UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER`S THESIS

INNOVATION STRATEGY OF TELECOMMUNICATION COMPANIES IN EUROPEAN UNION IN DYNAMIC OVER-THE-TOP ENVIRONMENT

Ljubljana, December 2015 LUČKA NEMEŠ

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INTRODUCTION

Communication is an integral part of our lives and we communicate by nature. For that reason telecommunication industry with its communication solutions touches every aspect of our lives. It affects the way we communicate with each other, the way we do business etc. In the past the main revenue generator for the industry were plain telephone calls, but due to advances in network technology it covers different areas today. Besides traditional local and long distance telephone services, new areas are advanced technology-based services, such as wireless communication, media and Internet protocol (hereinafter IP) networks, the Internet, optical communication, satellites. In addition to that, the telecom industry is also involved in different types of entertainment, such as cable television systems, delivering etc. (Telecommunication industry in Investopedia, 2015; Plunket Research, 2015).

Recently consumer communication patterns have evolved dramatically. According to McKinsey report (Hazan & Trivellato, 2012) consumers are communicating more than ever, but not in the traditional ways. They are talking less and are using different medium of choice; different social platforms and networks for communication, so called Over-The-Top (hereinafter OTT) applications, which are distributed via the Internet. The way consumers have evolved their habits in communication has a big impact on telecommunication companies (hereinafter telcos). Telcos have fixated on the monetization of mobile data as the main source of revenue growth and neglected their core communication services (Sale, 2013, p. 12). With this fixation they have allowed Internet players to gain ground in retail and distribution. Although mobile usage is booming, the revenues from mobile traffic are not, due to the fact that telcos aren't monetizing this sort of communication (Sale, 2013). According to Arcelus, Fonseca, Leonardo, Novo and Pont (2014, p. 2) the global mobile data traffic increased 40 times from 2008 to 2013, however the revenues associated with it barely tripled. Furthermore because of the OTT solutions and harsh competition among operators (mainly for the customer base), telcos are offering voice and messaging solutions for less and less, making them commodities (standard). Consequently the value of these core solutions is decreasing. Additionally, as a result of increased penetration of smartphones and similar devices, OTT application present a significant threat to telcos. This makes now a very interesting time to study it.

Big telecommunication companies are established corporations that used to excel at innovations. They reacted quickly to previous game changing innovations, such as the emergence of cellular mobile communications in the 1990s, but they seem to fail now in the face of the newest challenge to their revenues. The growing impact of OTT services on telcos' revenue is a widely accepted phenomenon (Sujata, Sohag, Tanu, Chintan, Shubham & Sumit, 2015). On the other hand small, highly innovative start-ups are appearing from nowhere and are ruling the world of innovation. Owens and Fernandez (2014) claim that it`s a dark time for established companies when it comes to innovation and that the age of traditional enterprise is over. This makes the telecommunication industry a very fertile ground for research into possible changes in their strategy and their way of innovating. This thesis will therefore focus on reasons for this situation; why aren`t telcos offering "better" solutions, how are they innovating, what are they doing wrong and, on the other side, what are OTT start-ups doing and how are they innovating.

For the reasons explained, I assume that as the number of OTT communication application users increases, the revenues of telcos decrease. Therefore my hypothesis is: "The number of OTT communication application users has a great impact on the revenues of telecommunication companies."

To determine whether or not the OTT communication applications have a significant impact on the telecommunication industry a deeper insight and further research is needed. With this in mind I will discuss and explore big telecommunication companies that are well managed, competitive and successful, that invest in new technologies but still aren`t introducing any breakthrough innovations in the communication market. For the purpose of providing more reliable results, I will concentrate on the European Union (hereinafter EU) market.

The research questions of my thesis will be:

Research question 1: Do OTT communication solutions have significant impact on telecommunication industry's revenues?

Research question 2: Can large telecommunication companies in EU, structured as they are today, stay competitive in the dynamic OTT environment?

The research will thus aim to identify the current challenges faced by telecommunication companies in EU in OTT environment, and their past and current innovation strategies (if and how are they innovating and how successful are they). Additionally I will compare the results with the strategies of successful OTT companies/start-ups in order to develop a framework for the solution in order to tackle those challenges successfully. This should provide a deeper inside into the innovation strategy of telecommunication companies in OTT environment.

In order to answer the research questions and test the hypothesis I will first analyse different theories on innovation strategy in the Chapter 1. Following the theoretical background, I will first continue with the analysis of telecommunication industry in general in Chapter 2 and then concentrate more on the EU market, which is the main focus of this thesis. I will analyse the performance of core telecommunication products in detail and also the innovation strategy of telecommunication companies. Chapter 3 will be devoted to the same analysis, but of the OTT industry, focused on OTT communication solutions. In Chapter 4 I will analyse the consumption trends of the communication products which will be followed by the segmentation of positioning of telecommunication companies in the OTT environment in Chapter 5. In Chapter 6 I will examine the whole communication market with descriptive and regression analysis and answer the research questions. Last but not least, Chapter 7 will provide my own recommendations, according to the results, focused on the innovation strategy.

This thesis will include analysis of the global data base from IDATE and Analysis Mason, data found in various practitioner articles, covering the fields of telecommunication industry, start-up environments, innovation techniques and every grey area in between. The analysis of these articles will help identify the challenges of the industry, as well as discover the right tools to address them. Further research data will be collected by the inclusion of academic

articles, covering the same fields. This will provide a complete overview of the research and inputs might prove useful to the development of this thesis.

1 INNOVATION STRATEGIES

According to Johnson and Scholes (2002) the strategy is the direction and scope of an organisation over the long-term. It is a plan of what the company wants to achieve and how it is planning to achieve it with its resources within a challenging environment. Companies have different strategies at every level of their business. In this thesis, and this Chapter 1 in particular, I`m going to analyse first the environment, and later on the innovation strategy of big corporations.

1.1 Innovation environment

The strategies of companies are constantly under the influence of the environment where they are operating. Especially when it comes to innovation. The innovation environment has evolved radically in the past digital era and is full of constant turbulences. Every company wants to achieve the strategic supremacy, be the innovation leader. In order to do so, they have to understand the interaction between the environment and the strategy in order to tailor latter better. Therefore managers have to analyse current environment and understand the appropriate strategic paradigm for that industry. If the company is able to have a strategic supremacy it can determine the rules for others by using different patterns of discontinuities. Other companies can just follow and learn those rules.

Not all strategies are suitable for all environments. In fact, strategies that are suitable in stable environments, where companies can for example use Michaels Porter`s "five forces" to access the business, can be a liability in unstable ones. An example for that can be digital environment where we are witnessing a lot of fast changes, new trends and norms of behaviour. Communication market, as a subsection of this market, has seen a complete change of the environment. Some players won by providing new types of service to customers and other players (among them incumbents, big telecommunication companies) were forced to follow. Environment like this, with constant turbulences can be explained as hypercompetitive environment, where advantages are rapidly created and eroded. Concept introduced by D`Aveni (1999, p. 130) outlines that every company that is currently a leader can become a follower in a few years and on the contrary every challenger has a chance to become a leader.

According to D`Aveni (1997, 1999) there are four different types of hypercompetitive environments that require different strategies for success:

- Equilibrium (Environment characterized by little or no competence-destroying turbulence where incumbent controls the environment by creating barriers to entry the market and the rivalry.)

- Fluctuating Equilibrium (Environment characterized by rapid turbulence based on frequent competence-enhancing disruptions. Incumbents with core competences sustain their leadership by enhancing old products/services.)

- Punctuated Equilibrium (Environment characterized by brief dynamic periods of innovations, which are followed by longer periods of convergence.)

- Disequilibrium (Environment characterized by constant innovations that are replacing the old products/services.)

According to this classification the telecommunication industry in EU in general, before the deregulation, could be characterized as the equilibrium environment. Before the deregulation big telcos, incumbents, controlled the environment completely. But after the deregulation telecommunication industry`s environment changed and can be better explained as the fluctuating equilibrium; where the industry leaders, big telcos, with their core competencies sustain their leadership by layering new competencies on top of already existing ones. They are focused on their current services by making steady improvements, but fail to offer breakthrough innovations (D`Aveni, 1999). Their offerings make all other market players focus on the same products as well and to follow them. Additionally based on their core solutions they are selling different combinations/bundles of it. The leaders create wealth by leveraging on their networks and consumer base.

Communication market, as a submarket of telecommunication solutions, is however more dynamic and can be described as disequilibrium. The market leaders in this environment aren't telcos anymore, but OTT players. They are the ones who create new products with new competencies before the competitors do so. They gain advantage by being faster than rivals, in this case telcos, who spend more energy catching up and reacting. For the leaders in this type of equilibrium it`s critical to be flexible, creative, fast and aggressive; which are all characteristics that are usually lacking when it comes to big established companies.

Traditionally we focus on competitive advantage when talking about strategy, but D`Aveni with his hypercompetitive markets definition takes the alternative way. According to this definition strategy is about creating something new, that destroys the opponent`s advantage. Most big companies first start as small innovators by leveraging cheap technology to deliver good-enough capabilities at low prices. Once these innovations get adopted on a bigger scale, they are the market leaders and are faced by the market that they want to protect from any new disruptions.

1.2 Types of innovation

Two types of innovations according to Christensen (1992, 2000) are sustaining and disruptive innovations. Sustaining innovations are the ones that improve the performance of established products in the way that mainstream customers in major markets expect and value. Disruptive innovations, on the contrary, offer completely new products with new features that also enable new markets to emerge. Disruptive products are usually cheaper, simpler and more convenient for use. O`Reilly and Tushman (2004) add that companies have to always exploit and pursue sustaining innovations in their existing products, to operate more efficiently and deliver

greater value. Additionally, companies should also make architectural innovations and fundamentally change some components or elements of their current business. But nevertheless completely new products are the one that give companies significant first mover advantage.

In case of the communication market sustaining innovations can be all improvements of current offerings by telcos. Improvements of core communication services and bundling them in different packages to make them more appealing. Disruptive innovations on the other hand are the ones that were brought to the market by smaller companies; such as WhatsApp, Viber, and Skype. These solutions are cheaper, more convenient for use and have enabled a new market to emerge. Disruptive innovations are generally not good accepted among market leaders` customers, especially at the beginning. Nevertheless they can eventually become fully performance competitive and compete against the established products (Christensen, 2000). This is also something that I have noticed in the communication market. Firstly when OTT communication solutions were introduced they weren`t popular among users of established communication solutions, also telcos reacted in a negative way. As disruptive innovations, OTT communication applications, were first used by the smaller group of users and later got accepted among others.

Generally companies research and analyse the market for good future planning; this is nevertheless also the basis of a good management. When dealing with sustainable innovations this also is appropriate approach, because the size and growth rates of the markets are generally known and available. Moreover trajectories of technological progress have been established, and the needs of customers are well-known. On the other hand, when dealing with disruptive innovations market analysis isn`t really possible, because the markets don`t exist yet. There are no market demand data nor financial projections. Using marketing and planning techniques that were used for sustaining innovations are thus obsolete. Market leaders and followers can both be equally successful and have strong first-mover advantage (Christensen, 2000).

The organisational design and management practices employed by companies have a direct and significant impact on the performance of both, the breakthrough initiative and the traditional business. It seems that breakthrough innovations are difficult and companies aren't really free to do what they want. Their suppliers, investors, and especially customers are pointing towards established lines of business. This presents a strong barrier to innovation, because the focus is on existing competitive advantage and not on identifying and creating the next sets of advantages (Owens & Fernandez, 2014; O`Reilly & Tushman, 2004; D`Aveni, 1997).

1.3 Innovation strategies in theory and practice

It is surprising that companies that are aggressive, innovative, customer-sensitive fail when it comes to finding new technologies and markets (Christensen, 2000, p. 24). Most successful companies are focused on their current products and fail when it comes to pioneering radically new products, or as explained before disruptive innovations. Failure to achieve breakthrough innovations, while making steady improvements to old products, is however a common problem among big companies according to O`Reilly and Tushman (2004, p. 74). Although

big companies are trying to be more innovative by building internal culture of innovation they don`t seem to succeed. Their projects are usually big budget spenders, that move very slow and are focused on "me-too" products that fail to enter and succeed on the market (Owens & Fernandez, 2014).

The reasons for difficulties are different. They can be explained as a consequence of organisational and managerial structure, too much focus on current capabilities and radical technology, and additionally, they can be explained through value networks.

Organisational and managerial structure can be one of the explanation of why big companies fail when it comes to breakthrough innovations. There are many different analyses of this topic and most of them conclude that bureaucracy, complacency, quarterly budgeting, salary based compensation, creative thinking and "risk-averse" culture are among reasons for that failure (Christensen, 2000, p. ix; Owens & Fernandez, 2014, p. xiii-xvi). The organisational structure of established companies is usually focused on component-level innovations, because most product development organisations consist of subgroups, that correspond to a product`s components. Systems as such work well until there are no disruptive innovations that would require a change. When this happens, that new technology changes are required, organisational structure presents a strong barrier to innovations and it prevents employees to communicate and work together in new ways (Henderson & Clark, 1990; Christensen, 2000; Owens & Fernandez, 2014).

Once companies set up internal innovation units, these are destined to fail for three reasons. Firstly, employees aren`t free to focus on high-growth opportunities. They have to address incremental innovations that lead to marginal growth. Mature business namely requires a focus on current customers and existing products, which is imbedded in employees` mind-sets. They internalize the company`s values and competences, which disables them to think out of the box and innovatively. Second reason for the failure is the fact, that employees in internal innovation units receive a salary, which can be demotivating in this case (real entrepreneurs are facing risk of losing everything and this drives the motivation). Employees execute well-defined responsibilities in return for agreed-on wages and they don`t take any big risks. Although this is a classic arrangement, it severely diminishes the motivation to be innovative. And thirdly, company`s innovation departments lack the financial structure, because they have to compete for funding on internal capital markets as any other department. Even though it takes years to show results, this departments have to show them on a semi-annual or annual timeline and are so forced to play corporate politics (Owens & Fernandez, 2014).

Established companies tend to be good at improving their current offerings with sustaining technologies that they already possess. Entrant companies, on the other hand, are good at exploring new technologies; also because they import the technology that was used and practiced before in another industry. The company`s historical choices affect its current knowledge and skills. Consequently when the company faces new challenges, where it can`t apply previously acquired skills and capabilities, it stumbles. Study of Tushman and Anderson (1990) says that most firms fail when a technological change destroys the value of competencies that were previously cultivated. On the contrary, they are successful when new

technologies enhance the competencies. These findings definitely affect companies that are facing new technologies.

Value network, introduced by Christensen (2000), describes how companies identify and respond to customers` needs, solve problems, procure input, react to competitors, and strive for profit. Within a value network each company's competitive strategy determines its perception of the economic value of a new technology. These perceptions consequently shape the rewards different firms expect to obtain through pursuit of sustaining and disruptive innovations. In established companies expected rewards drive all allocation of resources toward sustaining innovations and away from disruptive ones.

Value network strongly defines what companies can and cannot do. It influences company's ability to arrange and focus the necessary resources and capabilities to overcome the technological and organisational difficulties that present barriers to innovations. For that reason big companies with established value networks are likely to lead their industries in innovation of all sorts that address needs within this value network. On the contrary the same companies lag in the development of innovations that address the needs of customers in other emerging value networks. Disruptive innovations are complex, because their value and applications are uncertain according to the criteria by established companies. Ignoring technologies that do not concern your company`s customers can become fatal though. Technologies that are initially present only in emerging or commercially remote value networks may migrate into other networks and encourage innovations in new networks to attack established ones. In situations as such technological progress diminishes the differences across different value networks. Additionally new entrants have attacker`s advantage over established firms in those disruption innovations, because they can identify and make strategic commitment to attack and develop emerging market applications, or value networks. They are more flexible than established companies and can change strategies and costs structures (Christensen, 2000).

In addition to analysing company's capabilities and resources, when thinking about new technologies, companies have to examine the implications of innovations for their value networks. The key considerations are whether the new technologies will be valued within the current networks; if they have to address new networks with these technologies, or even create new ones; further more they have to consider if new technologies may eventually address the current customers' needs in the future in case markets intersect (Christensen, 2000).

1.3.1 Skunk works, intrapreneurship and innovation labs

Although most of big companies have started innovating, it seems that they aren`t really successful. As discussed before reasons for that might be different, but usually companies are focused more on sustainable innovations and thus they present just different versions of already existing products. In order to change that, companies implemented different innovation models in the past.

In 1940s M. Lockheed introduced skunk works model of innovation where the best and brightest researchers were isolated from the influence of the rest of the company. This gave the researchers the necessary autonomy, independence and freedom to escape the established

lines of thought and allow them to be disruptive. This model was used by IBM to nurture the personal computer (hereinafter PC), by Ericsson Mobile Communications to develop the Bluetooth technology. The model is still being employed by many large innovative firms, such as Intel, HP and Apple, to develop potential breakthroughs (Fosfuri & Røndeb, 2009; Wang & Kleiner, 2005; Christensen, 2000).

The skunk works model is claimed to bring several advantages, but in Owens`s and Fernandez`s (2014, p. 40) opinion it`s insufficient to ensure corporate survival during unpredictable market shifts and rapidly mounting competition. Additionally, because they often threat existing lines of business, they are generally kept secret and this makes it hard for them to cooperate with the company on any matter.

Alternative innovation program that is more open-ended is intrapreneurship (subset of a larger concept of corporate entrepreneurship). In contrast to the previous concept, this one is aiming to commercialize the employee ideas. Intrapreneurship allows an organisation to take advantage of promising ideas. The model is widely publicized and not kept secret. All employees have ideas to improve processes, but usually they don`t know what to do with them. This concept is enabling that and additionally it`s boosting their morale and promoting the company`s innovative spirit. Companies have the capacity to support intrapreneurship from the bottom up to transform the ideas into products and services that have value in company`s external and internal environment. It works on a waterfall model: coming up with the idea, drawing up the business plan, pitching it to an existing department, building the product and at the end being absorbed by the department (Desouza, 2011; Owens & Fernandez, 2014).

Similarly than with the skunkworks, also intrapreneurship isn`t as successful as it is supposed to be in practice. Most companies hold on to existing corporate structures, employees have their know-how and are involved in department politics which makes hard for them to let go and think out of the box. Thus the results are rather sustaining than disruptive innovation (Owens & Fernandez, 2014).

Lately another innovation concept has become quite popular among big corporations: the innovation lab. Companies pursuing this method gather a number of salaried intrapreneurs in an easy-going, entrepreneurial, start-up-like office that is supposed to encourage workers to come up with new innovations. The ultimate goal is to incorporate new solutions into existing or new products that will be useful, entertaining, and ultimately profitable for both, users and the companies that create them. Each company has its own innovation lab that offers a unique window into the company's research culture and vision. And although this sounds good, big companies aren`t commercializing any of its inventions discovered there. Although innovation labs are well prepared, they can`t seek for funding outside the company and are thus at the mercy of quarterly budget and aren`t equipped to scale their success. The efforts of innovation labs of big corporations rarely accomplish anything of a long-term significance. They lack the autonomy, incentives, financial structure etc. On the other hand, the innovation labs of search and social media companies (Facebook, Google, Twitter …) have made their ideas and new tools open to the public to test, play with, break, and offer valuable feedback and comments on what works and what doesn't, which turned out as a successful idea (Gordon-Murnane, 2011; Owens & Fernandez, 2014).

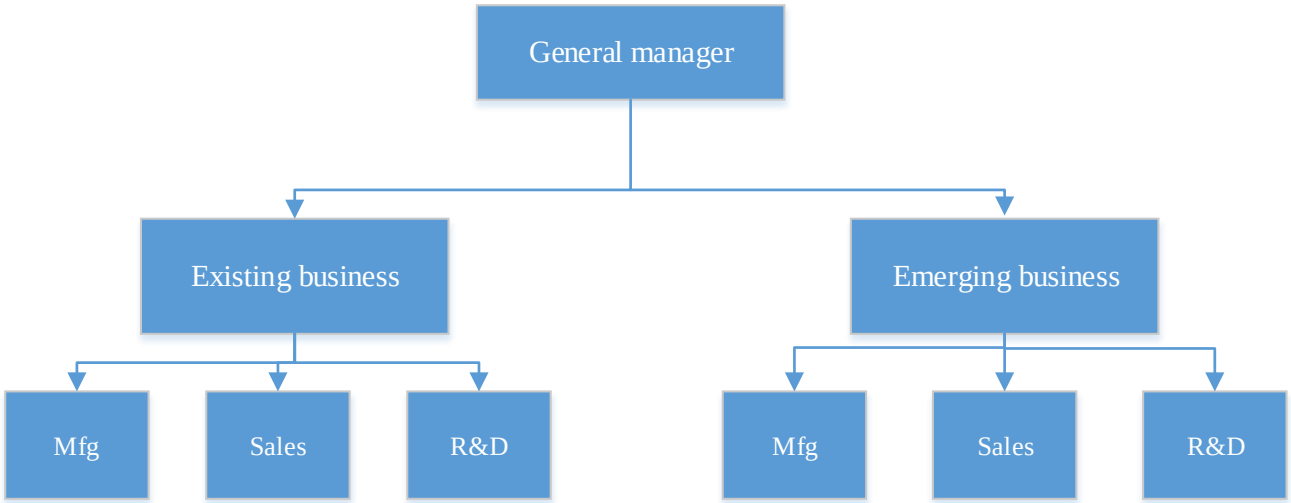
Since none of the mentioned concepts introduced breakthrough innovations, Owens and Fernandez (2014) introduced the concept of the innovation colony. This is a settlement where entrepreneurially minded employees and talented marketers, engineers, designers… from outside the company can build new products and services and bring them to market. It works as a bridge between the entrepreneurs and established company. It's funded by the established company, which in return has access to fresh ideas and insights on emerging technologies and trends. It`s consisted of small teams that are focused on conceiving new products, validating the market for them, and guiding them to product/market fir with increasing reliability and decreasing costs. The main aim of these teams is to test large numbers of ideas, so that they can be the first one to market it. I will analyse their concept further in the Chapter 1.3.4.

1.3.2 Ambidextrous organisation

The concept of ambidextrous organization by O`Reilly and Tushman (2004) theorises that companies that want to do disruptive innovation need to focus on both, their core business model and innovations in parallel. The ambidextrous organization requires executives to explore new opportunities while they are exploiting existing capabilities. This appears to be very hard for most of the companies, because they lack the flexibility, adopt a venture capital model or have cross-functional teams that aren`t successful.

In order to exploit and explore successfully at the same time, they have to separate their new exploratory units from traditional exploitative ones and so allow the different processes, structures and cultures. Meanwhile both units are connected via the senior executive level. This structure, illustrated in Figure 1, allows cross-fertilization among units and simultaneously prevents cross-contamination. Tight coordination from the management side enables the new exploratory units to get the necessary resources from the traditional units (such as financial resources, talent, expertise, customers etc.). At the same time the separation ensures that the new unit isn`t under the influence of the established company`s culture (O`Reilly & Tushman, 2004).

Figure 1. Structure of ambidextrous organisation



Source: O`Reilly & Tushman, *The Ambidextrous Organization*, 2004, p.79.

Ambidextrous organisations need ambidextrous senior teams and managers that have the ability to understand and be sensitive to different kinds of businesses. The vision of the company has to be clear and compelling and persistently communicated by a company`s senior team (O`Reilly & Tushman, 2004).

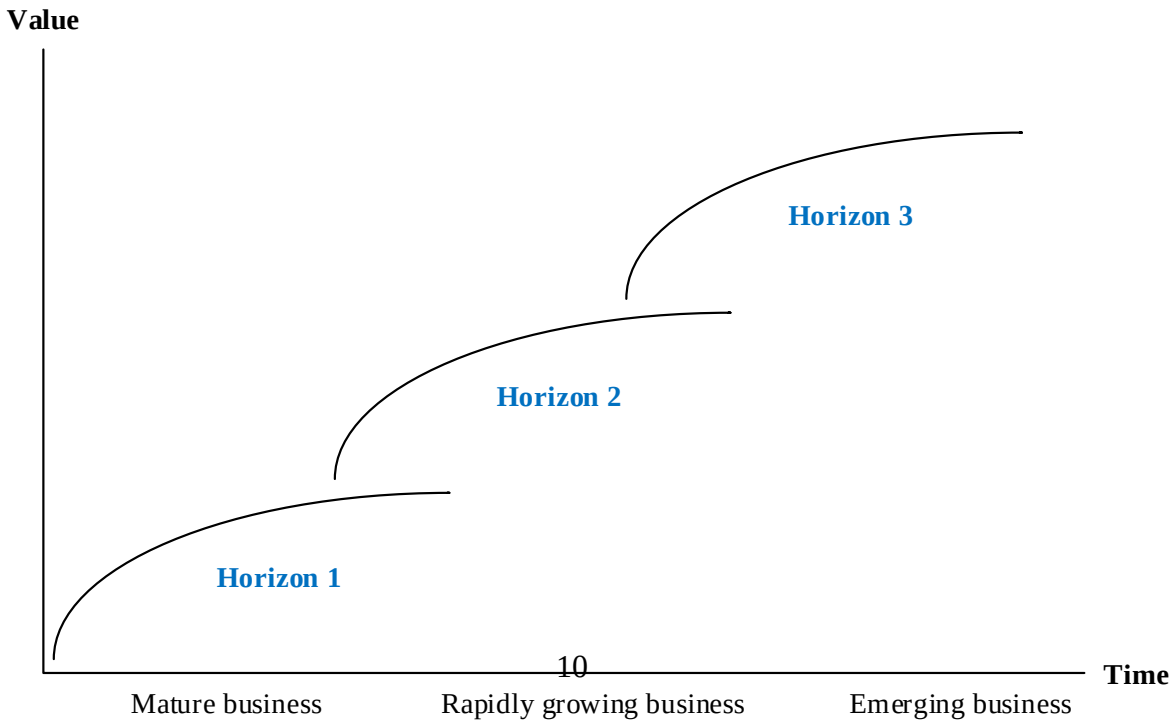
Although ambidextrous organisations have been proven successful, this theory presents just an idea and it lacks the practical part. It doesn`t say how companies should engage with the theory in real life, how they should balance the tension between exploitation and exploration; this is the key challenge of this theory.

1.3.3 Three horizons of innovation

Although Christensen (2000) made a clear distinction between sustainable and disruptive innovations, Baghai, Coley, White and Coley (2000) went a step further, because there are innovations that don`t fall into any of both categories. They introduced three categories of innovations that are called Horizons. Each horizon requires different focus, management and strategies; nevertheless companies have to deal with all of them simultaneously.

Figure 2 illustrates the categories graphically. Time on the x-axis suggests the phase by which businesses move over time (from Horizon 2 to Horizon 1, or from Horizon 3 to Horizon 2). The y-axis represents the growth in value that companies may achieve by attending to all three horizons simultaneously.

Figure 2. Three horizons of innovation



Source: Baghai, Coley, White and Coley, *The Alchemy of Growth: Practical Insights for Building the Enduring Enterprise*, 2000, p.5.

Horizon 1 is a mature core business that is critical to present performance of the company and that provides the greatest profits and cash flow that can be used for growth. They usually have some growth potential left, but will sooner or later flatten out and decrease. The focus in this horizon is on improving performance to maximize the remaining value. Horizon 1 have to be successful in order for Horizon 2 and 3 to start and be effective as well (Baghai, Coley, White, & Coley, 2000).

Horizon 2 is a rapidly growing business that is likely to generate substantial profits in the future. They are the emerging stars of the company that will attract investors` attention in the future and could transform the company; nevertheless not without considerable investments. For that reason the focus in this horizon should be on initiating resources, increase revenue and market share. Horizon 2 takes time and demands new skills, but is essential for the company`s growth (Baghai et al., 2000).

Horizon 3 is an emerging business; real activities and investments towards finding out future business. They are research projects, pilot programs, or minority stakes in new businesses. The focus here should be on discovering options for future opportunities and understand the first steps toward actual business. In case they prove successful they will be expected to reach first Horizon 2 and then Horizon 1 in the future (Baghai et al., 2000).

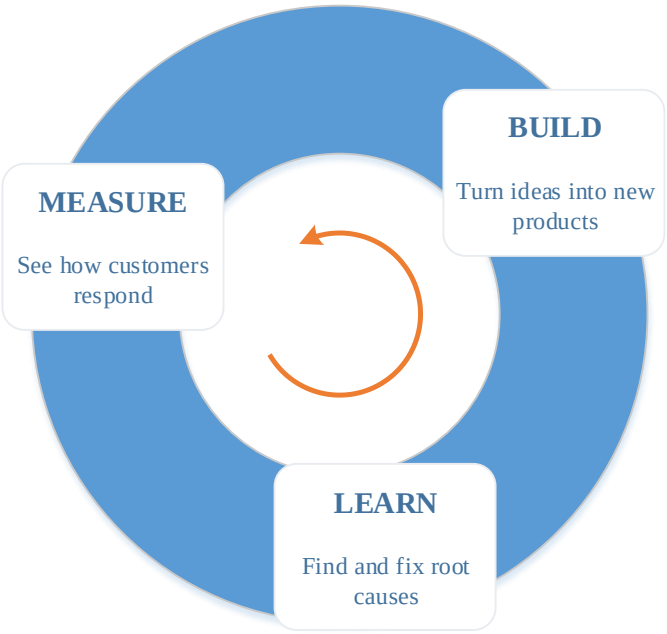
Although the theory uses a good explanation and provides a structure for companies to assess potential opportunities for growth without neglecting performance in the present, it doesn`t really make a clear strategy of how to deal with that.

1.3.4 The lean enterprise

Opportunities and new markets are very unpredictable and companies have to react to them quickly and aggressively. Owens and Fernandez (2014) managed, what previous authors failed, and clarified a way of how big corporations can be as successful innovators as start-ups. According to them also big companies can employ the lean start-up method of innovation, that was introduced by Ries (2011). The lean start-up method explains how can start-ups develop and introduce new products faster and more successfully. The core of the method is a combination of business-hypothesis-driven experimentation. The process is illustrated in Figure 3. In order to be successful, companies should constantly build new products and turn ideas into new products. They should start with minimal viable products that can be with end-customers quickly and can thus shorten the feedback time. Measurement of the performance of new products is essential to the whole process to see how customers respond. Last but not least, companies always have to learn, find problems and solve them accordingly. The method offers a repeatable way to determine who the customers are, what they want, how to deliver it, and how to make money along the way. By developing products that customers really want and introduce them early, they can reduce the risk and be successful.

The model is also useful to measure the functionality and efficiency of the team itself. By measuring successfulness in the past, their current occupation and efficiency, planning milestones and prioritizing, it is possible to determine when to stay in the same business model or when to change it.

Figure 3. The lean start-up process illustrated



Owens and Fernandez (2014) incorporate the lean start-up method into their theory and claim, that even big corporations can innovate as efficiently and successfully as small start-ups. According to them any innovation strategy should be broader and more flexible than a typical corporate strategy. They describe it as a matrix by control and momentum that yields following four strategies:

1. Incubation, that offers high control and low momentum. Start-ups that are incubated internally have no momentum and the innovation team is creating something new from scratch. For that reason, company also has the maximum control of processes and innovations.

2. Acquisition of start-ups enables company to take advantage of any momentum that company already has and high control. If they acquire it quickly, in lower momentum they gain the access to their talent.

3. Investment into start-ups that can`t be acquired gives the company access to high momentum, but low control.

4. Partnership with start-ups with low control and low momentum that enables companies to exchange soft assets such as contacts and mentorship for insights, relationships, and ideas that will help them become more innovative.

By engaging with one of the described strategies, companies can get an insight into potentially disruptive trends, that they otherwise wouldn`t notice. They get a close-up view of emerging business model that can be generalized also outside the start-up environments. Additionally they can build strategic partnerships and gain access to technology that would otherwise be unavailable. By doing so, companies have access to start-up employees that might be potential future hires and would bring a fresh, valuable perspective and experience into the company. Last but not least, by engaging with these strategies, this changes the association of company's brand with innovation, which leads to better reputation (Owens & Fernandez, 2014).

Although most of the companies have some kind of innovation departments, they are usually an extension of business as usual; they pursue projects that are dictated from top management and are not equipped to react to shifts on the market. Additionally they are managed as separate functions and are not coordinated in a unified way to generate innovation flow. The enterprise environment is meant for execution, which is enabling innovation. Innovation is a process of discovery that has to take place before execution, for this reason also the environment has to change accordingly. Innovation environment requires new culture, priorities and processes. And different business models, such as skunkworks, intrapreneurship, innovation labs and different partnership have a big weakness – lack of autonomy. All this is leading to sustaining innovation, which is also needed, but isn`t introducing and disruptive innovation. For this reason Owens and Fernandez (2014) suggest the establishment of innovation colonies.

Innovation departments (innovation colonies) to be successful have to be completely separated from other departments on a day-to-day working topics, but they require unconditional cooperation of other departments, such as access to data, expertise, materials, intellectual property etc. The employees of innovation colonies should be extraordinarily creative, energetic and independent. And for the success they also need an innovative culture, where taking daring risks is a norm, where day play by rule "take it, or leave it" and are for that reason also rewarded when their bets pay off. For established companies it is hard to change their culture. That kind of change requires changing the components of the company that make it what it is; in which case it wouldn`t the same company anymore. Instead of changing the culture, new culture has to be created and different, separate organisation. For that reason, innovation departments have to be based outside the established company; be a separate facility. In case it is an acquired company, it should stay in their original offices and have the permission to act independently. Moreover it should have its own brand and should be its own legal entity. With that structure employees in innovation departments don`t take directions from the executive suite, but should rather discover opportunities freely. In order for them to react quickly to market shifts, it`s better if teams are smaller – three to five people combining business, technical and design background. They should all be involved in all functions, especially at the beginning (Owens & Fernandez, 2014).

Last but not least, for big corporations to be successful, they should have more innovation departments at once, to be effective. Each of them focusing on different needs, markets, products etc. Owens and Fernandez (2014) conclude, that the more innovation departments the corporation has, the more it can benefit from it.

2 TELECOMMUNICATION INDUSTRY

Core communication products offered by telecommunication companies are Voice (fixed, mobile and lately also over IP) and mobile messaging. Due to consumption trends and competition these services feel great pressure on prices and are facing uncertain future.

Voice communication solutions have always been the core of telecommunication solutions and present the most reliable and ubiquitous method of communication. Initially this was voice communication via circuit switching (hereinafter CS)[1] that started off as a disruptive innovation in 1900s. In this case fixed lines are the traditional lines/cables that connect users` end device (fixed telephone) to the public switched network (Definitions of the Telecommunication indicators used in the EUROSTAT telecommunications inquiry in Eurostat, 2015). Later on, as greater mobility was desired, the industry was working on upgrading fixed voice service and introduced mobile voice. Although mobile phones are nowadays the principle service of access to telecommunication solutions, it still is a sustaining innovation. It allows users to move freely while being connected to the network. They are connected either to terrestrial network or satellites and these two are connected to the public switched telephone network (hereinafter PSTN). This enables users to be directly connected to a telecommunications operator, which connects that user to the public telecommunications network (Definitions of the Telecommunication indicators used in the EUROSTAT telecommunications inquiry in Eurostat, 2015). In general mobile service is the same as fixed, users are just using different ways to access the network.

Short messaging service (hereinafter SMS), also text messaging, is a service for sending short messages of up to 160 characters to mobile devices. They can be transmitted within the same cell or to anyone with roaming service capability (Short message service (SMS) definition in TechTarget, 2015). For the commercial use it was first introduced in the early 1990s and, as a disruptive innovation, it changed the communication industry dramatically. SMS has long been the main resource of revenues for telcos as it was a big margin generator. However this service is more vulnerable than Voice, because it`s easier for new providers to differentiate (Nakajima & Bonneau, 2013, p. 7; Sale, 2013).

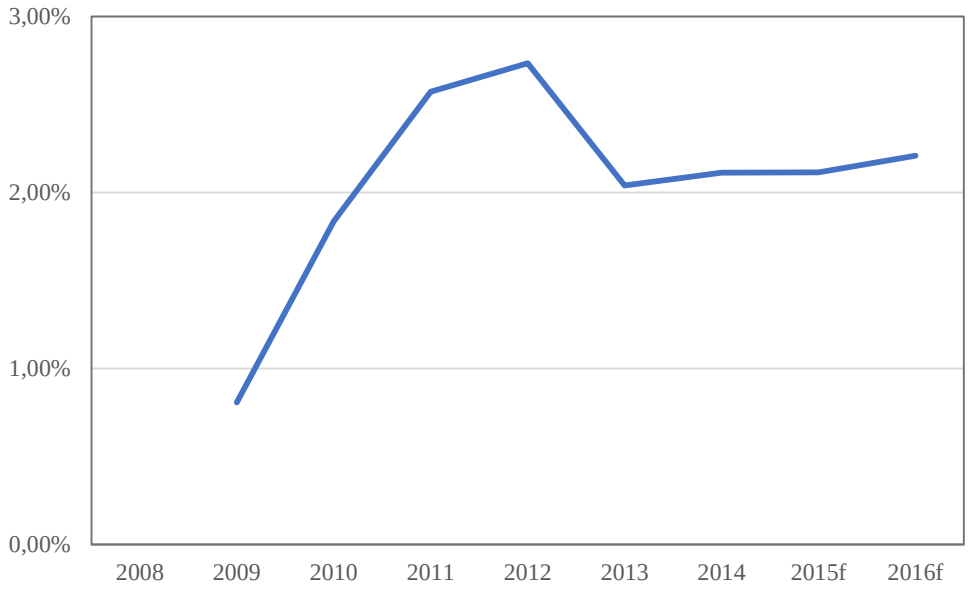
2.1 Overview of the global market for telecommunication services

Figure 4 presents the annual global growth of telecommunication services in years from 2009 to 2016. After a continuous growth from 2009, the growth dropped to 2% in 2013 because of the crisis in Europe; however this is forecasted to stabilize and increase in the following years. The growth is currently driven by emerging countries, while revenues from developed countries are slowly decreasing. Since 2009 the revenues from developed countries dropped by 1% each year. The most dramatic was drop in EU countries; from 2008 till 2013 the revenues dropped by 13%. The second were United States of America (hereinafter USA) with 7% decline in revenues in the same time span. The drop in revenues is mainly caused by

[1] Circuit switching is a type of network in which a physical path (a wire) is connecting two end-points in the network for the duration of the connection. During the connection no one else can use the physical lines involved (Circuit switched definition in TechTarget, 2015).

decline in fixed telephony. Since 2008 the fixed telephony has dropped by 7% each year. Some countries (China, Spain, France and Poland) were reporting even about the drop of 13% (IDATE, 2014a; Pouillot, 2014).

Figure 4. Annual growth in global telecommunication services market, 2009-2016 (%)



Source: IDATE, *World Telecom Services Market*, 2014.

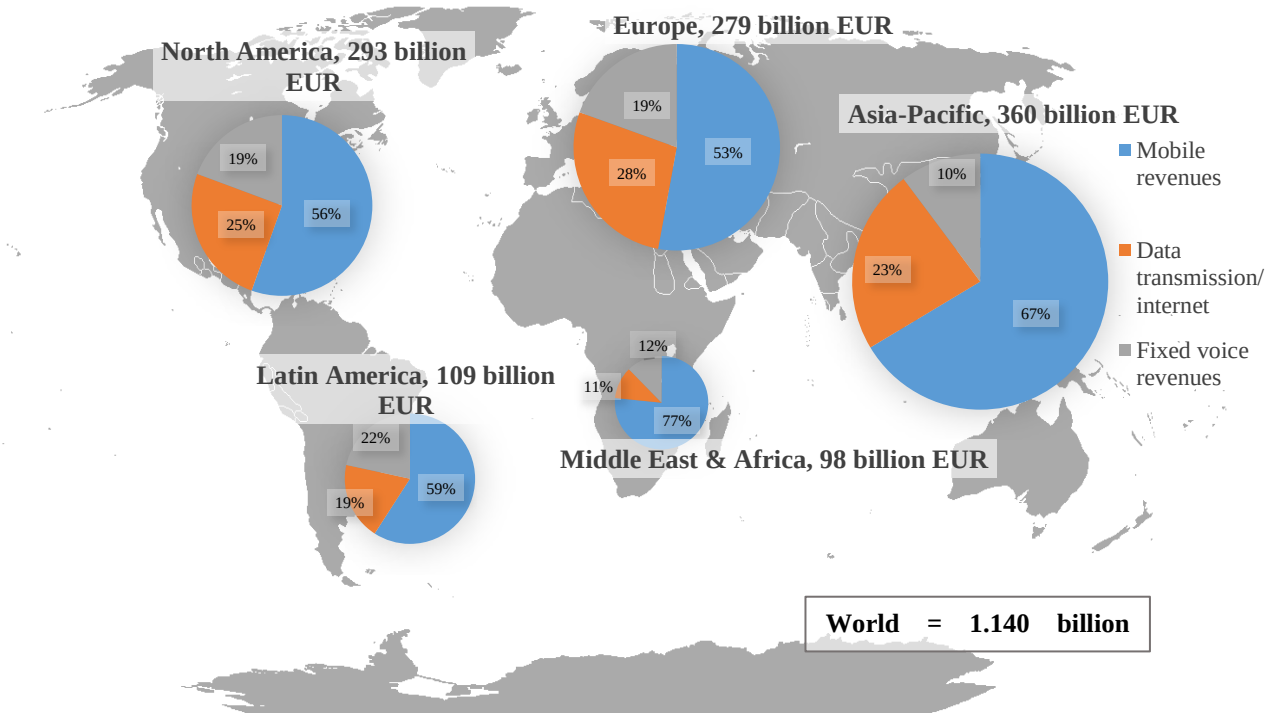
It is not surprising that developing countries are driving the growth, when countries such as India and China have the largest populations. They occupy the first positions in the number of mobile customers globally and this doesn`t seem to change in the future. What is surprising though is, that average per capita spending in those countries is the smallest one; ranking from 1 EUR/month in India to 17 EUR/month in Brazil (IDATE, 2014a). Among all countries, in Switzerland the average per capita is the highest with 87 EUR/month, followed by Australia, USA, Canada and EU countries. Looking at the historic data I can see the trend of average expenditure rising in developing countries and weakening in developed markets.

In 2014 the revenues from telecommunication services were 1.144 billion EUR on the global level (IDATE, 2014a). The market is growing moderately since 2011 and in 2014 the growth was 5.1%. Growth is based mainly on the expansion of mobile services (voice and SMS), since they account for more than half of the turnover of all services (59% of total services) and remain the main source of telecommunication revenues. Revenues from data transmission and Internet services increased by 5% in 2014 and revenues from fixed telephony continue to fall by 6% each year.

In geographic terms 33% of all revenues from telecom services come from Asia-Pacific, 25% from North America, 24% Europe, 10% Latin America and 8% Africa and Middle East (IDATE, 2014a).

Figure 5 shows the turnover of telco solutions in 2014 in geographic terms. The size of the circle presents the share of total revenues and each circle is divided among three areas of revenues – mobile services, data transmission and fixed voice services. The biggest share belongs to Asia-Pacific (hereinafter APAC), following by North America and Europe. In all those regions more than half of the revenues come from mobile services, followed by internet services and the smallest share from fixed voice revenues. Even in the developing countries in Latin America and Middle East and Africa (hereinafter MEA) the mobile services present the biggest part of revenues.

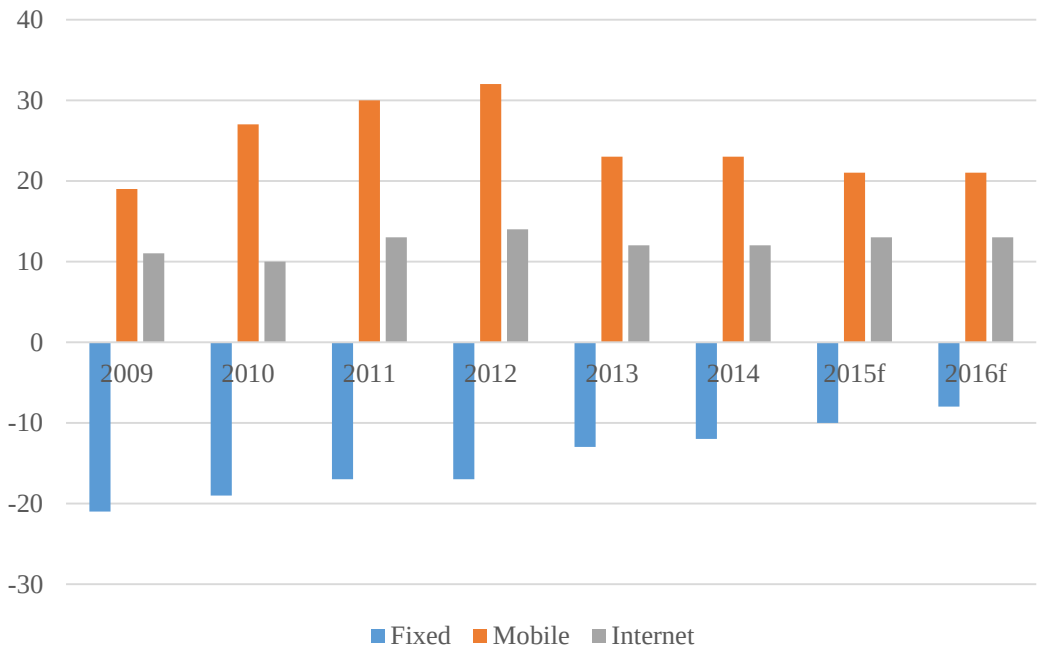
Figure 5. Breakdown of turnover of telecom services in the world in 2014



Source: IDATE, *World Telecom Services Market, 2014.*

Figure 6 shows the breakdown of revenues from 2009 onwards. Since 2009 the fixed voice services are continuously declining and this trend doesn`t seem to stop in the future according to the IDATE`s (2014a) predictions. Also the decline in growth of mobile services is clearly visible after 2012 and is a main cause for the weaker growth in general in the past years, as mentioned earlier. Meanwhile the revenues from internet services are increasing and are going to increase also in the future.

Figure 6. Contribution to the revenue growth of telecom services in the world, by segment, 2009-2016 (Billion EUR)



Source: IDATE, *World Telecom Services Market, 2014.*

Fixed telephony

Over the past decade the global fixed telephony lost 44% of its value (IDATE, 2014a). The fall was significant in Europe and North America (more than 40%). The revenues dropped also in APAC (55%) and Latin America (17%), but they increased in MEA (by 10%). According to IDATE (2014a) database, revenues from fixed telephony will continue to fall by 15% in the next 4 years.

Between 2009 and 2014 around 200 million fixed lines were deactivated worldwide; the most in Asia-Pacific. Additionally also the penetration of this service has fallen (IDATE, 2014a; Pouillot, 2014, p. 29). Nevertheless the service is still present in advanced markets where the infrastructure is good (Europa and North America where the density is around 25%). On the contrary in emerging countries where there is no infrastructure and the roll-out costs are high, this access mode is being abandoned and replaced by mobile telephony, which can be rolled-out faster and cheaper. Although there is a sharp decline in fixed service, it is not likely that users will abandon this altogether. Fixed voice still remains the most reliable and ubiquitous method of voice communication

Mobile voice and SMS

As mentioned, there is a continuous transition globally from fixed to mobile voice services, which is also caused with the emerging countries not having any fixed line subscriptions and they go straight to mobile (Nakajima & Bonneau, 2013; Pouillot, 2014). Mobile services were consequently the main source of growth in 2014 and in the years before. Although the growth was "just" 3.4% in 2014, it was constantly around 5% from 2010 and 2012 (IDATE, 2014a).

Data transmission (the Internet)
The revenues of data transmission have almost doubled in the past decade, however since the 2009 crisis, the growth has fallen to approximately 5% per year (against 12% in previous years) (IDATE, 2014a). Looking regionally, Europe has seen the lowest growth of revenues, followed by North America. Nevertheless the growth of volume is persistent and presents 50% growth for Europe and North America combined. IDATE (2014a) database projects even further growth of revenues from data transmission (18% by 2018).

Looking at the data from the previous years and the forecasts, I can conclude that although the revenues from data transmission have almost doubled since 2008 and telcos have solid earnings (+29 billion EUR 2008-2014), these aren`t high enough to cover losses from fixed telephony revenues (-48 billion EUR 2014). The fixed voice service is losing the most revenue globally and this trend doesn`t seem to stop. Moreover the data transmission stopped growing as fast as in the past, but the growth is still high (20% in 2011 and 8% in 2014). It appears that the services are reaching maturity[2] in developed countries and are under competitors' pressure. The penetration isn`t that intensive anymore and the number of customers is increasing more slowly.

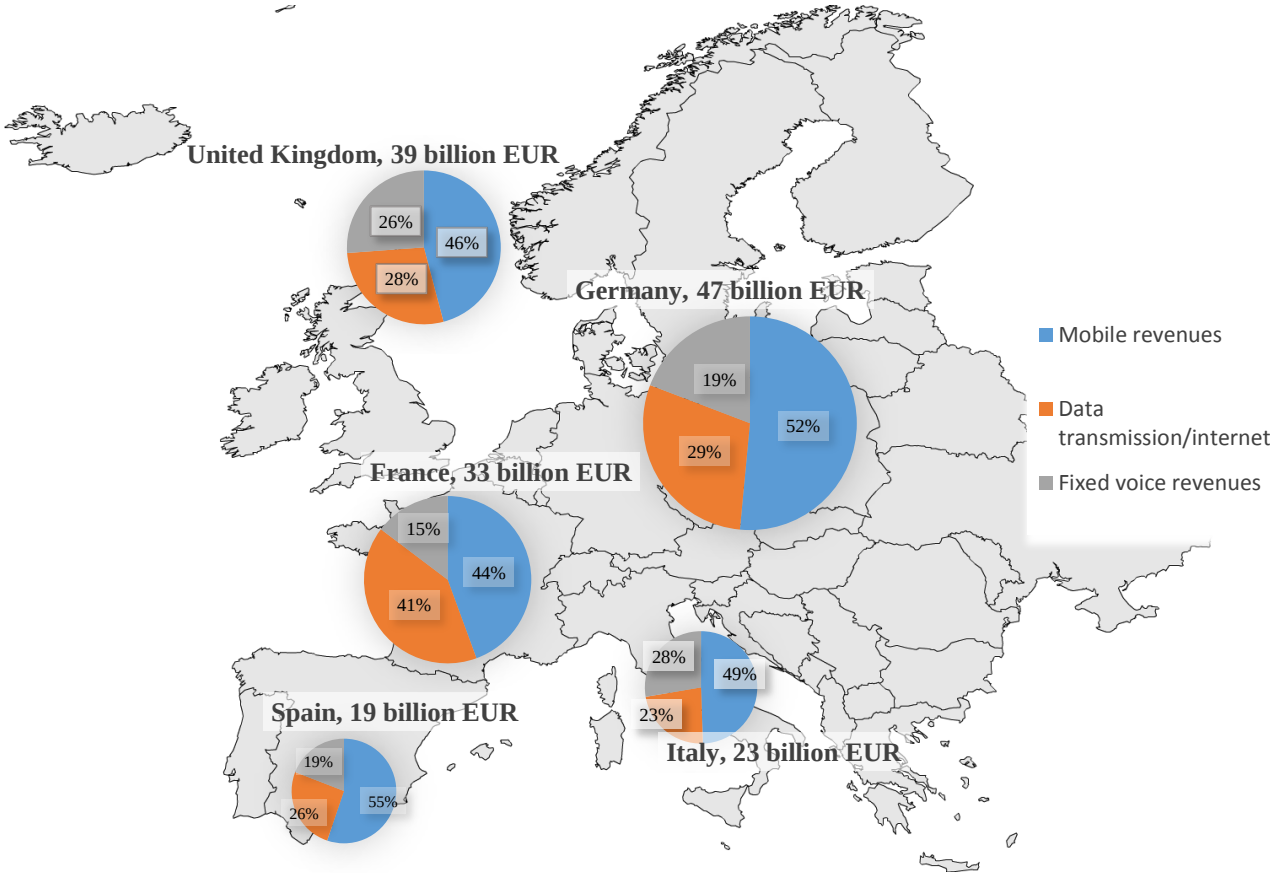
2.2 Overview of European Union`s market for telecommunication services

The challenges that telcos are facing on a global level are further intensified in EU by the grim economic situation. In 2012 telecommunication markets encountered their fourth consecutive year of recession (IDATE, 2014a). The competition is very stiff and the demand for solutions shows how fragmented EU market actually is. The average price of a fixed national call decreased by almost half over the last 10 years, similarly the international calls. The price of mobile calls dropped even further, by close to 60% in the same time span between 2002 and 2010 (Pouillot, 2013). In general when services reach the maturity this usually means that they are still growing, but slowly. But in the EU market this isn't the case. The stiff competition, demand and market trends are constantly lowering the prices, which presents a huge threat for telcos in these countries.

Figure 7 illustrates the breakdown of telecommunication services in the main European countries in 2014. Same as on the global map the size of the circle presents the share of the total revenues and each circle is divided among three areas of revenues – mobile services, data transmission and fixed voice services. Germany is the number one market, followed by the United Kingdom (hereinafter UK) and France. Revenues are mainly coming from mobile services, followed by internet services and fixed voice services. European market is still far from being homogenous; especially in the case of data transmission/ the Internet. National mobile markets are in the process of consolidation due to market maturity and reduced growth.

[2] The penetration of mobile solutions, for example, was 80% in the emerging markets and above 100% in the developed world, which suggests that the service has reached the maturity.

Figure 7. Breakdown of telecom services in the main European countries in 2014



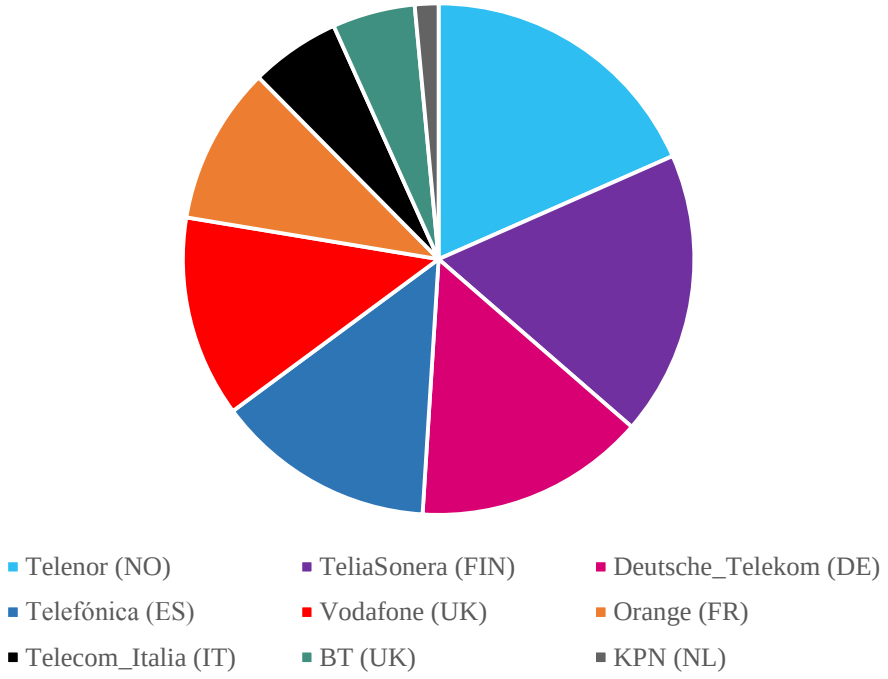
Source: IDATE, *World Telecom Services Market, 2014.*

Traditional voice landlines (fixed voice) are facing constant decline since 2012 also in the EU. Between 2009 and 2014 the revenues have shrunk for 38% (30 billion EUR). Mobile voice usage has significantly higher usage on the other hand. Reason for this is also the number of devices, as most households share one fixed device with all inhabitants, they don`t share mobile devices. However, also the revenues from this service have shrunk by 27% (32 billion EUR) between 2009 and 2014. Both revenues are expected to decline also in the future, but mobile not as sharp as fixed (Nakajima, 2012, p. 18; Pouillot, 2014; IDATE, 2014a).

2.2.1 Main players in the European market

In 2014 the revenues from all telecommunication services in Europe were 279 billion EUR which presents 25% of global revenues and so the third biggest market (IDATE 2014a, 2014b). Figure 8 illustrates the top 9 telecommunication companies in European countries based on revenues in 2013. Among the biggest ones are Deutsche Telekom (hereinafter DT), Telefonica, Vodafone and Orange.

Figure 8. Share of the biggest European telcos based on revenues in 2013 (in %)



Source: IDATE, *World Telecom Services Players, 2014.*

Globally the top 30 telcos earn more than 50% of their income outside their domestic market and among those are five European operators: Vodafone, Telefónica, Telenor, TeliaSonera and Deutsche Telekom. Besides these also Orange and Telecom Italia get around 30% of their income outside (Pouillot, 2014, p. 51).

Most of the European countries have oligopolies in mobile markets, although this trend is starting to disappear. In Germany and Italy the rivals are getting stronger and stronger and in some countries there is a high market concentration (the Netherlands, the UK, Austria and Ireland). Moreover in France the market situation is getting close to perfect competition (Pouillot, 2014).

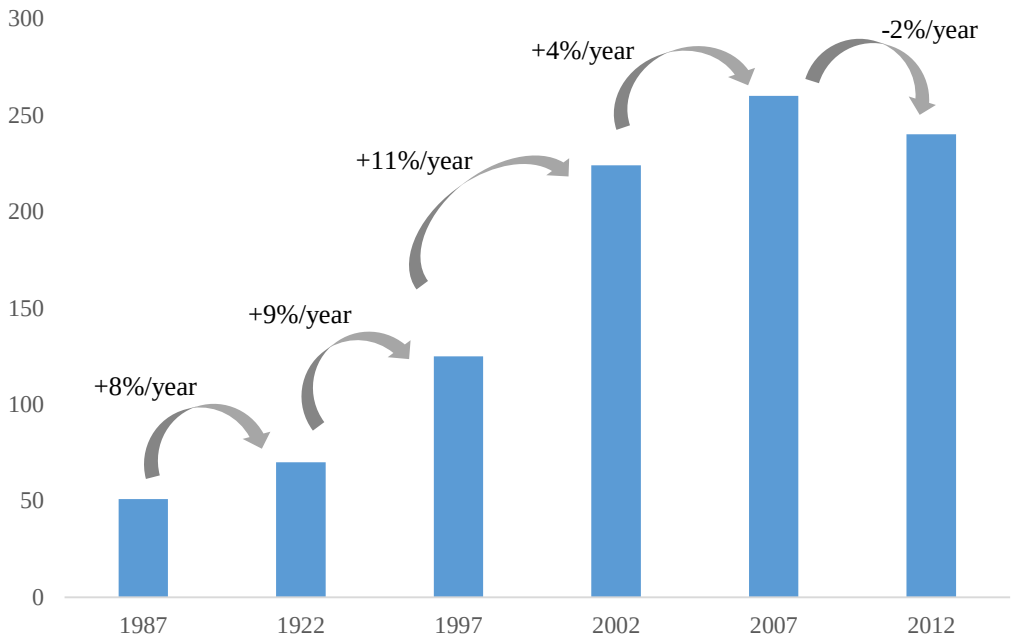
Generally the revenues of European telcos` dropped by 6.5% in 2013 (IDATE, 2014b). The exception were Deutsche Telekom and Telenor. The main reason for this drop are competitive pricing, bundling services and offering more and more for the same price. All of them, except Telenor[3] and SFR[4] are investing strongly (despite the grim economic situation) in the Long term evolution (hereinafter LTE) networks to differentiate themselves in the future.

[3] Telenor was an LTE pioneer in Europe and started investing earlier than others in the update of the network (Pouillot, 2014, p. 48).
[4] SFR changed the commercial strategy and the valuation of it`s network while being hit by competitors (Pouillot, 2014, p. 48).

2.2.2 Single market initiatives

According to Pennings (2015, p. 5) Europe's telecom sector was considered a success story for many years, however the situation has changed in the past years. There are different factors that can be marked as unfavourable for the European telecommunication market. Next to the economic downturn, these are also the cultural and linguistic barriers among EU countries (that don`t exist in the USA or China for example). Although the European market as whole is big, with its 500 million inhabitants in 28 countries, these people aren`t able to communicate to one another in their own language, which can present an obstacle when it comes to communication, if they don`t speak any common foreign languages. This in turn can affect the telecommunication industry in this region. Besides the linguistics, also the European telecoms policy and regulatory frameworks are one of the reasons for the harsh environment (Penings, 2015).

Figure 9. Telecom services revenues in Europe, 1987-2012 (Billion EUR, % growth)



Source: Pennings, *Single Market initiatives*, 2015, p. 8.

Figure 9 illustrates the evolution of the market since 1987. It shows that European market lost its energy in 2002 while it was growing very fast in the previous years. Between 2008 and 2014 the industry lost more than 40 billion EUR in annual revenues (Penings, 2015, p. 8). As already analysed in the previous section, the biggest share was due to drop in the fixed telephony which was under the pressure because of the roll-out of mobile services. But additionally also mobile revenues dropped between 2008 and 2012. Data transmission was the only service where revenues kept growing every years (Penings, 2015).

European regulation has facilitated the development of strong competitors in the whole telecommunication market and has fundamentally contributed to consumers getting more value for their money. In September 2013 European Commission (hereinafter EC) presented its vision for a single European telecoms market. The intention was to remove the barriers eventually, so that all EU countries would become one market (European Comission, 2013). For the promotion of the integration of all countries into one market following main three elements have been presented:

- one-stop shop (all operators can enter every member state and the reduction of administration burdens that telcos are facing when adding a new country to their market)

- a constant fixed wholesale access in the EU & coordinated spectrum access conditions (a higher degree of coordination in terms of regulatory remedies as well as better coordination of the modalities and timing of radio range allocation)

- EU wide consumer rules (net neutrality and the elimination of surcharges for mobile roaming and calls from fixed lines to fixed lines in another member country)

Agreement upon the package was achieved in June 2015. Although the final package is less ambitious as the first proposal it still represents an important milestone in the evolution of the common telecoms framework through EU (Penings, 2015).

Not all elements of the proposal have potential identical effect on the telecommunication market in EU and market players. For the end consumers the most important one is the last point about roaming and net neutrality. Moreover this point is also directly connected with the communication solutions offered by telcos.

Roaming

The main suggestion of the initial draft was the elimination of surcharges for incoming calls and a general phase out of roaming fees by 2017. The charges that are in force currently, the transition period and future plans are displayed in Table 1. According to this table in the transition period, that will be between April 2016 and June 2017, structural measures should stay in force. After the transitional period in 2017 however all roaming charges should be finally eliminated.

Table 1. Phase-out roaming charges (in EUR)

<table>
<tr><td></td><td>In force</td><td>30.4.2016-14.6.2017</td><td>15.6.2017 on</td></tr>
<tr><td>A minute call made</td><td>0.19</td><td>Domestic price + up to 0.05 surcharge</td><td rowspan="4">Using mobile abroad = the same price as at home</td></tr>
<tr><td>SMS sent</td><td>0.06</td><td>Domestic price + up to 0.02 surcharge</td></tr>
<tr><td>Megabyte of data used</td><td>0.20</td><td>Domestic price + up to 0.05 surcharge</td></tr>
<tr><td>SMS received</td><td colspan="2">Free</td></tr>
<tr><td>A minute call received</td><td>0.05</td><td colspan="2">Should not exceed an average maximum wholesale mobile termination rate set across the EU</td></tr>
</table>

Source: Pennings, *Single Market initiatives*, 2015, p. 23.

According to the proposal, roaming rates should be the same as domestic ones. Additionally it should be available in all member states. In case this is rolled out successfully, this will have a great impact on end consumers. All kinds of roaming charges among EU countries will be abolished and users can truly enjoy the EU market as a single, domestic market. On the other hand it will probably intensify the competition and lead to further decrease of telco revenues in EU.

The initial draft (from September 2013) was exempting some telcos from decoupling obligations. According to Rewheel report (2013) EC granted a discriminatory exception under certain circumstances. Discriminatory because exemption applied only to telecommunication companies that cover at least 10 EU member countries and 30% of the population. This encompasses only four big EU incumbents: Vodafone, Deutsche Telekom, Telefonica and Orange. The report points out double standards in case of delaying the adoption of free roaming retail packages and also applying a free roaming zone only within their group or by extending the zone with another big EU telco. In this case smaller operators would have to either surrender to big telco demands or loose the control of their customers while roaming. Smaller telcos were namely obliged to eliminate roaming fees in all their packages by July 2014 in all EU member countries where their customers are using the communication services or network. Additionally, bigger players have more time to eliminate roaming surcharges in all their packages (Rewheel, 2013). These provisions were ultimately dropped in the final draft.

Currently the key argument remains, that roaming fees will be eliminated in the future. Initially this was supposed to happen by June 2016 at the latest. During the discussions different options were suggested as to when this should be completely implemented, but in June this year they have agreed on June 2017 as deadline. In the meantime until April 2016 the charges will stay as they were in the past year (displayed in the second column in Table 1). During this time smaller telcos, that can`t compete on prices with bigger players now, will have time to charge a mark-up over domestic communication services for roaming services (Penings, 2015).

Even after the roaming fees will officially be eliminated, telcos will still be able to charge a fee for international calls in certain circumstances. However the discussion on this will be held in mid-2016 and at the moment isn`t relevant for this thesis.

Net neutrality

Net neutrality should allow users to visit any web site, no matter what is the content and no matter what the origin of the website is. Additionally, it allows network users, to use any OTT application regardless of the network. Although there were long debates on this topic, due to security issues, there was an agreement achieved in June 2015. Telcos are thus not allowed to control traffic on their networks in any way. In addition to that, users "…have the right to access and distribute information and content, use and provide applications and services and use terminal equipment of their choice, irrespective of the end-user`s or provider`s location or the location, origin or destination of the service, information or content." (Article 3 of the Telecoms Single market proposal in Penings, 2015, p. 29).

In May 2015 the EC introduced another initiative called The Digital Single Market, which aims at overcoming the fragmentation of the digital market place in EU and transform of what is still seen as fragmented into a truly integrated single market (Penings, 2015).

The whole initiative consists out of 16 initiatives classified into 3 categories (Penings, 2015):

- better access for consumers and business to digital goods and services across Europe
- creating the right conditions for digital networks and services to flourish
- maximising the growth potential of digital economy

The proposals for each category and each initiative is expected to be final in 2016, some even in 2015. Discussing these initiatives would be out of the scope of this thesis, but it is important to mention that with this strategy EC wants to change EU telco market to a global credible player in the global digital economy.

This short overview shows, that the regulatory approach has made a lot of changes on the telecommunication market in EU in the past years. In can be as a two-sided sword. On one side solutions are getting cheaper and more available, on the other side new services are emerging and are becoming widely accepted. End-users are the one who get the most benefit out of it, and it seems as the EU policies were aiming especially at that. However, as prices dropped rapidly after liberalisation of the market, the industry lost a lot of its power and

competitiveness against other global markets. Current initiatives of EC seem to tackle precisely this problem.

2.3 Innovation strategies of telecommunication companies

When telcos presented their core communication solutions in the previous century they were the first innovators and market leaders. In the meantime we see them as huge corporations, with ten thousands of employees, and not really as innovation engines. The fact is, that the times have changed and it used to take companies longer to come up with breakthrough innovations. The fundamental research underlying today`s core telco products dates back decades. For example the coding technology for the mobile communications was originated during the Second World War. Nowadays the innovation processes last from less than three months to over three years, with the median lasting twelve-eighteen months. And this life cycle is expected to even shorten in the next years (Economist Intelligence Unit, 2008).

As a rate of innovation has increased, so has the pressure on telcos do keep up with the pace. Traditionally the innovation departments and their new products and services were kept secret; also companies weren`t able to talk about it freely. For that reason also a deeper insight into their innovation strategy in the past wasn`t able. But this approach is currently changing and most of the telcos are engaging open innovation with the cooperation of suppliers, corporate partners, universities and even customers. This extends their intellectual property and even allows them to licence ideas from elsewhere.

Most of EU telcos have set up internal innovation laboratories, where they experiment with new ideas. Deutsche Telekom for example has T-Labs, Vodafone has Innovation Park, Telefonica has Internet laboratory. They all work on the same principle; the brightest talents and employees are transferred to new start-up-like offices where they can develop new products and services. In addition to that they cooperate with top universities around the world and form strategic partners with other large companies. Structured in this was they allow that specialist from different backgrounds work together and engage in different brainstorming sessions. They even enable each individual that is interested in their topics, to contribute via the Internet and contact them on any matter. Hence every customer can also be an integral part of the innovation process (Economist Intelligence Unit, 2008; Telekom Innovation Laboratories, 2015; Vodafone, 2015b; Telefonica Lab, 2015). Although these structures seem to be well prepared and organized, they still are within the corporate structure of the corporations. They are funded by the corporation and thus lack the autonomy and freedom that other smaller players have. This also might be the reason why we haven`t seen any disruptive innovations from telcos in the communication market.

Telefonica was the first telecommunication company that introduced the lean start up methodology to innovation projects called “Lean Elephants”. They split the innovation process into 4 phases (identify, define, refine, deliver) that allows them to focus on market and customers (Telefonica, 2015). Although the methodology is live since 2012 there haven`t been any breakthrough innovations from Telefonica in the communication market yet. This also makes the whole strategy debateable, since the innovation process is quite short nowadays.

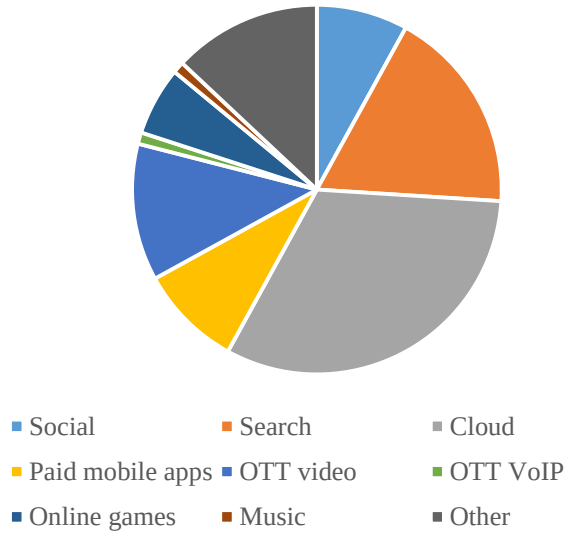
Most of big telecommunication companies are engaged also with other services, not communication-related. When it comes to innovation, it seems, that they are all mainly

focused on topics such as Internet of things, network security, big data, smart houses… and not really on the communication services market. This might be because of the high margins and big revenue potentials in other markets, and also due to their capabilities, knowledge and huge consumer base.

3 OTT COMMUNICATION SOLUTIONS

Over-the-top (OTT) solutions are all solutions that are distributed via the Internet and bypass traditional ways. Typically they are related to media and communication (Over-the-to Application in Techopedia, 2015). Figure 10 presents the breakdown of all OTT services in year 2015. According to predictions until the end of this year, Cloud is going to present the biggest part, followed by search, e-Commerce, social platforms and mobile applications (including games on mobile handsets).

Figure 10. Breakdown of OTT service market in 2015 (in %)



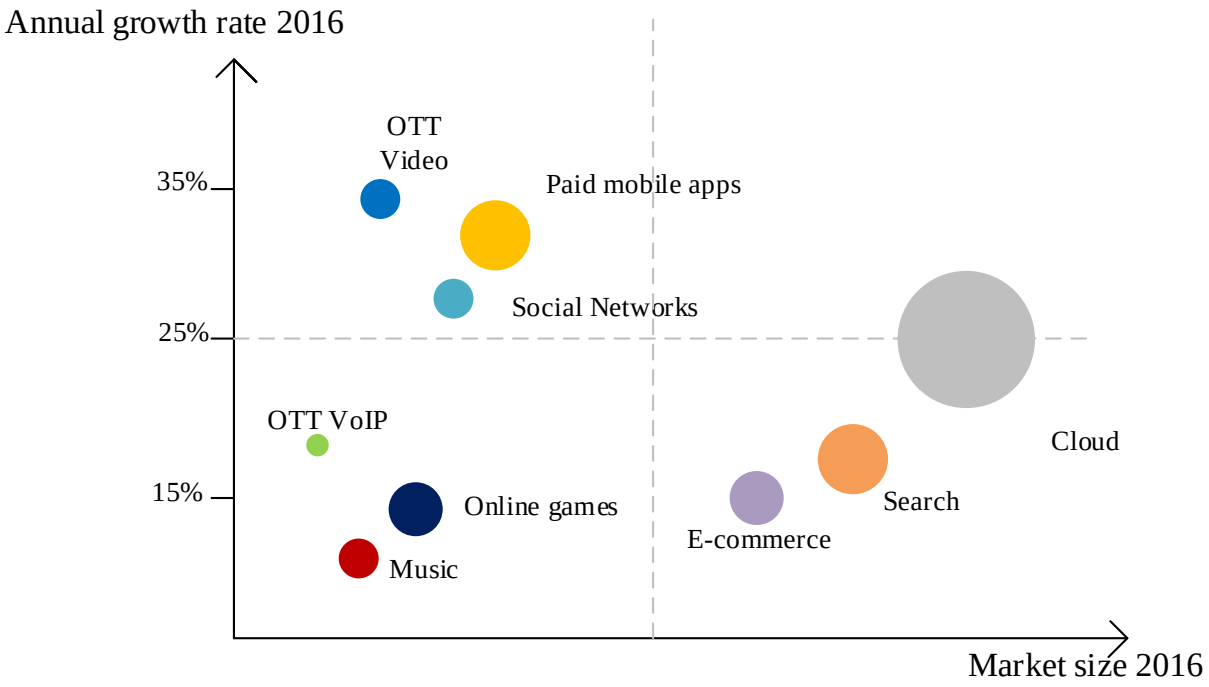
Source: Nakajima, *Word Internet Services*, 2013, p. 6.

Boston Consulting Group (BCG) Matrix in Figure 11 shows the potential of each OTT service individually. Matrix is divided into 4 quadrants according to the growth rate and market size. Each circle size represents the size of that particular service in relationship to other services (colours are the same as in the previous Figure 10).

According to BCG Matrix, services with high growth rate and low market size are question marks. This means that while the market size is small, high growth is expected in the future. In the OTT case OTT Video, Paid mobile applications and Social networks are services that

currently don`t have big market size, but are expected to grow in the future. Services with both, high annual growth rate and high market size are described as stars, and are the most successful. In the case of OTT services, this could be Cloud, because it presents the biggest market share and also shows a promising growth in the future. The third quadrant with big market size and low growth rate is described as cash cows. Those are services that have achieved their maturity and present a cash flow for other services. In case of Internet services this are E-commerce and Search. Most successful companies here are for example Google (search) and Amazon or Alibaba (E-commerce). Lastly the services with small market size and low annual growth are the dogs. The future of these services is still uncertain. These are OTT Voice over IP (hereinafter VoIP), online games and music.

Figure 11. The Internet service markets in a BCG matrix

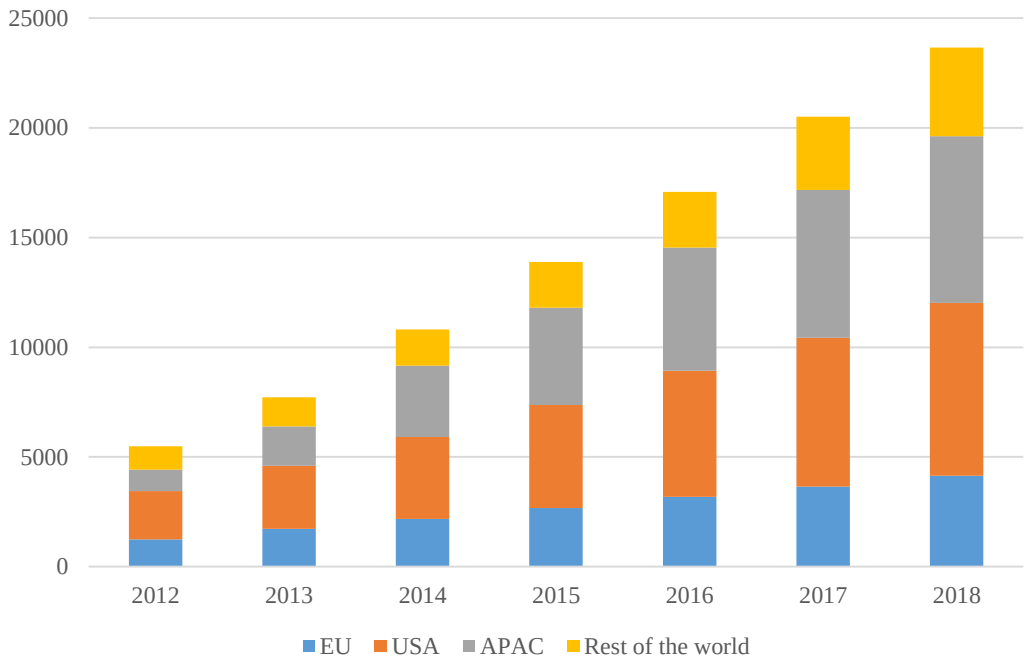


Source: Nakajima, *Word Internet Services*, 2013, p. 8.

In my thesis I`m focusing just on the communication OTT solutions, such as WhatsApp, Skype, Viber, We chat… The market is composed of three segments: VoIP, IP messaging and also social networks. Among other internet services OTT communication services aren`t representing a big portion, but they are the one who are direct substitutes for telecommunication solutions – Voice and SMS. According to the predictions illustrated in the BCG matrix it is expected that these services will grow even further and expand their market size in the future. The main reason why OTT communication solutions are so popular and why consumers are switching from telecommunication solutions to OTT is the price. OTT services cost very little, or are even offered for free. The users just have to be subscribed to such services and be connected to Wireless Fidelity (hereinafter Wi-Fi), or use a mobile data network.

OTT communication market globally surpassed 10 billion EUR at the end of the last year, as illustrated in Figure 12, and it`s expected to grow to 23.7 billion EUR by 2018. Looking regionally the USA will present the biggest market, followed by APAC and EU. Over 60% of revenues come from social networks and the rest is equally split between VoIP and IP messaging. Although the communication solutions present just a small fraction of all OTT solutions, there is still a lot of interest in this market as can be seen by the recent acquisitions and investments which will be further analysed in the Chapter 5 (Nakajima, 2014).

Figure 12. OTT communication services market worldwide, 2012-2018 (revenues in Million EUR)



Source: Nakajima, *Communication services: VOIP – IP Messaging – Social Networking: OTT vs traditional telco markets*, 2014, p 13.

Voice over IP

VoIP is voice communication over the Internet, which is enabled due to the advance in IP technology. These services are mainly offered by Internet players, and since last year also by some telcos. In this case users have free calls to the same provider and usually a charge to other lines (for example Skype to Skype). However, in general calling from one VoIP to another one isn`t possible (for example WhatsApp to Viber), which is a disadvantage comparing to Voice. The main advantage of this service is that consumer pay just the Internet usage (the data used if using mobile Internet connection or Wi-Fi) no matter where they call from (either in the same country or internationally). Telcos on the other hand are charging high roaming fees when calling internationally (Nakajima & Bonneau, 2013, p. 7).

The usage of VoIP solutions is constantly growing. France has been a pioneer in this area and in 2013 there has been 70% of landline calling traffic over IP; Germany comes second with 20% (Nakajima, 2014, p. 10). The VoIP market is dominated by Skype, which is a part of

Microsoft`s native applications. But there are also a lot of other providers such as Viber, Facebook, Vonage, tango etc. (Pouillot, 2013, p. 14; Nakajima, 2014).

OTT IP messaging

OTT IP messaging are services similar to SMS, where users can exchange a certain amount of characters. They are advertised as free, but they require Internet connection from telcos (so they aren`t completely free). Internet players are offering different ways of IP messaging – fixed and mobile. MSN (Windows live messenger) and Yahoo! for example are offering fixed IP messaging, which used to be very popular, but this isn`t the case anymore as mobile OTT messaging is dominating the market. Next to OTT messaging specific players such as WhatsApp, Viber and LINE, today also Facebook and Google are providing these services on their platforms. The same as in VoIP case customers can only communicate via one provider (WhatsApp-WhatsApp, Viber-Viber) (Nakajima & Bonneau, 2013).

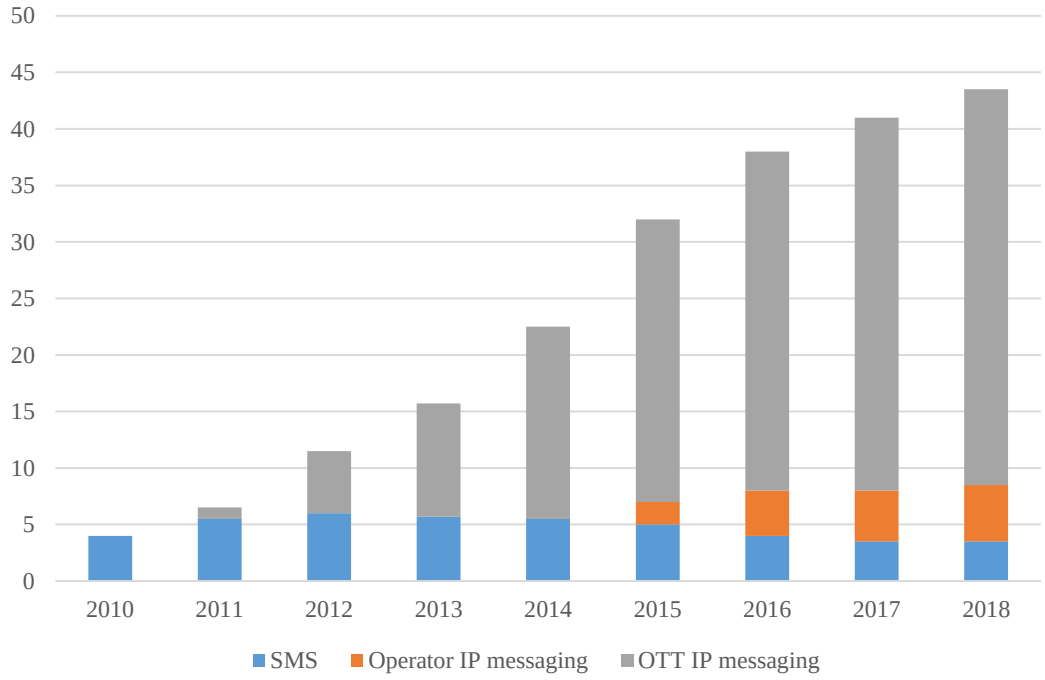
In 2014 the OTT messaging revenues reached 1.8 billion EUR and by 2018 this is expected to increase to almost 5 billion EUR. This will represent the largest growth out all three sub-markets of OTT communication. The market is currently the biggest in APAC (with their own local providers), followed by EU and USA (Nakajima & Bonneau, 2013).

Increasing usage of smartphones and social networks are encouraging new providers to offer different versions of OTT IP Messaging that substitute SMS. Figure 13 on the next page illustrates the messaging traffic originated on mobile devices globally since 2010. It`s clear that the SMS is falling continuously and, on the other hand, OTT messaging is increasing dramatically. Additionally telcos have introduced their own IP messaging solutions last year and in in this year they are slowly starting to increase as well. Sale (2013, p. 33) forecasts that by 2018 only 9% of all messaging traffic will account for SMS and the rest of IP-based messaging (Nakajima & Bonneau, 2013, p. 7; Analysis Mason, 2013).

Social Networks

Social networks are platforms where users can communicate among each other and post different things. Although social networks aren`t the subject of this thesis, some of them are offering OTT IP Messaging services (Facebook and Google) and this segment will be included in the analysis. As mentioned before social network`s OTT communication market is the biggest revenue maker among other OTT communication markets. In 2014 it reached 7 billion EUR and it`s predicted that this number will increase to 14.5 billion EUR by 2018. Due to the advertising revenues USA cover almost half of the market, followed by EU and APAC. The market is dominated worldwide by Facebook with 1.35 billion monthly active users, including 1.12 billion
mobile monthly active users. Its status is being challenged constantly by Google+ and QZone (in China), but both together have less users than Facebook in total (Nakajima & Bonneau, 2013).

Figure 13. Messaging traffic originated on mobile handsets, worldwide (Million EUR)



Source: *OTT communication services worldwide: forecast 2013-2018, 2013.*

According to Nakajima (2013, p. 12) the top 5 OTT players for internet services are Amazon, Google, Facebook, Microsoft and Apple. OTT players are providing different services (as summarized in Table 2), and all except Amazon are active in the communication services. The biggest competitors to OTT players are they among themselves. They are ultimately aiming at tightening their grip on users, their personal data and dominate the ecosystems (Nakajima, 2013).

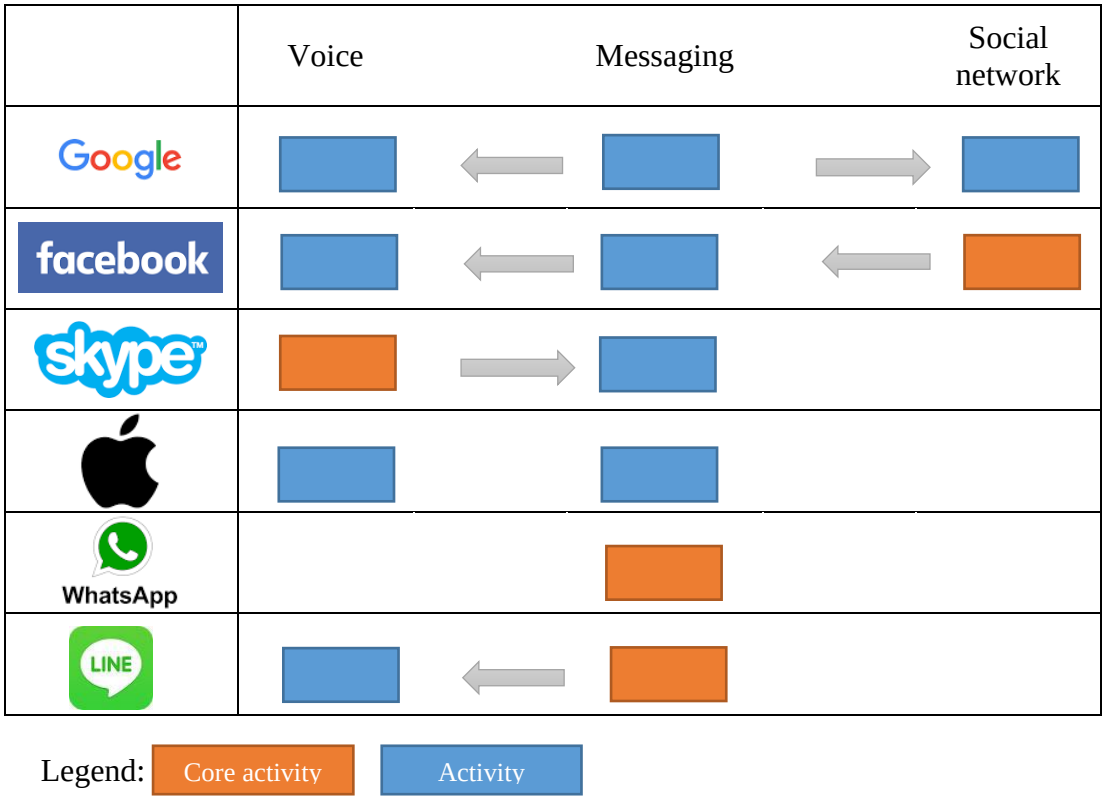
Table 2. The diversification of activities of large OTTs

	Google	Apple	facebook	amazon	Microsoft
Communication	Gmail Gtalk Google Voice Google+	FaceTime iChat Siri	"wall" IM VoIP	n/a	Outlook/ Hotmail Skype
Video and digital content	YouTube Google Play Google Music	iTunes AppStore	Partnerships with YouTube (tests)	Kindle store Instant video Prime MP3 LoveFilm	Marketplace MSN Video
Cloud	Drive App Engine Google Docs	iCloud iTubes Match	Photos	AWS Cloud Drive Cloud Player	Skydrive Azure
Payment	CheckOut Google Wallet	iTunes account Passbook	Virtual Money	1-click MarketPlace CheckOut	(Microsoft Points on Xbox)
Devices	Nexus Android GoogleTV	iPhone iPad iPod	(Partnerships)	Kindle Kindle Fire	Xbox Windows phone Windows 8 (acquisition of Nokia`s devices)

Source: Nakajima, *Word Internet Services*, 2013, p. 10.

Table 3 indicates which OTT players are in which communication activity and also which was/is their core activity. Facebook and Google are the only ones that are active in all three markets – voice, messaging and social networks. Most of other players are active mainly in two markets, except WhatsApp which has no voice service (so far). In case of Google and Apple the core activity lies outside of these three markets; all other players have core activities in these markets. Google`s core activity is search and it`s revenues are mainly generated by advertising and thus the growth of advertising is helping Google`s growth. Apple`s core activity, on the other hand, is selling devices, and this is also its main revenue generator.

Table 3. Positioning of OTTs regarding the communication services and their core activities



Source: Nakajima, *Communication services: Opportunities for telcos: voice, messaging and service enablers*, 2014, p. 16.

It is clear that most of the OTT companies cover more communication activities. This means that in theory users can subscribe with one provider and cover all activities, such as text, talk, video, file sharing… Facebook is a very good example of this, since it covers all three markets very successfully. It started as a social network where users could communicate via posts on the walls, private and group messaging. Later on it was possible to share photos and videos, even file sharing. Today users can even call (voice and video) via the application.

Top OTT players have huge numbers of monthly active users (as of mid-2015). Facebook is the clear leader with its 1.49 billion users (Facebook, 2015), followed by Google (Google+ and Gmail) with 1.2 billion (Statista, 2015a) and then WhatsApp with 900 million active monthly users (Statista, 2015b).

OTT providers have different business models, but three major groups can be defined:

- direct paid (users have to pay directly to use the solution)
- advertising (advertisement is the main revenue generator)
- founded through other services

An example of direct paid applications are WhatsApp, Viber and LINE, which users have to download first to their end-devices to use them. They don`t use advertising model and are easy and simple to use. WhatsApp users have to pay a yearly subscription and LINE users can purchase other integrated services, in-games and stickers. With this business model applications are able to gather users' data for either better advertisement via other platforms or better sales of integrated services. Although the focus of this thesis is on the EU market, it is still important to mention that the trend in Asia is different. OTT companies there are using different approach, no advertising (or not as much) and additionally selling stickers and games which are the main source of revenues. In Asia IP messaging applications actually are generating revenues. In EU and USA, on the other hand, companies are more using the information that they can get from IP messaging applications for better targeted advertising in other platforms (Nakajima & Bonneau, 2013).

An example of advertising business model is WeChat, where users see advertisement according to their past activities. The advertising model has a Cost per thousand impressions (hereinafter CPM) sales model, where the cost structure is derived from the numbers of viewers and ad receivers.

The third group of solutions isn`t generating any revenue on its own. The revenues are been generated by other services that belong to the same company/brand. This is the model that is being used by now the big OTT players who have different revenue streams. They don`t use any advertisements in the solutions, but the services are being funded by advertising in other services of these companies (Facebook and Google for example). The primary objective of this business model is to gain more user data which can be in turn used for better advertising. By controlling the communication they gather data about the users and can so advertise more efficiently and better targeted. This fundamental strategy can also be seen in Facebook`s acquisitions of Instagram (in 2012) and WhatsApp (in 2014) (Nakajima, 2014; Nakajima & Bonneau, 2013).

Microsoft and Apple, that are also active in this market, aren`t a typical OTT communication player. Microsoft entered the market with acquisition of Skype[5] and Apple by offering iMessanger and FaceTime communication service that is restricted to Apple devices only. In both cases companies are integrating those services into their software/devices to make them more appealing. By doing so, Microsoft retains its customers from switching to other alternatives and Apple is increasing their brand power which leads to more sales (Nakajima & Bonneau, 2013).

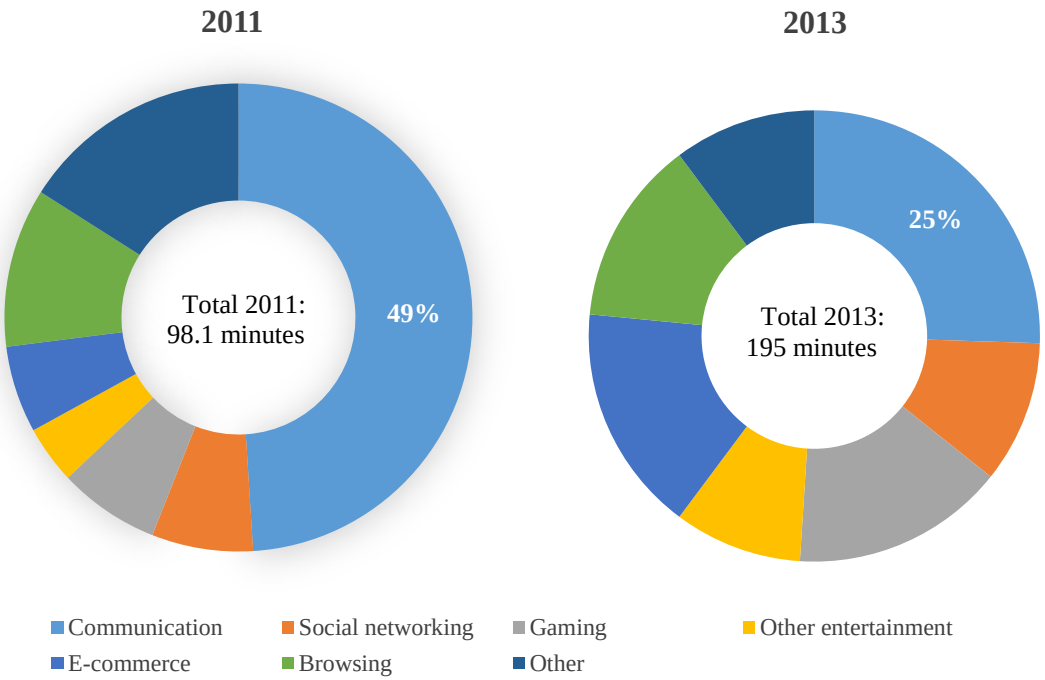
4 CONSUMPTION TRENDS

According to Analysis Mason (2014) the average time that consumer spends on smartphones has doubled between 2011 and 2013, from 98 minutes to 195 minutes per day. Figure 14

[5] Looking at the official numbers of Skype registered users that are growing every year I would expect also the revenues from this service to grow as fast, but this isn`t the case. Because calls Skype-to-Skype (97 % of all calls) are for free, Skype only makes money when users are calling "out" to landlines and mobile phone numbers.

below presents different activities that users were engaging with in year 2011 and 2013. Although consumers are more and more engaged with their devices, they are communicating less. The use of communication platforms (both telco and OTT) fell from 49% to 25% of all the time spent on their devices.

Figure 14. Average time per day spent using various functions and applications on smartphones in 2011 and 2013



Source: Analysis Mason, *Consumer smartphone usage: key findings from an on-device tracker*, 2014.

Among all communication services 72% of users were actively using IP messaging services in 2013 (compared to 45% in 2011). The average consumer today is spending approximately half of her/his total communication time (mobile or fixed) on non-voice activities (social networks, OTT messaging, emails, video/music, enhanced content…) on mobile devices. Moreover younger users (aged 13-34) are the ones who are twice as likely to own a portable device as older consumers (aged 35+) and consequently they are to 50% more likely to go online and communicate via social networks or other OTT applications. They are the ones who are adopting new communication services, such as video chat, social media communication services, OTT communication solutions very quickly (Hazan & Trivellato, 2012; Chappuis, Duncan, & Neruda, 2012).

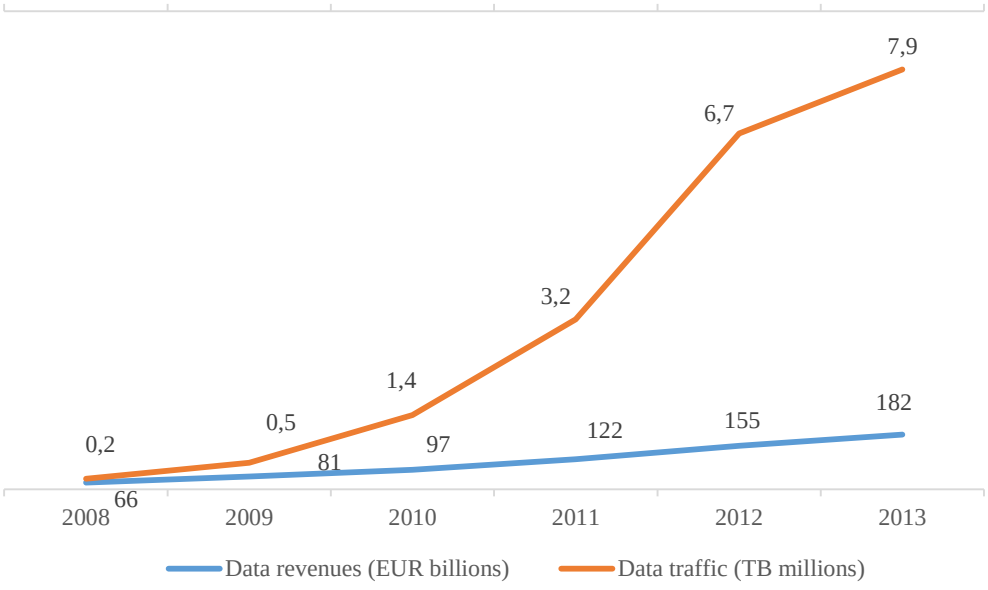
Older consumers (aged 35+) on the other hand buy more online than ever before. Online sales have grown by 33% each year over the past 5 years and this number is expected to reach 40% quickly. Consumers that buy online are slightly older, than the rest of the population and have higher average household incomes. They also spend more time using data-related applications, cloud storage and high definition (hereinafter HD) video. Additionally they are willing to

spend more on their telecommunication devices and mobile monthly plans (Hazan & Trivellato, 2012).
Based upon these trends it`s possible to predict future preferences and trends. OTT companies will deliver more communication applications that will substitute traditionally telcos` core service. As young consumers grow up, more and more of them will use mobile connected devices and OTT solutions. This could result in further loss of the value of core telecommunication services (voice and SMS). Meanwhile there are some consumers, especially older ones that are willing to pay more for premium services, faster Internet speed and security. Those are also consumers and trends telcos are focused on with their innovations and research, as analysed before. Current telcos` communication offerings and the growing popularity of OTT solutions could drive the prices of these solutions even lower. In addition to that also the technological progress and the open digital ecosystem could contribute to that decline in prices.

According to the users` consumption trends it isn`t surprising that the mobile data traffic is growing more than exponentially. In 2004 the data traffic presented 15% of all revenues from telecom services, and in 2014 this increased to 46% of all revenues in Western Europe (Pouillot, 2014, p. 7). Although the number isn`t as high in Central and Eastern Europe, the data traffic is constantly growing. This rise in online traffic is directly linked to the expansion of Internet users and usage, combined with rising smartphone and tablet use (Bonneau, 2014; Pouillot, 2013).

If I focus just on the mobile data (data via mobile phones and tablets) trends are the same. Figure 15 based on McKinsey (Arcelus et al., 2014) report shows that the global mobile data traffic increased 40 times from 2008 and 2013, but the revenues associated to it just tripled. Although mobile data presents strong revenue growth potential for telcos, this figure clearly shows, that they aren`t monetizing it fully. The situation can be described as profit paradox. As the value of the data access is growing for the consumer, margins for telcos are shrinking.

Figure 15. Data revenues and data traffic between 2008 and 2013



Source: Arcelus, Fonseca, Leonardo, Novo and Pont, *Monetizing mobile: Making data pay*, 2014, p. 3.

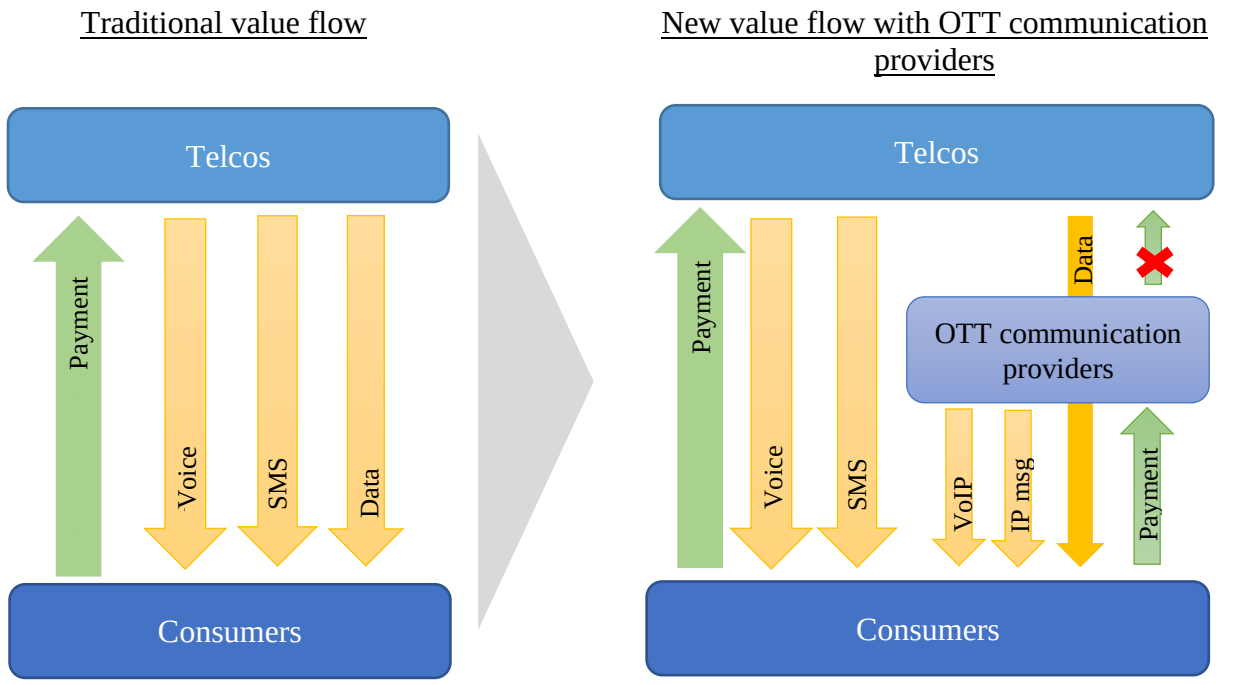
According to the same report, data has become the consumer`s most important buying consideration, after price. Data volume and speed present 40% of the weight in a consumer purchasing decision in both, developed and developing, markets (Arcelus et al., 2014). These developments could present major opportunities for operators, since they are the ones who provide the access. As the speed and price play a decisive role in the market, telcos should be able to attract customers and secure their loyalty. However looking at the revenues, it seems, that they aren`t addressing that in the right way. It is clear that users want more data and that this trend will continue also in the future. Providing network access is becoming one of the main income resources therefore telcos should start monetising data access in the right way.

Currently telcos are mainly offering volume-based pricing packages, premium internet plans (hence more expensive) and multi-device sharing plans, where users can share the plan on multiple devices. Alternative strategies should encompass also different access to speed, as different users have different requirement (not only on volume, but also on speed), or even unlimited access plans for increasing the market share. More differentiated offers are needed, as users who prefer light usage packages aren`t prepared to pay more the data surpluses. It is difficult to convince users to pay beyond of their needs. On the other hand there are heavy users that are willing to spend more on a high quality services and bigger or even faster packages. Therefore with higher rate of differentiation telcos could monetise the data access more efficiently. Looking at the trends, new business model is definitely needed.

5 POSITIONING OF TELECOMMUNICATION COMPANIES IN OTT ENVIRONMENT

As a result of commoditization of core telco services and OTT alternative ways of communication, telcos have started to look beyond their CS based communication. Figure 16 clarifies the traditional value flow before the OTT communication providers entered the market and after that. Traditionally telcos were the one who captured all the revenues from end consumers for all services that they provided (illustrated in the left side of the figure). With the presence of new OTT communication providers this has changed. Telcos are still capturing revenues from traditional communication services, however as these are now seen as commodities, the value has decreased and consequently the revenues are smaller. Additionally alternative VoIP and IP messaging solutions are becoming increasingly available and consumers prefer them because of the price and convenience. Moreover these OTT providers use the network that is provided by telcos for their services, but don`t have to invest in it as traditional telcos.

Figure 16. The value flow with and without OTT communication providers



Consumers pay telcos for the data, voice and SMS

OTT communication provides alternative voice and messaging services using telcos` data network; but no payment for this from OTT provider to telco

In response to the rise of popularity of OTT communication solutions telcos have responded in different ways. Table 4 summarizes the positioning of top European telecommunication companies (and Verizon from the USA) in new communication arena. All mentioned telcos have started with their own OTT communication services, some of them have partnership with big OTT players and most of them started participate in the new telco product Joyn. The analysis of main reactions to new OTT communication products follows in the next subsections.

Table 4. Telco positioning on offering beyond traditional communication

	Telco OTT	Partnerships	Rich communication suite enhanced
Telefonica	TU|me, TU|go		joyn
orange	Libon		joyn
vodafone	Vodafone One Net	skype	joyn
T-Mobile	bobsled	facebook	joyn
BT	BT SmartTalk		
verizon	Verizon Messages	skype	

Source: Nakajima, *Communication services: Opportunities for telcos: voice, messaging and service enablers*, 2014, p. 19.

5.1 Prohibiting OTT applications on the network

In the early days of 2012, when OTT communication solutions entered the market the main response of number of telcos in EU (especially market leaders) was prohibition of such solutions on their networks. Although the European Commission did not prohibited that in case telcos are doing it for the purpose of quality of other services. Moreover they have made it legally binding for telcos to declare any restrictions on access to particular services to their customer. Additionally with this Directive 2009/140/EC users are able to switch operators freely if they want to do so (European Commision, 2015).

Due to the growing popularity of these applications consumers have started switching telco providers. This has consequently lead to the change of telcos` strategy and allowing OTT communication services run on their networks (Nakajima, 2014).

5.2 Bundling

All analysed telcos have recently started offering different bundles of services to make them more appealing. These packages include a discount to encourage consumers to sign up. They offer different packages according to the consumers' needs and preferences. Many operators offer even unlimited (or at least an abundance of) SMS and not rarely also unlimited options for calls (to the same or/and other networks). For 13 EUR a month Vodafone in Germany is offering packages with 200 MB data, 50 min calling to all networks in Germany and 200 SMS. For 19 EUR a month o2 is offering 200 MB data and flat voice and SMS. Deutsche

Telekom is offering the same package for 27 EUR. Orange in France offers offering a package with unlimited SMS, 2 hours of free calls to any network for just 10 EUR (Vodafone, 2015a; T-Mobile, 2015; o2, 2015; Orange, 2015).

In terms of data most of the packages are priced depending on the speed and the volume. The more data in a package a customer books, the cheaper it gets (price/1 MB). For example DT is currently offering 200 MB for 27 EUR, 2 GB for 36 and 4 GB for 45 EUR. The second package is actually 7.5 times cheaper, and the last one 12 times cheaper than the first package. In contrary with European limited data packages, in USA unlimited data is on the market already (Vodafone, 2015a; T-Mobile, 2015; o2, 2015; Orange, 2015).

In regards to fixed lines, unlimited option for domestic landline calls is a commodity already. But calls from fixed to mobile usually require a certain fee (depending on the country and operator). In France for example unlimited options are already available.

5.3 Partnership with start-ups

Some telcos have started partnering with start-ups, in case of communication, with OTT providers. Usually they allow a certain amount of OTT communication access for free, or even unlimited access for free; without consuming data allowance when on the provider's network. The main reason for this is to get the users to subscribe to data plans to increase their revenues and also to increase their user base. And by partnering with the OTT providers telcos seem more attractive to consumers.

Skype for example have partnership with many different telcos; 3 and Vodafone in the United Kingdom, Verizon in USA, KDDI in Japan. Furthermore Optimus in Portugal is offering unlimited access to OTT messaging services. Also Deutsche Telekom in Germany is partnering with Spotify (music streaming application) and in the USA with Facebook.

5.4 OTT communication services by telcos

Some telcos have started their own OTT communication services to attract more consumers. In 2012 Telefonica presented Tu Me application that lets users call and message each other for free from their smartphones using either Wi-Fi or data access. The application was closed in the next year due to bed performance and re-introduced in 2013 as a new, more differentiated app Tu Go. Orange introduced Libon in 2012, the application that is directly competing with OTT communication applications by offering "free" calls via Wi-Fi or data access. Deutsche Telekom introduced Bobsled in 2011 enabling Facebook users to place a voice call by clicking on the name of a Facebook friend in a computer web browser, additionally users can call or text over the web browsers (via Facebook) or smartphones to landlines and mobile numbers. British Telekom (hereinafter BT) released BT SmartTalk in 2013 which lets users call from their smartphones over Wi-Fi or mobile data, but be charged on landline bill (up to 5 mobile numbers). Additionally they have unlimited free calls on the weekends. Vodafone on the other offered a special well differentiated solutions for business customers Vodafone One Net, where customers can be available on one number no matter the device (fixed or mobile), simple one billing for all numbers and additionally extra reliable connection and technology.

Most of the telcos` OTT communication solutions never really got as popular as OTT application, especially when the services aren`t even sustainable innovations, but rather hard copies of OTT services and have no additional value. In this case telcos have difficulties differentiating, are slow in reacting to trends and consequently aren`t creating additional revenue. An example of such failed applications are Tu Me by Telefonica and Bobsled by Deutsche Telekom.

Learning from that, telcos have changed the strategy and have started offering applications that have more telco-unique assets and can so differentiate better. Besides voice calling and messaging via Wi-Fi or network connection, they can either extend their mobile number to all other devices (TU Go by Telefonica), free calls to all international fixed and mobile numbers via the application (Libon by Orange), sending IP messages also if other devices doesn`t have the same application (Libon by Orange)… Although the data on the number of users of telco OTT applications isn`t available, I can guess that they aren`t as popular as already established OTT application.

5.5 Participate in Association of mobile operators and related companies led Joyn

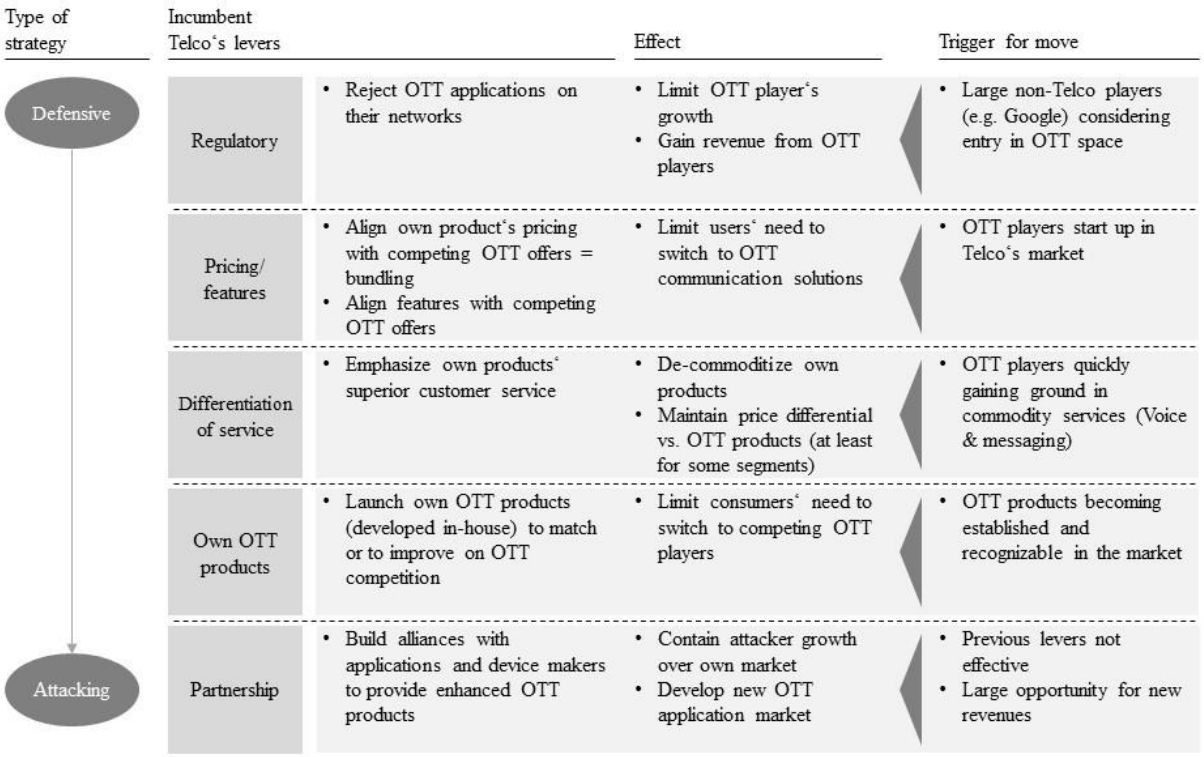
In 2012 at the Mobile World Congress the Association of mobile operators and related companies (hereinafter GSMA) launched Joyn. It is a rich communication suite enhanced (hereinafter RCS) with marketing brand Joyn, that enriches the communication itself (talk, chat, videos, pictures and music). The service isn`t fully live yet, but in principle it should work very simple with no downloads required, no registration, no password etc. The address book shows which contacts have Joyn and the application automatically knows the mode of communication available with each contact. It includes 100% reach and it`s voice and SMS compatible (Joynus). In the future all operators want to have Joyn embedded by default on all devices. The main operators that are already using it are: Deutsche Telekom, Telefonica, Vodafone, Orange, Metro PCS (pre-paid Wi-Fi service in the USA that is a part of T-Mobile), KT (South Korean biggest telco) and some others.

Joyn is a joint telco initiative to beat the threat of OTT communications apps. With their user base and their customer relationships that they already have, they could reach billions with this solution. Although the prerequisites are good, it`s going to be 4 years since the initial launch and the application is still not that well known, nor popular. It`s absent from many countries, and more importantly countries where all the operators offer the service. The cases where users can use the application interoperable are thus still scarce. Because not all operators have released Joyn, the service is not ubiquitous and for now Joyn is just like other OTT-like applications. It is unclear how many users are actually using it and even telcos itself have recognized that it`s evolving too slow to keep pace with the competition.

6 ANALYSIS OF THE COMMUNICATION MARKET

The reactions of telecommunication companies to OTTs entering communication market is summarized in the Figure 17. When OTTs entered the market in early 2012 big incumbent telcos in EU were prohibiting the OTT communication application on their networks. Because this strategy is hard to sustain over a longer period of time and because they were losing customers, telcos adjusted their pricing strategy and offered different bundles of core services and incorporated different features to make them more appealing for the users. Additionally, while OTT services were becoming more and more popular on the market, telcos attempted to differentiate their services by relaying on their brands, legacy, and customer service. Due to infections of all described actions, telcos offered their own OTT products that were developed in-house to attack OTTs` offers. Finally, since the telcos OTT applications weren`t that successful, they started building partnership with different OTT companies to capture the value created on their own market. The strategy of telecommunication incumbent changed from the defensive at the beginning to offensive, which appears to be more successful in this case.

Figure 17. Telecommunication companies` actions in OTT environment



Most of the new OTT companies, that are active in the communication arena, have global reach. This makes it hard for telcos to fight them just on their networks and among their consumer.

6.1 Regression analysis

I started this thesis with the assumption that increasing popularity of OTT application effects the revenues of telcos. After the analysis of both industries separately, consumer trends and segmentation of telco reactions, I will conduct a regression analysis to check my hypothesis. This statistical technique will show weather the revenues of telcos[6] change, when the number of OTT users change, everything else held constant (*ceteris paribus*). Thus the number of users is the independent variable and the revenues of telcos are the dependant variable.

H_0: The number of OTT communication application users doesn`t affect the revenues of telecommunication companies.

H_1: The number of OTT communication application users has a great impact on the revenues of telecommunication companies.

The results of the regression analysis on a global level are summarized in Table 5. The results show, that there is a high positive correlation between both variables. Coefficient of determination (R^2), which presents the percent of variability in dependent variable that can be explained by the regression equation, is approximately 99%. According to this analysis I could reject the H_0 and accept the H_1 with the significance level (α) of 5%. Results summarised below confirm that 99% of the variability in telcos` revenues can be explained by the variability in the number of OTT users.

Table 5. Regression analysis of the relationship between OTT users and telco revenues on a global level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99
R Square	0.99
Adjusted R Square	0.99
Standard Error	4085545519.17
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	9044424892645350000000.00	9044424892645350000000.00	541.85	0.00
Residual	7.00	116841775324574000000.00	16691682189224800000.00		
Total	8.00	91612666679699200000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	821211507853.86	2630606945.55	312.18	0.00
OTT users	21.09	0.91	23.28	0.00

[6] In this part I will take into consideration just revenues from core communication solutions – voice and SMS. These are the ones that are being replaced by OTT communication solutions and consequently the revenues from these services are being effected.

However, due to big differences across the globe, between developed and developing countries, as seen in the Chapter 1, there is a big chance of inaccuracy in the previous model. Revenues globally are increasing because of emerging countries and due to increase in the number of OTT users, regression analysis implies positive correlation. Yet in developing countries OTT applications aren`t widely in use. For this reason the rejection of H_0 would be inaccurate.

In the second regression analysis I thus focused just on EU market, to get a more representative function. EU countries among each other are more comparable, than all countries in the world, they have similar demographic trends, similar economies, prices are regulated according to the same policies etc. The H_0 and H_1 are the same than in the previous model. The results of the analysis are summarized in Table 6. The results show that there is a negative relationship between telcos` revenues and the number of OTT users, which is also what I was expecting. Meaning that as the number of OTT users is increasing, they are switching from telco core solutions to alternative options and consequently the revenues of telcos are decreasing. According to this analysis roughly 80% of the variability in the dependent variable can be explained by the variability of the independent variable. With low significance of the model and statistically insignificant independent value this model might be all right, and I could reject H_0 and accept H_1 saying, that the number of OTT users affects the revenues of telcos.

Table 6. Regression analysis of the relationship between OTT users and telco revenues in Europe

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.89
R Square	0.79
Adjusted R Square	0.76
Standard Error	6421469095.72
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	108008364099766000000.00	108008364099766000000.00	26.19	0.00
Residual	7.00	28864685743068400000.00	4123526534724060000.00		
Total	8.00	136873049842834000000.00			

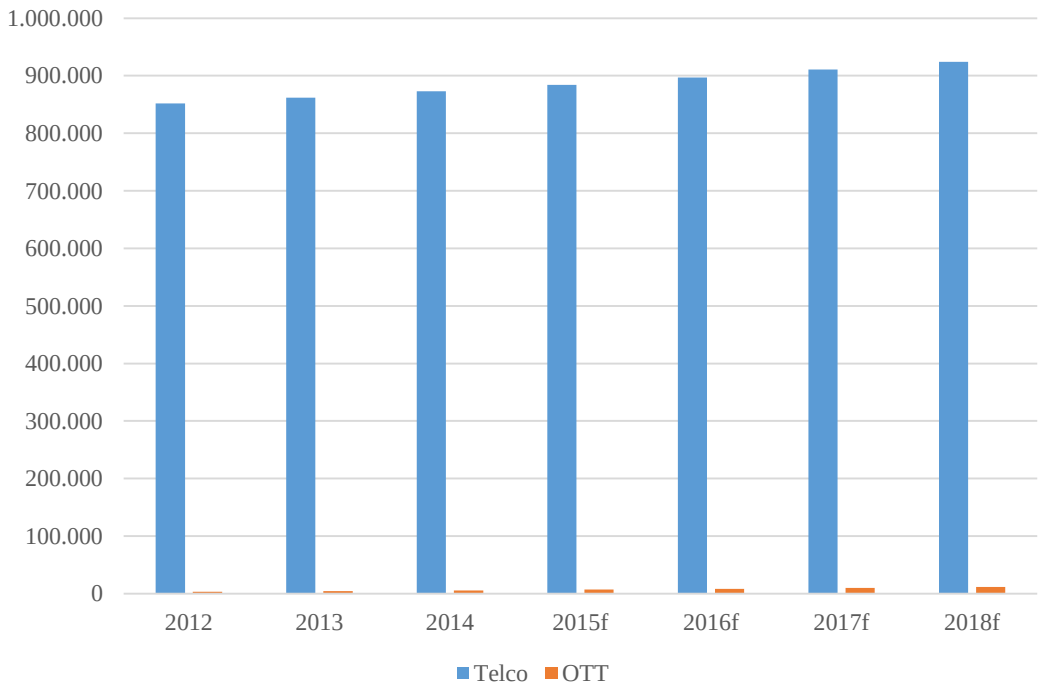
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	231783123052.45	4864748329.56	47.65	0.00
OTT users	-43.76	8.55	-5.12	0.00

Also additional regression analysis of OTT voice and OTT messaging applications separately showed similar results (summaries in Appendixes). All results show that there is a high correlation between variabilities in both variables.

Nevertheless according the analysis of the telco market (on a global and EU level) in Chapter 2 this simple conclusion would not be accurate and regression analysis could be misleading. The results of regression analysis might be inaccurate for many reasons. In this particular case I had to ignore all other variables that influence revenues of telcos, such as prices of the solutions, prices of the alternative solutions, maturity of services, economic situation, consumers etc. For this reason rejecting the H_0 just from these results would be inaccurate. Moreover, since OTT applications are widely on the market only since 2012, there are just 9 years of data (from those 9 years, half are predicted (2015-2018)) that were used in the analysis.

For that reason I will compare revenues from both, telcos and OTTs, to have a better picture. Figure 18 summarizes global revenues from both, in the period from 2012 till today and forecasts for the next two years. Telco communication revenues are again composed out of fixed telephony, mobile voice and mobile messaging revenues. OTT communication revenues are composed out of VoIP, IP messaging and a part of social networking revenues that correspond to messaging part. It clearly shows that although telco revenues were decreasing in the past as seen in Chapter 1 they are more or less stable now and are even increasing slowly. At the same time the OTT communication revenues are still very marginal compared to telcos revenue. Although OTT communication services are growing (as seen in the Chapter 3 and in Figure 18), telcos shouldn`t be worried because of that too much. Looking at the big picture they will only account for 3% of the communication market in 2018 (and just 1% of the total market).

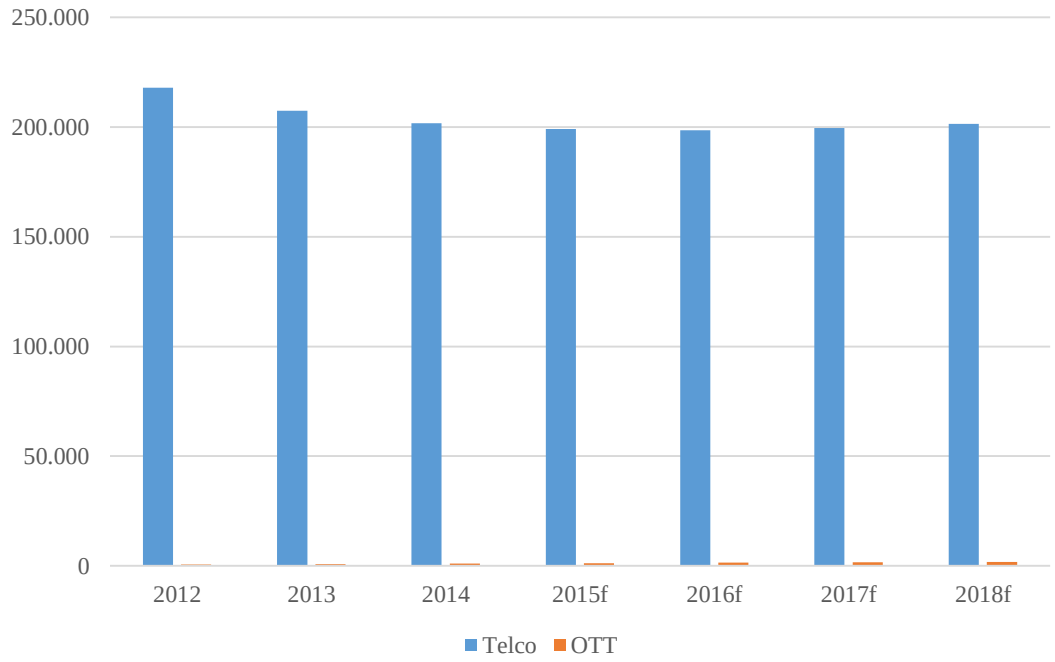
Figure 18. Total telco vs OTT communication revenues globally, 2012-2018 (Million EUR)



Source: Analysis Mason, *OTT communication services worldwide: forecast 2013-2018*, 2013 *and* IDATE, *World Telecom Services Market*, 2014.

In EU the situation is roughly the same. Figure 19 shows that the decrease in revenues of telcos is very slow and it doesn`t correspond the OTT revenues part. There was a significant drop in telcos` revenues in 2012 as explained in Chapter 1, but since then the situation is stabilized. As for the OTT communication market also here its size is marginal if compared to Telco`s market. It is expected that in 2018 it will account for 0.9% of the communication EU market (and 0.7% of the total EU market).

Figure 19. Total telco vs OTT communication revenues in EU, 2012-2018 (Million EUR)



Source: Analysis Mason, *OTT communication services worldwide: forecast 2013-2018*, 2013 and IDATE, *World Telecom Services Market*, 2014.

According to the IDATE and Analysis Masons predictions that I analysed in this thesis, the telco revenues aren`t going to decrease further, although they also don`t predict any increase. In respect to those predictions, regression analysis, Figure 18 and Figure 19 I can conclude that the communication market is not a simple case where OTT companies are deriving revenues from telecommunication companies. Moreover it`s a market where telcos are maintaining their services and values and OTT companies are growing their values themselves.

6.2 IP Messaging vs. SMS

The usage of SMS was growing steadily between years 2001 and 2012 and was mostly unaffected, when the first OTT applications were introduced in early 2010. On the other hand the revenues from SMS have been decreasing since 2008, thus even before the OTT communication applications were introduced to the market. In 2012 there was a significant drop, which can be explained with the economic crisis in the EU, as the whole economy faced a drop. Additionally by the 2012 when OTT applications became globally popular, users could

already use different bundles of SMS and even unlimited SMS for as little as 2 EUR per month. Bundling the service has also made it difficult to measure the revenues that come just from SMS over the time. But looking at the life-cycle of the service I can conclude that the service has reached its maturity. The saturation of the service was reached and the consumers started to see SMS as a commodity. Consequently the revenues from this service have decreased.

IP messaging user numbers are really impressive, but these numbers don`t translate into market value, as most of the time they don`t charge a lot (or anything) for their services. Also IP messaging isn`t a direct substitution for SMS, but rather for chatting/messenger. SMS tend to have longer content, more characters and IP messages on the other hand are shorter and users tend to send more of them with the same topic[7]. So the direct comparison of SMS and IP messaging might not be completely accurate. IP messaging has a strong social attachment and can be also described with the bandwagon effect, especially among young population. They are using it because their friends are using it, regardless of what they think about it. By using these they are in fashion. SMS however will stay the common texting service also in the future because it applies all devices, regardless of the network and connections. Additionally users can reach anyone in the address book.

Also after analysing messaging services exclusively, I can conclude, that OTT messaging applications don`t have significant negative impact on traditional telcos` SMS.

6.3 VoIP vs. traditional Voice

Skype was the first VoIP application that entered the market in 2003 and as data shows didn`t have any great impact on the performance of traditional Voice solutions. The revenues actually dropped later in 2007 when the EU regulation of roaming tariffs was introduced by the European Commission. The falling revenues are thus a consequence of EU policies. Additionally even in this case the service is reaching maturity and telcos are offering different bundles with unlimited calls to domestic networks and, not rarely, even to foreign numbers. As a result telcos` revenues are not growing and are rather decreasing slowly.

Also in this case, I can conclude, that VoIP services don`t have a significant negative impact on traditional telephony. If that would be the case, the revenues from mobile and fixed Voice would drop as soon as VoIP was introduced. But this wasn`t the case.

In both cases the analysis showed, that OTT communication applications aren`t the reason for bed performance and revenue decrease in case of Voice and SMS. Telcos are the one who have brought this upon themselves with the competitive pricing and special offer to increase the consumer base and their network. Looking at this analysis, I can also conclude that OTT communication applications aren`t seen as revenue generators, but rather a powerful tool for increasing user base. This is also one of the reasons why large Internet players are acquiring them (such as Facebook, Microsoft and Google). Information about the usage and about the users can be in turn used for better targeted advertising on other platforms.

[7] For example a typical SMS and reply might look like this: »Hi, how are you? If you are free tonight, do you want to go out for a dinner? Tis new restaurant looks nice« »Hi, yes, I`m free tonights. Let`s meet at the restaurant at 8 pm«. The same coversation via IP messaging would look like this for example: »Hi«, »Hi«, »How are you doing?«, »Good, and you?«, »Are you free tonight?«, »Yes, why?« etc.

6.4 Telco as intermediary between users and large OTTs

Although there is no significant impact of OTT communication services on telcos core communication services according to my analysis, OTTs are completely dependent on telcos by default. Telcos provide the network (connection) for all OTT applications. Even if the users are using different networks (by different telcos) they can be connected any time, any place. Therefore telcos can be seen as intermediary between users and large OTTs. Additionally telcos have huge consumer base all around the globe and consequently a huge billing platform which OTTs can use for billing. Facebook, Google and Skype are one of the first ones who have announced partnership with telcos to use carrier billing for communication services in the future. Service that have integrated carrier-billing solutions have seen an increase by 5 to 6 of conversion rates compared to credit card billing (Nakajima & Bonneau, 2013, p. 39). Also important to add is that telcos enjoy a certain trust by their customers which in turn increases the number of downloads and hence revenues of OTTs.

Telcos` consumer base reveals also a lot of personal data obtained through the mobile network, such as demographics and additionally also who called who, when, and for how long, and information about the applications used and mobile sites visited. Telcos can anonymize such data, analyse it for insights and sell to third parties (among others also OTTs) who can use it for better targeted advertising and improving their business. Telefonica and Verizon have already started doing this and it`s expected that others will follow.

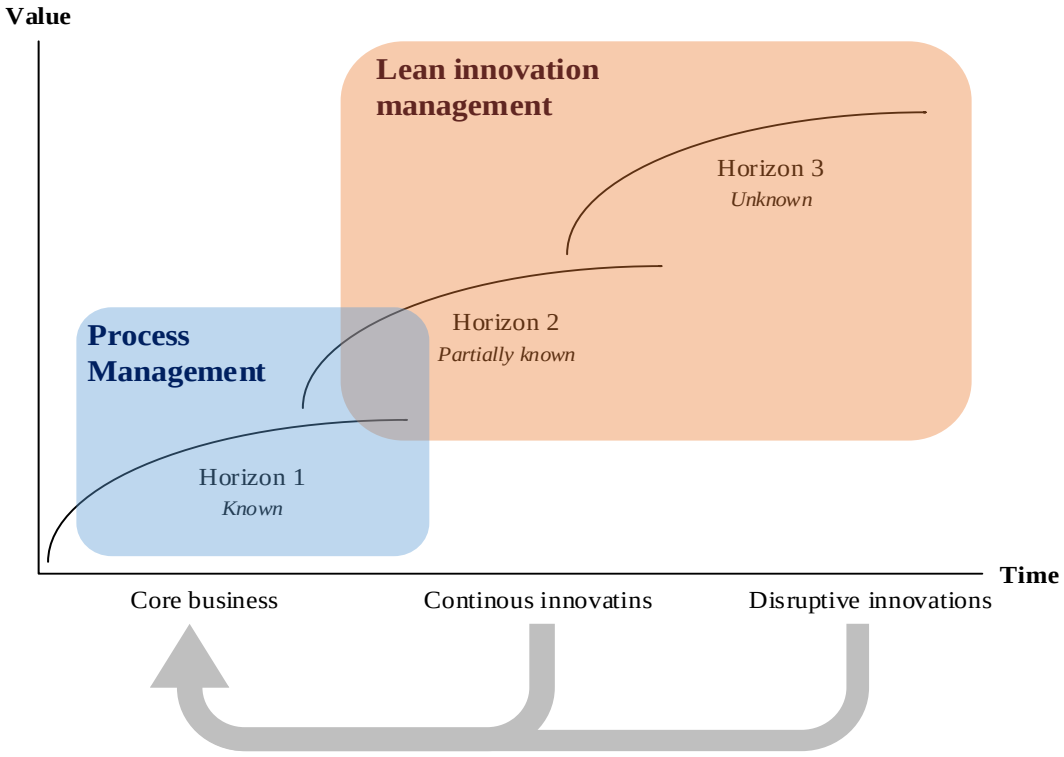
7 RECOMMENDATIONS

The analysis showed, that OTT applications don`t have a significantly negative impact on the revenues of core telco communication solutions. Nevertheless telcos couldn`t offer any breakthrough innovations in the OTT communication field after numerous attempts. According to this I can conclude that structured as they are today, they can`t stay competitive in the OTT industry. In order to change this, I believe big telco corporations should change their innovation strategy. They should use a three horizon innovation model, but combine it with the ambidextrous organisation theory and also the lean enterprise theory. This is also a concept, that was analysed by Blank (2015) and it`s illustrated in Figure 20.

Suggested business model still uses three horizons, but it`s upgraded with the ambidextrous theory and the lean management theory. In Horizon 1 the companies should focus on their core business with their capabilities and resources. They should use the same processes as they did always and use the same key performance indicators to access the business. In this case telcos should focus on their current offerings such as Voice and SMS and their current consumer base. The only innovation that should occur in this horizon is linked to pricing and processes.

In Horizon 2 the company should extend their current core business and look for new opportunities connected to their current offerings. In my case they should stay focused on their core communication offerings and offer some sustainable innovations connected to those or try to look for new distribution channels, new customers etc.

Figure 20. Suggested business model for innovation



In Horizon 3 corporations should be focused on new, disruptive innovations. Departments in this horizon should be physically separated from the rest of the company. As a result they can enjoy the freedom and have their own procedures, policies, incentives… People employed in Horizon 3 should be the best entrepreneurs, and they should work in small teams and that can thus respond fast. They shouldn`t be under the influence of politics from the corporation. Big corporations, with their financial resources, can theoretically afford to have more of those teams in Horizon 3. Due to their size and speed those could work on different projects simultaneously. This would significantly increase the innovation of big telcos.

Both, Horizon 2 and 3 should be run with lean start-up speed and organisation. They should be connected to the rest of the company via senior managers (as in the ambidextrous organisation), who have to be committed to it and have a clear and compelling vision. Additionally also the support staff from the Horizon 1, such as Finance, Legal, Human resources… should support employees in other departments, so that they can focus on what they do best and do it more efficiently. Hence all horizons are still connected via the senior managers and the support staff, but simultaneously independent.

Horizon 1 and 2 have to be committed to and support Horizon 3 with their innovations. Furthermore when Horizon 2 or 3 have successful innovations, those have to be implemented by Horizon 1 so that they can be rolled out on a bigger level and be offered to potential or new customers.

Once either disruptive innovations from Horizon 3, or sustainable innovations from Horizon 2 are successful and implemented and rolled out by Horizon 1, both horizons have to start again with a new cycle of innovations.

Big telcos should thus be both, ambidextrous and "lean", in order to be successful and innovative again. They should engage with new innovations in Horizon 2 and 3 constantly and simultaneously. In order for this to be successful senior managers should share a common vision and values; and they should be compensated for both; executing the current business and being engaged with innovations. Even more, the entire organization has to value and embrace not only continuous improvement but also successful innovations.

CONCLUSION

During this thesis telecommunication industry appeared to be more complex as I initially expected. The revenues for the whole industry on a global level are increasing slowly due to emerging countries, where the core services are in their initial stages of life-cycle. Another reason for this trend is thriving data transmission in developed countries. Yet revenues in general from developed countries, also EU countries, are decreasing slowly. Since the drop from core communication services is significantly bigger than growth of data transmission.

Although EU market is considered as one whole market, the analysis showed, that there are still big differences among countries national markets itself. The market is characterized by the common EU policies which are focusing on users' benefits and are aiming towards the single market among all countries, which would abolish roaming fees completely and consequently decrease telcos` revenues. In addition to that telcos are lowering the prices due to harsh competition, also bundling services to make them more attractive and consequently encouraging the drop of the value. Moreover core communication solution have reached maturity in EU and are thus widely accepted as commodities.

Although telecommunication companies in Europe are engaged in different innovation activities, they haven`t introduced any breakthrough innovation in this market, where their core services are losing value. Instead they are focused on high margin premium products that aren`t communication related. In the communication market they are continuing to be the follower with their sustainable innovations. Thus structured as they are today, telcos can`t be competitive in this market.

At the beginning of this thesis I assumed that OTT communication solutions have significantly negative impact on the telecommunication industry. Although OTT communication solutions are seen as a direct substitution of core telecommunication services, the analysis showed, that it is not a simple case where OTT companies are deriving revenues from telcos. It is a market where core telco communication solutions have reached maturity and OTT companies, that just entered the market, are growing their values. These values however aren`t revenues, but consumer base and consumer data. I can therefore conclude, that OTT communication services don`t have a significant impact on traditional telecommunication operators in EU. What is

more they are encouraging new areas of growth, as telcos network is essential for the existence of OTT communication application.

The telecommunication industry`s main challenge has shown to be their own innovation strategy and disability to introduce breakthrough innovations to the market. It has thus be proven to be a fertile ground for new innovation strategy implementation, as their core communication services have reached maturity.

There are two main limitations to the work of this thesis. First, the research is only based on quantitative data from the telcos database and qualitative data available on their official websites. Although it was initially meant to be supplemented with interviews, no company wanted to talk about these topics. A qualitative, first-hand insight into the industry issues and views from different telcos would definitely add value and deepen the insight provided by this thesis. Secondly, since the OTT communication applications are only available on the market since 2012 it is hard to predict the real effect on revenues from telcos just from the data based on 2 years and a couple of predictions. This hinders the research a bit as the results might not be as representative as they would be with larger number of years.

Future work could be built upon these areas of limitation. A quantitative and qualitative insight into this thesis`s topic would be a great complimentary study providing each company-insights that this thesis is lacking. Another interesting area of further research would be to analyse innovation performance of start-ups before they partner with big telecommunication companies, or are bought by big companies, and afterwards to see how the culture, corporate structure and efficiency are affected. Additionally, exploration of big corporations and start-ups based on geographical segmentation might provide some insights that have remained elusive.

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APPENDIXES

TABLE OF APPENDIXES

Appendix A: List of Abbreviations

List of Abbreviations

APAC	Asia Pacific
BT	British Telekom
DT	Deutsche Telekom (T-Mobile in the USA)
EC	European Commission
EU	European Union
GSMA	Association of mobile operators and related companies
IP	Internet Protocol
MEA	Middle East and Africa
OTT	Over the top
SMS	Short message service
Telco	Telecommunication company
USA	United States of America
Voice	Voice telecommunication service
VoIP	Voice over IP
Wi-Fi	Wireless Fidelity (wireless internet)

Appendix B: Abstract of IDATE`s market database

Table 1. Revenues of world telecom services market

WORLD REVENUES - EUR

Telecom Services Market by Region

Million EUR	2008	2009	2010	2011	2012	2013	2014f	2015f	2016f	2017f	2018f
North America	260,973	259,470	262,627	270,185	280,976	287,772	292,877	298,015	302,103	305,822	309,435
Europe	310,723	303,945	302,655	299,245	292,162	282,351	278,516	277,748	279,347	282,490	286,530
European Union	263,599	256,427	252,644	247,633	238,709	227,948	223,081	221,430	221,933	223,987	226,996
Asia Pacific	293,392	297,938	306,755	319,791	333,559	348,921	362,552	373,004	384,648	395,416	405,294
Latin America	84,139	90,875	92,820	96,531	102,296	105,457	108,865	112,322	115,103	118,156	121,139
Africa & Middle East	62,504	67,671	73,768	79,584	85,467	92,290	97,565	103,405	109,011	114,031	118,335
Total	**1,011,730**	**1,019,900**	**1,038,625**	**1,065,336**	**1,094,460**	**1,116,791**	**1,140,375**	**1,164,494**	**1,190,211**	**1,215,917**	**1,240,733**

Source: IDATE, in "World telecom services markets and players", December 2014
f: forecast e: estimate

Fixed Telephony Market by Region

Million EUR	2008	2009	2010	2011	2012	2013	2014f	2015f	2016f	2017f	2018f
North America	84,149	77,434	72,139	68,140	63,269	60,672	56,653	53,675	51,439	49,861	48,802
Europe	88,331	81,309	76,070	69,714	63,696	58,380	54,311	51,203	48,995	47,526	46,632
European Union	74,383	68,091	63,068	57,714	52,399	48,027	44,706	42,223	40,586	39,617	39,146
Asia Pacific	67,787	60,528	53,996	48,395	43,982	39,732	36,923	34,674	32,943	31,575	30,507
Latin America	29,512	28,969	27,277	26,482	25,467	24,459	23,527	22,134	20,290	18,876	17,633
Africa & Middle East	11,910	12,140	12,391	12,335	11,953	11,865	11,974	12,152	12,291	12,430	12,503
Total	**281,688**	**260,382**	**241,874**	**225,067**	**208,366**	**195,108**	**183,388**	**173,838**	**165,958**	**160,269**	**156,077**

Source: IDATE, in "World telecom services markets and players", December 2014
f: forecast e: estimate

Mobile Services Market by Region

Million EUR	2008	2009	2010	2011	2012	2013	2014f	2015f	2016f	2017f	2018f
North America	122,601	126,044	132,438	140,271	152,489	157,618	162,339	165,909	168,102	170,089	171,801
Europe	158,276	154,939	156,814	156,880	154,129	148,957	147,439	147,866	149,551	151,957	154,708
European Union	132,798	129,449	129,653	128,182	123,789	117,385	114,755	114,404	115,163	116,684	118,642
Asia Pacific	165,246	174,111	185,283	199,689	212,167	227,523	240,777	250,105	259,792	268,173	275,360
Latin America	43,348	49,256	51,420	54,445	59,414	61,636	64,297	67,617	70,675	73,576	76,306
Africa & Middle East	45,834	49,768	55,120	60,139	65,323	70,911	74,732	78,951	83,068	86,721	89,896
Total	**535,305**	**554,118**	**581,074**	**611,424**	**643,522**	**666,644**	**689,583**	**710,447**	**731,188**	**750,517**	**768,071**

Source: IDATE, in "World telecom services markets and players", December 2014
f: forecast e: estimate

Fixed data transmission and Internet Services Market by Region

Million EUR	2008	2009	2010	2011	2012	2013	2014f	2015f	2016f	2017f	2018f
North America	54,223	55,992	58,050	61,774	65,219	69,483	73,885	78,431	82,562	85,872	88,832
Europe	64,117	67,697	69,771	72,652	74,337	75,015	76,766	78,679	80,801	83,007	85,191
European Union	56,418	58,888	59,924	61,736	62,522	62,536	63,620	64,803	66,184	67,687	69,208
Asia Pacific	60,359	63,299	67,477	71,707	77,410	81,666	84,852	88,225	91,912	95,668	99,427
Latin America	11,279	12,649	14,122	15,603	17,414	19,362	21,042	22,572	24,139	25,704	27,200
Africa & Middle East	4,759	5,763	6,258	7,110	8,191	9,514	10,858	12,302	13,652	14,881	15,936
Total	**194,737**	**205,399**	**215,677**	**228,845**	**242,572**	**255,039**	**267,404**	**280,209**	**293,065**	**305,131**	**316,586**

Source: IDATE, in "World telecom services markets and players", December 2014
f: forecast e: estimate

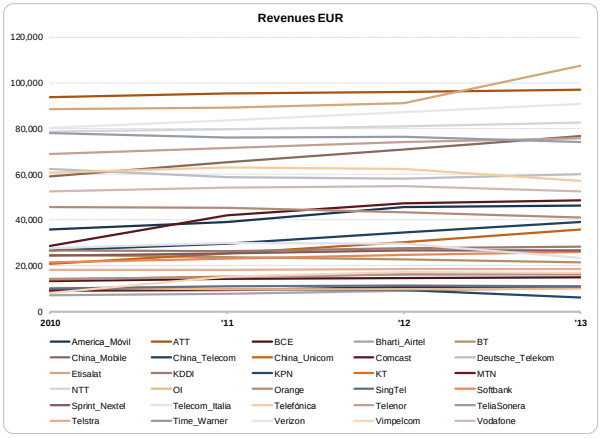
Source: IDATE, *World Telecom Services Market*, 2014.

Appendix C: Abstract of IDATE`s telecommunication players database

Table 2. Revenues of world Telecommunication Players

Definition: Million EUR

Select player…	2010	'11	'12	'13
America_Móvil	35,847	39,235	45,708	46,359
ATT	93,608	95,448	95,983	96,976
BCE	13,216	14,260	14,610	14,921
Bharti_Airtel	6,935	7,653	9,184	10,323
BT	24,641	23,657	22,751	21,509
China_Mobile	58,988	65,379	70,731	76,608
China_Telecom	26,728	29,789	34,412	39,094
China_Unicom	20,824	25,428	30,261	35,867
Comcast	28,574	42,060	47,128	48,700
Deutsche_Telekom	62,421	58,653	58,169	60,132
Etisalat	88,321	89,185	91,134	107,472
KDDI	26,564	26,506	27,568	28,264
KPN	9,743	9,572	9,241	6,161
KT	13,983	15,128	16,366	16,380
MTN	8,947	9,508	10,540	10,648
NTT	78,575	79,529	81,091	82,583
OI	10,392	9,749	9,831	9,929
Orange	45,503	45,277	43,515	40,981
SingTel	10,155	10,878	11,331	10,945
Softbank	21,327	23,188	24,715	26,073
Sprint_Nextel	24,526	25,367	26,638	26,733
Telecom_Italia	27,571	29,957	29,503	23,407
Telefónica	60,737	62,837	62,356	57,061
Telenor	68,967	71,637	73,966	75,645
TeliaSonera	78,016	76,210	76,278	73,953
Telstra	18,119	18,247	18,447	18,672
Time_Warner	14,211	14,819	16,108	16,661
Verizon	80,265	83,511	87,255	90,798
Vimpelcom	7,925	15,261	17,370	16,983
Vodafone	52,405	54,069	54,697	52,373



Source: IDATE, *World Telecom Services Players*, 2014.

Appendix D: Abstract of Analysis Mason`s forecasts database

Table 3. Forecast for the number of OTT users 2012-2018

Series category	Service type	Series name	Region	Country	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018
Users	Non-operator/OTT	voice – total	Western Europe	Austria		1 647 000	1 925 000	2 269 000	2 593 000	2 916 000	3 227 000	3 542 000	3 882 000	4 253 000
Users	Non-operator/OTT	messaging – total	Western Europe	Austria		987 000	2 144 000	3 837 000	5 270 000	6 324 000	6 931 000	7 229 000	7 420 000	7 576 000
Users	Non-operator/OTT	voice – total	Western Europe	Belgium		943 000	1 146 000	1 391 000	1 645 000	1 895 000	2 165 000	2 475 000	2 818 000	3 173 000
Users	Non-operator/OTT	messaging – total	Western Europe	Belgium		681 000	1 420 000	2 516 000	3 570 000	4 465 000	5 202 000	5 842 000	6 460 000	7 066 000
Users	Non-operator/OTT	voice – total	Western Europe	Denmark		1 155 000	1 334 000	1 556 000	1 769 000	1 986 000	2 209 000	2 440 000	2 694 000	2 964 000
Users	Non-operator/OTT	messaging – total	Western Europe	Denmark		694 000	1 456 000	2 533 000	3 432 000	4 107 000	4 530 000	4 777 000	4 968 000	5 127 000
Users	Non-operator/OTT	voice – total	Western Europe	Finland		1 266 000	1 544 000	1 973 000	2 441 000	2 927 000	3 379 000	3 818 000	4 183 000	4 497 000
Users	Non-operator/OTT	messaging – total	Western Europe	Finland		793 000	1 841 000	3 172 000	4 179 000	4 841 000	5 152 000	5 370 000	5 511 000	5 643 000
Users	Non-operator/OTT	voice – total	Western Europe	France		8 291 000	9 887 000	11 497 000	12 917 000	14 538 000	16 198 000	18 002 000	19 941 000	21 874 000
Users	Non-operator/OTT	messaging – total	Western Europe	France		5 348 000	10 310 000	17 124 000	22 930 000	28 482 000	32 643 000	35 814 000	38 872 000	41 998 000
Users	Non-operator/OTT	voice – total	Western Europe	Germany		15 822 000	18 191 000	21 016 000	24 058 000	27 092 000	30 134 000	33 225 000	36 513 000	39 813 000
Users	Non-operator/OTT	messaging – total	Western Europe	Germany		6 016 000	10 111 000	16 986 000	25 952 000	35 457 000	44 113 000	51 129 000	56 362 000	59 091 000
Users	Non-operator/OTT	voice – total	Western Europe	Greece		471 000	585 000	771 000	989 000	1 221 000	1 458 000	1 704 000	1 965 000	2 248 000
Users	Non-operator/OTT	messaging – total	Western Europe	Greece		209 000	416 000	829 000	1 374 000	1 979 000	2 569 000	3 077 000	3 462 000	3 728 000
Users	Non-operator/OTT	voice – total	Western Europe	Ireland		734 000	848 000	989 000	1 134 000	1 290 000	1 457 000	1 640 000	1 846 000	2 067 000
Users	Non-operator/OTT	messaging – total	Western Europe	Ireland		296 000	524 000	888 000	1 314 000	1 784 000	2 251 000	2 674 000	3 027 000	3 259 000
Users	Non-operator/OTT	voice – total	Western Europe	Italy		8 657 000	10 076 000	11 801 000	13 880 000	16 219 000	18 875 000	21 799 000	25 130 000	28 699 000
Users	Non-operator/OTT	messaging – total	Western Europe	Italy		3 814 000	6 805 000	11 103 000	16 902 000	23 772 000	31 305 000	38 783 000	45 666 000	51 001 000
Users	Non-operator/OTT	voice – total	Western Europe	Netherlands		6 201 000	7 058 000	8 141 000	9 280 000	10 472 000	11 609 000	12 668 000	13 553 000	14 256 000
Users	Non-operator/OTT	messaging – total	Western Europe	Netherlands		3 117 000	6 428 000	10 405 000	13 473 000	15 502 000	16 518 000	17 089 000	17 649 000	18 252 000
Users	Non-operator/OTT	voice – total	Western Europe	Norway		1 266 000	1 537 000	1 931 000	2 365 000	2 808 000	3 241 000	3 656 000	4 001 000	4 263 000
Users	Non-operator/OTT	messaging – total	Western Europe	Norway		665 000	1 569 000	2 765 000	3 724 000	4 367 000	4 751 000	5 026 000	5 222 000	5 348 000
Users	Non-operator/OTT	voice – total	Western Europe	Portugal		463 000	644 000	873 000	1 107 000	1 344 000	1 612 000	1 912 000	2 253 000	2 589 000
Users	Non-operator/OTT	messaging – total	Western Europe	Portugal		335 000	711 000	1 410 000	2 311 000	3 356 000	4 425 000	5 380 000	6 097 000	6 503 000
Users	Non-operator/OTT	voice – total	Western Europe	Spain		8 082 000	9 888 000	12 576 000	15 873 000	19 459 000	22 984 000	26 295 000	29 225 000	31 730 000
Users	Non-operator/OTT	messaging – total	Western Europe	Spain		5 276 000	12 130 000	21 647 000	31 100 000	38 037 000	42 149 000	44 722 000	47 180 000	49 746 000
Users	Non-operator/OTT	voice – total	Western Europe	Sweden		2 960 000	3 435 000	4 109 000	4 886 000	5 707 000	6 466 000	7 136 000	7 714 000	8 135 000
Users	Non-operator/OTT	messaging – total	Western Europe	Sweden		1 287 000	2 793 000	4 876 000	6 744 000	8 104 000	8 830 000	9 214 000	9 533 000	9 711 000
Users	Non-operator/OTT	voice – total	Western Europe	Switzerland		1 867 000	2 141 000	2 467 000	2 797 000	3 143 000	3 499 000	3 868 000	4 266 000	4 673 000
Users	Non-operator/OTT	messaging – total	Western Europe	Switzerland		749 000	1 333 000	2 262 000	3 333 000	4 459 000	5 479 000	6 307 000	6 897 000	7 188 000
Users	Non-operator/OTT	voice – total	Western Europe	UK		14 612 000	16 801 000	19 432 000	21 998 000	24 511 000	26 943 000	29 473 000	32 274 000	35 083 000
Users	Non-operator/OTT	messaging – total	Western Europe	UK		5 862 000	10 403 000	17 810 000	26 287 000	34 810 000	42 120 000	47 794 000	51 856 000	53 897 000
Users	Non-operator/OTT	voice – total	Western Europe	Western Europe		74 435 000	87 041 000	102 794 000	119 735 000	137 530 000	155 458 000	173 654 000	192 257 000	210 321 000
Users	Non-operator/OTT	messaging – total	Western Europe	Western Europe		36 127 000	70 396 000	120 161 000	171 892 000	219 850 000	258 967 000	290 224 000	316 180 000	335 134 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Bulgaria		290 000	407 000	570 000	760 000	950 000	1 141 000	1 319 000	1 478 000	1 624 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Bulgaria		214 000	397 000	686 000	1 056 000	1 450 000	1 882 000	2 316 000	2 731 000	3 110 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Croatia		397 000	516 000	649 000	805 000	977 000	1 157 000	1 336 000	1 504 000	1 657 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Croatia		259 000	431 000	665 000	966 000	1 320 000	1 703 000	2 087 000	2 434 000	2 695 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Czech		1 278 000	1 608 000	2 022 000	2 506 000	3 014 000	3 509 000	3 967 000	4 390 000	4 782 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Czech		694 000	1 110 000	1 800 000	2 709 000	3 729 000	4 785 000	5 779 000	6 617 000	7 227 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Estonia		118 000	159 000	215 000	280 000	347 000	415 000	479 000	536 000	589 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Estonia		83 000	146 000	252 000	378 000	516 000	660 000	793 000	903 000	983 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Hungary		614 000	763 000	966 000	1 217 000	1 472 000	1 737 000	2 004 000	2 260 000	2 496 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Hungary		559 000	963 000	1 664 000	2 606 000	3 487 000	4 394 000	5 276 000	6 063 000	6 684 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Latvia		261 000	330 000	415 000	507 000	605 000	703 000	795 000	880 000	953 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Latvia		135 000	220 000	356 000	523 000	714 000	912 000	1 104 000	1 272 000	1 392 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Lithuania		259 000	336 000	445 000	584 000	743 000	898 000	1 037 000	1 164 000	1 287 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Lithuania		145 000	249 000	441 000	711 000	1 032 000	1 359 000	1 652 000	1 905 000	2 118 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Poland		2 221 000	2 808 000	3 607 000	4 613 000	5 720 000	6 852 000	7 937 000	8 918 000	9 753 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Poland		1 269 000	2 071 000	3 410 000	5 292 000	7 541 000	10 049 000	12 657 000	15 168 000	17 344 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Romania		1 277 000	1 649 000	2 188 000	2 898 000	3 733 000	4 655 000	5 599 000	6 554 000	7 542 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Romania		563 000	887 000	1 480 000	2 334 000	3 405 000	4 665 000	6 040 000	7 503 000	9 034 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Russia		8 651 000	11 913 000	16 215 000	22 174 000	29 207 000	36 719 000	44 048 000	50 972 000	57 230 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Russia		8 304 000	14 440 000	23 498 000	36 862 000	52 645 000	69 443 000	85 403 000	99 729 000	111 144 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Slovakia		856 000	1 014 000	1 176 000	1 337 000	1 492 000	1 637 000	1 771 000	1 890 000	1 991 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Slovakia		359 000	517 000	734 000	995 000	1 292 000	1 618 000	1 962 000	2 300 000	2 606 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Slovenia		247 000	293 000	347 000	409 000	472 000	535 000	594 000	649 000	696 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Slovenia		146 000	228 000	353 000	521 000	710 000	907 000	1 101 000	1 267 000	1 391 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Turkey		1 846 000	2 626 000	3 910 000	5 842 000	8 485 000	11 557 000	14 933 000	18 144 000	21 058 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Turkey		1 248 000	2 478 000	4 999 000	9 052 000	14 644 000	21 249 000	28 730 000	36 067 000	42 684 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Ukraine		1 323 000	1 642 000	2 002 000	2 407 000	2 921 000	3 627 000	4 573 000	5 668 000	6 825 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Ukraine		578 000	865 000	1 399 000	2 220 000	3 346 000	4 978 000	7 290 000	10 196 000	13 561 000
Users	Non-operator/OTT	voice – total	Central and Eastern Europe	Central and Eastern Europe		19 638 000	26 063 000	34 726 000	46 341 000	60 139 000	75 144 000	90 390 000	105 005 000	118 485 000
Users	Non-operator/OTT	messaging – total	Central and Eastern Europe	Central and Eastern Europe		14 558 000	24 998 000	41 737 000	66 223 000	95 830 000	128 601 000	162 190 000	194 155 000	221 973 000

Source: Analysis Mason, *OTT communication services worldwide: forecast 2013-2018*, 2013.

Appendix E: Regression analysis on a global level

Table 4. Summary of Regression analysis on a global level

OTT users

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99
R Square	0.99
Adjusted R Square	0.99
Standard Error	4085545519.17
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	90444248926453500000000.00	90444248926453500000000.00	541.85	0.00
Residual	7.00	1168417753245740000000.00	166916821892248000000.00		
Total	8.00	91612666679699200000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	821211507853.86	2630606945.55	312.18	0.00	814991110873.99	827431904833.72	814991110873.99	827431904833.72
OTT users	21.09	0.91	23.28	0.00	18.95	23.23	18.95	23.23

OTT voice

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99
R Square	0.97
Adjusted R Square	0.97
Standard Error	5765901641.84
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	89285473157665500000000.00	89285473157665500000000.00	268.56	0.00
Residual	7.00	2327193522033720000000.00	332456217433388000000.00		
Total	8.00	91612666679699200000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	814617507874.14	4080267447.08	199.65	0.00	804969208515.80	824265807232.48	804969208515.80	824265807232.48
OTT voice users	71.61	4.37	16.39	0.00	61.28	81.94	61.28	81.94

OTT messaging

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99
R Square	0.99
Adjusted R Square	0.99
Standard Error	3813808389.78
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	90594507269321600000000.00	90594507269321600000000.00	622.85	0.00
Residual	7.00	1018159410377680000000.00	145451344339669000000.00		
Total	8.00	91612666679699200000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	824146644212.88	2354338817.99	350.05	0.00	818579517547.40	829713770878.37	818579517547.40	829713770878.37
OTT msg users 1	29.79	1.19	24.96	0.00	26.97	32.61	26.97	32.61

Appendix F: Regression analysis on European Union level

Table 5. Summary of Regression analysis on European Union level

OTT users

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.89
R Square	0.79
Adjusted R Square	0.76
Standard Error	6421469095.72
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1080083640997660000000.00	1080083640997660000000.00	26.19	0.00
Residual	7.00	288646857430684000000.00	41235265347240600000.00		
Total	8.00	1368730498428340000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	231783123052.45	4864748329.56	47.65	0.00	220279821174.46	243286424930.43	220279821174.46	243286424930.43
X Variable 1	-43.76	8.55	-5.12	0.00	-63.98	-23.54	-63.98	-23.54

OTT voice

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.86
R Square	0.74
Adjusted R Square	0.70
Standard Error	7176173959.72
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1008248189527090000000.00	1008248189527090000000.00	19.58	0.00
Residual	7.00	360482308901252000000.00	51497472700178800000.00		
Total	8.00	1368730498428340000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	236986511893.69	6672369337.55	35.52	0.00	221208865542.54	252764158244.83	221208865542.54	252764158244.83
X Variable 1	-135.61	30.65	-4.42	0.00	-208.08	-63.14	-208.08	-63.14

OTT messaging

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.90
R Square	0.81
Adjusted R Square	0.78
Standard Error	6074001643.03
Observations	9.00

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1110476026711400000000.00	1110476026711400000000.00	30.10	0.00
Residual	7.00	258254471716938000000.00	36893495959562500000.00		
Total	8.00	1368730498428340000000.00			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	229235775311.06	4139793218.82	55.37	0.00	219446719869.26	239024830752.86	219446719869.26	239024830752.86
X Variable 1	-64.38	11.74	-5.49	0.00	-92.14	-36.63	-92.14	-36.63