

The 5 Competitive Forces Framework in a technology mediated environment. Do these forces still hold in the industry of the 21st century?

Author: Marvin Larry Shamir Luis Fernando Johnson
University of Twente
P.O. Box 217, 7500AE Enschede
The Netherlands
m.l.l.s.f.johnson@student.utwente.nl

In 1979 Michael E. Porter published his article “How competitive forces shape strategy“ which has gained massive popularity among entrepreneurs and managers for suggesting a holistic framework to analyze the forces driving industry competition. Now, more than 30 years later, academics suggest that the model became frozen in time, and, is in its original form no more applicable to today’s business context. Hence, this study will find out that indeed according to recent literatures the five competitive forces model can be partly rejected. Moreover, four additional forces will be presented in the course of this study to make up for the innate weaknesses imposed by Porter’s framework. These additional forces will then be integrated into Porter’s original five forces framework and applied to the telecommunications industry to depict the weaknesses of the unaltered model. It will be understood that Porter’s model in its original form will solely provide a very superficial attempt to explain the forces driving industry competition in the 21st century. The readjusted model will allow to step beyond Porter’s model and provide a much clearer view on the decisive forces determining industry competition.

Supervisors: Dr. E. (Efthymios) Constantinides. Assistant Professor Marketing / E– Media Dr. K. (Kasia) Zalewska-Kurek. Assistant Professor Strategic Management

Keywords

Five Forces Framework, Competitive Advantage, Innovation, Digitalization, Globalization, Deregulation

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

3rd IBA Bachelor Thesis Conference, July 3rd, 2014, Enschede, The Netherlands.

Copyright 2014, University of Twente, Faculty of Management and Governance.

1. INTRODUCTION: A MODEL THAT SEEMS TO HAVE BECOME FROZEN IN TIME

In the year of 1979 a framework was introduced that should turn the entire way around how managers and entrepreneurs view the competitive environment, in which a firm in a specific industry is embedded in. The model is most widely known as Porter's forces model (Porter, 1979). Since then Porter's model was considered to be the ultimate tool to discover the forces that drive industry competition. It is handy, it is quick to use and, most importantly, it is easy to understand. The model basically aims at describing the competitive environment a firm is embedded in along five industry-specific factors that drove to Porter's mind industry competition (Porter, 1979). Despite that, in recent years, these forces have massively come under fire. Some researchers argue that the model has an innate weakness, and, besides this, is difficult to operationalize (Lee, Kim, & Park, 2012). Other researchers, on the contrary state that the model does not take into account a firm's potential collaborative relations with determinants of the industry environment (Dulčić, Gnjidić, & Alfirević, 2012). Grundy (2006) even said that it seems as if the once so popular forces model has become frozen in time. This gives rise to the question if Porter's five forces are still holding in today's competitive environment and, hence, if these forces still define modern industry competition. As the environment changes, so does the industry and also the firms that react according to the changes imposed by the changing environment and industry. And this is exactly where this paper draws on.

This paper aims at providing an in-depth literature review of the latest findings on Porter's competitive forces model. It will answer the question whether the five forces framework should be accepted, partly rejected, or probably even fully rejected in today's business context. This, in turn, will be facilitated by firstly introducing the reader to the five forces framework and informing him what it is basically about. Afterwards, the latest thoughts and findings on alterations to Porter's framework will be identified. These findings will either constitute whole new approaches, which will serve as substitute approaches to Porter's model, or approaches that go beyond Michael E. Porter's framework by adding additional forces to it. From there, this paper will overflow to empirical work that is derived from the findings made earlier in this paper. Here, this study will take a closer look at the telecommunication industry with the case study of Apple, HTC, Google and many other important players from the telecom industry. The case study will then allow to comprehend a new conceptual framework that is specifically designed for application in the high-tech industry. Augmenting the existing five forces framework will allow to solve the research problem of the ever growing competition in the telecommunication sector in recent years. Laffont and Tirole (2001, p. 1) mention this dilemma in their book 'Competition in telecommunications' by saying that "competition in the telecommunication has developed faster than in other industries." Hence many firms operating in this industry struggle to gain competitive advantage and this is where this paper sets in.

The research problem will be solved along the course of this study by finding an answer to the following three research questions:

To what extent do Porter's Five Forces alone drive industry competition in large multinational companies operating in the telecommunication industry?

To what extent are the factors globalization, deregulation, digitalization and innovation relevant to driving industry competition?

To what degree do the factors globalization, deregulation, digitalization and innovation show applicability in business practice?

2. A SNEAK PREVIEW INTO THE FIVE COMPETITIVE FORCES

Porter defined five distinct forces that have to be thought of when determining the attractiveness of a certain industry. Attractiveness, at this point, refers to the profitability the industry offers its entrant. According to the profitability it should then be thought about if entering the industry is reasonable or should be avoided. The stronger these five forces are the less profit can be achieved in this specific industry and, hence, the less attractive this industry is to its potential entrant (Porter, 1979).

The five competitive forces are constituted by the threat of new entrants, the bargaining power of buyers, the bargaining power of suppliers and the threat of substitute products or services.

The threat of new entrants

Porter considers the threat of new entrants in a given industry as a vital factor in determining industry profitability and attractiveness. He assumes six major sources of barriers to industry entry exist (Porter, 1979).

Here, the factors of economies of scale, product or service differentiation and capital requirements do constitute the main areas of attention when estimating the threat of new entrants (Porter, 1979). In some industries, huge economies of scale play a role in order to enter the industry, while in other industries more product or service differentiation leads to regulate the threat of new entry. Other industries such as the pharmaceutical or automotive industry require huge amounts to be invested for instance in product machinery before any profits can be derived. Hence, Porter (1979) sees this aspect as a driving force for industry competition.

Bargaining power of buyers

The bargaining power of buyers is the level to which buyers can exert power on participants in an industry. This can happen through various ways such as force down prices, demand higher quality and play competitors off against each other (Porter, 1979). Among the most well known factors of power that buyers can exert on industry participants is the purchase volume and the level of product or service differentiation (Porter, 1979, 2008).

Bargaining power of suppliers

The bargaining power of suppliers, on the other hand, is the level to which suppliers can exert power on participants in an industry. Suppliers can exert power on firms operating in a specific industry by knowing that there are no fallback suppliers to which firms can shift, when buyer and supplier share the same production facilities or have other co-operations with suppliers that bind them to one specific supplier (Porter, 1979).

Threat of substitute products or services

The threat of substitute products or services is basically described as the level to which products or services are exchangeable with other products or services in the same industry (Porter, 1979). The easier it is for the prospect to find substitutes to ones offered products or services the harder it is for an entrant to position himself in an industry and, hence, generate profits (Porter, 1979, 2008).

Rivalry Among Existing Competitors

Knowing the preceding four factors it can be now arrived at the final force, which is according to Porter (1979) the rivalry among existing competitors. The stronger these preceding forces interact the stronger the rivalry among existing competitors will be. Porter (1979, p. 7) also refers to this force as the “jockeying for position” as this force is mainly about using tactics such as price competition, advertising slugfests and product innovation in order to assume a fixed position in the industry.

In summary, Porter (1979) assumes these five forces to be applicable to absolutely every industry, regardless of if it is low-tech, or high-tech, emerging economy or developed economy (Porter, 2008) and sees them as a vital key to determining industry trends, profitability and attractiveness.

3. METHODOLOGY

Having discussed Porter’s underlying forces in the preceding paragraph the reader will now be given an understanding of how this paper will be structured. At the same time, the line of reasoning will be provided that this paper employs in order to find an answer to the aforementioned research questions and arrive at a sound conclusion.

In the first instance, this paper will go on with providing an insight on recent academics and what they think of Porter’s competitive forces framework. Here, one will be introduced firstly to variations that have been made to the original five forces framework that can be derived from three different schools of thought. After that it will be arrived at a trend. The paper will secondly introduce whole new approaches brought to the reader by academics who assume that neither minor nor major alterations are enough in order to define the forces driving industry competition in the 21st century. The raw data used is mainly gathered through internet-based search engines like Scopus, Google Scholar or the Internet library of the University of Twente, but at the same time searching through offline libraries. Not least Downes (1997) article reviewing the five forces framework critically is found searching offline libraries. Subsequently the literature found be relevant will be analyzed. After that, the relevant articles are entered a literature matrix (see Table 1a and 1b). The top rows rightwards display the different categories of intellectual approaches towards Porter’s five forces framework, which are found scanning through the articles while the first column downwards lists the different authors belonging to one of these categories. The various categories are formed by reading through each article and entering their intellectual approach as new category. Whenever a new approach is observed it is instantly entered in the matrix. Likewise, whenever authors were found to come up with the same intellectual approach they were assigned to the same category. The paper holds two such matrices. One holds the information for the alterations or variations to Porter’s framework, while the other one holds information on the new approaches towards the five forces framework. This is done in order to observe trends more easily

and independently. The relevance of an article is mainly determined looking at the paper’s abstract and conclusions. Whenever these are found to be appealing an in-depth analysis is applied by reading through the whole paper. The year of publication also plays a role as articles have to be moderately new in order to provide a sound message on the topicality of Porter’s five forces. Following this manner every article is judged independently if it should be incorporated in this study or not. In total, 54 articles are used for this study. Eleven articles are used to discuss the common alterations to Porter’s model ranging from minor to major alterations to his model. 21 articles are used to present new surrogating approaches to the five forces approach. These 21 articles, in turn, allow to arrive at 10 articles which propose innovation to be the main force driving industry competition, 11 articles which suggest the resource-based view to drive industry competition and 6 articles that assume other forces to drive industry competition. This provides 27 entries into the matrix other than the 21 articles mentioned in the beginning. This is because 6 double-entries exist where an article is attributed to both the resource-based view and the innovativeness as force driving industry competition. Lastly, the remaining 22 articles focus on either Porter’s own comments on his framework, literature that supports the effect of shorter product life cycles on a firm’s innovativeness or articles that deal with the analysis of various telecommunication industries around the globe.

The key search terms to find relevant articles are primarily ‘competitive advantage’, ‘innovation’, ‘globalization’, ‘deregulation’, ‘digitalization’, ‘innovation’ but also ‘five forces’, ‘industry competition’ and ‘competition’. Entering the search term ‘competitive advantage’ in Google Scholar provided 2.700.000 results, while 96,719 results could be retrieved checking the University of Twente online library. Science direct gave 240,605 hits. From the articles, which were thought to be relevant the bibliography was checked in order to find useful cross-references to discover even more meaningful articles.

An often times discussed article is the one of Downes (1997). Downes is well-known for his book called ‘Unleashing the killer app: Digital strategies for market dominance’ and suggests in one of his articles three forces driving industry competition which surrogate the five competitive forces model. These are globalization, deregulation and digitalization (Downes, 1997).

Moreover, the level of innovativeness will gain a lot of attention in this study as this paper will point out its importance as force driving industry competition. This will of course come along with many authors backing this assumption up. Accordingly, this paper will recombine the knowledge gained from the literature review to come up with one holistic framework that makes up for Porter’s shortcomings of the five forces model. The new forces being relevant will be operationalized and further explained to the reader. On top of that, it will be explicitly explained why these specific forces should be taken into consideration. A figure will follow to illustrate at a first glance which line of reasoning was followed to arrive at the forces neglected by the five forces framework.

After that, the paper will be concluded by taking a closer look at the telecommunication industry. Here, mentioning the examples of Apple, HTC, Google, Juniper Networks and many other important telecom players will facilitate a greater understanding of the new framework presented in this paper by applying it to the case of the aforementioned organizations.

In the end of this study, the reader will be introduced to a discussion and limitations section. In this section, the reader will critically reflect on the findings made in this paper while at the same time catching a glimpse at the various limitations the paper comes along with. Having understood the limitations the paper will be ultimately ended with the conclusion. Here, all findings made throughout this study will be summarized, which, in turn, will provide food for thought for future research.

4. LITERATURE REVIEW

4.1 A round-up of common criticisms

In order to provide a better understanding of the following opinions of academics on the model this paper will distinguish between three schools of thought. The first school of thought will be comprised of academics who only see minor adjustments to the model as necessary. Here, Porter's forces have only been summarized or grouped. No changes have been made to the model by adding or detaching forces of the original model. The second school of thought consists of academics who see a mediocre adjustment to the model as inevitable and relevant. This explicitly means that adjustments to the five facets of the model have been taken place by the academic by replacing forces completely or only keeping some of them unchanged. The last school of thought argues for major adjustments to the model. Here, the whole model is reconsidered and/ or is combined with other models. This basically means none of the forces are kept in their original manner.

A relatively small number of researchers regard minor adjustments to the model as necessary. Slater and Olson (2002) propose an augmented model that only groups or summarizes Porter's model in a new way. Slater and Olson (2002, p. 16) argue that none of the forces should be removed. They simply restructure the model by for instance, combining substitutes and threat of new entry into a single category to which they refer to as "composite competitive rivalry force". The vast majority of academics, however, see an either mediocre or major adjustment to Porter's five competitive forces approach as prerequisite. Dulčić et al. (2012, p. 1077) believe that "the five competitive forces model should be modified for assessing today's dynamic industry structure." Dulčić et al. (2012) introduce the dimension of time dynamics, which to their opinion enables managers to get a clearer glimpse in the existence of past, present and future interactions between the industry environment and firms which are embedded in it. Another mediocre adjustment to the model is presented by Breedveld, Meijboom, and de Roo (2006). Breedveld et al. (2006) assume Porter's model cannot be applied to not-for-profit organizations as the structure of the forces look somewhat different in this sector and, hence, is not applicable to every industry opposed to the assumptions of Porter (1979). Hence, Breedveld et al. (2006) modify the determinants of the bargaining power of labor suppliers in order to make it applicable to the home care industry. Nevertheless, the other four forces are kept in their original way. Maxfield (2008) assumes mediocre adjustments to the model to be made by making Porter's model more compatible with corporate social responsibility than with approaches resting on neoclassical equilibrium models of firm performance. So one can obviously see that ideas on the adjustment of Porter's model come from various perspectives. Surprisingly, most literature found that major adjustments to the model are needed. Lee et al. (2012) assume that the five forces framework has an innate weakness and is difficult to operationalize. Hence, it should not enjoy

popularity anymore. Alternatively, an analytic network process (ANP) approach is provided to overcome Porter's model and therewith make up for its weakness and difficulty in operationalization (Lee et al., 2012). The same approach is employed by Wu, Tseng, and Chiu (2012) who also see the ANP approach as a perfect substitute to Porter's five forces framework. Other approaches see the Toulmin method as an outstanding substitute to Porter's obsolete model as the validity of Porter's model is questionable (Narayanan & Fahey, 2005) while again other authors regard the Delta-Method as appropriate substitute to the competitive forces framework to describe the forces driving industry competition (Hax & Wilde li, 2001). Nevertheless, two specific literatures have gained massive popularity among Porter contestants, which is on the one hand Tony Grundy's article "Rethinking and reinventing Michael Porter's five forces model. Strategic Change" and Larry Downes (1997) published article "Beyond Porter". While Grundy's article focuses more on the background of each of the five forces and, hence, derives so-called micro-forces from the original five forces, Downes' article basically comes up with three additive forces, which are *globalization*, *digitalization* and *deregulation* (Downes, 1997). These three forces have gained massive popularity among researchers who argue against the five forces framework, and, is at the same time also able to be quickly applied to any industry of choice. This is why, this paper will further elaborate on these three forces in the course of this study. Beyond that, this paper provides with Fig. 1 an overview of the three different schools of thought, showing that among the eleven most trending literatures already seven have considered that major adjustments to the model have to be made in order to make the model applicable to today's business context. Only a minority of trending articles saw either mediocre or minor adjustments to the model as enough to make the model applicable to today's business context.

Three schools of thought on Porter's Five Competitive Forces Model

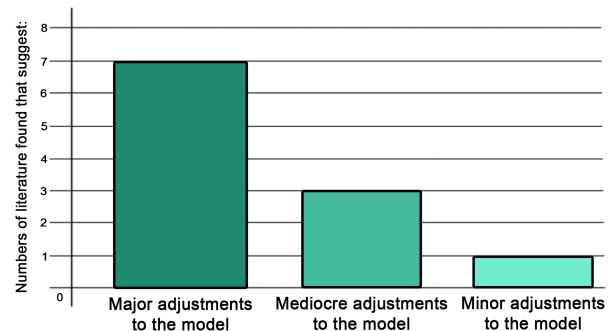


Fig. 1 – Dispersion of literature suggesting alterations/adjustments to Porter's model over the three distinct schools of thought

In addition to the different alterations to Porter's model we have discussed in the previous section one should not disregard that also whole new approaches to strategic thinking and, hence, the definition of the forces driving industry competition have emerged. For this purpose a more holistic view has been employed by focusing thoroughly on what other researchers have so far found to drive industry competition regardless from Porter's five forces. At this point, it is important to note that this paper has a narrow focus on the high-technology industry in the form of the telecommunication industry. This is why it might be very interesting to check what other researchers have thought to be a force that is inevitable to take into consideration when thinking in high-tech terms.

Unlike the previous section where different schools of thought were presented showing the trend that most researchers suggest that a major adjustments to Porter's model should be made, clearer trends can be observed when taking a look at the factors driving industry competition in the high-tech industry or more specifically the telecommunication industry. These trends assume the level of innovativeness to be a very important factor. Earlier, innovativeness was only regarded as one of many resources a firm had, derived from the ideology of the resource-based view. Innovativeness was related to internal factors, which aimed at obtaining competitive advantage. Nowadays, however, the level of innovativeness has turned out to be among the most important factors when thinking about the forces driving industry competition. It has become an external factor, which is to large extent affecting the industry environment. This assumption is further supported by Qiannan (2011, p. 382) who explicitly states that "innovative industrial clusters can promote the regional competitiveness. Therefore, the study of relationships between regional competitiveness and innovative industrial clusters has become an important issue." This statement should provide the reader with a first impression how inevitable innovativeness is in defining the driving forces of industry competition. This is topped off by Bettis and Hitt (1995) who both assume that rapid technological changes undermine the sustainability of competitive advantage (Sirmon, Hitt, Arregle, & Campbell, 2010). This again fosters how important the concept of innovation is when thinking about the forces driving industry competition in an innovation-mediated industry as the telecommunication is. It is even gone a step further by claiming that government policy makers face strategic discontinuities, which are changing the nature of competition due to technological change, make old tools for the assessment of the driving forces of industry competition obsolete and form a whole new competitive landscape with new forces driving industry competition (Bettis & Hitt, 1995). Another research conducted for the U.S. car industry highlights again the importance of innovation and the loss of competitive advantage without it. Same as the telecommunication industry the car industry also belongs to the high-tech industry where resisting innovation that reduced pollution in the 1970's led to a loss of competitiveness in the global economy (Porter & Van der Linde, 1995). A finding which Michael E. Porter himself made and, hence, obviously also let him believe that the concept of innovation is inevitable in defining the forces driving industry competition for the high-tech sector. Lastly, very important contributions to research dedicated to the field of the forces driving industry competition have been made by Li and Vanhaverbeke (2009, p. 105) who found in their paper "The relationship between foreign competition, absorptive capacity and pioneering innovation: an empirical investigation in Canada" that "the likelihood of pioneering innovation increases when foreign competition continues to increase from a moderate to a high level." This, again, pinpoints how important it is to take a firm's level of innovation into consideration when formulating the forces driving industry competition. This is why this paper will also concentrate on the concept of innovativeness as driving force for driving industry competition in combination with Downes' proposed three forces to provide the reader with an even better understanding which forces are needed to be implied to Porter's original five forces framework to define today's forces driving industry competition.

4.2 Innovativeness as a firm's main resource contesting the singleness of Porter's 5 Forces

As it has been made clear in the earlier section of this paper innovation plays a tremendous role in gaining competitive advantage in an innovation-mediated industry and, hence, should be understood to be a force that also drives industry competition.

Now a lot of research has not only been focusing solely on innovation as a factor driving industry competition. Also the resource-based view, which found acceptance in academics more than two decades ago seems to still play a role up to today. According to Barney, Wright, and Ketchen (2001) the resource-based view on a firm aims to explain the internal sources of a firm's competitive advantage. The resource-based view proposes that if a firm is to achieve a state of sustainable competitive advantage it must gain or already hold resources or capabilities of rare, inimitable and non-substitutable nature (Barney et al., 2001). Only if this state is given a firm can achieve sustainable competitive advantage. Rather than looking at the position of a firm in a specific industry the resource-based view claims to see competitive advantage and, thus, the forces driving industry competition in a firm's internally held resources. These internally held resources, in turn, can be found in various forms among firms operating in a specific industry. Srivastava, Franklin, and Martinette (2013) propose a few examples by mentioning leadership, organizational culture, human capital management and design and culture to be resources that are embedded in the context of an organization and, moreover, should be refined in order to gain competitive advantage. The assumption of human capital being among other factors a factor driving industry is also supported by Campbell, Coff, and Kryscynski (2012). Only a very few authors believe that factors driving industry competition are others than the resources being held by the firm. Examples here are for instance, Reeves and Deimler (2011) who assumes that the level to which a firm can adapt to changes in an industry is a force driving industry competition. The better one adapts to the industry the more competitive advantage he will become, is here the line of reasoning. Another supposition again is that effective team management is driving industry competition (Aguinis, Gottfredson, & Joo, 2013). So what becomes clear is that literature conveys many different ways of what researchers perceive to be the forces driving industry competition. Yet, going through academic literature a current trend is observable, which goes hand in hand with the findings we have discussed in the previous section dealing with innovativeness and its strength to drive industry competition. Here, surprisingly a lot of linkages between the resource-based view and literature perceiving that a firm's innovativeness is a key driving force to industry competition could be found. Camisón and Villar-López (2011) and Weerawardena and Mavondo (2011) believe that both learning capabilities and organizational memory foster the emergence of organizational innovation and marketing innovation, which in turn has effect on sustained competitive advantage. What falls into place is that the concepts of the resource-based perspective and a firm's innovativeness as a main force driving industry competition inseparably belong together as a firm's innovativeness is also a resource a firm holds. Saqib (2011) sums it up nicely by declaring that the literature is basically showing both, the views for the innovation and the competitive advantage but its moving towards the resourced based theories of management. This is once more the reason why the concept of a firm's innovativeness should be strictly included in the forces driving industry competition – especially in an innovation-mediated environment. In Fig. 2 the reader can again see the most trending articles dealing with the

forces driving industry competition. What becomes obvious is that most literature places its focus on innovation under the resource-based view as main driver for achieving competitive advantage. Only a very few authors assume that the forces driving industry competition cannot be attributed to the level of innovativeness a firm has or the resources it holds in general. To be explicit, out of 27 gathered articles on forces driving industry competition only six articles focused on forces other than the resource-based view or level of innovativeness.

Literature found on forces driving industry competition

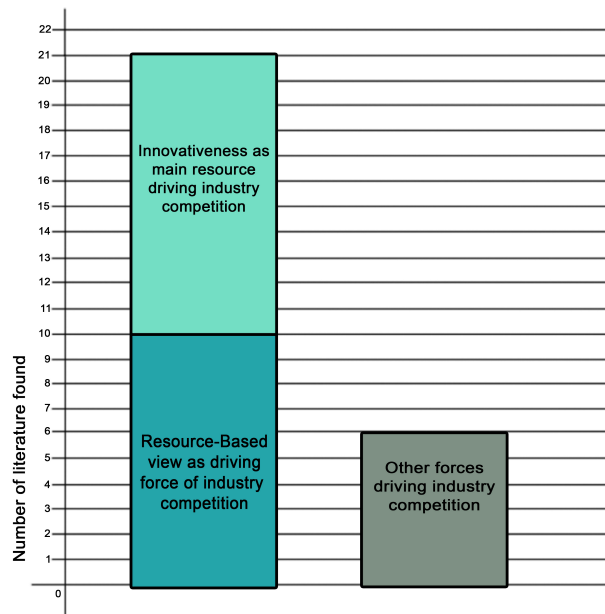


Fig. 2 – Dispersion of literature suggesting completely new and surrogating approaches to forces driving industry competition

4.3 The decisive forces that have become part of today's new dynamic in the telecommunications industry

Having started with the explanation of Porter's five competitive forces framework right through to unveiling the common trends in strategic management dealing with the forces driving industry competition it is now time to take a closer look at the four factors we have found to be inevitably relevant to gain competitive advantage. These forces will be not only explained in more detail but also operationalized in order to help firms understand the point of how to gain competitive advantage in a technology-mediated industry.

Digitalization

One of the three forces Downes (1997) proposed to be relevant in today's business context is the threat imposed by the increasingly digitalized market environment. This means in particular that firms no longer only face competition within their own industry but across industries (Downes, 1997). In this regard Downes (1997) sets the example of electronic shopping malls, which are nowadays commonly operated by credit card organizations or telecom operators. These are more easily operated as they do not require a brick and mortar business to distribute their products or services. Downes (1997) conveys that those who still make use of the original five competitive forces framework (Porter, 1979) in today's business context would not see these changes coming in time. As the power of information technology grows, so does access to information, which provides fertile ground for unexpected organizations

from other industrial backgrounds to enter one's specific industry. Information is no longer a good that can be kept secretly easily. Through digitalization knowledge on suppliers and other vital information quickly spills over to competitors. A strong supporter of the assumption that digitalization should be taken care of when thinking in strategic terms is Flower (2004). In his paper "Competition technology, and planning: preparing for tomorrow's library environment" (Flower, 2004) the example of the nontraditional competitor Barclay's Bank in the UK is presented. Barclay's Bank now also runs an online shopping mall, therewith forgoing costs for rents, transaction costs and infrastructure, which a brick and mortar shopping mall had to face.

Having said that, it is crucial to explain how the concept of digitalization is operationalized. Not operationalizing the force of digitalization would have no practical value for the reader of this study. Knowing how the level of digitalization is measured allows an organization to see its relative position in an industry compared to its competitors. Here, the authors Friedrich (2011) provide remedy. At this juncture it is important to note that Friedrich (2011) do not constitute a scientific source but a source that is retrieved from searching the web. Yet, it should also be borne in mind that the four authors conducted their research under the umbrella of the PricewaterhouseCoopers company, which is the sixth-largest privately owned organization in the United States and makes this source not only a reliable source but a very practically relevant source, too. Friedrich (2011) bear upon the information provided by Eurostat, which belongs to the European Commission and conducts statistical analyses for the European member states and analyses, which were conducted within PwC. What the authors found are four so-called elements of digitalization. Upon these elements it is possible to assess a firm's progress and level of digitalization. The four elements are *Digital Input*, *Digital Processing*, *Digital Output* and *Infrastructure*.

Infrastructure stands for the sophistication of the underlying IT technology involving the use of computer networks as well as the presence of a connection to the Internet (Friedrich, 2011)

Digital input describes the extent of digital processes in the procurement stage of the business, regarding the usage of electronic transmissions as well as computer networks suitable for automatic order processing according to Friedrich (2011).

Digital processing makes up the most important part as it exhibits the degree to which processes are integrated, both internally and with external partners (Friedrich, 2011). Examples are the existence of digital technologies such as enterprise resource planning, customer relationship management, production and services management and the distribution of knowledge within the company to favor the coherence between the various functions in a firm. External integration is comprised of activities such as the electronic transmission of data with business, supply chain management, etc.

The last element is Digital output, which refers to the importance of digital processes in the sales function and computer networks to allow automatic sales processing.

The better these four elements reinforce each other and are in place the better an organization will be at using digitalization to achieve long-term competitive advantage. According to Friedrich (2011) it is not unusual that the biggest companies have gained perfect hold of digitalization, while SME's still struggle gaining competitive advantage, which is also due to their poor digitalized structure. The better

digitalized competitors in a given industry are the fiercer competition will be. Hence, one has to be strong at all four elements.

Globalization

With the term 'globalization' Downes (1997) refers to improvements in communication and distribution logistics, which allowed multiple businesses to buy, sell and cooperate in a global context. Customers nowadays can shop around and compare offerings not only nationally but globally, which comes at the expense of mid-sized organizations that find themselves among international competitors even if they do not import or export goods or services. This has of course a huge impact on a company's strategy in order to stay ahead of the international competition. Downes (1997) says that it is no longer enough to be a price-leader or quality-leader as it was the case two decades ago. Instead, competitive advantage can be found in the ability to manage far-reaching networks of partners and develop long lasting relationships with the client. Knowing this, though, still does not give an organization the understanding of how competitive advantage can be siphoned-off of the fact that globalization found its way into today's business context. This is why, again, the factor globalization is made measurable in order to derive valuable information for business application.

To measure 'globalization' one has to understand that there is nothing like one uniform way to measure it. Instead, many different approaches towards measuring globalization have evolved over time. Heinemann (2000) suggests that more globalized countries have lower increases in taxes and government expenditure, whereas the German author Vaubel (2000) found that more globalized countries tend to have lower government consumption. Another author uses an index of capital account openness to illustrate that developing countries have suffered more from globalization than developed did (Chanda, 2005) in contrast to the assumption that foreign direct investment is an indicator of the level to which a nation is concerned by the effects of globalization (Blomstrom, Lipsey, & Zejan, 1994; Garrett, 2001). The latter thought is also apprehended by Dreher (2006) who was cited 916 times on his paper dealing with globalization and how to measure it properly.

What becomes evident is that firms seeking to get hold of the factor of globalization should probably take all of the aforementioned factors into account. A possible way to gain competitive advantage could then be to start a business operation in a developing country, which is not prone to globalization like a country that is already developed and is, hence, massively invaded by various international firms.

Deregulation

The third force Downes discusses in his article 'Beyond Porter' is the force of deregulation. Downes (1997) argues that in the past decades a dramatic shrinking of government influence has taken place. Downes (1997) also mentions the telecommunication industry in this connection but also other industries such as airline, utilities and banking in the U.S. and Europe. This is partly due to the new opportunities of information technology that exist. Downes (1997) explains that information technology is the most decisive difference between Porter's assumptions in the form of the five forces framework and the new forces being relevant in today's business world. Economies, which were present during the publication of 'How competitive forces shape strategy' used IT as a tool for

implementing change (Downes, 1997). However, today technology has emerged to be the most significant driver for change.

This time, however, we will not be able to give a precise way of how deregulation can be measured like we did before. Deregulation depends too a large extent on the sitting government and their decisions. These tend to vary largely from country to country (Spiller & Cardilli, 1997). Hence, no obvious trends can be seen when a government opens up, or tightens up regulations. It always depends on the political and economical state the country is currently embedded in. According to this state the government will be deregulating or regulating. Yet, important contributions to this issue have been made by the often times cited authors Spiller and Cardilli (1997) who suggest that three common elements exist that determine governmental reforms in the telecommunication industry. Having researched countries such as Mexico, the United States, Australia, the United Kingdom and many others thoroughly in the past it could be seen that deregulation reforms have been passed when "the incumbents were all state-controlled monopolies; in each case a politically strong government committed to deregulation pushed through radical reforms; and the countries have learned from each other in the process" (Spiller & Cardilli, 1997, p. 127). According to these three factors the only way to reduce the exposure to deregulation activities from a company's perspective is to move to locations, where the influence of these three forces is low. Otherwise, it has to be coped with the prevailing regulatory conditions. But deregulation activities are not always the preferred state. In case of the telecommunication industry, deregulation activities have led in the case of Chile to the fiercest local and long-distance competition in the world (Spiller & Cardilli, 1997).

Level of innovativeness

Since it has been already elaborated in very much detail on the force of the level of innovativeness as driving force of industry competition in the preceding sections of this study, this paragraph will convey another striking reason why the level of innovativeness is just so much important in regard to technology-mediated environments.

When thinking about the level of innovativeness it is also crucial to understand what the driver of innovativeness in general is. What proved to accumulate massive popularity in the past is the concept of increasingly shrinking product life cycles (Bayus, 1998; Millson, Raj, & Wilemon, 1992). As product life cycles shrink, firms have to act accordingly. As a result, firms had to increase their speed of innovation, which has now led them to come up with new product and service innovations faster than ever before. Gaimon and Singhal (1992) back this theory up by providing the example of IBM who have introduced over the twelve-year period from 1964 to 1976 only two new families of mainframe computers. In the following four years, however, IBM has introduced four new families of computers (Gaimon & Singhal, 1992). Nevens (1990) on the other hand manifests the assumption of increasingly shorter product life cycles by the example of typewriters, which had progressively shorter life cycles from 15 years, to seven and finally only five years. In order to not be lured to belief that the shrinking of product life cycles is just a matter, which has gained popularity back in the 90's Columbia Business School professor Rita Gunter McGrath has explicitly stated that product life cycles and design cycles are getting shorter (Cliffe, 2011). It is now arguable if the factor of shrinking product life cycles deserves attention in the readjusted forces framework or

not. This paper decided intentionally to not directly refer to product life cycle as a force driving industry competition. Instead, it chose for the level of innovativeness as a force, which also accounts for the fact that product life cycles specifically in the high-tech industry become shorter. Hence, it is not the shorter product life cycle itself, which drives industry competition. Alternately, it is the increasing level of innovativeness at which firms have to perform as a reaction to the shrinking product lifecycle, which causes the industry to turn highly competitive (Cliffe, 2011)

What is now left for discussion is the question of how innovation or more explicitly the level of innovativeness of a given industry can be measured. Here, the academic contributions of Jalles (2010) produce relief. Jalles (2010) research on the best proxy to measure innovation is based on a panel dataset of 73 countries between the years of 1980 and 2005, which makes his study along with the multiple citations his study has gained in comparison to other authors a very reliable source of knowledge. Jalles (2010) proposes the following two proxies to measure the level of innovativeness. Firstly, the number of patents registered (in the US market) and the Intellectual Property Index. The results of his study propose that countries with a higher degree of Intellectual Property Rights will achieve higher incomes per capita, while countries with low IPR will have low incomes respectively (Jalles, 2010). Secondly, patents can either deter or encourage in innovation depending on certain conditions (Jalles, 2010). Knowing that these two parameters measure innovation, in practice firms can check for industry attractiveness by looking at the number of patents and the Intellectual Property Index. If these two measures are low, entering the market is a choice to be thought about as competitive advantage can be achieved relatively easily when more patents are in place and when a higher score on the Intellectual Property Index can be achieved. For more information on that read 'How to measure innovation? New evidence of technology-growth linkage'. Of course it has not only been investigated on Jalles (2010) way to measure innovation but also on other authors such as Bos, Economidou, and Sanders (2013). Despite that, Jalles (2010) has so far served with the most precise proxies to measure innovation as explained earlier.

Up to this point, a huge bulk of information has been processed in the course of this paper. In order to facilitate a better understanding *Fig.3* provides an overview of the most important findings, which have been made so far resulting in a new, modern and readjusted interpretation of the so far popular Porter's five competitive forces framework, which has become partly outdated in the 21st century according to the findings made in this study. To come up with the table and give birth to the new refined five forces framework only the most renowned and essential authors based on either the date of publication, the number of citations and more importantly their value to contribute to this study have been chosen. *Fig. 4* includes the operationalization of each of the additive four forces in a more comprehensive way.

4.4 The telecommunication industry – an analytical approach through the application of Porter's 5 forces

So as to provide a better understanding of how the new readjusted competitive forces framework functions this study will make use of the most relevant firms operating in the telecom sector such as Apple Inc. To make sure Apple Inc. was classified as being active in the telecom industry the online

database Orbis (2014b) has been checked. At Orbis Apple Inc. is explicitly mentioned to be operating in the radio and television broadcasting and communications equipment industry, which is classified by its Primary Code 3663 according to the US standard industrial classification code. At this point it is worth mentioning that the industry information used for this case study will develop from the trusted database Orbis, which provides information on a broad range of firms being listed in it. At the same time Orbis allows access to the profiling company MarketLine (2014b), which consists of an internal team of analysts, drawing on primary and secondary research. This guarantees that the industry information provided in this case study does not date back any longer than May 2014, and, hence, makes the information highly practically relevant. More information on Apple Inc. as a company is also retrieved using MarketLine (2014a). The same method has been applied to the remaining firms mentioned in the above.

To compare the advantages of the new refined framework to the original five forces model proposed by Porter (1979) Apple, among other firms, will be used as an example to illustrate what effect the industry has on its participants from a five forces model perspective and from a readjusted model perspective.

4.4.1 From a traditional 5 Forces perspective

The traditional five forces perspective basically assumes the Porterian view towards the forces driving industry competition. These are now used to assess the forces for the industry of telecommunication in which Apple Inc. is embedded in with its most successful products – the iPhone and the iPad.

Threat of new entrants

According to MarketLine (2014b) the threat of new entrants is strong as the industry requires only low fixed costs while at the same time maintaining conditions for low-cost entry (MarketLine, 2014b). This is, among other reasons, due to the possibility to set up online stores. Hence, Apple is embedded in a market environment in which it will have constantly to face new competitors. Some of them might become serious competitors in the near future. This assumption is also reflected by Jakopin and Klein (2012) who say that in the past 20 years a large number of new market entry opportunities have opened up resulting in an increase in overall industry competition, which points out the highly competitive characteristic of the telecommunications industry.

Bargaining power of buyers

The bargaining power of buyers is according to MarketLine (2014b) considered to be moderate. This is because mobile phones are highly differentiated and vary in terms of form factors and price. Hence, it is difficult for the customer to replace a mobile device without losing the unique features the device comes with (MarketLine, 2014b). These unique features can be constituted by the operating system it runs or its design, to mention a few factors. Nevertheless, it should be borne in mind that switching costs are still somewhat low for the buyer, which leads retailers such as Apple to compete on price. The idea of the low switching costs for the buyer is also adopted by Kim, Park, Ryoo, and Park (2010) who assume that among other factors such as adverse logistics and taxation, switching costs is a factor that forces suppliers in the industry to place a greater attention on the buyer than the other way around.

	Alterations to the five forces framework	Completely New Approaches that surrogate the five forces framework	Porter's Five Competitive Forces Framework
Three major contributing authors in this study	Downes, L. (1997). Beyond Porter. Context Magazine. Available at. (cited 17)	Bettis, R. A., & Hitt, M. A. (1995). The new competitive landscape. Strategic management journal, 16(S1), 7-19. (cited 1179)	Porter, M. E. (1979). How competitive forces shape strategy: Harvard Business Review Boston.
Proposed forces driving industry competition	Digitalization, Globalization & Deregulation	Level of innovativeness	Threat of New Entry Bargaining Power of Suppliers Bargaining Power of Buyers Threat of Substitute Products/or Services Rivalry Among Existing Competitors
Supporting Authors	<p>Porter, M. E. (2001). Strategy and the Internet. Harvard Business Review, 79(3), 62-79. (cited 4755)</p> <p>Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. Economic development quarterly, 14(1), 15-34. (cited 2944)</p> <p>Porter, M. E. (1986). Competition in global industries: Harvard Business Press. (cited 1995)</p> <p>Porter, M. E. (1996). Competitive advantage, agglomeration economies, and regional policy - Reply. International regional science review, 19(1-2), 93-94. (cited 520)</p>	<p>Simon, D. G., Hitt, M. A., Arregle, J.-L., & Campbell, J. T. (2010). The dynamic interplay of capability strengths and weaknesses: investigating the bases of temporary competitive advantage. Strategic Management Journal, 31(13), 1386-1409. doi: 10.1002/smj.893 (cited 81)</p> <p>Weerawardena, J., & Mavondo, F. T. (2011). Capabilities, innovation and competitive advantage. Industrial Marketing Management, 40(8), 1220-1223. doi:http://dx.doi.org/10.1016/j.indmarman.2011.10.012 (cited 24)</p> <p>Camisón, C., & Villar-López, A. (2011). Non-technical innovation: organizational memory and learning capabilities as antecedent factors with effects on sustained competitive advantage. Industrial Marketing Management, 40(8), 1294-1304. (cited 14)</p> <p>Chakravorti, B. (2010). Finding competitive advantage in adversity. Harvard Business Review, 88(11), 102-108. (cited 14)</p> <p>Qiannan, Z. (2011, July). A study on the interactional relationship between regional competitiveness and innovative industrial cluster. In Product Innovation Management (ICPIM), 2011 8th International Conference on (pp. 382-385). IEEE. (cited 0)</p>	None

latest scientific knowledge adds up to one holistic readjusted framework

Porter's Five Competitive Forces Model readjusted to the challenges imposed by the telecommunication industry of the 21st Century

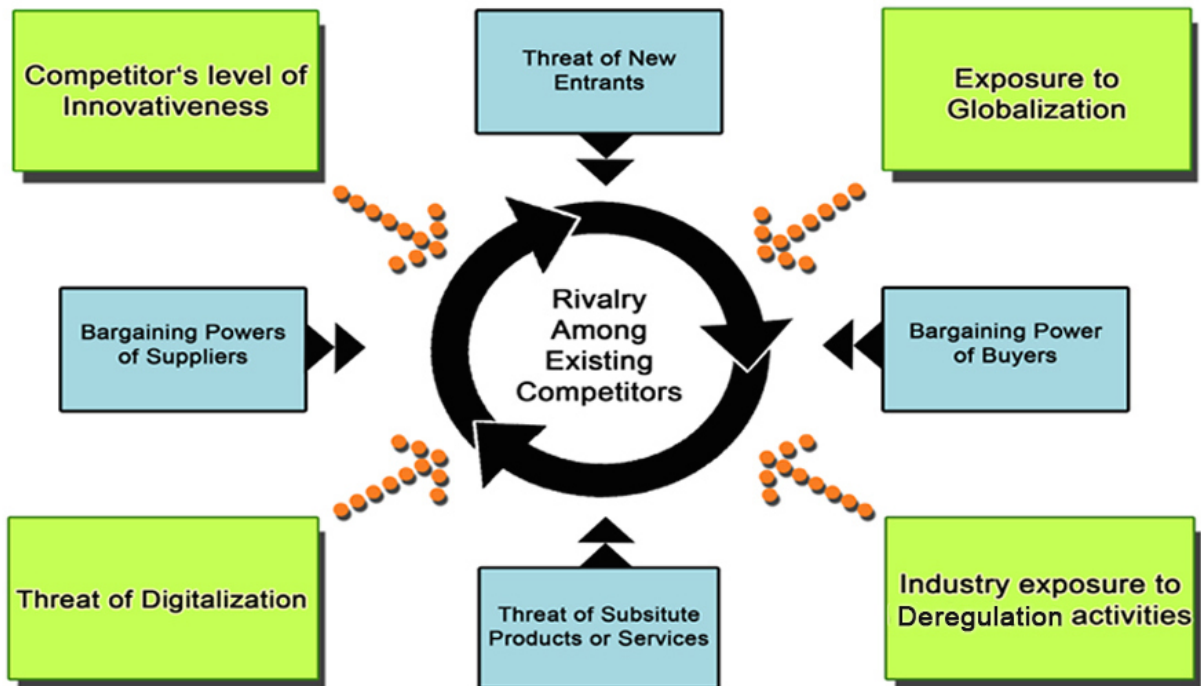


Fig. 3 – Most important literature taken into consideration for the readjusted Porter's model

	Digitalization	Globalization	Deregulation	Level of innovativeness
Authors	Friedrich, L. M., Gröne and Köster. (2011). Measuring industry digitization & Leaders and laggards in the digital economy (<i>cited 3</i>)	Chanda, A. (2005). The influence of capital controls on long run growth: Where and how much? (<i>cited 129</i>) Heinemann, F. (2000). Does globalization restrict budgetary autonomy? (<i>cited 28</i>) Vaubel, R. (2000). International Political Competition: A European competition oversight for governments and the empirical evidence (<i>cited 34</i>)	Spiller, P. T., & Cardilli, C. G. (1997). The Frontier of Telecommunications Deregulation: Small Countries Leading the Pack (<i>cited 118</i>)	Jalles, J. T. (2010). How to measure innovation? New evidence of the technology–growth linkage (<i>cited 17</i>)
Measured by	<ul style="list-style-type: none"> • Degree of Digital Input • Degree of Digital Processing • Degree of Digital Output • Degree of Infrastructure 	<ul style="list-style-type: none"> • Level of increase in taxes & expenditure • Level of government consumption • The level of FDI 	<ul style="list-style-type: none"> • Type of incumbent control • Political state of strength • Country's learning abilities from affiliated countries 	<ul style="list-style-type: none"> • Number of patents registered in the market • Level in the intellectual property index
Key Findings	<ul style="list-style-type: none"> • The stronger the aforementioned forces reinforce each other, the better digitalized the organization is • The more competitors exist being strong along these factors the harder it gets to obtain competitive advantage 	<ul style="list-style-type: none"> • More globalized countries tend to have lower increases in taxes & government expenditure • More globalized countries tend to have lower government consumption • More globalized countries receive more FDI 	<ul style="list-style-type: none"> • A state can either be either a state-controlled monopoly or an oligopoly driven by individuals in an economic system • Where political state is strong the ability to push through reforms tends to be more radical • Countries can learn from affiliated countries and their reform practices 	<ul style="list-style-type: none"> • The number of patents registered in the market can either encourage or deter innovation • Countries with a higher degree of IPR will achieve higher income per capita
Conclusion	<p>Where: Many competitors with a high level of digitalization exist: Threat of digitization high</p> <p>Where: Many competitors with a low level of digitization exist: Threat of digitization low</p>	<p>When: Countries have lower increases in government taxes and expenditure, lower government consumption and receive high amount of FDI: Exposure to globalization is high</p> <p>When: Countries have higher increases in government taxes and expenditure, higher government consumption and receive lower amount of FDI: Exposure to globalization is low</p>	<p>Where: State is a controlled monopoly, political state is strong and learning from affiliated countries to implement their reform practices is high: Industry exposure to deregulation activities is high</p> <p>Where: State is a oligopoly driven by individuals, political state is weak and ability to learn from affiliated countries to implement their reform practices is low: Industry exposure to deregulation activities is low</p>	<p>Where: Number of patents is registered in the market is high and level of intellectual property rights in the IPR index is high: Competitor's level of innovativeness is high</p> <p>Where: Number of patents is registered in the market is low and level of intellectual property rights in the IPR index is low: Competitor's level of innovativeness is low</p>

Fig. 4 – Measurement of the four additive forces driving industry competition

A classical example of the bargaining power of suppliers is the iPhone 5C, which was developed to serve as a cheaper alternative to the iPhone 5 because Apple understood that it had sacrificed many potential customers to competitors, who offered cheaper versions of mobile phones with similar features long time before Apple.

Bargaining power of suppliers

The bargaining power in the telecommunication industry is moderate due to a high level of customer loyalty the whole industry enjoys (MarketLine, 2014b). Apple is well-known to be a perfect example in this regard having customers as loyal as they are willing to spend unreasonable prices for Apple devices. Moreover, suppliers have gained hold of their sourcing options by employing standardized circuit boards and operating systems (MarketLine, 2014b). Again Kim et al. (2010) back the findings up made by MarketLine (2014b) who state that next to the switching costs, which hinder supplier's bargaining power in the telecommunication industry trust plays a significant role. Where trust is established a better balance between the bargaining power of buyers and suppliers can be yielded. Trust is here the salient point that matters, which allows suppliers to exert greater bargaining power on their buyers (Kim et al., 2010).

Threat of substitute products or services

The threat of substitutability in the telecommunication industry has massively decreased in the past years making the threat of substitute products or services moderate (MarketLine, 2014b). This is because digital communication on mobile devices has become common-place. It is no longer a decisive reason for which a prospect would switch to another supplier. In addition to that, reliability features vary from mobile device to mobile device (MarketLine, 2014b) and from operating system to operating system. This works again in favor for Apple who can gain competitive advantage in the industry. Nonetheless, a threat of substitutability is imposed by second hand devices, which can serve as substitute products. Many consumers, however, will not go back to second hand products due to warranty reasons or simply the fact that the technology is not state-of-the-art. Nakamura (2013) who focuses on the Japanese telecommunication industry even observed the trend that consumers again turn to ordinary voice communication services rather than fancy data transmission services. This clearly shows that data transmission has become the standard nowadays and is no longer a pivotal factor to switch to another supplier of the same product or service.

Rivalry among existing competitors

According to MarketLine (2014b) rivalry among players is weak. Another positive factor for firms like Apple operating within the boundaries of telecommunication is that exit barriers are low, too (MarketLine, 2014b) making it easy to escape the industry in case of failure. Yet, MarketLine (2014b) classifies the level of rivalry among existing competitors as weak since weak rates of growth in the US communications devices may work to enhance the rivalry between market players.

After all, one is tempted to think that the industry of telecommunications is quite promising and Apple had unimpeded time gaining profits. This, however, is not true and

why it is not true can be explained using the new redefined competitive model that this study presents.

4.4.2 From a 5 competitive forces model readjusted to the challenges imposed by the telecommunication industry of the 21st century perspective

Digitalization

As discussed earlier especially the concept of digitalization plays a tremendous role in the telecommunication industry of the 21st century (Downes, 1997). The telecommunication industry has experienced tremendous changes in the past decades, becoming increasingly more competitive through better-digitalized competitors from unrelated industries. This trend can be followed when considering the latest studies of Friedrich (2011). Friedrich (2011) illustrate in their paper "Measuring Industry digitalization & leaders and laggards in the digital economy" an industry digitalization index, from which it is clear that the telecommunication sector belongs to the top three sectors, which are affected by digitalization. This means being competitive is automatically intertwined with being tremendously more digitalized than existing competitors. This is further backed up by the examples of Google and Apple who both moved away from their traditional industry domains. Google for instance is no longer only known for its engagements in computer programming, data processing and other computer related services according to the database Orbis and its US SIC Code 737. Instead, the digitalized industry environment has reshaped all players embedded in it to also move out to other industry domains. Google also started to offer their own mobile phone under the Nexus series, becoming a serious competitor in telecommunications for Apple, Samsung and other well-known players (MarketLine, 2014a). The same currently happens with Amazon, which exploits the new driving force of industry digitization by moving into the telecom industry, too. Amazon Inc. is no longer operating in the industry of miscellaneous shopping goods stores but across various industries including the telecommunication industry with their new flagship the Amazon Fire Phone. Nokia, on the other hand, depicts an undeniable example of how digitalization can ruin a company. It is a well-known fact that Nokia has experienced tremendous declines in the past years (MarketLine, 2014c). This is due to Nokia's main competitors of which most do not have a telecommunication background (MarketLine, 2014c). Top competitors now turned to be firms like Cisco Systems, Google, Huawei Technologies and Juniper Networks (MarketLine, 2014c).

Having said that, it becomes obvious that a classical five forces analysis would have not been aware of these trends coming and would have not allowed a company to understand the forces driving industry competition in the high-tech industry.

Globalization

Globalization, on the other hand, has also found its way into today's business contexts and influences not only the high technology industry but almost every industry one can think of. Nevertheless, this study will maintain a close view to the high-technology industry. Since companies started to enter other countries and penetrate the market with their products or

services competition intensified considerably (Glen, Lee, & Singh, 2003). This can be understood when looking at the most renown players in the high-technology industry and their competitors. Apple's main competitor is no longer only Microsoft as a U.S. based firm. Instead, Sony Corporation as a Japan-based firm, Samsung Electronics and LG Electronics as both South Korean firms belong to Apple's main competitors in the high-tech industry, which makes globalization a very important factor in defining the forces driving industry competition (MarketLine, 2014a). Again, in the late 70's globalization was not an issue that enjoyed high importance as it does nowadays, which obviously let Porter (1979) neglect this decisive force. Besides that, it is worth mentioning that in recent years highly competitive environments where no longer solely developed countries but increasingly emerging countries such as China, Brazil, Malaysia or Mexico. A study conducted by Glen et al. (2003) found out that industries in these markets actually even resulted to be more competitive than current developed countries, which is in line with the assumptions this study made on the measurement of globalization. This study found that exposure to globalization is high when countries have lower increases in government taxes and expenditure, lower levels of government consumption and receive on top that a high amount of foreign direct investment which is the case in countries such as China and Brazil (Chanda, 2005; Heinemann, 2000; Vaubel, 2000). Hence, these destinations are very lucrative for firms that seek to take advantage of fast economic growth, which results in an even greater inflow of foreign competitors to the domestic industry.

Deregulation

As this study already found out earlier deregulation activities have strong influence on industry competition like it was illustrated in the example of Chile, which experienced deregulation in the telecom industry, and, in turn, became one of the fiercest local competitions worldwide (Spiller & Cardilli, 1997). This example, however, only presented one of many examples as each country has different regulations and, hence, shapes the high-technology environment or more specifically the telecom environment differently. As this study is not able to capture deregulation activities in each and every country it will provide the examples of the European and North American telecommunication industry to show how crucial the force of deregulation is when thinking about forces that drive industry competition. Consequently, it will be finished up by showing what the industry regulation or deregulation has caused to its players in the industry.

An extensive research on the regulative activities on the U.S. telecommunication industry has been done by Langley (2002) who found that the U.S. Federal Communications Commission (FCC) has taken to a very large extent influence on the telecom industry. This led to high prices, less demand and an overall competition distortion of the industry (Langley, 2002). Hence, Langley (2002) advises governmental regulators to stay away from the sector of telecommunication as the effect government intervention can have on an industry and its competition is too vigorous. On the other extreme, Europe can be found where government has engaged in extensive deregulation to promote competition (Stienstra, Baaij, Van den Bosch, & Volberda, 2004). As a result of industry liberalization industry monopolies were broken down (Stienstra et al., 2004), which led to a more competitive environment than ever before. Bearing the examples of the European and North American telecom industry in mind it is evident that government regulation or deregulation has an effect on industry competition

and should, hence, be classified as a driving force that deserves courtesy in Porter's five forces model.

Level of Innovativeness

Lastly, it will be explained why the level of innovativeness should not be disregarded as anchored in the examples of Apple, Google and HTC.

Earlier, when operationalizing the level of innovativeness it was found that the level of innovativeness can be measured by the number of patents registered in the market and, hence, the corresponding rank in the intellectual property index (Jalles, 2010). Looking at the data provided by DeutscheDeutscheBank (2010) it reveals that patent filings have substantially increased in the high-tech industry from the years 2000 to 2010 for all three firms with Apple leading the way. Especially in the year of 2007 Apple has intensively started to file patents (DeutscheBank, 2010). This was according to DeutscheBank (2010) due to the launch of the iPhone. At the same time it can be observed that Google and HTC also started filing patents, which shows that Apple's attempt to file patents triggered a rivalry among Apple's top competitors to keep up with the innovative power of Apple (DeutscheBank, 2010). From this it can be concluded that competition was no so longer solely driven by the possibility to offer substitute product or services, or the threat of new entrants to the market, nor any of the other remaining three forces of Porter (1979) but on the ability to innovate and more importantly be more innovative than the competitors. This trend can be followed to the present where Apple holds 8294 main patents in total (Orbis, 2014a).

Having applied the new readjusted framework to the high-tech industry with focus on the telecom industry it can be seen that Porter's conventional five forces framework proved to be partly outdated and has to be redefined taking the aforementioned four additional forces into account. The telecommunication industry is depicted as much more promising from a Porterian perspective than it actually is when applying the new readjusted framework to the industry.

5. CONCLUSIONS & RECOMMENDATIONS

Drawing to an end, the question whether the five competitive forces by Porter (1979) still hold in the telecommunication industry of the 21st century can be answered by partly rejecting Porter's perception of the forces driving industry competition. It is found that there are more forces that play a role when thinking about the driving forces of industry competition in the high-tech environment or more specifically the telecommunication industry (Dulčić et al., 2012). On the one hand, Downes (1997) provides three more forces namely *Digitalization*, *Globalization* and *Deregulation* that should be considered when determining the forces driving industry competition. On the other hand, this study has found through empirical work that another significant factor is represented by the *Level of Innovativeness*. Knowing this, allows managers and entrepreneurs of the 21st century to rethink their assumptions on the forces driving industry competition. However, Porter's model should not be considered to be completely outdated either (Slater & Olson, 2002). This presumption is also reflected in *Fig. 1* where a meaningful number of other authors also only proposed mediocre adjustments to the model to be relevant. Porter's five forces framework should instead be used when a simpler and more holistic industry analysis is desired. Here, it helps to get a brief

insight into the industry of choice. Nevertheless, when a more thorough and in-depth analysis of the environment is desired then Porter's model lacks on decisive information (Grundy, 2006). This trend can also be observed in this paper especially when looking at the high-tech mediated environment. Here, the readjusted framework presented in this study will provide relief and a more in-depth analysis of the high-technology sector, which provides clearer guidance through the competitive environment and its essential driving forces.

6. LIMITATIONS & FUTURE RESEARCH

Besides all the strategic valuable knowledge this literature review comes with, there are of course certain limitations that should be borne in mind.

The timeframe in which the study was supposed to be conducted involved only 10 weeks. Hence, the whole study including discovery of the relevant articles, reading and selecting information and coming up with a new scientific contribution had to take place within this timespan. Besides that, not all literature was accessible using the student account from the University of Twente. Moreover, this study maintains a close look at the high-technology industry making the readjusted model not absolutely applicable to every industry environment. In some cases, as well, examples have been manifested within the telecommunication industry as representative industry of the high-tech sector as this paper is not capable of providing an in-depth analysis on each and every industry. These weaknesses provide vital ground for future research.

7. ACKNOWLEDGMENTS

Firstly, I want to thank Dr. Efthymios Constantinides and Dr. Kasia Zalewska-Kurek for continuous support, valuable suggestions and comments during the composition of this thesis. I also thank my family and friends, with May leading the way, for mental support.

8. BIBLIOGRAPHY

- Aguinis, H., Gottfredson, R. K., & Joo, H. (2013). Avoiding a "me" versus "we" dilemma: Using performance management to turn teams into a source of competitive advantage. *Business Horizons*, 56(4), 503-512. doi: <http://dx.doi.org/10.1016/j.bushor.2013.02.004>
- Barney, J., Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, 27(6), 625-641.
- Bayus, B. L. (1998). An analysis of product lifetimes in a technologically dynamic industry. *Management Science*, 44(6), 763-775.
- Bettis, R. A., & Hitt, M. A. (1995). The new competitive landscape. *Strategic Management Journal*, 16(S1), 7-19.
- Blomstrom, M., Lipsey, R. E., & Zejan, M. (1994). What explains developing country growth? : National Bureau of Economic Research.
- Bos, J. W. B., Economidou, C., & Sanders, M. W. J. L. (2013). Innovation over the industry life-cycle: Evidence from EU manufacturing. *Journal of Economic Behavior & Organization*, 86(0), 78-91. doi: <http://dx.doi.org/10.1016/j.jebo.2012.12.025>
- Breedveld, E. J., Meijboom, B. R., & de Roo, A. A. (2006). Labour supply in the home care industry: A case study in a Dutch region. *Health Policy*, 76(2), 144-155. doi: <http://dx.doi.org/10.1016/j.healthpol.2005.05.007>
- Camisón, C., & Villar-López, A. (2011). Non-technical innovation: Organizational memory and learning capabilities as antecedent factors with effects on sustained competitive advantage. *Industrial Marketing Management*, 40(8), 1294-1304. doi: <http://dx.doi.org/10.1016/j.indmarman.2011.10.001>
- Campbell, B. A., Coff, R., & Kryscynski, D. (2012). Rethinking Sustained Competitive Advantage from Human Capital. *Academy of Management Review*, 37(3), 376-395.
- Chanda, A. (2005). The influence of capital controls on long run growth: Where and how much? *Journal of Development Economics*, 77(2), 441-466.
- Cliffe, S. (2011). When Your Business Model Is in Trouble (Vol. 89, pp. 96-98): Harvard Business School Publication Corp.
- DeutscheBank. (2010). Yearly patent filings by Apple, HTC and Google with the US Patent Office. from <http://fortune.com/2010/03/08/counting-patents-apple-google-htc/>
- Downes, L. (1997). Beyond Porter. *Context Magazine*. Available at.
- Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. *Applied Economics*, 38(10), 1091-1110. doi: 10.1080/00036840500392078
- Dulčić, Ž., Gnjidić, V., & Alfirević, N. (2012). From Five Competitive Forces to Five Collaborative Forces: Revised View on Industry Structure-firm Interrelationship. *Procedia - Social and Behavioral Sciences*, 58(0), 1077-1084. doi: <http://dx.doi.org/10.1016/j.sbspro.2012.09.1088>
- Flower, E. (2004). Competition, technology, and planning: preparing for tomorrow's library environment. *Information Technology and Libraries*, 23(2), 67.
- Friedrich, L. M., Gröne and Köster. (2011). Measuring industry digitization & Leaders and laggards in the digital economy. Retrieved 11.10.2014, 2014, from <http://www.strategyand.pwc.com/media/file/Strategyand-Measuring-Industry-Digitization-Leaders-Laggards-Digital-Economy.pdf>
- Gaimon, C., & Singhal, V. (1992). Flexibility and the choice of manufacturing facilities under short product life cycles. *European Journal of Operational Research*, 60(2), 211-223. doi: [http://dx.doi.org/10.1016/0377-2217\(92\)90094-P](http://dx.doi.org/10.1016/0377-2217(92)90094-P)
- Garrett, G. (2001). The distributive consequences of globalization. *UCLA, MS*.
- Glen, J., Lee, K., & Singh, A. (2003). Corporate profitability and the dynamics of competition in emerging markets: a time series analysis. *Economic Journal*, 113(491), F465-F484. doi: 10.1046/j.0013-0133.2003.00165.x
- Grundy, T. (2006). Rethinking and reinventing Michael Porter's five forces model. *Strategic Change*, 15(5), 213-229. doi: 10.1002/jsc.764
- Hax, A., & Wilde Ii, D. (2001). The Delta Model — discovering new sources of profitability in a networked economy. *European Management Journal*, 19(4), 379-391. doi: [http://dx.doi.org/10.1016/S0263-2373\(01\)00041-X](http://dx.doi.org/10.1016/S0263-2373(01)00041-X)

- Heinemann, F. (2000). Does globalization restrict budgetary autonomy? *Intereconomics*, 35(6), 288-298.
- Jakopin, N. M., & Klein, A. (2012). First-mover and incumbency advantages in mobile telecommunications. *Journal of Business Research*, 65(3), 362-370. doi: <http://dx.doi.org/10.1016/j.jbusres.2011.05.009>
- Jalles, J. T. (2010). How to measure innovation? New evidence of the technology-growth linkage. *Research in Economics*, 64(2), 81-96. doi: <http://dx.doi.org/10.1016/j.rie.2009.10.007>
- Kim, K. K., Park, S.-H., Ryoo, S. Y., & Park, S. K. (2010). Inter-organizational cooperation in buyer-supplier relationships: Both perspectives. *Journal of Business Research*, 63(8), 863-869. doi: <http://dx.doi.org/10.1016/j.jbusres.2009.04.028>
- Laffont, J.-J., & Tirole, J. (2001). *Competition in telecommunications*: MIT press.
- Langley, M. (2002). Hands off telecom: give deregulation a chance. *Spectrum, IEEE*, 39(6), 10-12.
- Lee, H., Kim, M.-S., & Park, Y. (2012). An analytic network process approach to operationalization of five forces model. *Applied Mathematical Modelling*, 36(4), 1783-1795. doi: <http://dx.doi.org/10.1016/j.apm.2011.09.012>
- Li, Y., & Vanhaverbeke, W. I. M. (2009). THE RELATIONSHIPS BETWEEN FOREIGN COMPETITION, ABSORPTIVE CAPACITY AND PIONEERING INNOVATION:: AN EMPIRICAL INVESTIGATION IN CANADA. *International Journal of Innovation Management*, 13(1), 105-137.
- MarketLine. (2014a). Apple Company Profile. 2014, from https://orbis.bvdinfo.com/version-20141010/Report.serv?_CID=2605&context=PUNHAJ1L1L55YXG&SeqNr=0
- MarketLine. (2014b). Communications Equipment in the United States (2014). from https://orbis.bvdinfo.com/version-20141010/Report.serv?_CID=826&context=PUNHAJ1L1L55YXG&SeqNr=0
- MarketLine. (2014c). Company Profile Nokia Corporation. Retrieved 2014, 2014, from https://orbis.bvdinfo.com/version-20141013/Report.serv?_CID=1352&context=1BH5AMTBLCBKLM0&SeqNr=1
- Maxfield, S. (2008). Reconciling Corporate Citizenship and Competitive Strategy: Insights from Economic Theory. *Journal of Business Ethics*, 80(2), 367-377. doi: 10.1007/s10551-007-9425-1
- Millson, M. R., Raj, S. P., & Wilemon, D. (1992). A survey of major approaches for accelerating new product development. *Journal of Product Innovation Management*, 9(1), 53-69. doi: [http://dx.doi.org/10.1016/0737-6782\(92\)90061-G](http://dx.doi.org/10.1016/0737-6782(92)90061-G)
- Nakamura, A. (2013). Retaining telecommunication services when universal service is defined by functionality: Japanese consumers' willingness-to-pay. *Telecommunications Policy*, 37(8), 662-672. doi: <http://dx.doi.org/10.1016/j.telpol.2012.12.008>
- Narayanan, V. K., & Fahey, L. (2005). The Relevance of the Institutional Underpinnings of Porter's Five Forces Framework to Emerging Economies: An Epistemological Analysis. *Journal of Management Studies*, 42(1), 207-223. doi: 10.1111/j.1467-6486.2005.00494.x
- Nevens, T. M. (1990). Commercializing technology: what the best companies do. *Strategy & Leadership*, 18(6), 20-24.
- Orbis. (2014a). Number of main patents filed for Apple Inc. Retrieved 28.10.2014, from https://orbis.bvdinfo.com/version-20141030/Report.serv?_CID=1733&context=1BH5AMTBLCBKLM0&SeqNr=0
- Orbis. (2014b). US SIC Code Apple Inc. Retrieved 12.10.2014, from https://orbis.bvdinfo.com/version-20141010/Report.serv?_CID=826&context=PUNHAJ1L1L55YXG&SeqNr=0
- Porter, M. E. (1979). *How competitive forces shape strategy*: Harvard Business Review Boston.
- Porter, M. E. (2008). The five competitive forces that shape strategy. *Harvard Business Review*, 86(1), 25-40.
- Porter, M. E., & Van der Linde, C. (1995). Green and competitive: ending the stalemate. *Reader In Business And The Environment*, 61.
- Qiannan, Z. (2011). *A study on the interactional relationship between regional competitiveness and innovative industrial cluster*. Paper presented at the Product Innovation Management (ICPIM), 2011 6th International Conference on.
- Reeves, M., & Deimler, M. (2011). Adaptability: The New Competitive Advantage. *Harvard Business Review*, 89(7/8), 134-141.
- Saqib, I. (2011). Environment for innovation: Gaining competitive advantage. *African Journal of Business Management*, 5(4), 1232-1235.
- Sirmon, D. G., Hitt, M. A., Arregle, J.-L., & Campbell, J. T. (2010). The dynamic interplay of capability strengths and weaknesses: investigating the bases of temporary competitive advantage. *Strategic Management Journal*, 31(13), 1386-1409. doi: 10.1002/smj.893
- Slater, S. F., & Olson, E. M. (2002). A fresh look at industry and market analysis. *Business Horizons*, 45(1), 15-22. doi: [http://dx.doi.org/10.1016/S0007-6813\(02\)80005-2](http://dx.doi.org/10.1016/S0007-6813(02)80005-2)
- Spiller, P. T., & Cardilli, C. G. (1997). The Frontier of Telecommunications Deregulation: Small Countries Leading the Pack. *The Journal of Economic Perspectives*, 11(4), 127-138. doi: 10.2307/2138467
- Srivastava, M., Franklin, A., & Martinette, L. (2013). Building a Sustainable Competitive Advantage. *Journal of technology management & innovation*, 8(2), 47-60.
- Stienstra, M., Baaij, M., Van den Bosch, F., & Volberda, H. (2004). Strategic Renewal of Europe's Largest Telecom Operators (1992-2001):: From Herd Behaviour Towards Strategic Choice? *European Management Journal*, 22(3), 273-280.
- Vaubel, R. (2000). Internationaler Politischer Wettbewerb: Eine europäische Wettbewerbsaufsicht für Regierungen und die empirische Evidenz. *Jahrbuch für Neue Politische Ökonomie*, 19, 280-309.
- Weerawardena, J., & Mavondo, F. T. (2011). Capabilities, innovation and competitive advantage. *Industrial Marketing Management*, 40(8), 1220-1223. doi: <http://dx.doi.org/10.1016/j.indmarman.2011.10.012>
- Wu, K.-J., Tseng, M.-L., & Chiu, A. S. F. (2012). Using the Analytical Network Process in Porter's Five Forces Analysis – Case Study in Philippines. *Procedia - Social and Behavioral Sciences*, 57(0), 1-9. doi: <http://dx.doi.org/10.1016/j.sbspro.2012.09.1151>

9. APPENDIX

Do Porter's 5 Forces Still Drive Industry in the 21st century?				
Adjustments to Porter's 5 Forces Framework				
Author Name:	Major adjustments to the model	Mediocre adjustments to the model	Minor adjustments to the model	
	whole model is turned over and or recombination with other models	adjustments to facets of the model has taken place	facets have been summarized or grouped	
Downes, L. (1997). Beyond Porter. Context Magazine. Available at.				
Dulčić, Ž., Gnjidić, V., & Alfirević, N. (2012). From Five Competitive Forces to Five Collaborative Forces: Revised View on Industry Structure-firm Interrelationship. Procedia - Social and Behavioral Sciences, 58(0), 1077-1084. doi: http://dx.doi.org/10.1016/j.sbspro.2012.09.1088				
Grundy, T. (2006). Rethinking and reinventing Michael Porter's five forces model. Strategic Change, 15(5), 213-229. doi: 10.1002/jsc.764				
.				
.				
.				
.				
.				
.				

Table 1a – Literature Matrix on articles dealing with adjustments to the five competitive forces framework

Do Porter's 5 Forces Still Drive Industry competition in the 21st century?							
Whole new substitute approaches to Porter's 5 Forces Framework							
Author Name:	Resource-Based View	Innovativeness of competition	Uncertainty Adaptability	Management of competitive advantage	Adversity	Product/ Service differentiation of competitive advantage	Corporate Environmental Ethics Management
Qiannan, Z. (2011). A study on the interactional relationship between regional competitiveness and innovative industrial cluster. Paper presented at the Product Innovation Management (ICPIM), 2011 6th International Conference on.							
Reeves, M., & Deimler, M. (2011). Adaptability: The New Competitive Advantage. Harvard Business Review, 89(7/8), 134-141.							
Bettis, R. A., & Hitt, M. A. (1995). The new competitive landscape. Strategic Management Journal, 16(S1), 7-19.							
.							
.							
.							
.							
.							

Table 1b – Literature Matrix on articles dealing with whole new approaches to Porter's 5 Forces Framework