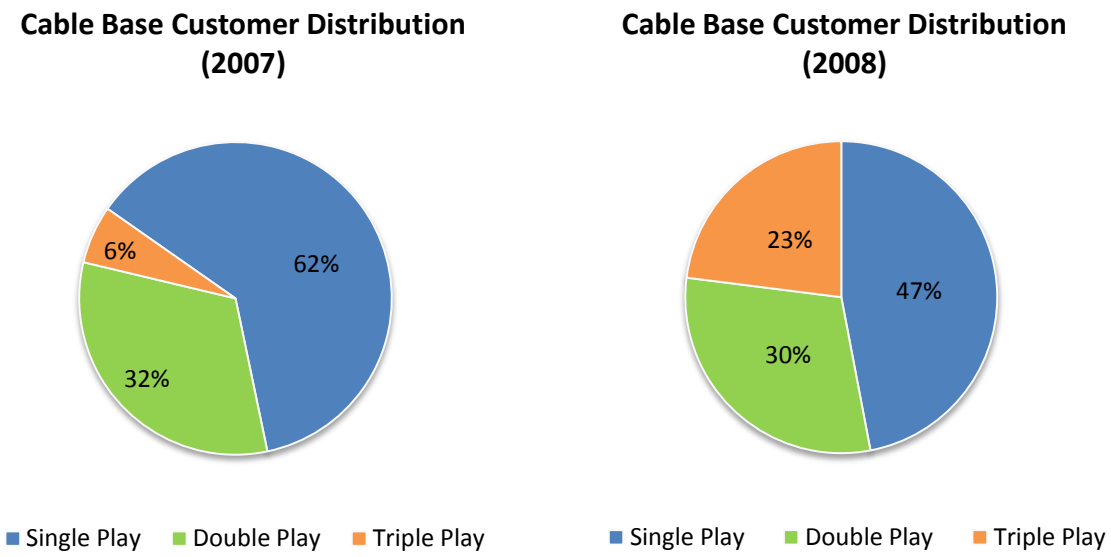
Exhibit 7 Subscription to multiple play service and to single service



Legend: FV – Fixed Voice I – Internet TV – Pay TV

Source: Source: ANACOM, *The state of the Portuguese communications in 2008* (Report)

Exhibit 8 Triple play's evolution in ZON Multimedia's TV cable base customers (2007/2008)

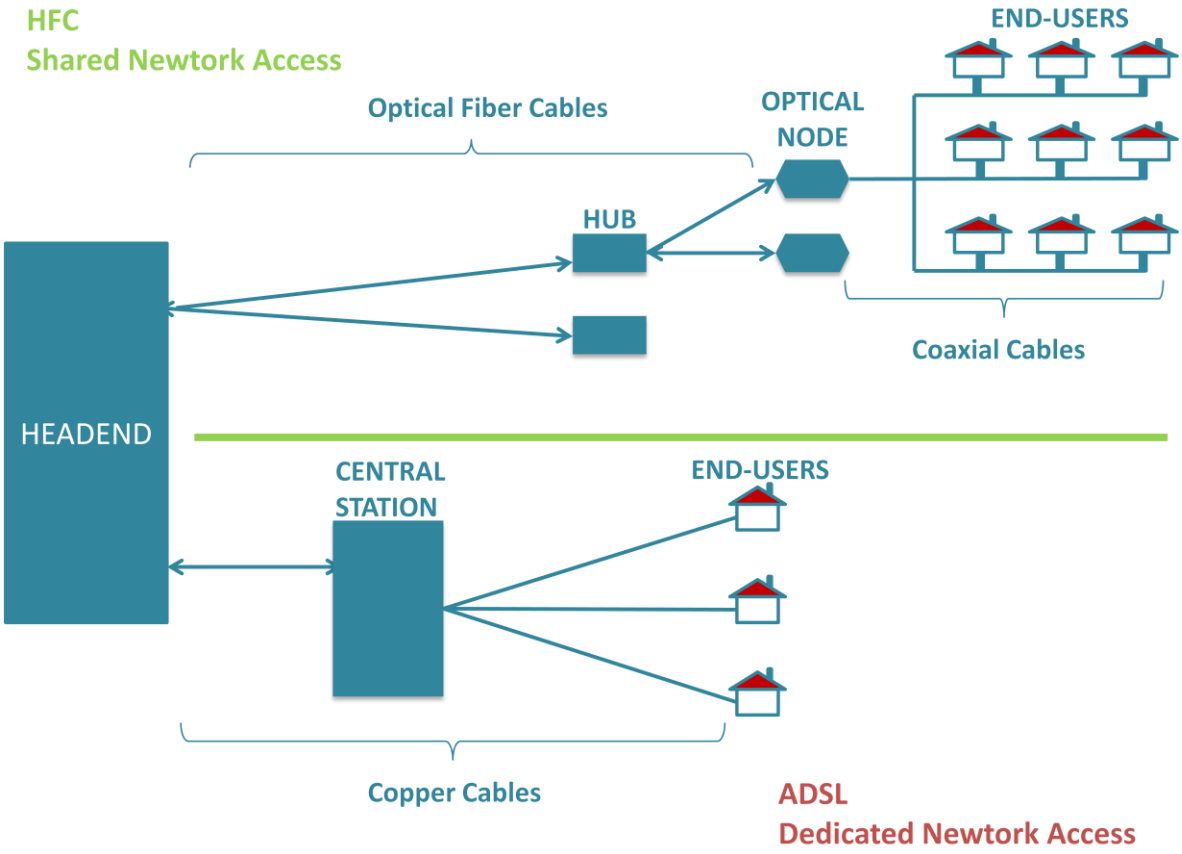


Source: ZON Multimedia Annual Report 2008

Exhibit 9 Main events that occurred in each of the triple play services

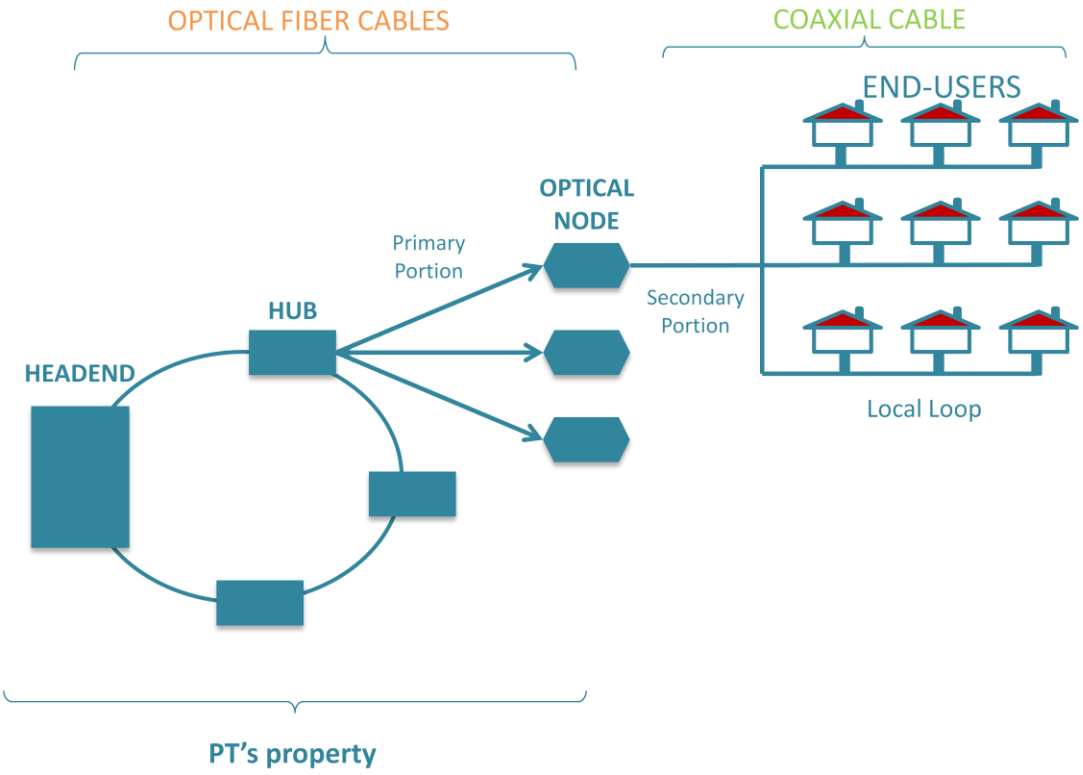
Fixed Voice
Initially fixed voice was only delivered by traditional copper cables network but with the development of the Voice over Internet Protocol (VoIP) it was possible to make telephone calls over a computer's network. The advent of the local number portability which allowed keeping the telephone number when changing operator, was another relevant change. The growing effect of substitution of the mobile voice for the fixed voice and the development of several tariff plans such as free nights or free weekends contributed as well to relevant changes in this service.
Pay TV
The Pay TV service is the term associated to subscription-based television services. The subscription to this service implies paying a monthly fee according to the quantity and quality of TV channels that the user chooses. Comparing to the free TV (analog TV) service, a better performance is expected. In Portugal, the most relevant technologies that allowed this pay TV service are three: cable TV (CATV), the Internet Protocol Television (IPTV) and Satellite (Direct to Home broadcast– DTH). In 2008, Digital Terrestrial Television (DTTV) appeared in Portugal, in order to substitute the free TV (analog TV) which included 4 TV channels for free, maintaining the same number of TV channels but with higher quality of transmission. Until the end of 2008, the innovations adopted by telecommunications' operators included the possibility of having several televisions connected to this service in different rooms in the same house and the possibility of having an electronic programming guide allowing the user to customize his TV channels' lists according to his preferences. The pause in live TV feature, the video recording plus the video on demand that allowed customers to rent a movie in their television and the diversity of channel packages including premium channels with high quality and highly specialized content – they all constitute additional developments that users have gained access to in the last years.
Broadband Internet Access
Since its appearance that internet has had an important role in society. The most meaningful changes in the internet services were related to the appearance of the mobile/wireless internet and to the levels of bandwidth. The higher the levels of bandwidth, the largest is the capacity and speed of the internet broadband.

Exhibit 10 ADSL and HFC networks' architecture



Source: Corning (2005), Broadband Technology Overview White Paper – Optical Fiber

Exhibit 11 ZON Multimedia's HFC architecture network



Source: Corning (2005), Broadband Technology Overview White Paper – Optical Fiber

Exhibit 12 Summary of the highest speed capacity packages from each operator (end of the first semester of 2008)

	Operator	TV (#Channels)	NET (download speed)	FIXED VOICE	Price
ADSL	**Portugal Telecom Meo**	45	16Mb	Unlimited	49,54€
	Sonaecom Clix SmarTV	47	12Mb	Unlimited at night	53,40€
HFC	**ZON Multimedia ZON TV cabo**	90	18Mb	For free at nights and weekends	48,69€
	Cabovisão	46	25Mb	Unlimited	78,97€

Source: Operators' websites, annual reports and available information at media

Exhibit 13 PT's consolidated financial highlights at 2008

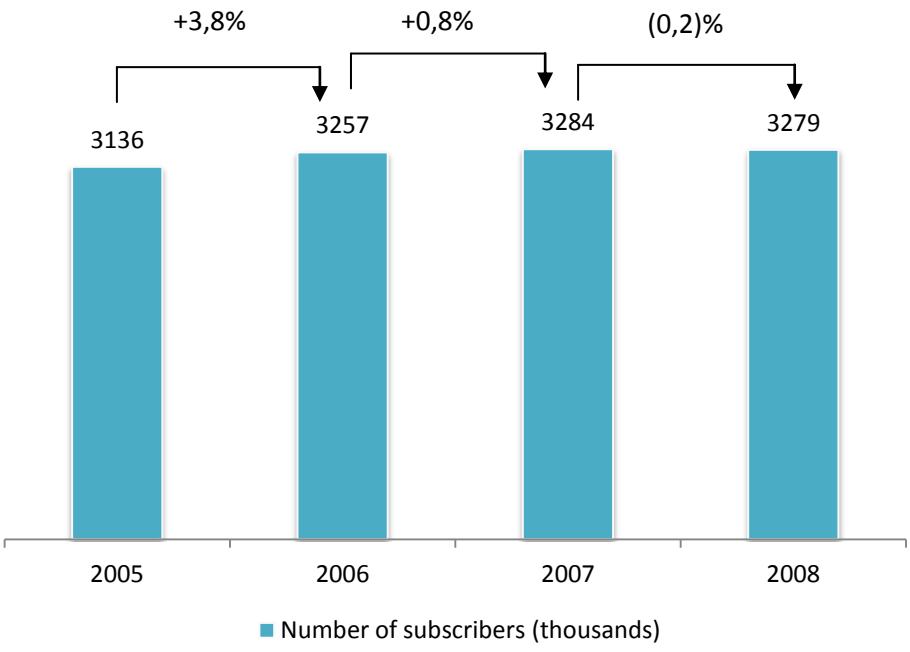
	2007	2008
Operating revenues	6,148.4	6,734.3
Wireline	1,962.4	1,931.4
Domestic mobile + TMN	1,542.9	1,601.5
Brazilian mobile + Vivo	2,463.0	3,039.8
Other and eliminations	180.1	161.6
EBITDA[(1)]	2,356.7	2,442.9
Wireline	1,008.8	842.5
Domestic mobile + TMN	679.0	689.2
Brazilian mobile + Vivo	595.0	832.5
Other and eliminations	73.9	78.7
EBITDA margin (%)	38,3	36,3
Consolidated net income	741.9	581.5
CAPEX [(2)]	899.3	1,242.3
Net debt	4,381.8	5,571.3
Earnings per share (€)	0.67	0.63
Net debt/EBITDA	1.9	2.28

[(1)] EBITDA = income from operations + depreciation and amortization.

[(2)] EBITDA margin = EBITDA / operating revenues.

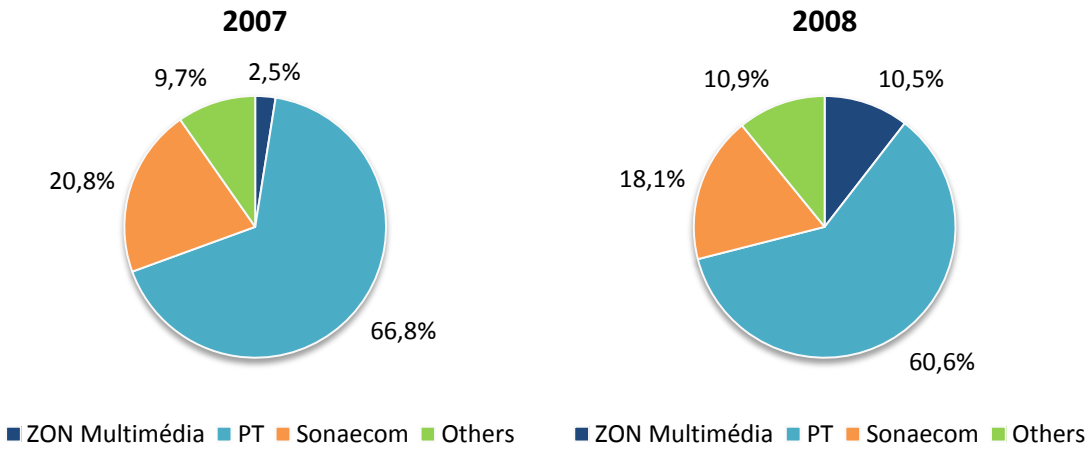
Source: Portugal Telecom Annual Report 2008

Exhibit 14 Number of Portuguese subscribers of the fixed voice service evolution (2005-2008)



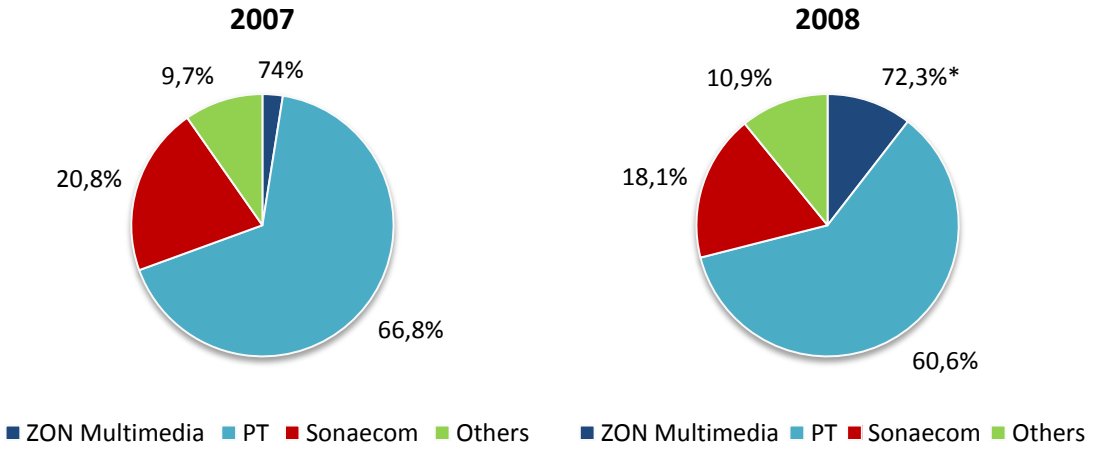
Source: ZON Multimedia Annual Report 2008

Exhibit 15 Portuguese fixed voice market shares (2007/2008)



Source: ZON Multimedia Annual Report 2008

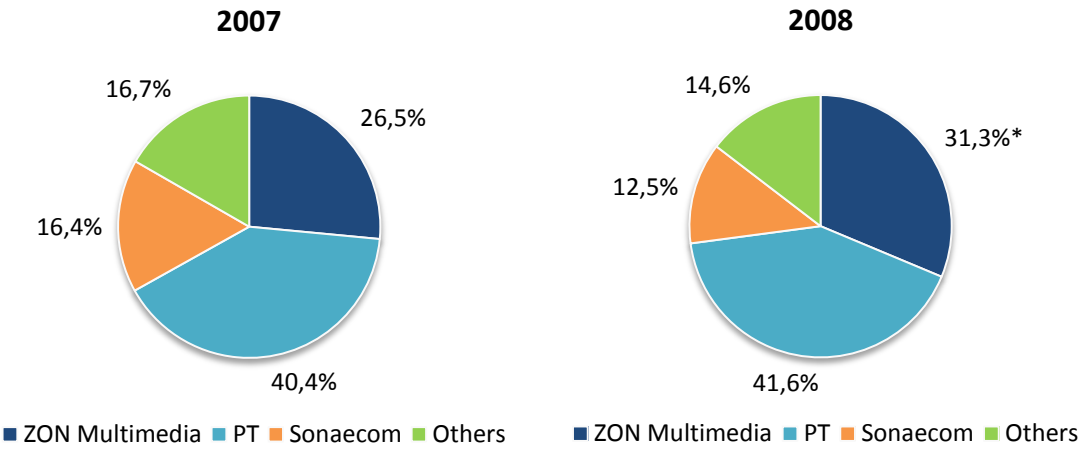
Exhibit 16 Portuguese Pay TV market shares by subscription (2007/2008)



* Included 4% of subscribers gained due to ZON Multimedia acquisitions during 2008. Without it the company would have 68,3% market share.

Source: ZON Multimedia Annual Report 2008

Exhibit 17 Portuguese broadband internet market shares (2007/2008)



* Included 2,4% of subscribers gained due to ZON Multimedia acquisitions during 2008. Without it the company would have 28,9% market share.

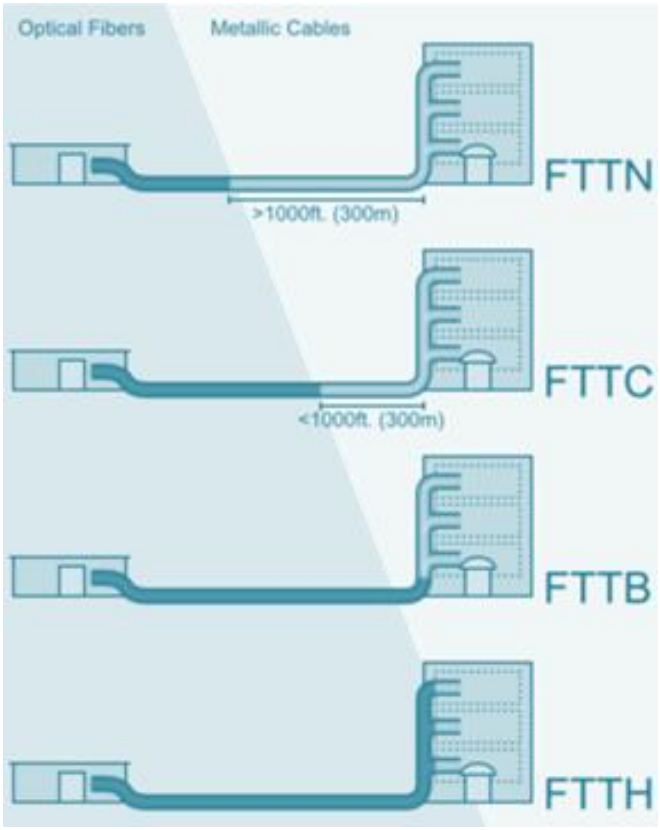
Source: ZON Multimedia Annual Report 2008

Exhibit 18 Fiber optics technology's main advantages

CHARACTERISTIC	ADVANTAGE
'Enormous potential bandwidth'	This allows carrying a lot more and faster data than what the ADSL or Cable modem technology can reach. This is reflected in shorter download times.
'Small size and weight'	The optical fiber has a diameter similar to a human hair. Hence, even applying protective covers the optical fibers are far much lighter and smaller than metallic cables. This allows alleviating cities' duct congestion.
'Immunity to interference and cross talk'	The lighting signals from one fiber optic do not interfere with other fiber optics which makes the phone calls or TV reception clearer.
'Low transmission loss'	Optical fiber cables carried a signal over long distances
'System reliability and ease of maintenance'	The low transmission loss propriety along with the prediction of optical's components have a lifetime of 20 to 30 years tend to reduce costs and time of maintenance.

Source: Fiber-Optic Telecommunication and the Economic Benefits of a Better ICT Infrastructure in the Context of Bangladesh document by Shabbir A. Bashar

Exhibit 19 FTTx architecture variations



This scheme illustrates the variations of the FTTx architecture according to the distance between the end-user and the optical fiber cables.

The building on the right side is where the end users are located, being the dotted rectangles distinct habitations. On the left side is the operator's central office.

Source: Fiber to the x from Wikipedia (http://en.wikipedia.org/wiki/Fiber_to_the_x)

Exhibit 20 The different 100Mbps offers (first quarter of 2009)

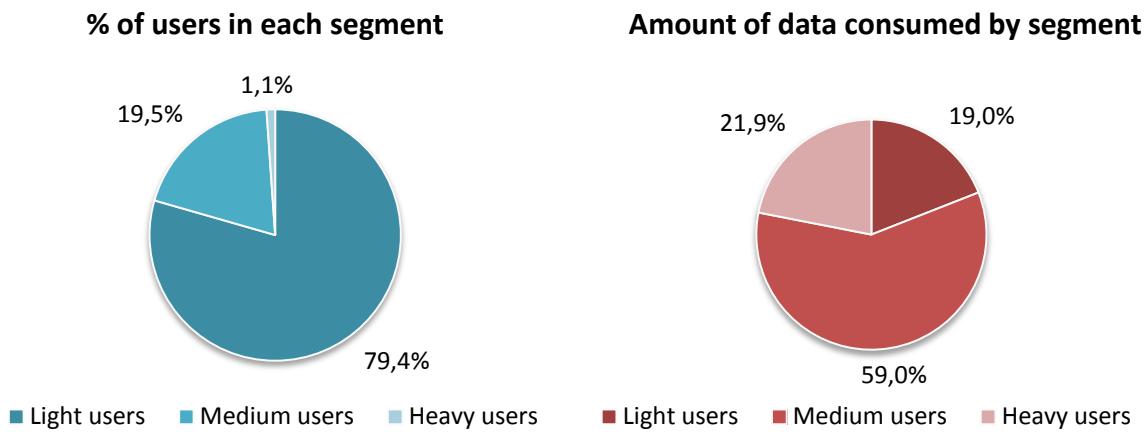
	TV	NET Download |Upload	VOICE	Price/ Month (promotion)
Clix Fibra Pack L	20	30 Mb|3 Mb	9pm-9am to fixed voice	39,90€
Clix Fibra Pack XL	80	50 Mb|5 Mb	Not free	49,90€
Clix Fibra Pack XXL	100	100 Mb|10 Mb	24 h/day	64,90€
ZON Net Wideband 50MB	110	50 Mb|2 Mb	24 h/day	57,90€
ZON Net Wideband 100MB	110	100 Mb|6 Mb	24 h/day	64,99€

Note that ZON Net Wideband initially was only a double play package requiring the subscription of the TV service. The customer needed to pay 59,49€ per month for the double play plus the price of the TV service. However, in the following month this offer changed to the triple play service as described above.

The biggest difference between the services presented above and the ones that offered lower speeds were their geographic reach. This ultra broadband speed was present only in some Portuguese regions like Lisbon and Oporto, with the ZON Net Wideband being present in a smaller area because of its later deployment.

Source: The information was gathered through consulting conceded information from ZON Multimedia and from the online article 'Tek tip: Move to fiber' published at 2009 in the Sapo Tek website

Exhibit 21 Data Traffic consumption by users' segments



These graphics above depicted were built on the basis of a sample of 13 205 users for the month of September of 2008. The data was organized according users segments:

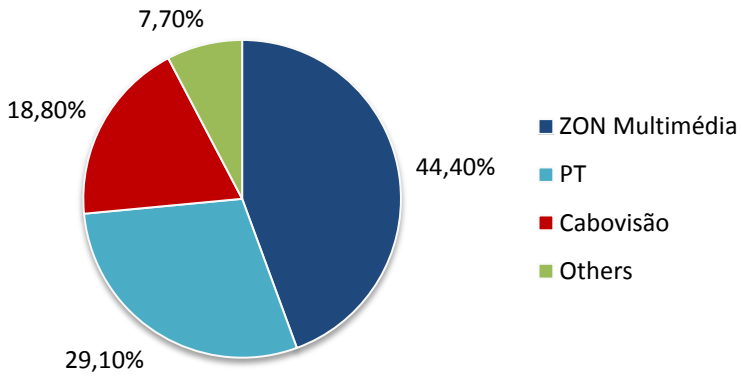
Segment	Interval (Gigabytes)	Average (gigabytes)
Light users	[0,10]	2.16
Medium users	[10,100]	27.38
Heavy users	[100,+00]	178.99

Legend: Consumed gigabytes by segment

The light users were the segment with more users in number but with lower traffic consumption. The medium users segment represented 19.5% of the quantity of users and consumed 59% of the total amount of data consumed in that month. The following users are classified as heavy users because although they represented only 1.1% of the total number of users their consumptions amounts were so high that they were able to affect the network performance.

Source: ZON Multimedia

Exhibit 22 The triple play market shares on the first quarter of 2009



Source: ZON Multimedia

III. Literature Review

The concept of Strategy takes several forms. Undoubtedly it constitutes the subject of a wide field of knowledge which can be approached in many different ways. Hence, in order to avoid dispersion and to concentrate on relevant literature regarding our Case Study, this review opts for a focused approach where technological change will occupy a relevant place and not for a very exhaustive presentation of written literature.

Issues such as innovation, the importance of technological change in competitiveness, dealing with failure when facing technological change, sustaining technology vs. disruptive technology and technology's path will be dealt with through the next few pages which will be complemented with a broader analysis intended to highlight the more general issue of technological change in companies' competitive advantage and in generic strategies as well as in situational analysis and in the industry structure.

3.1. Innovation

In the OECD glossary the word innovation is defined as '*the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations*' (2005).

Innovation can be approached in several ways. On a more entrepreneurial approach presented by Peter F. Drucker (2002), innovation is appointed as the heart of entrepreneurship. It means creating new wealth-producing resources or improving the actual resources in order to create wealth.

Tidd, Bessant and Pavitt (2005) state that talking about innovation is almost the same as talking about change; hence, the authors present four categories of innovation, taking as their basis the concept of change: product innovation; process innovation; position innovation; and paradigm innovation ('*changes in the underlying mental process models which frame what the organization does*'). According to these authors, those categories are the first dimension of innovation. Note that for Tidd, Bessant and Pavitt it is important to stress that repositioning the perception of a launched product or process also constitutes a type of innovation. The second dimension consists in the degree of novelty that an innovation/change implies. These can be minor, incremental improvements and radical changes. Radical changes are responsible for transforming the way people use things and think about them (Tidd, Bessant and Pavitt, 2005).

According to Henderson and Clark (1990) the dichotomy 'radical vs. incremental innovation' is not enough to explain all the competitive consequences of innovation. The authors introduced two new

types of innovation, the modular and architectural innovations. For the authors all kinds of innovation are related with its impact on the architectural knowledge and on component knowledge (figure 1).

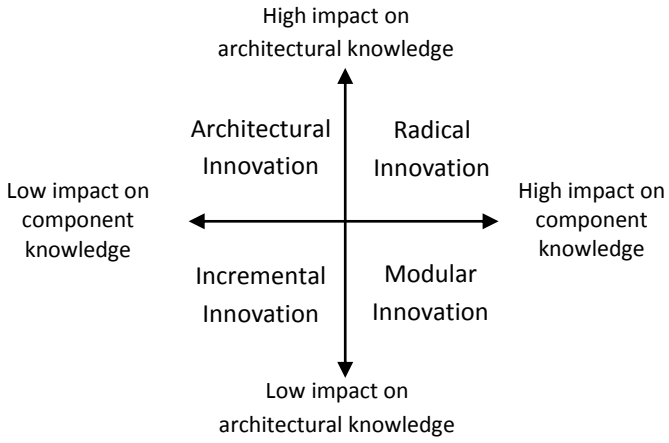


Figure 1. A framework for defining innovation

Source: Henderson, Rebecca M., Clark, Kim B. (1990), "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the failure of Established Firms",

In a new study by the consultant Accenture, '*The Innovation Death Spiral*' (2011), a more recent perspective in which competition is one of the key objects of study, innovation is said to comprise three main types: incremental, platform and breakthrough. The three categories deliver different valued benefits to the consumer and different competitive advantages to the company. See figure 2.

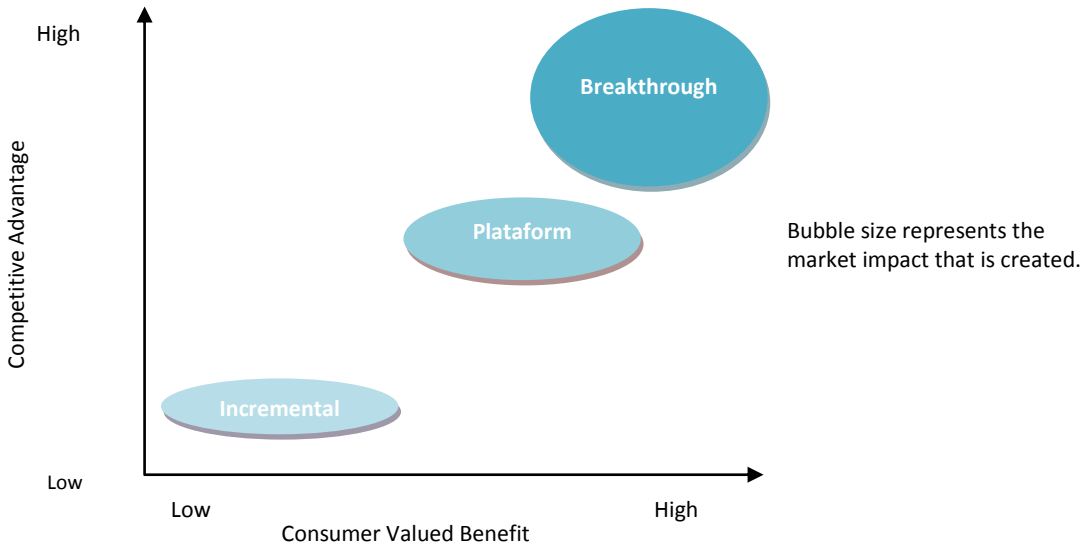


Figure 2. Competitive innovation matrix

Source: Accenture (2011), The Innovation Death Spiral: How Companies Get Stuck Throwing Good Money After Bad Ideas—and What that Mistake Is Costing Them.

3.2. Managing Technological Change

3.2.1. The importance of technology change in competitiveness

According to the OECD definition, technological innovation comprises, '*new products and processes and significant technological changes of products and processes'* (2001).

Technology is widely present on the basis of all organizations. Most of the time, technology have a more prominent place in a product or in a production process, occupying a dominant position (Porter, 1985). Porter adds that technological change is one of the key drivers of competition. For Sood and Tellis (2005), '*technological change is perhaps the most powerful engine of growth in markets today'.*

According to Porter et al. (1991), technological change has a relevant role in countries' competitiveness and in their firms' competitiveness. For these authors, among the factors that are able to improve economic productivity, technological change is the most important one. Therefore, technological change must be a key concern for governments. Porter (1990) supports this view stating that each country's competitiveness depends on its industry's capacity to innovate and upgrade. The fiber optic network that the Japanese started to deploy in the nineties represents a good example of how the deployment of a technological change can affect industrial opportunities and, consequently, the international competitiveness of one country. At the time, the Japanese predicted that in the next 25 years about 30% of their GNP would derive from the new services and goods that would be created by the high-capacity broadband of the fiber optics network. This network would make possible the creation of vast economic opportunities (Porter, Roper, Mason, Rossini, Banks, 1991).

For Porter (1990), the competitive advantage of companies is accomplished by acts of innovation. Schilling (2008) supports this same view stating that in several industries technological innovation is the main driver of competitive success. For this author, the increasing importance given to innovation is mainly due to the globalization of markets and to the advances in information technology.

3.2.2. Deal with failure

All over the world there are cases of well-managed companies that have failed when taking decisions related to technological change. In fact, this failure is appointed as one of the most firm patterns in business (Bower and Christensen, 1995). The same thinking is reinforced by Utterback (1994) who

states that innovation is at the same time the creator and the destroyer of companies and industries. This author also states that it is not difficult to understand why established companies frequently pay no attention to radical innovations when they first appear since it is very difficult to see in that first stage its real potential and impact in the industry.

In the computer industry, for instance, the well-known Apple computer, now appointed by Fortune magazine as the most beloved company in the world (2008-2011) with its personal and user-friendly computing, lagged five years behind the leaders in launching its portable computer since it feared to alienate its customers (Bower and Christensen, 1995). In the picture photography industry, Kodak, which had been the film-based photography leader since its creation, faced a period of trouble when the digital imaging, a next generation of picture taking, began being commercialized by other companies. These cases illustrate a situation in which current products which were developed according to one technology were undermined by a later radical technology. According to Leifer et al. (2000), the incremental improvements applied to old technologies are just a way of delaying what cannot be postponed. If on the one hand the focus on incremental innovations helps to avoid risk, on the other hand it contributes for missing opportunities (McDermott and Handfield, 2000).

Betting in a new technology should be neither a fast nor an excessive cautious decision. However, the uncertainty associated to the introduction of a technological change makes its management a risky process which tends to delay its adoption. Moreover, according to Porter (1999), companies do not like to make choices. They see it as a dangerous and limiting process. Managing technological innovation is difficult and unpredictable. Once adopted the new technology, the time lag between technical viability and commercial practicality is a period of tension in which companies wait for success being conscious that the opposite can happen.

3.2.3. Sustaining technology vs. disruptive technology

According to Christensen's book *The Innovator's Dilemma* (2003), the technological changes in an industry happen due to two main types of technologies, sustaining and disruptive technologies. Following the same author, sustaining technologies improve the mainstream customers' valued performance in established products present in the market. In turn, the emergence of disruptive technologies result in worse product performance which mainstream customers are not willing to acquire at first but a fringe of the market is up to. This kind of technology, according to the author, is typically focused on different attributes than the ones desired by the mainstream customer.

For Bower and Christensen (1995), one of the most fundamental reasons of failure among leading companies when facing disruptive technologies is related to company-customer's relationship (one

of the most important management dogmas) and namely to the apparent paradox of being *too* close to customers. If initially this excessive attention can lead to success, in a second phase it can induce companies to launch new products that do not address effectively the customers' need. These companies stay so focused on their main customers that the process is run in order to maintain them, discarding new products and technologies that to their eyes do not seem to satisfy those customers, and blinding them to the importance of new technologies and for what other segments are searching for.

Usually, disruptive technologies are unattractive. Well-established companies know that in the short term the new market segment conquered by a new technology will not bring higher revenues then the established product. Besides, it is very difficult to study a market that does not exist in order to make long-term forecasts about the potential success (or lack of it) of the new technology (Christensen, 2003). Consequently, managers conclude that it is better to continue investing in the current technology than in a new one because this new technology is seen as something that cannot bring a significant contribution to the company's growth. For managers, this is a way of reducing risk and safeguarding their careers, staying close (as they were trained to do) to main customers and focusing company's resources on satisfying them, in order to secure profitability. For Gino and Pisano (2011) this excessive customer focus can be called a *myopic focus on short-term financial performance.*

3.2.4. Technology's path

S-Curve

The S-curve is extensively employed as a tool for thinking about competition and technological innovation (Callahan, 2007). The S-curve can help an organization to track what is happening to its technology and anticipate when to move on (Floyd, 1997). As living organisms, technologies also follow a life cycle, from their birth to death or obsolescence – a limit for performance exists (Schilling, 2008). Historical data shows that technological progress is a continuous process. The S-shaped pattern (depicted on figure 3) that emerges from this progress illustrates it.

The S-curve generally relates the technology performance (vertical axis) with the amount of effort invested in that technology (horizontal axis), as time progresses. During its lifecycle the technology's performance tends to improve. This improvement is initially slow because its fundamentals are not yet well understood (Schilling, 2008). According to Foster (1982), during this phase the effort applied is reflected only in limited performance improvement. But then, with the establishment of a

knowledge base, progress accelerates quickly, reaching its maximum about halfway on the route to its limit. At this moment improvements slow down and when the limit is reached, improvements should drop to zero. According to Schilling (2008), as the technology starts to attain its natural limits, the s-curve flattens and the cost of each marginal improvement rises. As this maturation process goes on, the technology becomes more and more vulnerable and subject to be substituted by a new s-curve or technological discontinuity.

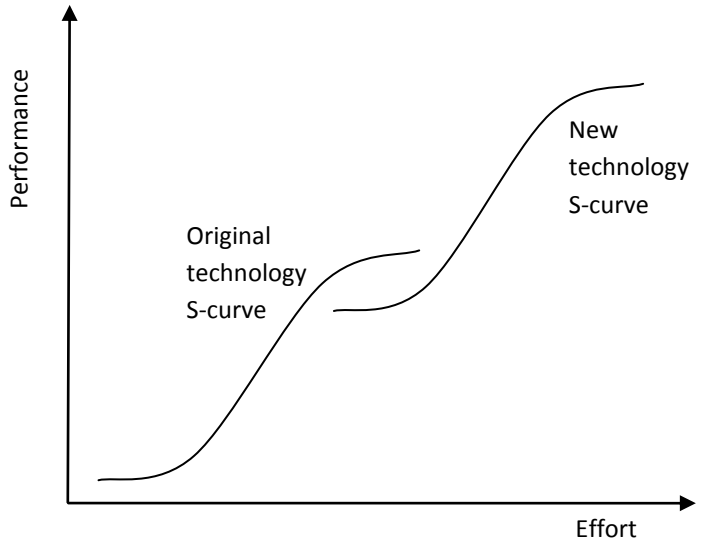


Figure 3: The technological S-curve

Source: Callahan, John (2007), Patterns of Technological Innovation

Christensen (2003) states that the S-curve constitutes a helpful tool to predict when an established technology will be superseded by an emerging one. The sign that a new technology probably will supplant the old one is the inflection point of the established technology; when it reaches this point a new technology may come out to overcome the existent one.

The typewriter industry depicts the continuing development of S-curves. If initially the typewriter was a breakthrough, the appearance of the IBM Selectric typewriter created a new electric typewriter industry; then, the word processor was developed and brought the previous technology to obsolescence; finally, the computer with Microsoft Word tool/software and desktop printing came to occupy the ultimate last S-curve.

Rogers' diffusion of innovations theory (1995) presents five categories of adopters along an S-curve adoption model: innovators, early adopters, early majority, late majority and laggards. This model gives a company the opportunity to figure out who are the adopters of a certain technology and when will they adopt it; it also allows to anticipate opportunities before competitors, a focused sales effort and to harness the energy generated by market evolution.

The importance of forecasting

According to Porter (1985) *'with some insight into the likely pattern of technological evolution, a firm may be able to anticipate changes and move early to reap competitive advantage. However, there will be always uncertainty wherever technology is involved'*.

Over time, several laws were formulated predicting the evolution of technologies. These laws were mainly focused on computer and communication technologies. Their main objective was to answer the question: what will happen to these technologies over the course of time? Moore's law (1965) was an example of that. According to Moore, the number of transistors in an integrated circuit would double every eighteen months or by a 60% annual growth rate. This has had a crucial role in determining when to launch new products based on transistors, mainly computers. This prediction has influenced directly the transistor manufacturers since they know that they need to develop their technology in order not to be overcome by other manufacturers who are also aware of the technology path. Although some argued that this progress probably would reach a screeching halt, the most that can be said is that some slowdown will happen (Coffman and Odlyzko, 2001). The growth rate presented by Moore survived over the following 25 years.

Gerald Butters of Bell Labs describes a parallel law to Moore's law, the Butter's Law of Photonics, where the network capacity (bandwidth) was the central issue. According to it, every nine months the amount of data that can run in an optical fiber doubles. Note that the transmission equipment upgrade is excluded. Consequently, every nine months a diminishing of the transmitting cost by bit over the optical network takes place. This bandwidth's technology prediction is complemented by Nielsen's law in which Nielsen (1998) states that high-end users' connection speed (bits per second) or the maximum bandwidth available to home users increases by 50% every year or doubles every 21 months. As a corollary to his law, Nielsen stated that the annual growth rate of bandwidth is slower than the one of Moore's law due to three reasons. To replace or upgrade physical infrastructures takes too much time and billions of dollars to telecoms companies, requiring digging up streets and installing equipment. Hence, one of the reasons has to do with telecom companies being conservative. The other two reasons are related to users. The first is associated to their unwillingness to spend great amounts of money on bandwidth, mainly because real bandwidth delivered by the internet provider usually does not meet promised bandwidth at the time of purchasing since it depends on a complex information transmission between the user and the provider. Hence, customers become reticent to spend much money in something that does not meet expectations. Still according to Nielsen, the second reason resides in the fact that even though the user base is

constantly growing, the new users are mostly characterized for being low-end. The high-end users are the ones that have always been online; hence the average shifts will be smaller than before.

3.3. Company Analysis

3.3.1. SWOT analysis

'Situation analysis begins with the process of strategy formulation and requires that strategic managers attempt to find a strategic fit between external opportunities and internal strength while working around external threats and internal weaknesses' (Wheelen and Hunger, 1995). This sentence introduces the ultimate goal of a SWOT analysis. The SWOT analysis, according to Rothaermel (2008), is a coherent framework that is based on internal issues of the company (strength and weaknesses) and on the external (environment) ones (opportunities and threats) that the company faces. This author adds that to understand thoroughly the external environment the application of the PESTEL framework is a helpful alternative. Wheelen and Hunger (1995) add that through SWOT analysis the manager should be able to identify the company's distinctive competences ('*the particular skills and resources a firm possesses'*) as well as the superior way in which these competences are employed.

Some limitations are appointed to SWOT analysis. Henry (2008), among some other limitations, appoints the following: The weight given to each listed factor is the same for each of the four classifications; and there are some factors that can be both classified as strengths and weaknesses or opportunities and threats.

3.3.2. The Value Chain

According to Porter (1985), a company's competitive advantage cannot be analyzed by observing the company as a whole. In fact, a company's competitive advantage derives from a set of discrete activities performed by the company in its different areas. For Porter (1996), these activities are then the basic units of competitive advantage. The author adds, still, that it is from the collection of all these company's activities, and not from only one or two, that the company's advantages and disadvantages emerge. If on the one hand each of these activities can play a part in a firm's relative cost position, on the other hand they can generate a basis for differentiation.

Accordingly, the concept of value chain was introduced by Porter with the goal of analyzing what are the sources of competitive advantage, examining all the mentioned activities that a firm performs and how these activities interact. According to Porter (1985), the value chain, depicted in figure 4, should be constructed at the firms' level and not at the industry level. Moreover, although some of

the firms within an industry have very similar value chains, the competitors' value chain are usually very different and these differences are the effective key sources of competitive advantage.

Hergert and Morris (1989) state that an essential notion in a value chain analysis is that in the course of the vertical stream of production inside the firm (design, production, marketing, delivery and service) a product collects value and costs. And when a value that goes beyond costs is generated, a profit is created.

According to Porter the value chain depicts the total value which is composed by margin and by value activities. The value obtained from the difference between the collective value and the collective cost resulting from the value activities involved is designated margin.

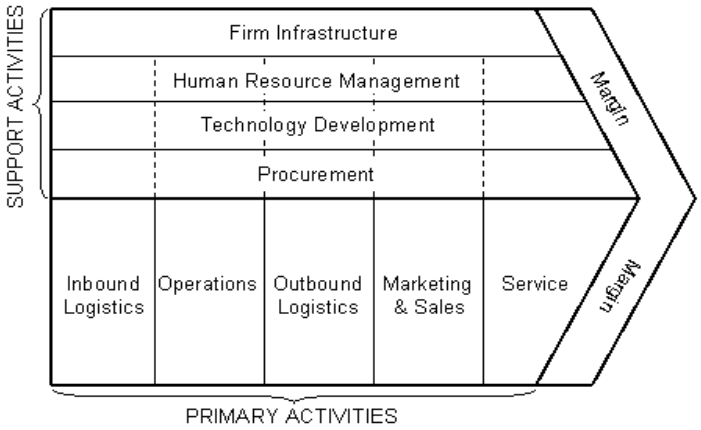


Figure 4. The Generic Value Chain

Source: Porter, Michael E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press, New York.

As figure 4 shows**,** the value activities in the value chain are divided in two types: the primary activities which are subdivided in 5 generic categories and the support activities which are subdivided in 4 generic activities. The primary activities *'are the activities involved in the physical creation of the product and its sales and transfer to the buyer as well as after-sale assistance'* (Porter, 1985). The support activities, as it names suggests, *'support the primary activities and each other by providing purchased inputs, technology, human resources, and various firmwide functions'* (Porter, 1985).

The primary activities are inbound logistics, operations, outbound logistics, marketing and sales, and finally, service. For Porter (1985), depending on the industry, each of these categories has a more vital role than others in a company's competitive advantage. The support activities are divided into the following categories: procurement, technology development, human resource management and firm infrastructure. Figure 4 depicts vertical dotted lines between the activities of human resources management, technology development and procurement, meaning that these activities can be, at the same time, associated with particular primary activities and support the whole chain. Firm infrastructure is not linked with any specific primary activity but supports the whole chain; this is why it does not appear with dotted lines.

Hence, and according to Porter (1985), value activities are the discrete structure of a company's competitive advantage. Whether a company is high or low cost relatively to its competitors is determined by the way each activity is performed combined with its financial performance. The way each value activity is executed will establish its contribution to buyer's needs and thus differentiation.

Since several products do not come directly from one single company to the end user, Porter adds that a firm's value chain makes part of a large system. This large system is named The Value System and relates the value chains of upstream suppliers to the firm's value chain and downstream channels. All the activities performed by these set of value chains will influence the final output that arrives to buyer's value chain.

3.3.3. Generic competitive strategies

For Porter *'Positioning determines whether a firm's profitability is above or below the industry average'* (1985). Porter also states that in the long run the essential basis for a company to be above the average performance is the sustainable competitive advantage. According to the author, there are a lot of weaknesses and strengths that a company may have; however, there are two basic types of competitive advantage: differentiation and low cost. Hence, combining these two types of competitive advantage with the scope of activities which according to Wheelen and Hunger (1995) is *'the breadth of the company's or business unit's target market',* leads to three generic strategies: differentiation, cost leadership, and focus, being this last one divided in two variants, differentiation focus and cost focus. These three strategies allow, according to Porter, a company to reach the desired above-average performance position in its industry. See figure 5 above.

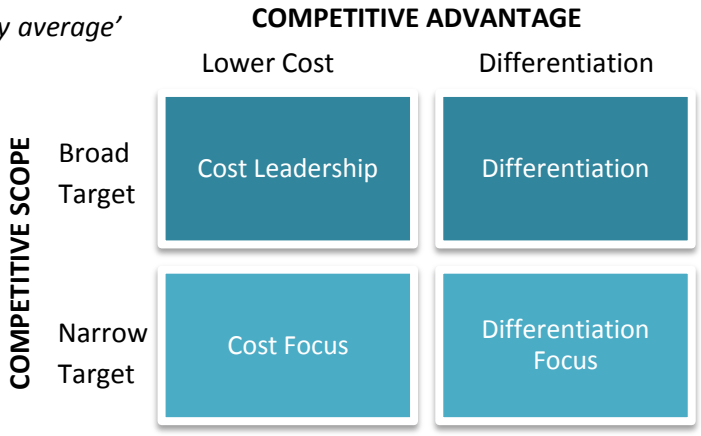


Figure 5. The three Generic Strategies

Source: Porter, Michael E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press, New York.

For Porter, to achieve a competitive advantage implies to make choices. A company needs to define what kind of competitive advantage it is to attain, and the scope in which it will attain it. If it does not happen the company is probably trying to be *'all things to all people'* and this is, according to Porter,

the formula for mediocrity and for being below the average performance of the industry, since it frequently indicates that a company does not have any competitive advantage.

Differentiation

In this kind of competitive advantage, the leader searches for being unique in some dimensions widely-valued by buyers. A few number of attributes that buyers give importance to is selected to then try to uniquely positioning the company in order to meet those buyer's needs. The premium price that comes from the uniqueness is the rewarded of this differentiation strategy. Differentiation is different along distinct industries and it can take several forms. Porter (1985) appoints some: differentiation through the product itself; through the delivery system; through a different marketing approach. For Porter (1985), a company that achieves a sustained differentiation will be above the performance of the industry if its premium price is superior to the extra costs needed to achieve its uniqueness. Wheelen and Hunger (1995) appoint that differentiation constitutes a viable strategy since it creates brand loyalty which allows lowering the costumer's sensitivity to price and in turn passing the extra costs incurred by differentiation to them.

For Porter (1985) it is important that a company that achieves differentiation does not ignore costs since low costs can nullify the premium price achieved through differentiation. According to the author, if this kind of company wants to reduce costs it must reduce it in all the areas that do not affect differentiation. In an industry, there is space for several successful differentiation strategies if there are several attributes valued by buyers (Porter 1985).

Cost Leadership

The sources of this kind of competitive advantage differ according to the structure of the industry and may include: proprietary technology, pursuit of economies of scale, pursuit of cost reductions from experience. On this last source, Amit (1986) states that companies commonly find a way of attaining competitive advantage through pursuing a cost leadership by quickly riding down the experience curve. According to Porter (1985), a low cost producer must discover and exploit all kinds of cost advantage's sources. The cost leader has, due to its lower costs, the ability to charge lower prices than competitors and yet to achieve an acceptable profit (Wheelen and Hunger, 1995). For Porter (1985) it is important that a cost leader does not ignore differentiation since if its product is not accepted by the market due to lack of it, in order to expand sales this leader will be forced to set discount prices much lower than competitors, thus abolishing any cost position's benefits.

The strategic logic behind cost leadership strategy is that generally it requires the company to be the cost leader. The issue is that when there is more than one aspirant to this position, every point of

market share is seen as crucial and rivalry becomes fierce. Hence, *'cost leadership is a strategy particularly dependent on preemption, unless major technological change allows a firm to radically change its cost position'* (Porter 1985).

Focus

According to Porter (1985) this strategy is characterized by a narrower competitive scope than the other two generic strategies. The focuser selects one segment or a group of it and then serves it excluding the other groups in the industry. Wheelen and Hunger (1995) add that for a focus strategy to work it needs the existence of trade-off between the overall market share and profitability. According to Porter (1985) this is not a way of gaining overall competitive advantage, but a way of gaining it only for a segment or group of it; moreover, there is space enough in an industry for the existence of several sustainable focus strategies. There are two variants of this strategy: *cost focus* in which a firm searches a cost advantage in its elected target segment and exploits differences in cost behavior of this segment, and *differentiation* focus in which a firm searches for differentiation in its targeted segment and tries to meet the special needs of these buyers.

Stuck in the middle

According to Porter, a company that fails to accomplish any specific strategy and tries to accomplish each and every one of them is a company that is stuck in the middle. These companies are mostly of the time below the average performance of the industry, and even when they discover a profitable product this advantage is rapidly eliminated by the generic strategies' leaders of the market. According to Porter (1985) '*becoming stuck in the middle is often a manifestation of a firm's unwillingness to make choices'*.

According to Tidd, Bessant and Pavitt (2005) the decision of what technology strategy to adopt is highly dependent of the generic strategy that a company has decided to accomplish, particularly, for products and process developments. This highlights the importance, given by Porter (1985), of choosing exactly what kind of strategy to attain and to not be stuck in the middle, since for different strategies, different developments have to be made (Tidd, Bessant and Pavitt, 2005). For Porter (1985) '*the technologies that should be developed are those that would most contribute to a firm's generic strategy, balanced against the probability of success in developing them*'.

3.3.4. Innovation Leadership versus followership

Along with the decision of what technology to adopt according to the generic strategy, another important issue is to decide whether to be a technological follower or a leader. For Porter (1985)

technological leadership consists in seeking to be the first to introduce the technological change which is able to support the generic strategy on which a company is based on. According to Tidd, Bessant and Pavitt (2005) this requires a strong commitment to risk-taking and creativity. Technological followership must be a conscious decision that involves an active strategy in which the company deals with the choice of being the follower. This kind of strategy is based on imitating/learning from the technological leaders' experience (Tidd, Bessant and Pavitt, 2005).

According to Porter (1985) the choice of a company to be a technological leader or a technological follower is based on three issues: At what extend the leader is able to sustain the technological change over competitors; what are the advantages that a leader can take from being the first to adopt a technological change (first-mover advantages); and the disadvantages that a company can face when moving before competitors in adopting a technological change (first-mover disadvantages).

3.4. Industry Structure

3.4.1. Strategic Groups

According to Porter (1998) the first thing to do when analyzing the structure of an industry is to characterize the strategies from the relevant competitors according to two dimensions that the analyst shall choose. As examples, Porter presents the following dimensions: specialization, channel selection, brand identification, product quality, technology leadership, vertical integration, service, etc. For Porter *'a strategic group is the group of firms in an industry following the same or similar strategy along the strategic dimensions*'. For Duysters and Hagedoorn (1995), defining the strategic groups within an industry is a relevant tool for comprehending its heterogeneity.

According to Porter (1998), firms included in the same group are firms that are very similar in many ways and not only in their broad strategies. If they have similar strategies they usually have similar market shares and they tend to react and to be affected in the same way by competitive or external moves. In the same vein as Porter (1998), Hitt, Ireland and Hoskisson (2011) state that competition between groups' members is more intense than with outside firms.

Porter (1998) states that designing strategic groups is really helpful in structural analysis. The author adds that '*it is an intermediate frame of reference between looking at the industry as a whole and considering each firm separately*'.

3.4.2. Porter's five forces industry analysis

'The first fundamental determinant of a firm's profitability is industry attractiveness. Competitive advantage must grow out of a sophisticated understanding of the rules that determine an industry's attractiveness' Porter (1985).

Managers often tend to define competition in a narrow way, looking essentially to direct competitors. However, competition for profits goes further than established industry rivals, including other four competitive forces: the bargaining power of suppliers, the bargaining power of buyers, the threat of substitutes, and the entry of new competitors (Porter, 2008). It is through the study of these five competitive forces related with these influent factors that Porter (1985) determines the profitability of an industry and, consequently, its attractiveness.

Porter (1985) states that the collection of each competitive force's strength will determine the capacity of a company to earn in an industry. Porter adds that this collective strength differs from industry to industry. Moreover, it can change with the industry evolution. Afuah and Utterback (1997) support this view stating that industry structures are dynamic and not static. According to Afuah and Utterback what makes a product-market and an industry attractive today may change and transform it in not so attractive tomorrow. And what brings this change of attractiveness results from changes in the types and quantity of rivals, nature and sources of substitutes, customers, barriers to entrants and suppliers. For Lynch (2003) beginning with the analysis of industry through Porter's five forces is the best way to start analyzing competition. For this author '*this analysis will provide a basic starting point in any development of the major factors driving the dynamics of the industry'*.

3.4.3. Porter's five forces analysis – A technological change approach

Porter (1985) adds also another important factor. For him technological change can potentially affect each one of the five forces, and develop or corrode industry attractiveness. Henderson and Clark (1990) support this perspective adding that radical innovation may be the cause of success of new entrants and also the cause of the redefinition of a particular industry. Porter (1985) also states that the potential effect on an industry structure caused by a technological change tells that a company, before setting its technology strategy, has to consider the impact that it will have in the industry structure. And that the resultant effect on attractiveness is dependent on the nature of the impact of the technological change on each of the competitive forces. For Porter (1985) *'companies must recognize the dual role of technological change in shaping both competitive advantage and industry structure when selecting a technology strategy and in making technology investments'.* Porter (1985) then presents the impact of technology in each of the five competitive forces.

Technology and entry barriers

Technological change has the capacity to raise or lower economies of scale in almost every industry. It can raise these economies, for example, if it affects the pace of new products' introduction. Or it can lower these economies if it is talked about a flexible manufacturing system (Porter 1985), as Alcorta (2001), states the old mass production replacement by new computer-controlled flexible automation is resulting in reduced optimal scales of output, but at the same time is raising the flexibility of production contributing for a wider variety of goods and reaping economies of scope.

Technological change, according to Porter, is also the learning curve's basis which results from improvements of various types of technological change: yields, layout and machine speed. Technological change can also contribute to absolute cost advantages through allowing low-cost product design or can increase the amount of capital needed for competing in an industry. Technological change can allow as well shaping the pattern of product differentiation in an industry. It can impact the switching costs by raising it or lowering it. It can also influence access to distribution through bringing companies to use another channels or reinforcing the need of using old channels. It is due to all these reasons that technological change can have a powerful role in determining the entry barriers to an industry. Tidd, Bessant and Pavitt (2005) state that through locking-in technological change and through protecting technology (patent and other legal methods) it is possible to decrease new entrants. On the other hand, substitute products and reduced economies of scale will increase the threat of new entrants.

Technology and buyer power

The bargaining relationship between an industry and its buyer can be, according to Porter (1985), shifted through technological change. The fact that technological change can affect switching costs and differentiation, determinants of buyer power, shows the capacity of it in increasing or decreasing the buyer power. Also the backward integration by the buyer can be facilitated by technological change. According to Hill and Jones (2009), switching costs are the costs that buyers must support when changing from one product based on one kind of technology to another product based on a distinct technology. According to these authors, buyers will accept switching costs if the gains of adopting a new technology compensate the costs of switching.

Technology and supplier power

According to Porter (1985) and Tidd, Bessant and Pavitt (2005) an innovation can decrease the supplier's power if it reduces companies' technological dependence on suppliers. Porter (1985) also adds that technological change can induce the industry to purchase from a new powerful supplier or,

instead, can abolish the need of purchasing from a powerful supplier group. Moreover for Porter, the technology investments made by companies allow creating in-house knowledge of supplier technology which allows the use of multiple suppliers and consequently the abolishment of the dependence on any supplier.

Technology and substitution

Technological change generates totally new products or new methods of using products that substitute others (Porter, 1985). These changes alter the switching costs and the relative price/value that buyers attribute to substitutes.

Technology and rivalry

According to Porter (1985) 'technology can alter the nature of rivalry among existing competitors in several ways.' For Porter, technology can aggressively modify the cost structure and therefore influence pricing decision. The author also states that technology as a role in product differentiation and switching costs which is relevant for rivalry. Moreover, technology can impact the exit barriers since, for example, a company that purchases a machine highly specialized to particular goods and that cannot be used in any other production process tends to be forced to not abandon the industry, and this will also affect rivalry. Tidd, Bessant and Pavitt (2005) state that through innovation rival companies can set up a monopoly position; contrarily imitation can destroy a monopoly position.

3.4.4. The key (or critical) success factors

According to Boyton and Zmud (1984) the *critical success factors are those few things that must go well to ensure success for a manager or an organization, and therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance.* This concept was popularized by John Rockart but it was first introduced by Ronald Daniel in the 1960's. According to Rockart the KSF are the key areas in which things must go well in order to make a business grow.

IV. Teaching Note

The ultimate goal of this section is to present a point of view on how the Case Study (II) previously described can be discussed in class. It is expected to be completed by the instructors' and students' comments. The intended goal is not to limit the instruction action but to provide a possible basis for it.

This section is then divided in six major sections: The Case Synopsis section which presents a summary of the Case Study; The Learning Objectives section where the main teaching goals of the Case are highlighted; The Assignment Questions section; The Class Plan section in which is suggested several points that should support the answer to the Assignment Questions as well as the time allocated for each of the Assignment Questions while the class discussion; The Analysis section provides the analysis required to address each of the Class Plan points and then the Assignment Questions. The development of this last section requires that Case Study and Literature Review have to be kept in mind.

4.1. Case Synopsis

ZON Multimedia is a Portuguese based company that operates in the telecommunications market and that was born from the spin-off of PT Multimedia from Portugal Telecom in 2007. Nowadays, these two companies are among the strongest players of the telecommunications market and are direct competitors in the central issue of this market, the triple play offer which teams up three main services, fixed voice, pay TV and broadband internet over a unique connection. In 2008 ZON Multimedia was the leader in this integrated offer mostly due to its pay TV service.

In Portugal, in 2008, the triple play was delivered by two main types of broadband access technology: the Asymmetric Digital Subscribed Line 2+ (ADSL 2+) technology, which is based on copper cables, and the Cable technology, which is based on a hybrid of fiber and coaxial cables (HFC). However, while both networks were able to deliver a substantial number of channels and unlimited voice, they had a theoretical limit in terms of broadband internet capacity. The limits were different, having the ADSL a shorter limit.

Besides PT, the main competitor of ZON Multimedia, Sonaecom and Cabovisão were the other relevant market players. PT was the incumbent and the only operator with sufficient capacity to provide network-access to other market players, including ZON Multimedia. Its main network was based on ADSL 2+ technology and it was described as being a powerful company due to its old market presence, its strong financial capacity, leadership, innovation and competitive behavior.

In 2008 the forecasts for exponential growth of internet consumption heralded the incapacity of the then current networks' capacity to meet future customers' needs. Besides that, the quality and formats of new TV channels were becoming ever more demanding. The emergence, all over the world, of Next Generation Networks (NGN) which allowed operators to deliver larger bandwidth based on fiber optical cables brought about a new light in the telecommunications market. Among the several types of technologies that allowed the new designation of NGN the one that expected to be widely implemented was the fiber-to-the-home (FTTH). The FTTH allowed delivering through fiber optical cables the services to the end-customer's door. But its deployment implied, in most cases, the abandonment of the old networks for new ones. However, ZON Multimedia had an alternative to this new network. In fact, with some upgrades, its own network (HFC) could deliver a higher bandwidth as compared to the bandwidth delivered up to 2008. But another problem arose: the HFC was a network that was shared among users and there was a smaller percentage of them, the heavy users, which was consuming the remaining customers' capacity, damaging other users' triple play experience. Sonaecom was already delivering a FTTH network and PT would make the same move sooner or later. The incumbent was only expecting the regulator's decision.

In 2009, in face of these last market developments, ZON Multimedia needed to make a decision. Either it would move towards the adoption of FTTH, as its main competitor would probably do, or it would keep on investing on its current strategy of maximizing the HFC capacity and putting fiber only in special cases (heavy users) in order to decongest the lines. Considerations in terms of the time expended, costs of deployment and maintenance, and the real future-proof capacity needed to be made in the short-term in order not to lag behind its main competitor, PT.

4.2. Learning Objectives

The aim of this Case Study is to present its readers with a real example of a company that faces a competitive industry where technology occupies a central role and needs to make a final decision related to this issue (deploying or not a new network) that could put it at the level of its main competitor. The constant challenge involved in the rapid evolution of this industry requires its players to constantly innovate and try to think ahead of competition, in order to maintain themselves in the game. Hence, the following issues are expected to be understood by students during the analysis of this Case:

- The main activities, functions and competitive advantages of a telecommunications operator, ZON Multimedia;

- The main actors and their main activities in the Value System of the telecommunications industry;
- The complexity and dynamics of the telecommunications industry;
- The strength that an incumbent can have due to first move advantage in an industry;
- The behavior of a telecommunications operator facing a troubled competitive context;
- The crucial factors that must be considered in order to survive in the telecommunications industry;
- The role of technology in this industry;
- The importance of facing the end of a technology lifecycle and understanding when another should be adopted;
- The impact of a technological change (FTTH) in this industry and, particularly, in the competitive landscape;
- Whether FTTH's adoption can be a source of sustainable competitive advantage;
- The impact of the technological change in the strategic positioning of ZON Multimedia.

Addressing these issues is not the only possible approach for this analysis. Others can be raised in order to complete this analysis and to better adjust it to the instructor's final goals for the course.

4.3. Assignment Questions

Besides providing a possible guideline for how to use the Case Study in class, the goal of the Assignment Questions is also to induce students to think about these questions before the discussion of the Case Study takes place, in order to build a structured thinking about it.

Assignment Question 1: What was the strategic behavior of ZON Multimedia in the telecommunications industry in 2008?

Assignment Question 2: Describe the Portuguese telecommunications industry in the end of 2008.

Assignment Question 3: If adopted, may the technological change (FTTH network deployment) be a source of sustainable competitive advantage for ZON Multimedia in the future?

Assignment Question 4: Is the deployment of a FTTH network an inevitable outcome for ZON Multimedia? Imagine that you were a member of the decision making team. What would you recommend to be done, facing the current developments of the telecommunications market in 2008?

4.4. Class Plan

The Class Plan specifies the time that should be allocated for each of the four Assignment Questions and the issues to be included in each of these four main discussion points during a 90 minutes class. This approach aims to address a Strategic Management course in which Innovation and, particularly, Technological Change are the subject of the day. It is expected that the Case Study has been read beforehand.

- **Internal Analysis** [*20 minutes*]

Assignment Question 1: What was the strategic behavior of ZON Multimedia in the telecommunications industry in 2008?

a) Was the operator pursuing any kind of generic market strategy? If yes, which one? [*6 minutes*]

b) What were ZON Multimedia main activities? And how did they contribute for building a competitive advantage? (Suggestion: Porter's value chain) [*7 minutes*]

c) How was ZON Multimedia's performing in the market? (Suggestion: SWOT analysis)[*7 minutes*]

- **Competitive Landscape** [*27 minutes*]

Assignment Question 2: Describe the Portuguese telecommunications industry in the end of 2008. The students can analyze:

d) The positioning of fixed voice, mobile voice, pay TV and broadband internet access services, as well as triple play and wholesale services in the industry lifecycle. (Suggestion: Industry lifecycle analysis) [*6 minutes*]

e) The industry structure and its attractiveness. (Suggestion: a 5 forces Porter's industry analysis) [*9 minutes*]

f) The heterogeneity between competitors within this industry. (Suggestion: a Strategic groups analysis) [*7 minutes*]

g) The industry's key success factors. [*5minutes*]

- **Impact of technological change** [*28 minutes*]

Assignment Question 3: If adopted, may the technological change (FTTH network deployment), be a source of sustainable competitive advantage for ZON Multimedia in the future?

h) Where was the HFC technology located in the S-Curve in 2008? Is the FTTH technology a new S-Curve? (Suggestion: S-curve framework) [*7 minutes*]

i) What are the main drivers for the adoption of FTTH? And, what are the key requirements for an operator rolling out a FTTH infrastructure? [*6 minutes*]

j) What is the role of this technological change in the 'stuck in the middle' positioning of ZON Multimedia? [*7 minutes*]

k) What is the impact of the deployment of this new network in the industry as a whole, have also in mind the impact in the triple play business? [8 *minutes*]

- **Making a Decision** [This last point aims to relate all the collected main points of the discussion and construct a strong argument – *15 minutes*]

Assignment Question 4: Is the deployment of a FTTH network an inevitable outcome for ZON Multimedia? Imagine that you were a member of the decision making team. What would you recommend to be done, facing the current developments of the telecommunications market in 2008?

4.5. Analysis

Internal Analysis

Assignment Question 1: What was the strategic behavior of ZON Multimedia in the telecommunications industry in 2008?

a) **Was the operator pursuing any kind of generic market strategy? If yes, which one?**

Gaining competitive advantage through differentiation was a complicated process in the telecommunications market. The issue was that any differentiation such as new price packages and bundles were rapidly and easily imitated by competitors. Also, new functionalities that a player could get before other players were provided by technology vendors that rapidly make it available for the remaining players. Besides that, as the main products of this industry became to be considered as commodities by consumers, it also became very difficult to create a genuine differentiation accepted by customers, since the purchasing decisions became too dependent on performance and price. The ultimate barrier to differentiation was created by the suppliers of network-access (other operators) that control the services' quality. Until 2009 the HFC's fiber optics portion of ZON Multimedia was rented by PT which many times delivered a defective, delayed and degraded service.

The cost leadership competitive advantage was another goal difficult to achieve in this specific industry, in which the incumbent besides had a large clients' base, owned and provided the other operators' networks. In the costs side, the price discussion with suppliers was very relevant, although prices end up being very similar for all operators according to their dimensions. Notwithstanding, the key issue of economies of scale achieved on the network infrastructures through increasing the number of clients' base could contribute for a cost leadership, although this was only achievable for the largest competitors. PT was the only owner and provider of network infrastructure and had access to strong economies of scale, it had the quality and cost control of its network, being therefore able to squeeze margins aware of its network's costs without financial damaging, achieving a cost leadership advantage.

In what refers to focus strategies, ZON Multimedia did not focus on any special segment. Its targets were always the residential and enterprise customers. And the wholesale segment was also taken into consideration as a future targeted segment.

In 2008, ZON Multimedia was trying to achieve a competitive advantage through its competitive triple play offer. Although its triple play offer had several and competitive variations that were rapidly and efficiently launched to the market, these were also rapidly imitated by other operators. The true competitive advantage that ZON Multimedia had in the triple play service was due to the fact that it was the largest cable TV operator, being therefore easier and consequently less costly to the company than for other operators to install the other triple play services in customers' houses. This was the main reason for the accelerated pace at which triple play offer' subscription rates from ZON Multimedia grew. But this competitive advantage seemed to be short-termed. The HFC network was another source of competitive advantage for ZON Multimedia since through HFC it could deliver more capacity to clients once they started to require it. This characteristic was not shared by the ADSL 2+ networks. Hence, until a new technology emerged with such capacity, as it was expected with FTTH, ZON Multimedia would benefit from a short term competitive advantage.

In conclusion, the market was pushing ZON Multimedia for a stuck in the middle position. On the one hand it tried to achieve a cost leadership position through economies of scale due to its large clients' base, but this cost was in some way controlled by PT which rented the fiber portion of ZON Multimedia network. In fact, PT could enjoy lower costs in its own network which made PT the cost leader. On the other hand, ZON Multimedia was also trying to achieve differentiation (through its triple play offer) but the rapid imitation moves from competitors fearing to lag behind the market did not allow it. The competitive advantages that ZON Multimedia possessed, along with the suck in the middle position, could lead to some profits, but only in the short term.

b) What were ZON Multimedia main activities? And how did they contribute for building a competitive advantage? (Suggestion: Porter's value chain)

ZON Multimedia business included several activities that together contributed for delivering the final service and value to customer. Beginning with primary activities, it was through the building and maintenance of its Network Infrastructure that ZON Multimedia became able to provide its main services to the subscriber (pay TV, voice and broadband). It was mostly in this activity that this operator invested high amounts of capital, in order to maintain and upgrade its network with enough capacity and quality to meet market trends. The Management Infrastructures Operations Department and the Network Access Department were responsible for the Network Operations' activities in which a careful network monitoring and correction of performance issues were made.

The network related activities were crucial for the operator, since it was through them that ZON Multimedia was able to transport and deliver its services with the best quality and performance. It is important to remind that in 2008 the fiber portion of the HFC network was provided by PT and the coaxial cables were owned by ZON Multimedia, hence the quality of its network was also dependent on PT's wholesale service.

The Contents' Management was another kind of primary activity of ZON Multimedia. It included the activity of theater exhibitor and distributor of audiovisuals through purchasing and management of movie transmission rights. Although these activities did not represented margins as high as the core activities (pay TV, voice and broadband) delivered they had a strategic relevance. A strong audiovisuals management allowed ZON Multimedia not only to strengthen its offer on video-on-demand (more videos available), but also to strengthen its premium TV channels offer and to select the best movies to launch in theaters.

In what refers to ZON Multimedia's Marketing and Sales activities, one of its main duties was the selection of retail channels. ZON Multimedia had several stores under its brand manned by a trained sales force, mainly outsourced. It had also agents, as well as door-to-door salesmen to complement these activities. Besides, the operator had a website where customers could find all the commercial offers. It is also worth mentioning pricing and bundling activities, which occupied a relevant position, being crucial to respond quickly when competitors lowered their prices or presented new services in bundles. Moreover, there was a growing trend to invest in marketing in order to fight the triple play market competitors.

The last primary activity is constituted by Customer Support and Services in which billing[9] and customer accounts, customer care and customer information bases are processed. ZON Multimedia had several outsourced call centers managed by the organization and responsible for taking care of the customer. Through the inbound service the customer contacts ZON Multimedia either to clarify any doubt about billing or to buy the service; trough the outbound service ZON Multimedia call centers contact customers in order to extend contracts or to present more customized offers. The customer could always go to any ZON Multimedia store to clarify doubts about the service or to make payments or ask for support through the website. Any need regarding repairing or installation was also provided by ZON Multimedia through its technical staff or agents.

Among the support activities of ZON Multimedia there is a consistent Human Resource Management. In 2008 ZON Multimedia had around 1620 employees. A trainee program for future employees from several areas was available. Training activities and workshops for the employees of the outsourced support clients' services and for other areas inside the organization, as well as a commission scheme for salesmen were also available. Technology Development was another support activity that was highly valued by ZON Multimedia, not only because of the information systems that run all the company's value chain but because of its direct impact on the core business. In a telecommunications operator technology is a key factor not only for designing better and differentiated services and products, but because technological expertise in the network infrastructures allows improving network's performance and quality of the delivered service.

The Procurement activity of ZON Multimedia had a crucial role for cost savings. Most of the costs associated to telecommunications companies come from areas where the procurement activities have a role. It was trough procurement activities that ZON Multimedia negotiate with its suppliers any kind of service or equipment needed to the normal performance of its business. It was through this negotiation process that the conditions of acquisitioning, installation and maintenance costs of each terminal equipment, software, cable, etc are defined. Among the most relevant Infrastructure activities of the company one can find activities related with investors' relationship, financial and administrative activities, corporate finance planning and control, legal services management as well as activities related with regulation, competition and interconnection between these two, etc.

All these activities (see **figure 1**) had a relevant role and none of them could be excluded. However, there were some that were more crucial than others when talking about achieving the differentiation and lower costs that ZON Multimedia tried to reach. Hence, the Network Infrastructures and

[9] It is the term used to describe the methods and systems of collecting telephone calls' information and other services that appear in the subscriber's bill.

Operations along with Customer Support and Services were the most critical areas for developing the operator's competitive advantages related to the HFC network and to the easiness of installation characteristic of its triple play service. Besides, trough Procurement it was possible to achieve lower costs with the other actors of the value chain system; through Technology Development it was possible to make the triple play service and network more competitive in the market.

It is important to recognize the interdependencies and the relevant role of exploiting the linkages between these value activities. For instance, a bad customer service at the customer's home can damage the marketing credibility; in turn, a poor performance at Network's Operations can lead to bad billing.

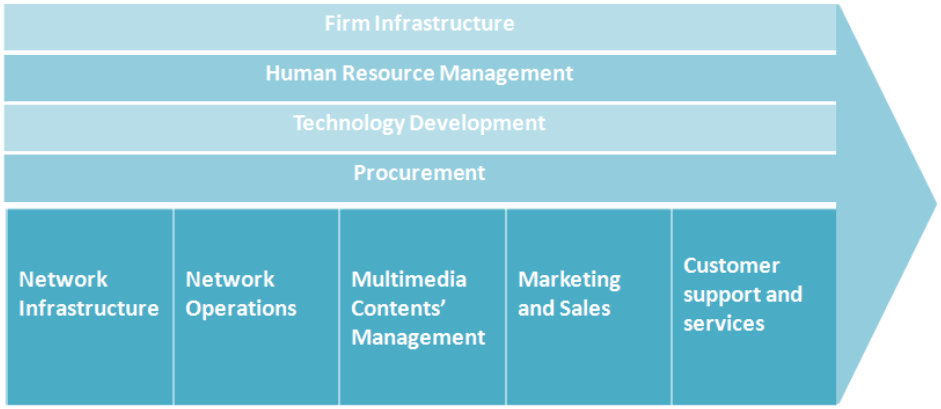


Figure 1. ZON Multimedia's Value Chain

As expected, ZON Multimedia value chain was inserted in a Value System, which is represented in **figure 2**. Between these seven different levels there were relevant linkages that contributed to the good performance of each one in the system. The cable-providers were essential to guarantee the quality of the final service. If the cables had transmission problems or insufficient bandwidth to deliver the convergent services [with sufficient capacity] to the final consumer, consumers would become unsatisfied and the operator's reliability would be questioned. The equipment-providers were mostly international and their main activities consisted in providing and installing terminal equipments and network equipment. These activities must be connected through software-providers. In fact, there was a growing trend to integrate software providers and equipment-providers vertically or horizontally.

The products and services of software-providers made their presence felt all across the value chain, from the software for equipment-providers' hardware, through the management and billing software created for operators, to the software used by consumers in their home experience. The more these

actors bet on intellectual capital in order to create more sophisticated software, the better was the management and the services delivery to customers' homes.

The operators' value chain was the main one of the telecommunications value chain system. It is also important to state that some operators have integrated into their business activity the wholesale of network-access. The most relevant case was the mentioned one from the incumbent, PT, which had the largest network in Portugal.

The following activities are the ones related to the outsourcing companies' value chain. They are responsible for call center services, information systems, customer care, sales, equipment' maintenance, etc. Without these activities, it would be difficult to run the business units of the telecommunication market since operators tend to dedicate themselves mainly to the core businesses (transport of information through pay TV, voice and internet). These outsourcing companies need to share risk with the operators since the operators' performance in the market is dependent of the performance of these outsourcing companies.

The content providers were responsible for the activities of creating, developing, packaging and distributing contents that operators used in their offer. Google and BBC were examples of internet content providers where the user could find services like YouTube and spend data traffic. In the TV platform the contents can be associated to the distribution of theater movies and TV channels. These activities were very important for the pay TV service for one main reason: for customers the contents that were transmitted in their TV sets were essential to define a customized pay TV offer. The TV channels that represented relevant sources of profitability were the ones with sport, children and cinema contents. The biggest issue of the TV contents was their high costs. ZON Multimedia had integrated this function of TV content provider as one of its business unit, producing some TV channels (for instance, TVCINE). However, more than 90% of the TV channels were bought from content providers that were not telecommunications operators. In the Voice platform, examples of contents were applications or other services that can be accessed by the voice equipment.

Finally, the buyers' value chain completed the value chain system of telecommunications sector. The role of the buyer was to experience the provided services and interact with the previous chains in order to raise issues that should be the target of improvements through the whole value chain system.

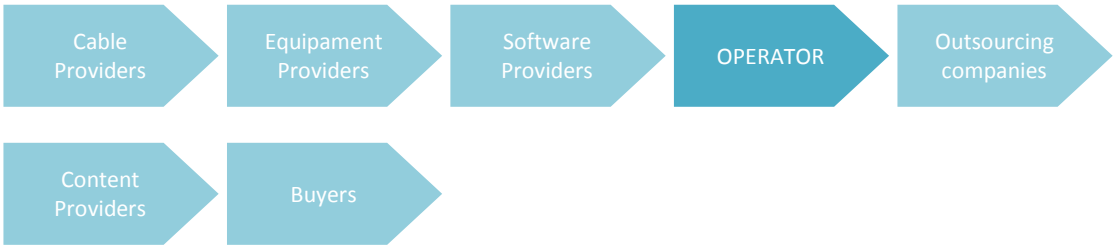


Figure 2. Value chain system of the telecommunications industry

c) How was ZON Multimedia's performing in the market? (Suggestion: SWOT analysis)

Strengths

- HFC was a technology's network future-proof superior to ADSL 2+
- Easiness of triple play installation in cabled customers' home
- The leader in the triple play offer and in the pay TV segment
- A new brand (ZON TV Cabo) replacing the hated TV Cabo brand.
- ARPU was increasing due to the triple play service
- Rapid reaction (after Spin-off)
- Readiness and efficiency in launching competitive triple play offers

Weaknesses

- Lower debt capacity than main competitor
- The operator needed to follow a new learning curve to develop FTTH.
- Dependency on PT conducts and network-access
- Customer service perceived as bad
- Company still struggling to recover from the loss of 90% of day-to-day managers
- HFC: promised internet speed was not what the customer got in practice; high fixed costs
- 'Stuck in the middle' position

Opportunities

- Changes in consumption patterns: exponential consumption of the broadband internet and adoption of converged services.
- PT did not yet deploy FTTH. The incumbent was waiting for regulation.
- Through the FTTH deployment the operator could get economies of cost
- HFC if upgraded could compete with FTTH for a while.
- Customers were not informed about the true advantage of acquiring FTTH

Threats

- Development of Next Generation Networks (FTTH)

- Market saturation
- Highly competitive environment:
  - PT: Strong financial muscle to invest in new technologies; Owner of its own network access: unlimited access to network; Testing FTTH since 2007. It had a vast knowledge and technological skills. For that reasons PT could enter the FTTH market at any time.
  - Price war
- Changes in consumption patterns: lead competitors to adopt threatening technologies that HFC cannot compete with in the long term.
- Global economic crisis
- The pay TV, broadband internet and voice were becoming commodities
- Uninformed customers about network-access technologies

Analysis:

The convergence of the three main business areas was at the responsibility of ZON TV Cabo, a company of ZON Multimedia group that was previously named TV Cabo and was responsible for the pay TV segment. The biggest problem of this TV Cabo was the fact of being known for its bad customer service. However, after the change of name to ZON TV Cabo and with plans to improve customer service it was expected that this perception would change. Besides, the ability to react that ZON Multimedia showed when it was needed to recover from the spin-off, facing a deep restructuration, was a sign that this new player should not be underestimated by the market.

A strong and a very competitive triple play strategy was defined. The easiness of installation in customer's homes where cable TV was already provided led to a competitive advantage comparing to the ADSL 2+ market players. For the year of 2008-2010 the strategic plan of ZON Multimedia was based on three points: *to lead in triple play; to deliver excellence in customer service and operational efficiency; and to capture new growth opportunities*. The leading position of the triple play was achieved still in 2008 and it continued to consolidate, mostly due to the above mentioned installation easiness but also due to the rapid and efficient way of launching and creating very competitive triple play packages. The development of the triple play led to an increase of ZON Multimedia's ARPU from 30,8€ in 2007 to 32€ in 2008. This strong bet in this integrated service was a reaction to a market that was saturated. The customer retention was an issue that the triple play could help to solve, allowing the operator to maintain its market share.

Its main competitor was PT Comunicações with its recent Meo brand which also delivered a triple play offer. PT Comunicações was a subsidiary of its mother company that had a management team

with a deep knowledge in the telecommunications market, and a debt capacity superior to ZON Multimedia. However, there was a differentiator between these two operators (although not visible to the customers eye), the broadband network technology. The HFC was a technology that through upgrades could achieve superior performance than ADSL 2+ and it was therefore classified as a more future-proof technology. However, it was certain that a high capacity technology, the FTTH, would be introduced in the market by the ADSL 2+ operators because they did not have another option in order to face the HFC operators' network. The exponential growth of broadband consumptions was an indicator that this differentiating competitive advantage would be overcome by FTTH introduction before customers really need it. However, the regulation was delaying the deployment of FTTH by PT who was waiting for a more favorable decision. The ultimate goal of PT was to obtain regulation's guaranties that it would not be forced to open its future NGN for other market operators. Meanwhile another market player, Sonaecom, the number two of the voice segment, was already implementing FTTH.

The consumption pattern of broadband internet services was changing due to the over-the-top contents and this was the main reason for the technological changes that were happening and would happen in the sector, however customers had not yet the true perception about FTTH advantages due to lack of information. The internet, voice and pay TV were becoming perceived as commodities; hence the performance/reliability and lower prices had come to be the key decision factors in the moment of purchase. This, together with the global economic crisis and competitiveness, was the trigger for a price war which ZON Multimedia did not escape to. In fact, all these factors were pushing ZON Multimedia for an undesirable *stuck in the middle* position.

Competitive Landscape

Assignment Question 2: Describe the Portuguese telecommunications sector in the end of 2008.

d) The positioning of fixed voice, mobile voice, pay TV and broadband internet access services, as well as triple play and wholesale services in the industry lifecycle. (Suggestion: Industry lifecycle analysis)

To understand the composition of the telecommunication sector in the end of 2008, the positioning of the five main services plus the triple play within the industry lifecycle will be clarified. At that time the telecommunications market was evaluated in 5.5 thousand million euros; it had grown 3,2% from the previous year. The fixed voice service was the only one that suffered a decreasing in revenues. In

fact its slower growth rate since 2006 together with the threat of the mobile voice service pointed to the fact that this service was entering its declining phase. The pay TV service and the broadband internet service were those whose revenues increased the most, by 13,8% and 13,1% respectively and comparing to the previous year. Regarding the number of subscribers, the pay TV service was growing; from 2007 to 2008 there were more 313 thousand subscribers. The number of broadband internet subscribers also increased with 123 thousand new subscribers. However, the segment that generated more volume of revenues for the telecommunications market was the mobile voice which grew 4.4% and represented 55,3% of the total value of the telecommunications market and this service did not make part of the triple play offer. The wholesale access services (directed to operators and large companies), since 2006 experiencing a negative growth, became positive between 2007 and 2008, achieving 9% of the total market value. In this last year, the triple play service (internet, fixed voice and pay TV) counted only 343 051 subscribers, its future growth would depend on the moving of clients' base to this offer or new subscribers. **Figure 3** depicts the several segments and its position in the industry lifecycle.

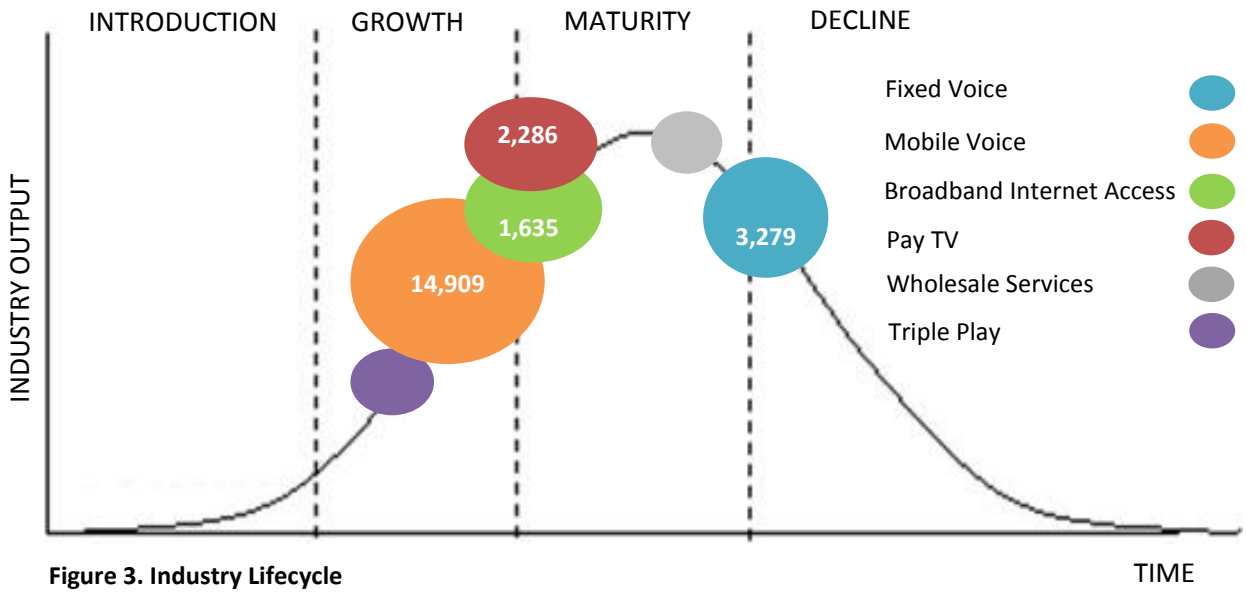


Figure 3. Industry Lifecycle

Note: The circumferences' size represents the number of subscribers. The wholesale and the triple play services are services with a number of clients much inferior to the other services.

e) The industry structure and its attractiveness. (Suggestion: a 5 forces Porter's industry analysis)

New entrants: In the telecommunications services the process of connecting one more customer does not cost much for the service provider if its network is already deployed. This means that there were *Supply-side economies of scale.* There was also the network effect, on the demand side, called

demand-side benefits of scale. This effect usually benefits the incumbent of telecommunications preserving its market position. In Portugal the incumbent, PT, was the first to install the fixed voice service and the only one for a while. The fixed voice service is a service that only gains value if other people have it. With time the incumbent gained almost all the fixed voice connections mostly due to this network effect. In the case of PT, the network effect worked as a first-mover advantage. It was also possible to achieve this network effect in broadband internet and mobile voice with, for instance social networks (Facebook) and special tariff packages that brought together groups (Extreme).

Besides economies of scale, telecommunications operators became also able to achieve economies of scope *(Supply-side economies of scope)*, meaning that if its network was already in place the operator can turn local calling inexpensive, if combined with other services and products such as internet, pay TV, long distance calling, etc. The ability of different technologies' operators to deliver also other services in their multiple play offer (for example, ADSL 2+ operators with IPTV service) had as a consequence *demand side economies of scope* due to this range/diversity of services being delivered by a unique operator. Other relevant sources capable of influencing the threat of new entrants in this industry were the *switching costs*. The medium high switching costs in the customers' side of this industry were not very attractive for those who wanted to enter in the market and expect to attract customers from other players (switching costs are thoroughly addressed in the buyers section, page 69).

The *Capital requirements* to enter this industry were extremely high. The infrastructure setup costs were the largest ones, but the need for renting infrastructures (which happened in most of the cases, among players not able to build their own networks) was also another cost that could not be ignored. Hence, if an operator wanted to enter this industry it was required that it had resources and financial strength in order to support these high costs.

In Portugal the incumbents of fixed voice and pay TV services were undoubtedly strong. For these two incumbents, the brand image/identity was already established in the market. They had conquered *incumbency advantages* over the operators that entered later in the market. PT, the incumbent of fixed voice and former monopolist, was the only operator for many years that owned the network infrastructures essential to an operator to exist in this kind of market. This meant that PT was the only one offering direct service and the only operator providing wholesale network-access service to the other market operators. PT occupied two crucial positions in the market. It was a competitor and a wholesaler of infrastructure related services necessary to its competitors. This network access' monopoly gave a first-mover advantage to PT since it was PT who decided how to, and when to deliver the access to the other competitors. However, this activity was regulated by

ANACOM in order to avoid abusive behavior. In what refers to the pay-TV service, in 2008 the incumbent, ZON Multimedia, had more than 70% of market share and was the leader of the triple play with its advantage of the previous installation of the pay TV service that made easy to installing the remaining services at customer's home.

The unequal access to distribution channels did not constitute a source of barriers to enter in the telecommunications industry in Portugal since almost every distribution channels were outsourced, a fact that diminishes this barrier effect. If an operator wanted to enter the market it only needed to contact some of these companies and establish its distribution network without big constraints.

Regarding *government policy*, through its regulator (ANACOM), the government granted the regulation, supervision and representation of the telecommunication sector. ANACOM was the authority responsible for attributing licensing rights to aspirant operators, which was a complex process. The regulation of mergers and acquisitions between established operators were another example in which the regulator acted in order to promote competition and to avoid the control of the market by few competitors. The most relevant events expected in this area were related to NGN. The government was committed to induce operators to invest in NGNs. Hence, the creation of a credit line by the European Investment Bank was to be offered to those operators that would show the intention to deploy about 1.5 million homes by the end 2009. It was also expected that the regulator presented a well-defined plan of NGN regulation that until that time had not been presented.

Besides these seven major sources of barriers to entry, the expected retaliation felt by potential entrants is also relevant to define the threat of new entrants in this industry. The price wars were already a reality in this market, besides that there was also a strong advertising from main operators. Therefore, the expected retaliation was something that potential operators were already aware of.

Conclusion: The threat of new entrants in the telecommunications industry was low. Entrants in this industry seemed to happen via acquisition of an established player in the market since the entry barriers were very high.

Suppliers: The telecommunications suppliers were divided in seven groups: Cable, equipment and software suppliers, operators with its access-provider function, outsourcing companies and contents providers. Regarding the first three supply services, there were a sufficient number of international suppliers to negotiate the products and services required by operators. Note that there were practically no Portuguese suppliers. Without these suppliers, operators would not have material to deliver their offer and would not be able to have an appropriate customer service, a fact which

increased suppliers' power. However, the large number of suppliers and the not visible differentiation among them diluted their bargaining power. In this case the suppliers do not represent the risk of forward integration since these companies would need to acquire licensing to achieve an operator position, which is not a simple process; besides, they would also face all the other entry barriers. The contents providers were responsible for the production, aggregation and packaging of contents then delivered to the operators who distributed them. There were TV contents providers, internet contents providers and voice content providers. The TV content providers had some strength in the market since, for instance, a TV channel could become vertically integrated and be exclusive to one operator. This exclusivity might be a key decision factor when a buyer was undecided between rival operators' packages at the moment of purchase. An example of that is the benfica TV channel that is exclusive to Meo pay TV service.

Finally, among the access providers which were operators, there were two types of business: the renting of underground ducts space or power poles space, being the most common underground ducts, and the renting of network-access lines. The ORAC[10] system, which was owned by PT, was the physical underground structure (ducts) in which almost all the other network lines run. PT was the unique wholesaler of the ORAC system which meant that there was a high dependency on the wholesale activity of PT. It was also up to ANACOM to regulate this relationship. Regarding the second type of business access, PT was not the only wholesaler able to provide it to large companies. However, as it was mentioned it is the only one able to provide it to other operators since there were no more relevant wholesalers with such reliability and geographic reach. Because of these factors, the bargaining power of this kind of supplier was high.

Conclusion: The bargaining power of suppliers was medium because of the strength that PT had over other operators through the network-access wholesale. Without the role of PT in the suppliers' side the bargaining power would be much lower.

Buyers: The triple Play services were very similar among different operators. People tended to characterize these services almost as commodities, a fact which translates itself in a search for low-prices and a reliable service. Another interesting factor was that if on the one hand the individual services that the triple play offers included were considered as commodities, on the other they were also the first to be excluded when budget cuts had to be made. Although telecommunications' operators tried to achieve differentiated offers, they ended up being very similar. The margins were already so squeezed that prices were also very similar. These made the market triple play offers almost the same at buyers' eye. Buyers' costs were another important point when defining the

[10] Oferta de Referência de Acesso a Condutas or Reference Offer of Ducts Access

bargaining power of these buyers. They could be divided in searching costs related to the search and comparison of alternative offers, and in switching costs, related to the switching from one operator to another.

Searching costs: The lack of clear information and comprehensibility of the offer's conditions was one of the problems that buyers found when they were looking up for market offers. Buyers did not dominate technical terms associated with these offers. Besides, there was unclear information while the service was acquired. Relatively to the comparison between the offers' prices and the offers' characteristics, it was a difficult process since there was a lack of homogeneity among the services available in the market. The different voice service's conditions practiced by distinct market operators, such as the different tariffs between different times of the day, was a case in which buyers became confused when there was the will to compare offers.

There are several categories of switching costs. Here, only the most relevant for the telecommunications industry will be discussed: transaction costs, contractual costs, learning costs, compatibility costs, and costs associated with multiple offers.

Transactions costs: The cancelation of the old contract and the celebration of a new one implied the presentation of several documents, involving some dislocations and time which increased the transaction costs; costs related to divulging the new telephone number or e-mail (more relevant to non-residential customers) were also important. The portability issue was something that gave more mobility to buyers since they became able to maintain their number when changing from one operator to another.

Contractual costs: On the one hand, the obligation to be committed in using the service for a period of 12, 18 or 24 months when the buyers acquired the service, granted equipment at a lower price (modem, mobile phone, etc) or another discounts; however, it should be noted that if the contract was cancelled before its deadline there were financial penalties that strongly influenced mobility to another operator. On the other hand, the customers' loyalty schemes that were translated into point's accumulation allowed the acquisition of new equipments and services, as text messages packages, which were incentives to repetitive buys. Cutting with one operator to change to another implied loosing these points.

Learning costs: Examples of this kind of cost include changing from one mobile operator to another and having to relearn the new numbers of access to voice mail or to clients support, or, when changing broadband internet provider, being confronted with a new access portal with information organized in another way which obliged buyers to relearn how to surf on it.

Compatible costs: In telecommunications, the set-up boxes (an equipment required to install pay TV at home) of each operator were only compatible with its own software. Hence, when a buyer wanted to switch from one operator to another he would need to rent new equipment. Besides, mobile phones were usually locked to one operator, a procedure that blocked customers' mobility.

Costs associated with multiple offers: Most of the time the acquisition of a multiple service brought advantages for buyers such as not having to shopping around searching for services in distinct operators or to receive only one bill instead of several. But at the same time, when a buyer wanted to change only one service from one operator to another he would need to renegotiate the conditions previously agreed with the old operator which would affect the costs associated to the remaining triple play services. Changing from one single bill to several ones was also an additional cost that a buyer would incur on if he decided to collect the services from several providers.

Conclusion: On one hand, and although operators tried to create it, differentiation among services was almost inexistent. There were also customers making downgrade from multiple offers to single offers due to economic issues which obliged operators to provide higher quality at lower prices. On the other hand the switching costs and searching costs were in some extent high, a fact which decreases the probability of customer mobility. Hence, the buyer bargaining power is medium, although potentially different for residential or enterprises customers. It is worth noting that buyers were also interested in creating contents; in a way they were content providers, as in the creation and sharing of contents through host programs like YouTube which was increasing the demand for larger network's capacity.

Substitutes: If it was compared traditional services against non-traditional, the second ones were a substitution threat. The traditional fixed voice services by wire could be substituted by mobile lines or by internet voice services, being Skype a good example of this last substitution. In fact, users of Skype could make calls for free over the internet or long-distance phone calls for lower prices. Hence, companies, as SAPO, that only delivered internet and which were not telecom operators could take a bite of voice revenues. The cable pay TV (the historical subscription TV) could be substituted by IPTV (TV over internet). Here, the companies that were only internet providers did not present a threat, unless contents' providers started to sell their contents to these internet providers, until then only sold for pay TV operators. In the broadband internet access, which allowed delivering the triple play, customers could choose between some network technologies, being the most reliable ADSL 2+, HFC or the emerging FTTH. They could also opt for mobile internet delivered through the 3rd generation (3G) wireless system which was installed in Portugal in that year of 2008. This network had the advantage of being controlled by its owner since its frequency was independent of any access-

provider. It was expected that in the future this network would conquer the same capacity as the wirelines networks. 3G was able to deliver mobile voice, internet and TV. Contrary to Wi-Fi (also a wireless network) the 3G networks were long-range networks.

Conclusion: There were some substitutes and with very similar performance and prices. However, due to mobility issues of changing from one service/network to another this substitution was smoothed. Then the threat of substitutes was medium.

Rivalry: The PTM spin-off marked the beginning of a more competitive market since with it the historical operator which possessed copper network and cable modem network lost this last facility for ZON Multimedia (old PTM). PT lost market share and monopoly in this sector was thus abolished. This event triggered a commercial war between the new group and PT, and brought about the rest of the market players. Revenues and profits went down. The market became to be composed by four main players that followed the international trend of offering convergent services as a means to fight the pressure of competition. From the four players, the two aforementioned, ZON Multimedia and PT Comunicações, were the strongest. This industry was highly concentrated. Concentrations ratios were all superior to 85% for the triple play and for the individual services. The triple play market segment concentration ratio of the first three operators was equal to 92.3%. The top three operators of the fixed voice, pay TV and broadband internet fixed access had, respectively, concentration ratios of 89.6%, 98.3% and 87.5%. Hence, with few operators holding the biggest percentages of market share, the smaller competitors were not able to get a competitive position. However this indicator alone was not enough to indicate the level of rivalry.

As it was mentioned above (question d), the internet broadband access and the pay TV were still growing services now entering in a maturity phase. The fixed voice was an area that, contrary to the mobile voice, was entering the declining phase (revenues declining) and operators were trying to reanimate it through the tariffs packages services. This slowing down of services' market shares increased rivalry and the broadband internet and pay TV became to be the biggest fighting field. Besides, the adoption of new technologies (NGN) or the need for upgrading the current ones in order to achieve largest network capacity and to delivery diversity brought players to think in doing high investments to not lose market competitiveness. Other projects lead by the government and the regulator authority, as the definition of an explorer for deploying the DTTV (which was delivered to PT), as well as the attribution of the new ZON Multimedia's Mobile Virtual Network Operator (MVNO) which allowed this operator to enter in the mobile area, were all factors that reinforced market competition. Measures to regulate the deployment of NGN in Portugal would also be defined, in order to reinforce competition.

Exit barriers were high, since to deliver telecommunications services highly specialized equipments were needed. The billing systems and networks could not be used for anything else. Moreover, the swift obsolescence of networks (requiring upgrading and monitoring regularly) made their liquidation difficult. The operators were forced to stay in this industry unless a merger or an acquisition was made. This led to an increased competition since operators were forced to stay in the industry and try to survive inside it.

Conclusion: Industry's rivalry was high.

Attractiveness: This extended analysis allowed to access the overall attractiveness of the telecommunications industry. The threat of new entrants in the telecommunications industry was low, the bargaining power of suppliers was medium, there was medium threat of substitutes, the industry's rivalry was high and the bargaining power of buyers was also medium. The best positioned services in the market and consequently the most attractive were the mobile voice and the triple play which were in their growing stage. Pay TV and broadband internet were at the end of that phase, with only limited growth in the future. Then the triple play was seen as a way to grow since the single offers would not allow it for much more time. Moreover, fixed voice was already in its declining phase. In conclusion, this was not an attractive industry mostly due to high rivalry and corresponding squeezing margins, and to the bargaining power of suppliers, namely and mainly the incumbent itself, that took advantage of its position, compromising other operators' services.

f) The heterogeneity between competitors within this industry. (Suggestion: a Strategic groups analysis)

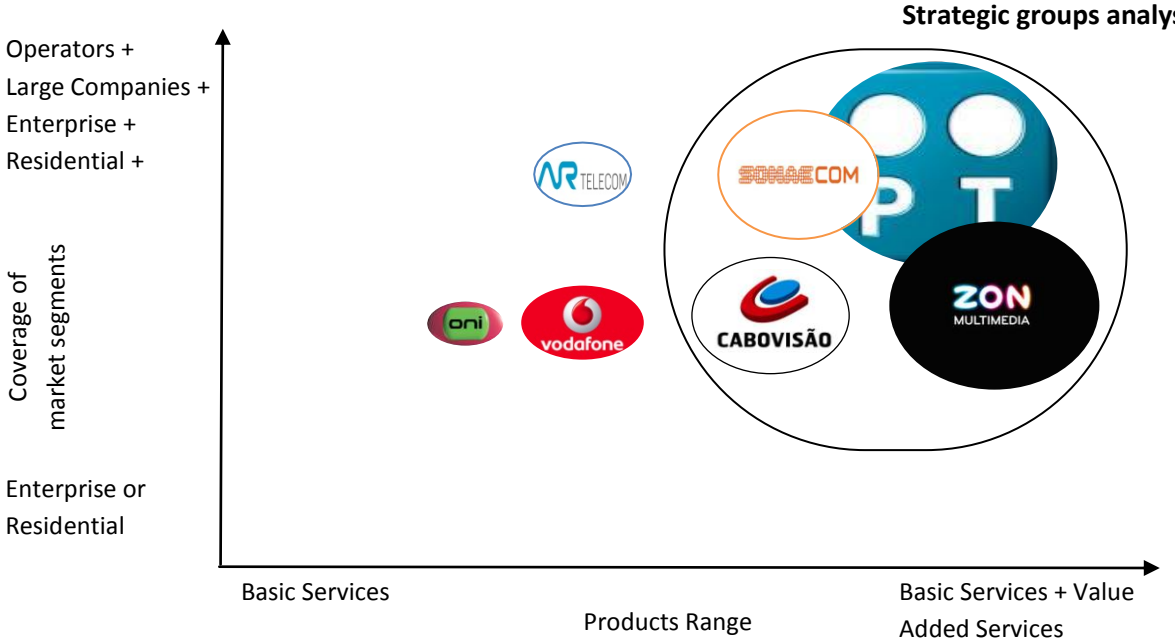


Figure 4. Strategic groups of the telecommunication industry

The strategic groups for the telecommunications market in 2008 in the Portuguese territory are depicted in **figure 4**. The y-axis represents the coverage segments dimension. The level of coverage depends on the number of segments that each operator was able to reach. It ranges from one segment, for an operator that provided services for only one group, (like residential or enterprise customers) to an operator that covered all the market segments (enterprise, residential and large companies plus operators). The x-axis represents the product range dimension. The term 'basic services' describes the services included in triple play. An operator with basic services can have voice, or pay TV or broadband internet access. As an operator moves across the middle of the x-axis it starts to move from this basic offer to offering other services that would give more value to its triple play service such as voice mail, wireless internet connection, online data base storage, web domain and email, antivirus and etc. It is important to point out that the size of each operator's circumference represents its fixed broadband internet access market share since this service is the one that supports the other two main services (voice and pay TV).

According to these two dimensions the Portuguese telecommunications included one big group which included the largest market operators surrounded by three other companies that were moving towards them. In 2008, Vodafone's offer was yet very focused on the mobile side. It offered mobile calls, mobile TV and mobile internet. However, it was slowly entering the fixed market with its Vodafone Casa Duplex ADSL offer which included ADSL2+ service and fixed voice service. Hence, although Vodafone had a strong mobile offer for enterprise and residential customers, it did not have the fixed triple play offer. Only in 2009 did Vodafone enter the fixed triple play market with Vodafone Casa TV, an IPTV service. TMN and Optimus were not taken into consideration since they belonged to PT Comunicações and Sonaecom, respectively. Vodafone was the only independent mobile operator in the broadband internet fixed market. Regarding ONI, it sold its residential business to Sonaecom, staying focused only in the enterprise segment and in the wholesale of voice and data to larger enterprises. It did not offer mobile services nor pay TV. AR Telecom served residential and enterprise segments, it had a triple play service; it did not offer mobile services but its offer also included a small presence in the large companies segments, providing voice services.

The main group depicted is composed by PT Comunicações, ZON Multimedia, Sonaecom and Cabovisão. PT Comunicações was the operator with the largest segment coverage. It had a strong portfolio that covered the three main segments, being the only operator able to rent network access to other operators. This is why it appeared highlighted at the extreme of the y-axis. Its market share was the highest mainly due to the advantage of being the incumbent. ZON Multimedia was the number one in the pay TV and triple play segments, the number two in the broadband internet service and later that year it acquired the mobile service which reinforced its services portfolio.

However, it only served the residential and enterprise segments. Sonaecom was the number two in the fixed voice service and the number three in the broadband internet access; it had a strong mobile service through the Optimus brand. Besides including residential and enterprise customers, it had also wholesale voice and data services for other large companies. Finally, Cabovisão covered the residential and enterprise segments; it did not have mobile voice service but it had pay TV in which it had a strong position. This was a strong group in terms of market share but it was also a group on which the number of value added services was very similar between operators. ZON Multimedia was the exception offering the ZON@FON, a wireless shared network with a large geographic reach that allowed its customers to share their own network and use the network of other customers without paying an extra fee. PT Comunicações had also a wireless shared network but with a much lower client's base.

g) The industry's key success factors

- Bundling

Bundling allowed operators to deliver convenience to customers. The idea of acquiring several services together without taking much time or receiving several bills made customers more satisfied. It also reduced the customer's acquisition cost supported by the operator and allowed them to achieve higher ARPU. Finally, bundling also lowered churn rates.

- Network ownership (quality/reliability)

Network ownership was a fundamental factor since it allowed controlling directly the quality of the network service by the operator and not indirectly through secondary operators that were in the market and could influence this quality in favor of their own activity. The stability that quality brought and the performance reliability that a network provided were essential factors for inducing a good word-of-mouth spread, to improve and make trustful the operator's image and to decrease churn rates.

- Economies of Scale

Deploying and maintaining a network was something that brought high fixed costs for operators. To service a single customer in a town where the infrastructure was not yet deployed was a very expensive process. However, when the networks were already installed and servicing thousands of homes the marginal cost per one more customer became significantly lower. Hence, it made sense that large operators filled up their networks infrastructures in order to take advantage of these

economies of scale. Therefore, with large subscriber bases, large operators enjoyed an advantage over smaller operators.

- Customer Service

It is due to customer service that most of the time customers became able to take the best of their experience. Most customers were in contact with employees only during the installation process or service outages, but it was expected that a customer service was available during all the service's usage in order to fix problems rapidly and to manage contracts that were almost ending either to prolong them or to offer better opportunities or customized packages. This customer service was crucial for the operator and customer since the customer became aware that a customized package could be acquired, and the operator would not lose that client if he accepted to change or to prolong the contract.

- Brand Name

The brand name was important since customers tended to choose the service from the operator that they knew better. As the incumbent, PT had conquered recognition in the market, not only due to its large history but also because of large investments made in advertising. This obliged the other market players to also strongly invest in advertising in order to be able to counter this name.

- Financial Strength/Resources

This is an industry that requires operators to support high fixed cost with the deployment of an infrastructure network. Besides, several upgrades are required at a regular basis, along the infrastructure's lifecycle. The licensing costs are also high. Hence it was required that an operator had a strong balance sheet in order to support it. The capacity to raise money at cheaper rates than other players in the market could, therefore, provide an important advantage.

- Partnership

Products and services that composed this industry were diverse and required knowledge in many different areas. This made difficult to an operator to deliver everything in the best way under its specific skills. Hence, it was crucial for a player to create useful partnerships in order to close these gaps and deliver a complete service.

- Innovation/Technological Change

Bringing new complements/features to the actual services or the need for new or upgraded networks' infrastructures capable of supporting high broadband internet access and converged services were all actions that required innovation. Although it was very difficult to achieve long term differentiation in this market, through these actions operators could achieve it in some way for the short term. It allowed them to deliver more effective and differentiated products and services to final consumer capable of competing against other players in the market. Example of that was the development of a TV remote for kids, or more user-friendly interfaces for the pay TV.

Analysis:

In 2008 the sector suffered several changes. The spin-off of PT Multimedia accentuated market competition. Several issues were discussed under the regulatory board: the revision of this regulatory board, New Generation Networks and the Digital Television. The high market shares concentrated in few operators and the need to stimulate competition were the drivers of these discussions. There were four main competitors; among them; two were especially strong, ZON Multimedia and PT. According to the dimensions of market segments coverage and product range the market could be grouped into one main group composed by the four main operators, where PT stood out due to its wholesale access service to other operators and its incumbent advantage; and a set of three other operators with a much less visible market presence. This high rivalry and bargaining power held by buyers, and the high capital requirements to build an own network infrastructure or to maintain access-network suppliers were the main factors that were contributing for an increasing unattractive industry.

The mobile services were responsible for 51% of the total revenues of the sector, while the fixed services were responsible for the rest. The fixed voice service, previously responsible for the major part of the sector's revenues, was in the declining phase. Pay TV and broadband access were entering the maturity phase with their clients' base growing, although not for long. The wholesale service was in the maturity phase; it was a very static market and more dynamics depended on a large operator abandoning these services. PT was the most relevant provider of this service. This likely market stagnation and the existent competitiveness resulted in decreasing revenues and profits which were fatal for an industry in which the fixed costs were very high. It was therefore required an enlarged client base. The triple play service was then seen as a possible strategy, increasing ARPU and lowering churn rates. The multiple play service became a key battleground where players fought for maintaining or furthering their market share. Market consolidation was also seen as a solution by some operators searching for enlarging their market share and strengthening their market positions.

The broadband internet service had been improved in order to deliver higher capacities and speeds and to respond to exponentially growing consumption. At the time the main types of broadband technology in the market, also responsible to deliver the multiple play service, were the ADSL 2+ (based on copper cables) and the HFC (based on coaxial plus fiber cables). A third relevant type of broadband network, the FTTH, a NGN, started to be deployed to respond to market demand for high speeds. Its core technology was the optical fiber. It promised to substitute the ADSL 2+ technology, by then was reaching its theoretical limit. Portugal was experiencing an economic recession and a fiscal stimulus package was announced which included 800 M€ for operators committed to deploy about 1.5 million homes by the end of 2009. The national regulator had not yet launched a well-defined regulation for the FTTH deployment.

Impact of Technological Change

Assignment Question 3: If adopted, may the technological change (FTTH network deployment), be a source of sustainable competitive advantage for ZON Multimedia in the future?

h) Where was the HFC technology located in the S-Curve in 2008? Was the FTTH technology a new S-Curve? (Suggestion: S-curve framework)

The upgrades seemed to be enough to make HFC meet the growing demand for higher bandwidth and maintaining reliability and signal quality. However this was a short-term certain since it was known that HFC had a theoretical limit that, although superior to other technologies in the market, would be reached in the future. Besides, FTTH was already entering the national territory. Fiber optics, the main material of the FTTH, was reaching its maturity. Although it had not yet been used extensively for telecommunications, it had been used in other industries. Hence, its cost, as raw material, was relatively affordable and very competitive with coaxial and copper cables.

HFC was still able to threat the actual technologies in the market but the comparison with FTTH technology, which seemed to be the only path available for ADSL operators, along with the exponential consumption forecasts made operators speed up HFC upgrades, faster than initially imagined. Hence, it was expected that the HFC network would reach its maturity stage sooner. Experts believed in 10 years. At that stage, more efforts would be required to achieve superior performance. As customers started to ask for more bandwidth, the upgrades would begin to happen in a more regular basis, requiring gradually lengthier and slower processes.

All over the world, it was expected that this technology would show itself capable of modifying the basis of competition, due to its superior capability to deliver unlimited bandwidth and reliable services, even if some years and R&D would be required to achieve its full potentiality and to develop new services. **Figure 5** depicts the HFC and the FTTH S-curve, as well as their respective positioning in the curves in 2008. The y-axis represents performance, which relates the effective bandwidth with total costs for the last mile[11]. The x-axis the effort spent over time. HFC was crossing the middle of its-S-curve which meant that the technology could yet be improved. In this position, the quantity of technological knowledge accumulated over time allowed a decreasing in the amount of effort required to improve the technology's performance. Moreover, the total costs required were also lower than in its earlier stage, and the progress of the technology was allowing the deployment of larger bandwidth. On the other hand, FTTH was at the end of its earlier stage. It still required the accumulation of more knowledge in order to streamline the deployment of the technology, to decrease the effort needed and increase progress. There were high initial costs and the bandwidth that FTTH could offer was still equivalent to the one provided by HFC technology. However, as time went by and the effort required decreased, it was expected that FTTH's performance would increase due to a decrease in costs and an increase in effective bandwidth. Then, it would reach a stage in which it would be able to overcome HFC technology, which would in turn achieve its physical limit. FTTH would supplant HFC as soon as the inflection point of this established technology (HFC) was reached.

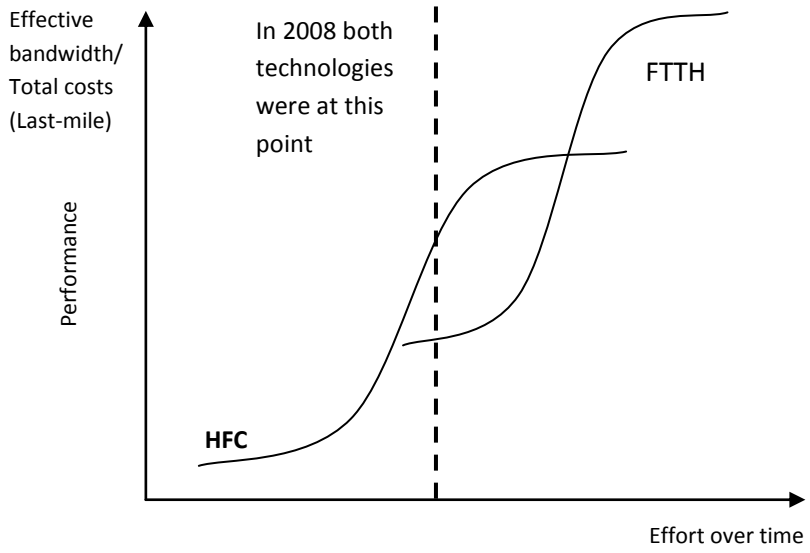


Figure 5. HFC and FTTH S-curves

[11] The term last mile describes the neighborhood network infrastructure. The last mile of FTTH is made of fiber and the last mile of HFC is made of coaxial cables.

i) What were the main drivers for the adoption of FTTH? And, what were the key requirements for an operator rolling out a FTTH infrastructure?

Changes in bandwidth consumption (exponential growth) were probably the underlying driver for the deployment of a FTTH infrastructure. This consumption would continue to grow at a rapid pace. The appearance of new and improved consumer electronic equipment that support high bandwidth, together with the users' willingness to create and share new contents and a lot of other expected applications that would require high-bandwidth developments were all contributing for a visible pressure on bandwidth needs. Hence, it was assumed that most of the high-end households would opt for FTTH if the service's price was affordable. **Competitive pressure** was another important factor. ZON Multimedia (cable operator) was the leader of the triple play service. Moreover, it had a broadband technology with a theoretical capacity superior to the one used by ADSL 2+ operators. Besides, as the quality of the converged services improved, the need for a more capable network architecture increased. Hence, ADSL 2+ operators tended to accept the FTTH as a key resource to compete against cable operators' technology. The adoption of FTTH by these operators became to be certain. Furthermore, the market seemed moving towards a duopoly where ZON Multimedia and Portugal Telecom, with their large clients' base, were the main actors. Hence, in order to react against this trend other operators would start to feel the need to deploy FTTH networks with the ultimate goal of maintaining market share, offering services and products equally competitive. The **government also pressured operators to move to fiber.** On July of 2008, the national government considered the telecommunication sector as an important pillar for the development and to help rescuing the country from economic recession. It was then created a credit line in order to stimulate operators to deploy next generation networks. As mentioned the Portuguese regulator at the end of 2008 did not have a consistent definition of the regulation applicable to the NGN. This would change since it was a sensible theme, considering how difficult it was to compete against the incumbent, PT. In addition to these factors, the **lower operational costs** of FTTH were also a motivation to deploy this technology. Besides, FTTH was still in its childhood and there were still opportunities for **decreasing the FTTH hardware costs**.

Regarding the main requirements for an operator to roll out a FTTH infrastructure, this analysis bring to fore the following points: The acquisition of **specific knowledge and skills**; To have a **robust initial market share**, enough to reduce the risks of failure; To have a **financial capacity** in order to hold up the large investment that is required to deploy it.

The number of operators that could respond to these requisites was not high. Those who were not able to deploy it would probably be obliged to buy access from operators that were able to do it.

j) What was the role of this technological change in the 'stuck in the middle' positioning of ZON Multimedia?

The technology should be adopted according to the generic strategy that a company follows. ZON Multimedia was being pushed by the market to a 'stuck in the middle' position. The FTTH strategy could be seen as a way to leverage ZON Multimedia to successfully pursuit differentiation or cost leadership. But to what degree is this affirmation true? Although it would require a huge initial investment, the FTTH's repairing and maintenance costs were equivalent to 35% of the HFC technology's costs, which would allow ZON Multimedia to conquer a more cost effective position. This factor might suggest that migrating customers' services from the old technology to FTTH could contribute to follow up a cost leadership strategy. However, this would depend on economies of scale that would be obtained by migrating the client's base (the larger the clients' base, better) and in the negotiation of prices with suppliers. Nevertheless, as Porter stated, a cost leadership cannot be truly achieved if there are more aspirants to this position and it is exactly the scenario that would result with the adoption of FTTH. One of the main drivers for the future adoption of this technology by ZON Multimedia was precisely the expected move to FTTH by PT which had a large clients' base and would also pursuit this cost leadership. Besides, the negotiation with the suppliers of this technology would be undifferentiated, resulting in very similar prices that each one set or negotiate with operators which would be another barrier to cost leadership.

On the other hand, the FTTH adoption could be a means for differentiation since it would allow, in the future, delivering improved and more sophisticated services such as simultaneous HD channels, high-definition video communications or 3D TV channels. Since these would be perceived as high-quality premium services they could provide more revenues for operators if customers accepted to pay them as premium services, as it was happening in other countries. This differentiation, however, would be achievable by any other operator that would decide to deploy this new technology and the same situation of difficulty in achieving differentiation would end to happen. As example, HD or 3D TV channel providers would put it available for every player and if there would be some exclusivity of HD or 3D TV channel contents due to arrangements these would be overcome due to similar contents that could be provided by other TV content providers.

The only way of achieving this differentiation would be through reserving Greenfield areas to deploy FTTH before other operators and explore its profitability. This would allow obtaining exclusive information from customers on that area and creating customized services for those customers.

k) What was the impact of the deployment of this new network in the industry as a whole, have also in mind the impact in the triple play business?

The large-scale adoption of FTTH would affect all the five forces that drive competition within the telecommunication industry. Hence, in order to understand how they will influence the industry structure, the more relevant issues regarding each of the five forces are addressed in the next paragraphs.

FTTH and entry barriers: The adoption of FTTH would raise the capital required to enter in this market since the deployment of this technology required high investments. It is also true, though, that operating costs would be lower than the ones currently supported by the operators, what would make the market more attractive for entrants. The introduction of improved or even new products and services would lead to stronger multiple play offers which would raise switching costs and economies of scope. The economies of scale would also be high, as happened with the old technologies. These high economies of scope and scale would be not easy to achieve by lonely entrants since they require a relevant clients-base. The need to develop a new learning curve for all those who did not have skills or knowledge in this technological field also raised these barriers. All in all, the FTTH introduction would lead to higher entry barriers.

FTTH and supplier power: The replacement of the current networks that serve thousands and thousands of people by this new one would bring massive opportunities to suppliers; this, however, would require them to develop the knowledge and skills involved in deploying and maintaining this new technology. Since the existent suppliers, mostly international, were aware of the emergence and importance of the FTTH network, they started to develop their own competences in this field, and many of them were already deploying it in other countries. The number of suppliers available would not change much since the suppliers would be the same as before but with new knowledge, meaning that there would be a number of suppliers enough to maintaining negotiation as before. The fact that fiber optics prices as well as the costs of construction and equipment per subscriber were decreasing were making suppliers' prices more competitive. A relevant point is the fact that FTTH, as a new technology, was subject to system instability. Errors or lacks due to inexperience in the supplier side could compromise the operator's reliability. In conclusion, the FTTH would not change much the bargaining power of suppliers.

FTTH and buyer power: The introduction of FTTH can dilute the bargaining power of buyers through increasing searching costs and switching costs. The searching costs could be increased since the lack of knowledge about this technology can difficult the comparison between rival offers. Also, the superior number of services then offered would confuse customers who would have to choose

between several different new packages. The switching costs would also probably increase since customers would have to learn how to deal with the new services and products and to change from older equipment to new one, compatible with fiber. Moreover, the appearance of stronger multiple play offers and the expectation that FTTH would bring reliable and improved services which would correct most anomalies associated to current networks would probably reduce churn rates. However, the status of commodities that these services had would persist, independently of the technology, and mainstream customers would probably not be willing to pay more for these new services and products even if in some cases the premium prices could be accepted. All in all, the introduction of FTTH would decrease the bargaining power of buyer.

FTTH and substitutes: The FTTH adoption would replace the copper cables and coaxial networks and the equipment that connected those lines. At the level of products and services, it would allow their improvement. The near future appearance and improvement of multiple 3D and HD channels in all TV sets at users home could substitute the traditional channels. However, more services or applications that did require those large bandwidths were yet to be designed. Hence the FTTH would increase the threat of substitutes but this effect would be more visible in the future with the appearance of new services.

FTTH and rivalry: The investment required to deploy FTTH was extremely high which meant that only competitors with high investment capacity would be able to roll out FTTH and to incur in high fixed costs. The largest players would probably be the only ones capable of deploying this network, therefore the capacity of smaller players to compete would decrease, since they would need to rent access-network to largest players. Hence, the market would stay concentrated in the largest players, however, with some of the largest ones stronger than before due to new business opportunities, as providing access through FTTH network-access wholesale services to large companies. The deployment of an own FTTH network would guaranty more control and quality of service giving the opportunity to really fight competition. Moreover, the lower operational costs that this technology would achieve in the future, comparing to the current ones, would allow creating cost savings critical to competitiveness.

The deployment of FTTH would require acquiring knowledge and skills which PT was already developing through the conduction of tests since 2007, what would increase the incumbent advantage, positioning PT at a more advanced point in the learning curve, as well as Sonaecom that was already deploying its FTTH network. Copper-cables operators with a more limited network capacity than HFC operators were aware of the need to deploy it. On the other side, HFC operators also knew the FTTH's opportunities and the power that ADSL operators would win with it.The

information that government would make available a credit line created by the European Investment Bank to incentive operators to invest in NGNs and the will to regulate networks and to open the ducts system for NGNs would also contribute to increase rivalry among the biggest competitors. However, the late decision of the regulator was delaying the FTTH deployment by PT.

In what refers to the triple play services, they would now be delivered in a more efficient and secure way thus contributing for a more competitive behavior. The large bandwidth that FTTH delivers would allow improving existent services (VOIP, VOD, IPTV) or creating new services and products which require large bandwidth. The expected appearance of 3D and HD TV Channels in all TV equipments at users home, were examples of services in which the requirement for large bandwidth was implied. In fact, both types of TV channels require much more bandwidth than a standard TV channel (in the case of HD, for example, 4 times more). Besides, signal losses and slower internet signal due to peak hours would disappear from the triple play offer. All is all the FTTH adoption would increase the rivalry.

For all of these reasons, the deployment of FTTH would lead to deep changes in the behavior of almost all the actors in this industry.

Analysis

In the future, with the deployment of FTTH technology, current technologies made of coaxial and copper cables will probably turn obsolete. Being very recent, that technology was yet to achieve its maximum performance; it had, however, been already improved and the knowledge acquired by suppliers through deployment experience was becoming refined. The hardware costs and the cost per subscriber in deploying and installing equipment were decreasing. Besides, in a certain moment in time FTTH operational costs would be lower than those associated to the ADSL 2+ and HFC network, achieving a sustainable position in terms of costs and allowing further extended competitiveness. Furthermore, the high quality of FTTH could allow setting premium prices that customers would possibly be willing to pay for. However, services that would in fact require extended bandwidth, as the ones FTTH can offer, were not yet in the market, with the exception of 3D and HD TV Channels in all the TV sets of customers' home, expected to appear in a few years but which HFC with its upgrades was able to provide also. Hence, products and services would remain nearly unchanged for the next years, making differentiation still difficult to attain.

HFC technology (the basis of ZON Multimedia network), although similar to a NGN technology (due to its ability to achieve high capacity through some upgrades), was expected to reach its limit sooner

than FTTH. Actually, this network's architecture also included optical fiber (besides coaxial cables), but the fact that FTTH was entirely made of fiber optics put it in advantage, making operators believe that this would be the next technology. It was undoubtedly true that network technology was one of the most important fields of telecommunications. The adoption of FTTH could thus bring some competitive advantages for market operators such as: more satisfied clients due to more reliable services, more periodic innovative services, less service problems and swifter problem resolution. But these advantages would be shared by the rest of the market players, as soon as they started to adopt FTTH.

However, for ZON Multimedia to attain a sustainable competitive advantage through FTTH it would have to become independent from its network access provider, PT. Only then would ZON Multimedia control the quality and costs of its network. Being independent from PT, ZON Multimedia would be also able to provide access network to other market players, gaining some extra revenues. The player should then start to replace the coaxial cables by fiber optics and gradually migrating the HFC network to FTTH. At the same time, the player should start to deploy FTTH in areas not yet reached by the other operators (Greenfield areas), which should be a fast process. Hence, the operator could gain the monopoly of those areas, attaining a more competitive position. Being the first player to deploy FTTH in a Greenfield area, ZON Multimedia would be the only one to explore the profitability of this area and, consequently, to have exclusive information about those customers. This could be used with commercial objectives. The advantages that would be gained attaining Greenfield areas, however, would depend on the regulator's decision about the FTTH access – whether it obliged all the operators to open their FTTH network for the market or not. In the first case, these advantages would be difficult to achieve. The true sustainability of the FTTH technology will depend mostly on two factors: Independency from the incumbent with favorable regulator decision and capacity of ZON Multimedia to continue to respond rapidly to the market.

Making a Decision

> **Assignment Question 4:** Is the deployment of a FTTH network an inevitable outcome for ZON Multimedia? Imagine that you were a member of the decision making team. What would you recommend to be done, facing the current developments of the telecommunications market in 2008?

ZON Multimedia's decision whether or not to deploy FTTH should be based on three main factors: the need to meet the increasing exponential bandwidth demand (including heavy users), network

costs and its relative position to PT. Taken together, these three factors would allow ZON Multimedia to maintain a competitive strategic position in the market. The following paragraphs address the impact of these three factors on both scenarios, in order to come to a final decision.

OPTION I – Implementation of a FTTH network

The first factor, to meet the increasing exponential bandwidth demand, arose from the increasing need of operators and communities to deliver reliable and competitive services and in the need of increasing the level of experience and support of these services. FTTH would be able to deliver such large bandwidth. But a critical point of this technology was exactly to what extent the future services and products would require such large bandwidth? In fact, the services that would be only supported by a FTTH network were yet to born; besides, it would be very difficult for a customer to have the perception that a FTTH service was much better than one from a HFC network. Actually, HFC's experts stated that for the next 10 years HFC would be still capable of supporting the improved services with some upgrades.

The second factor, to decrease network costs, was probably the main reason for this deployment. The difficulty in achieving differentiation and the price wars pressured telecommunications operators to pursuit lower costs. And although the investment initially required to deploy FTTH was high, its maintenance and repair costs were lower than for HFC, granting therefore the possibility of obtaining lower operational expenditure with FTTH.

The third factor, ZON Multimedia's relative position to PT, was an essential factor to the operator maintained its market competitive position. The adoption of FTTH would bring ZON Multimedia the possibility to offer future products and services, as any other operator with this NGN. Besides, the 'fiber' term was showing all over the world its strength in influencing customers' purchasing choices, a fact that led the term 'fiber' to be employed as a marketing tool. Another concern of ZON Multimedia, related with PT, was to gain independence from its wholesale services. As it was already mentioned, although the coaxial cables of ZON Multimedia's network were the operators' propriety, the fiber optics portion was rented from PT. For gaining that independence, ZON Multimedia was planning to build up its own fiber optics infrastructure to replace the one rented from PT.

The adoption of FTTH by ZON Multimedia would require the mentioned high investment which would not allow financial space to build and substitute the fiber optics rented from PT. The deployment of FTTH in areas where the HFC network was deployed, although not requiring the replacement of every HFC's components (some of them being able to support the fiber cables), implied the replacement of the coaxial cables for fiber cables. Hence, if ZON Multimedia could not

gain independence from PT wholesale service, its FTTH network (as its HFC network) would depend on PT network access wholesale service since the rented portion would be unchanged.

However, the deployment of FTTH would put ZON Multimedia network technology hand-in-hand with the future since it was expected that FTTH would inevitably replace the HFC's S-curve in the future. Nevertheless, such decision would be a lengthy process of 5 years, at a slower pace than the incumbent if it decided to move forward with the adoption of FTTH. PT's superior financial capacity would allow it to deploy FTTH at an accelerated pace. The general risks that any operator could face when decide to deploy FTTH are depicted in figure 6.

Type of Risk	
Market Risk	Is related to the non materialization of the increased revenues that are expected, the issue is that the market offers big discounts for packages comparing to single services' prices. If every operator has access to a NGN they would launch new packages but at discounts prices and the revenues would be divided by all market players. The market could expand but it would be due to cuts in prices (discounts) and not due to the revenues created because those would be shared among players.
Regulatory Risk	Is associated to the lack of well defined rules that make it difficult preparing a business plan. And this reflects for example in the uncertainty of how to manage the wholesaler service for NGN since there were no defined ways to deliver it, neither defined costs rules of this activity.
Operational Risk	Is related to the replacement of the network since it can create discontinuity or a lower level of service during the migration. This can affect the perception of the service quality and increase the number of abandonments by clients. Besides that, the human errors due to the lack of practical knowledge that have to be acquired can create some issues of quality of service. Also some conflicts inside the organization can arise since the deployment of a new network is such a deep process that it is complicated when there is a lack of balance between internal forces.
Technology Risk	Since the deployment requires high investments, there is a high level of preoccupation with the longevity of the technology. One player can choose between some options when deciding how to deploy the NGN searching for the one that brings it the most competitive and with longer life. The risk of obsolescence of the technology in 20 years would be null, however, the appearance of a new/improved technology that could substitute the FTTH can also represent a risk.

Figure 6: Risks associated to FTTH deployment

OPTION II – Maximize the HFC potential but using FTTH in some cases

In what refers to the first factor, the increasing exponential bandwidth demand, the 360 Mb that ZON Multimedia would be able to deliver after the upgrades would be enough for responding to it, at least, for the next 10 years.

The second factor, the network costs, was the main disadvantage of this option when comparing to the first one. As it was mentioned, HFC's maintenance and repair costs are higher than the ones for a

FTTH network. And, over time, these costs would be even higher as the upgrades would be required at a more regular basis. However, the investments required to make the upgrade to 360Mb as well as the impact on capital expenditures would be lower.

The impact of this option on the third factor, ZON Multimedia's relative position to PT, would depend on two factors: independence from the wholesale service provided by PT; and the ability of the operator to promote its network as a NGN. The independence from the wholesale service from PT would be possible to achieve due to the lower investment that this option required. This financial space would allow ZON Multimedia not to renew the contract with PT for the fiber infrastructure and build its own one. With this, it would be possible to provide wholesale service of fiber infrastructures to other operators. In a time of a saturated market, facing decreasing revenues and problems in maintaining customers, this new business opportunity could be relevant.

This option would also fix up the problem of heavy users through the replacement of the coaxial cables at HU's houses by optical fiber cables. The ability of the operator to promote its network as a NGN was linked to the idea of overcoming the strength of the term 'fiber'; therefore, if ZON Multimedia bet in educating customers (e.g. through advertising) in order to highlight the true capacities of its network and showing that it was a network that included also fiber optics, customers would understand that staying with ZON Multimedia in the following years would be a totally secure and reliable decision.

The adoption of this second option would require less time than in the first option, being 2 years enough to make the upgrades. However, the medium-term limit, to be achieved when the s-curve limit of HFC was reached, could limit the evolution path of ZON Multimedia products and services in a future.

Decision

After analyzing both options, the recommended decision is the second option since it is believed that the independence from PT has a very important role for the market competitiveness of ZON Multimedia.

The independence from PT fiber infrastructures would guarantee the networks' quality and would avoid a defective, delayed and degraded wholesale service. Besides, it would allow a more efficient cost control. This would also weaken the incumbent that would lose one of its largest clients of network-access. The problem linked with the dependence on PT was the forced sharing of information with the wholesaler. For instance, when ZON Multimedia decided to reach to a new

area, PT could delay its wholesale service and be the first to move there, catching the clients before ZON Multimedia.

This second option would allow ZON Multimedia to delay the high investments that FTTH deployment requires without affecting its services. In fact, through the upgrades it would be able to guarantee more than sufficient capacity to meet demand and to overcome the issues of congested lines for the next years.

At the same time, the operator should start acquiring know-how in FTTH technology since the limit of the HFC's s-curve would be inevitable in a future and this would allow being prepared to receive this technology when that day arrived. Besides that, it must create improved training courses for its employees in order to offer a more reliable customer care service and to present to customers the similar potentiality of services delivered by an FTTH or an HFC network. When the regulator's decision and the credit lines for this deployment were finally defined, ZON Multimedia should start deploying FTTH in Greenfield areas in order to gain monopoly of those areas and then gradually migrate the HFC network for FTTH.

4.6. What happened next?

ZON Multimedia decided to upgrade the HFC network. However, on the 14th of May of 2009, Portugal Telecom made the announcement that it would invest in the FTTH network and for that it would make a partnership with Corning Company, the international leading supplier of fiber optics. The new bandwidth would allow PT to offer in the future a theoretical maximum of 1Gb and 200 HD channels.

PT bet on a strong strategy of communication. Using the fiber optics' promotion campaign the company presented also its new company image (rebranding). At the time, the television commercial put everybody curious about this new material.

'The fiber optic is rising all over the country, with you we will revolutionize the telecommunications future and bring it to every Portuguese home, with you we want to make Portugal an even brighter country. PT people with fiber'

PT's TV Commercial

The message transmitted in the advertisement was so effective that led customers to state that fiber was what did matter in the moment of purchase even if they did not know what fiber was. People

wondered what was so spectacular in fiber optic and associated it to PT. In the course of this process, PT divulged two new packages (one with 20 Mbp and another with 100 Mb) with the designation 'meo fibra'. **Table 1** depicts PT fiber's offer:

Meo fibra	TV Channels	NET Download |Upload	Fixed voice calls	Price/ month
Total 20	70	20 Mb|1Mb	9pm-9am	49,90€
Total 50	100	50 Mb|5 Mb	24 h/day	59,90€
Total 100	100	100 Mb|10 Mb	24 h/day	64,90€

Table 1: PT's fiber offer after the FTTH deployment announcement (July of 2009)

Source: ZON Multimedia

With the 100 Mb package the subscriber would have the possibility to access the video club with more than 2000 films and fixed to fixed voice calls were for free during the period of night. Besides, PT guaranteed that users could have access to high definition TV channels in at least three TV sets at the same time .All the packages included also mobile broadband internet with 100Mb for free, in case of subscription.

It was essential to move customers' attention in another direction. In fact, ZON Multimedia had already several FTTH zones with the acquisition of TVTel and Pluricanal. Besides that, HFC was by essence a hybrid of fiber and coaxial, it had fiber in its designation and more than this, the network upgraded which was already running would allow achieving higher bandwidth (360Mb) which would be enough to answer the demand in the next years. Hence, it was decided to name these packages as 'fiber'. Like in the PT offer, all these packages included a 100Mb mobile broadband internet for free in case of subscription (see **table 2**).

ZON	TV Channels	NET Download |Upload	Fixed voice calls	Price/ month
FIBRA 50	110	50 Mb|2 Mb	24 h/day	59,90€
FIBRA 100	110	100 Mb |4 Mb	24 h/day	64,90€

Table 2: ZON Multimedia's offer after the name fiber (July 2009)

Source: ZON Multimedia

5. This was followed by a period of mutual accusations in which PT accused ZON Multimedia from using the name fiber without having FTTH. However, all the charges were abolished in court and ZON Multimedia escaped unscathed. During the period 2009-2010 ZON Multimedia did not renew the contract with PT and built–its own fiber optics infrastructure that supported its network. Only in 2010 did ZON Multimedia enter the FTTH world. With the following strategy: starting to substitute the heavy users' lines with FTTH, gradually preparing the remaining

network for future requirements and at the same time deploying FTTH in greenfield areas for future passed homes.

6. Conclusion

Developing this Master Thesis gave me the pleasure of being very close to a real company, ZON Multimedia, in the telecommunications industry, a world that is in constant mutation.

Through this Thesis it was possible to realize that recently the telecommunications sector has gone through two major developments that implied change in the sector. The first one happened when the triple play offer entered the market. This brought with it a new way of doing business and a new battleground for market players. The second one is still happening with the large-scale adoption of a new technology, FTTH, which .promises to change the basis of the telecommunications sector – the network where all the services run on. The FTTH in an initial phase seemed not to bring strong advantages for its adopters since the products and services that customers could get with it were yet to born. Moreover, the market's alternatives were yet too similar to what FTTH could offer. But it would be a matter of time since its s-curve would surpass the s-curve of the other market technologies. Besides, the 'fiber' term, if well promoted, could be a strong marketing tool and attract customers.

It was also possible through reasoning on the fast way that ZON Multimedia reacted when PT decided to announce the deployment of FTTH, to understand that a decision is not always made on the basis of a lengthy process. In fact, if market players want to survive in a competitive environment they are required to make fast decisions and maintain a very competitive positioning, in order to face market developments. Not lagging behind is crucial.

Besides, this Thesis also gave me the chance to understand that the telecommunications sector is essentially dependent on short-term competitive advantage. True differentiation and cost leadership are difficult goals to achieve, which FTTH seemed not to be able to change, at least in the short-term.

Moreover, it makes me understand that in an industry in which the incumbent is a powerful player it is essential to have a strong and cautious regulator in order to allow true competition. This is a difficult process when the normal performance of the industry depends on that incumbent. The major issue related to the incumbent is its dual role in this industry: it is a network-access provider and at the same time a competitor, which brings an advantageous situation to the incumbent and a disadvantageous situation to the remaining market players.

Finally, the development of this Thesis made me believe in the existence of a paradox within the Portuguese telecommunications sector [which is transforming it]. If on the one hand operators place customers in a place more and more central, at the same time, this is making the sector less and less attractive. The effort made by operators in transmitting the idea that customers should not live without these services has educated people to think that access to these services should not involve spending high amounts of money. Hence, people consider these services as commodities; the key purchasing factors become low prices and high performance, forcing operators to improve their networks and to effectively lower prices in order to retain and to conquer new customers. In the end, this situation seems to benefit customers, through low prices and large bandwidth, and to damage the operator. This makes one to think about what can be added to these offers in order to make them more valuable [for customers] and, consequently, making them pay more for them. But this is a theme that it would be interesting to deepen in further research.

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