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Mirroring and Disruption

- A Case Study of Nokia's Decline

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CARL-JOHAN BLOMQVIST
DAÐI SNÆR SKÚLASON
MAGNUS SJÖLANDER

Department of Technology Management and Economics
Division of Innovation Engineering and Management
CHALMERS UNIVERSITY OF TECHNOLOGY
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CARL-JOHAN BLOMQVIST
DAÐI SNÆR SKÚLASON
MAGNUS SJÖLANDER

Supervisor: Christian Sandström, Ph.D.

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Magnus Sjölander

Abstract

The mobile industry is an ever changing and fast growing technology based industry that is very interesting to examine at this point in time due to the technological shift the industry has gone through in the recent years. This technological shift has caused a disruption in the industry and led to the demise of many incumbents as new firms entered the industry. We argue that the shift the mobile industry has gone through is not merely a technological one, but rather a paradigm shift from the old feature phone paradigm to the new smartphone paradigm. Further, this paradigm shift brings substantial changes; where the institutions and underlying logic as well as those competences and business models that are important differ between the two paradigms.

Nokia, the Finnish mobile device manufacturer, is one of the incumbent firms that have lost out during this shift. The company maintained a market leading position until the middle of the first decade of the 21st century when its market share started to drop rapidly, especially in the high-end, smartphone segment of the market. Despite its once strong position, Nokia lost out to new entrants.

In this report we examine Nokia's case and try to unveil the most important factors behind the demise of this technology giant. In order to do so, a case study of Nokia's development between 2003-2010 was conducted, where extensive empirical data was collected through interviews with former Nokia employees and industry specialists, as well as by utilizing extensive secondary data. To analyze the data collected and help explain Nokia's case, a theoretical framework is constructed using existing theory. Theory from various research streams is used, including theory on the evolution of industries; industrial transformation, including disruptive innovation and resource dependency; an organization's cognitive abilities and its abilities to change, including concepts such as dynamic capabilities and dualism; as well as ecosystems and networks, where concepts such as network effects, two-sided markets and institutions become important.

We will argue that a hierarchy of factors contributed to Nokia's downfall, but that the underlying and most important issue was the firm's inability to understand and adapt to the new smartphone paradigm and the underlying changes it caused in the industry; namely, changes in what institutional logics were applicable. In the new smartphone paradigm, software as well as platform logic and the corresponding mechanisms of two-sided markets, were much more important. This new emphasis and focus in the smartphone paradigm was fundamentally different from that of the feature phone paradigm, upon which Nokia had built its strong competence of hardware development. We propose this as following naturally by an enlarged perspective on the mirroring hypothesis, which we argue can be used to better explain incumbents', such as Nokia's, path dependence along an industry. This opens up for new suggestions on how the incumbent's curse can be viewed. Further research should investigate the suggestions made in this report and elaborate on the implications of this new perspective.

Acknowledgements

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Carl-Johan Blomqvist

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Daði Snær Skúlason

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Magnus Sjölander

Table of Contents

List of Figures

List of Tables

1. Introduction

The study of economic progress and development has long intrigued researchers and dates back to the dawn of modern economics (e.g. Smith, 1776). Ever since, much discussion has been made on how economic progress and development should best be described and characterized, in what context it belongs, and in particular, what factors drive this progress and what consequences can be expected. In contrast to neoclassical economics, often regarded as being too simplistic and static to explain economic progress, Schumpeter (1942) put forward his theory on how economic progress can be explained as waves of new technology and innovation. Schumpeter hailed the entrepreneur as the driver behind new cycles of innovation, driving economic progress through a process of creative destruction; a process where the creation of new value through innovation triumphs existing product and services, and ruins the old, existing paradigm of what is considered valuable.

Since then, many other have of course contributed valuable theory to explain further details of economic progress and related phenomena. One area within the topic of economic progress that has gained a lot of attention from researchers is the discontinuity in between the business cycles Schumpeter (1942) tried to explain. In particular, researchers have put significant attention to the phenomena where incumbent firms fail to properly respond to competition from new entrants in the face of technological change – known as The Incumbent's Curse. Researchers have published various different theories on the matter, taking different approaches to explain why incumbent firms are unable to respond to discontinuous innovation that originates from new entrants (e.g. Bower & Christensen, 1995; Christensen, 1997; Christensen & Bower, 1996; Christensen & Raynor, 2003; Danneels, 2004; Tripsas, 1997; Tripsas & Gavetti, 2000). One of the most popular explanations is Clayton Christensen's theory of disruptive innovation, which has gained widespread popularity in both the academic and professional world (Bower & Christensen, 1995; Christensen, 1993, 1997; Christensen & Bower, 1996; Christensen & Raynor, 2003).

Technology industries are interesting to study in this context, as multiple waves of creative destruction can be witnessed in a short time due to the fast pace and volatile nature of these industries. The mobile industry, being a ever changing and fast growing, technology based industry, is especially interesting at this point in time due to the technological shift the industry has gone through in recent years. This shift disrupted the industry and led to the demise of many incumbents in the industry as new entrants entered the industry, many of whom from adjacent or similar industries (Hacklin et al., 2013).

Nokia, the Finnish mobile device manufacturer, is one of these incumbent firms. The company had maintained a market leading position until the middle of the first decade of the 21st century when its market share started to drop rapidly, especially in the high-end, smartphone segment of the market. Until Nokia's demise, the company was seen as being very innovative and a clear technological leader in the industry. Furthermore,

researchers such as Christensen had even predicted that Nokia would not loose out to new entrants and succumb to the Innovator's Dilemma (McGregor, 2007).

Despite its strong position, Nokia lost out to new entrants who emerged as the mobile industry converged with adjacent digital industries. The company did not only fail to beat these new entrants in bring market leading innovations to the market in a timely manner, but also failed to respond appropriately to threats posed by the innovations produced by its new competition. In this research project we will examine Nokia's case, trying to identify the most important factors behind the demise of this technology giant. Furthermore, we will suggest a new perspective to examine the phenomenon that is The Incumbent's Curse, which we believe serves better than existing theory to explain the underlying factors for Nokia's demise.

1.1. Purpose

The purpose of this research project is to examine the strategic decisions of Nokia's mobile phone business in order to explain why Nokia lost their position as a market leader in the mobile industry. In order to do so, extensive empirical data was collected through interviews with former Nokia employees and industry specialists, as well as by utilizing extensive secondary data from various sources. Furthermore, a theoretical framework is constructed to analyze the empirical data collected and ultimately fulfill the purpose of this research project.

1.2. Scope and delimitations

We limit the scope of the research to the years 2003 to 2010 as important strategic decisions were made to Nokia's organization in both 2003 and 2010. In 2003 Nokia took a decision to change its organizational structure to better align with a new focus on multimedia and enterprise solutions. In 2010 significant changes to Nokia's strategy started to emerge when Stephen Elop took over as President and CEO. In addition, we will focus our analysis on the part of Nokia's business that is responsible for mobile devices, but not Nokia's Network business unit (later Nokia Siemens Networks). Data on this business unit will be presented in some places to give a more holistic picture of Nokia, but it will not be considered when analyzing the findings of this research project.

1.3. Report Structure

This report starts with an overview of the method used during the process of this research project. Following that, the theoretical framework utilized in the research is constructed using a wide range of theory that relates to evolution of industries and The Incumbent's Curse. When the theoretical framework has been constructed we present the empirical data collected through the process of this research project, both primary data collected through interviews and secondary data gathered from various reliable sources. The theoretical framework is then used to analyze the empirical data and shed light on the strategic decisions and actions that led to Nokia's fall from a market leading

position. Finally, the results of the project are discussed and concluded, and a new perspective from which to examine the fall of incumbents is suggested.

2. Method

This section will describe and discuss the strategy and structure of this research and what research design was employed during the process of the research. The process itself and how the research progressed will be discussed, and an overview of what methods were used for data collection will be given. Finally, a discussion on the quality of this research will follow.

2.1. Research Strategy and Design

Defining an appropriate strategy to be used is an important starting point of every research project and the decision of what research strategy to use is very dependent on the research project being undertaken. There is no "one-size fits all" solution when it comes to selecting a research strategy, as different strategies will be more appropriate to use for certain projects than others (Cepeda & Martin, 2005). Bryman and Bell (2011, pp. 26-27) discuss the advantages of distinguishing between quantitative and qualitative research strategies, not only on the level of what types of data is collected but also on the level of how the researcher views the world. In that sense, a qualitative research strategy generally employs the view that social reality cannot be separated from the individual and that truth is subject to the interpretations of the researcher (Bryman & Bell, 2011, p. 27; Cepeda & Martin, 2005). Quantitative research, on the other hand, has a more objective view on these matters, taking a perspective commonly connected to the natural sciences.

The approach taken in this research project is a qualitative one, since both the accounts of the people interviewed in this study and the interpretation and analysis done by the researchers is subjective and cannot be separated from the social world. Further, the research design that is employed in this research is that of a case study, with Nokia as the focal firm. The qualitative case study is considered a suitable option when it comes to business research as it takes on the "why" and "how" questions of how complex events and processes unravel (Cepeda & Martin, 2005). Yin (2009, p. 4), further argues that the case study research design allows researchers to retain a holistic view to fully explain complex social phenomena. The qualitative case study has increasingly been established as a valid, high-quality research method and its importance and usefulness for theory building have further been enforced (Cepeda & Martin, 2005; Christensen, 2006; Yin, 2009, pp. 6-8).

2.2. Research Method and Data Collection

A combination of both primary and secondary data was collected in order to clarify the case of Nokia and thereby fulfill the purpose of this research project. Here will follow a detailed account of how each group of data was collected and what research methods were used for said data collection.

2.2.1. Primary Data

The primary data used in this research project was collected by the means of semi-structured interviews, a common method for gathering data in qualitative research (Bryman & Bell, 2011, pp. 446-447). In semi-structured interviews, the interviewer uses an interview guide to structure the conversation, but gives the interviewee leeway to answer as he pleases, allowing the interviewer to follow up on interesting details that might arise (Bryman & Bell, 2011, p. 446). These aspects of semi-structured interviews make them a perfect fit for an exploratory study like this one, as they allow researchers to get a wide and holistic view of the phenomena being studied.

Prospect interviewees were selected from a set of former Nokia employees that were part of the company during the period from 2003 till 2010. A special emphasis was placed on finding managers and executives, as these are most likely to have a good insight into Nokia's strategy and the decisions made during the period. Apart from Nokia employees a set of industry specialists, academics that have focused on the industry, as well as representatives of the mobile network operators (MNO) were located as potential interviewees. This set of prospect interviewees was contacted by email and interviews scheduled with those willing to participate in the study. Further interviewees were then identified and contacted through snowballing, a sampling method where interviewees are used to get in contact with other prospective interviewees (Bryman & Bell, 2011, p. 491). This technique proved successful and resulted in interviews with people that had served as high-level managers within Nokia, as well as with other knowledgeable actors from the industry.

A total of 15 interviews were conducted with 14 unique interviewees, 10 of whom were former Nokia employees. Apart from one interview conducted in person, all interviews were conducted through telephone or Skype. The length of the interviews ranged from 30 minutes to approximately two and a half hours, with the most common length being around one hour. The people interviewed for this study together possess a broad and deep understanding of Nokia's strategy, organization and the decisions made within the company during the focal period. Furthermore, the fact that all Nokia employees interviewed are not currently employed by Nokia may strengthen their credibility, as their employment therefore does not restrict their testimony. A complete list of interviewees along with a short description of them and the relevant roles they have held can be found in Appendix A. Some interviewees wish to remain anonymous and details about their person will therefore not be published.

2.2.2. Secondary Data

Apart from the primary data provided by the semi-structured interviews conducted, a number of secondary data sources were also utilized. These include press releases from Nokia, Nokia's annual reports (Form 20-F), as well as other public documents and financial statements from the company. All this data is publicly available and was retrieved from Nokia's website. Furthermore, information from industry analysts, news

4

articles, websites of other actors within the mobile industry (such as other device manufacturers and MNOs), as well as various other Internet sources was also used. When selecting sources for secondary data, the credibility of the data was a primary concern and the highest quality sources available were always selected.

2.3. Research Process

The initial motive behind this research has its roots in previous unpublished work we have done on The Incumbent's Curse and the case of Nokia. This, in combination with encouragement from Henrik Berglund, Associate Professor, and our supervisor, Christian Sandström, Ph.D., sparked a special interest in further exploring Nokia's fall from a market leading position.

The process that this research project has adhered to can be described as a combination of two concurrent iterative processes; one of data collection, discussion and analysis, and one of constructing a theoretical framework to explain and make sense of the data collected. As the data collection progressed iterative discussions and analysis of Nokia's situation and the reason behind their downfall took place. These discussions, along with insights from the theoretical framework, were used to further explore important topics in further interviews. Furthermore, discussions with Mr. Sandström and Mr. Berglund helped us uncover new literature and theories to investigate, and to guide us in the right direction.

As the research progressed, the analysis and data collection became deeper and more focused on specific areas that were identified as being more important than others to explain Nokia's fate. One could argue that the processes followed a funnel-like pattern, starting by looking at Nokia's situation from a broad perspective, but then focusing in on the factors that were deemed the most important.

The data collection process was continued until the data retrieved from the interviews became predictable to the interviewers; that is, when same or similar answers to questions were received from multiple interviewees, it was assumed that sufficient knowledge had been gathered on the topic. Of course a higher number of interviews and a larger data set can help produce more accurate results, but due to the time constraints and the difficulty of getting in touch with interviewees, the aforementioned method was deemed sufficient.

When the data collection process was deemed completed, further analysis and discussions were conducted to identify the most important factors behind Nokia's demise. These factors were then expanded upon and put in context with the theoretical framework, formulating a precise explanation for this report.

2.4. Validity and Reliability

An important part of every research project is establishing credible criteria of the quality of the research itself. As Bryman and Bell (2011, pp. 394-399) discuss, there has

been considerable debate on how the quality of qualitative research should be assessed and researchers have proposed various ways of doing so. Some researchers argue that different criteria should be used for qualitative than quantitative research, because the qualitative approach is inherently different from the quantitative one (Bryman & Bell, 2011, pp. 394-399), while others argue that the classic criteria of validity and reliability, which originates from quantitative research, can be applied largely unchanged to qualitative research (LeCompte & Goetz, 1982; Mason, 2002). Furthermore, Yin (2009, p. 40) describes measures with which the quality of case study research can be assessed.

The quality of this research project will be assessed with the concepts of validity and reliability as explained by Yin (2009, pp. 40-45). As covered in Bryman and Bell (2011, p. 395), the application of these concepts to assess the quality of qualitative studies is well established and the terms are applied in a very similar manner as they are applied in quantitative research. Following these criteria, we will inspect the reliability as well as the construct, internal and external validity of this study.

2.4.1. Construct Validity

Construct validity refers to how well the data gathered in a study represents the concepts or phenomena they are gathered to represent; that is to say, whether a certain piece of data does in fact give any information about the concept or phenomena it was intended to represent. As inherent in qualitative research, the primary data gathered represents the views and thoughts of the interviewees and must be handled as such. However, the relatively high number of interviews and the consistency of results across interviews help strengthen the construct validity of this study and indicate that the data collected does in fact represent the concepts and phenomena it is supposed to. Furthermore, the extensive secondary data collected helps build a complete picture of the case of Nokia, further strengthening the construct validity of the study.

2.4.2. Internal Validity

The internal validity of a study is important an important measure that is used to assess whether or not causal relationships between the concepts or phenomena studied have been established. To ensure internal validity of this study various sources of data were used to gather extensive information about the case of Nokia in the timeframe studied. This creates a thick description of Nokia during that time which is further supported by the consistency of the data gathered. Efforts to establish correct timing of events can further help increase internal validity of a study, as timing of events is an important factor in establishing causality. From time to time it proved difficult to establish exact timing of some events, which might have impacted internal validity negatively.

6

2.4.3. External Validity

The concept of external validity describes how well the results of a study can be generalized to explain similar situations in other social contexts. Case studies are often considered difficult to generalize due to their small sample size, although some authors have argued this concern is ungrounded (e.g. Christensen, 2006; Yin, 2009, pp. 43-44). Even so, the focus in this study has been primarily to explain the case of Nokia. However, since many firms in the mobile industry suffered similar fate as Nokia, the results may perhaps be used to explain a more general development in the mobile industry and possibly other fast moving, technology based industries, although further research is required to confirm this.

2.4.4. Reliability

The reliability of a study refers to the degree to which it can be replicated by other researchers. As discussed by Bryman and Bell (2011, p. 395), qualitative research is always difficult to replicate since the social settings affecting the research change with time. That is to say, the current state of social reality, in particular that of the mobile industry, greatly affects the testimony of interviewees and therefore this study's main data source. Should the same interviews be conducted later in time, it is not necessarily certain that the same data would be gathered even if the interviews remained otherwise identical. Furthermore, the fact that all primary data was gathered from semi-structured interviews, which allow for considerable leeway in terms interviewee response, further lowers the reliability of this study even though the reliability of the secondary data used in the study can be considered high. However, as the interviews were all recorded the lower reliability of the semi-structured interviews could be partly mitigated by reusing the data collected.

3. A Theoretical Framework on The Incumbent's Curse

In this section a theoretical framework will be constructed in order to explain why Nokia lost its market leading position in the mobile industry. A broad selection of theory will be used to achieve this, including but not limited to research on The Incumbent's Curse, organizational theory as well as on ecosystems and value networks.

We will start by exploring how industries evolve and how innovation can cause shifts and discontinuities in industries. We will then examine the internal factors that affect innovation in organizations and how they contribute to success in the face of industry change and discontinuous innovation. Finally, we will look into the external factors that affect a firm's success in the face of industry discontinuities.

3.1. *The Evolution of Industries*

As put forward in the introduction, economic progress is often described according to Schumpeter's (1939, 1942) waves of innovation. These waves give the fundamental explanation to why economic systems cannot solely be explained by assuming a steady state or equilibrium conditions, such as often is done in the neoclassical economics research stream (Nelson & Winter, 2002). In contrast to equilibrium conditions, Schumpeter (Schumpeter, 1939) continued on the work on business cycles, such as Kondratieff waves (Garvy, 1943; Kondratieff, 1979), and proposed a structure where longer cycles consists of many smaller cycles. Further, Schumpeter (Schumpeter, 1942) suggested that these cycles are caused by innovation, which leads to temporary imbalance in favor of the innovator, causing a new wave of progress to strike through and subsume previous waves and innovations.

3.1.1. Patterns of Innovation

Abernathy and Utterback (1978) proposed each business cycle to be characterized as following along a specific pattern, often referred to as the pattern of innovation. Abernathy and Utterback (1978) argued that each cycle follows an evolutionary, continuous, pattern (also suggested by many others, e.g. Hamilton & Singh, 1992; Nelson & Winter, 2002; Perez, 1985; Sahal, 1985), going through three major phases: the fluid, transitional and specific (Abernathy & Utterback, 1978). In the beginning of a cycle uncertainty is high, the underlying market need is still to be explored and it is still unknown how big the potential of the new market and/or technology is. Thus, focus is in this phase on product innovation and a big variety of products are introduced. As the industry starts to realize the true market need and how to best satisfy it, the variety of products in the market starts to decline. This is often referred to that a dominant design has been reached. This in turn triggers a shift in focus from product innovation to efficiency in the underlying processes and lowering cost becomes the driving force in the industry. In general, innovation declines in general in this last phase.

In the fluid phase of a business cycle, i.e. the early stage, the number of actors increases as there is yet to be a dominant design and thus, a clear winner (Suárez &

Utterback, 1995). However, as the dominant design is set and the industry matures, a shakeout period begins where a few strong firms manage to outcompete their competitors. Two explanations are given to why this happens; either because of a specific event which triggers stiff competition, or because the gap between the stronger and the weaker actors widens along time (Klepper & Simons, 2005). A specific event can be that of a specific dominant design being set, leaving actors that have chosen to go down a different path in the industry or actors that have not yet entered in a predicament, as they are behind along the new dominant trajectory of the industry (Suárez & Utterback, 1995). In the second explanation the shakeout follows naturally by the force of competition and feedback loops, such as described by Forrester (1968), since stronger actors become stronger and weaker actors weaker. Thus, when the industry progresses and matures weaker actors will be forced to leave.

In sum, the industry will throughout its first period not be characterized by strong growth in market size since the market need is still to be explored. Only when the market need is starting to get established, real growth will happen, referred to as the transitional phase by Abernathy and Utterback (1978). In the end of the life cycle, the specific phase (Abernathy & Utterback, 1978), growth will decline since the market need will have been saturated and any additional enhancements along the existing technology trajectory will no longer yield as much value to the market (Hamilton & Singh, 1992). In other words, the market growth of an industry will in general follow an S-curve shape (e.g. as described by Hamilton & Singh, 1992; Perez, 1985; Sahal, 1985).

3.1.2. Shifts and Discontinuities in Industry Evolution

Albeit Abernathy's and Utterback's (1975) description of the evolution of an industry, as well as many contributions that build on top of their theory, provides a great insight into the evolution of an industry, it does not fully address shifts in between the business cycles. The Schumpeterian new wave of innovation that will eventually subsume the old paradigm does play a vital role in explaining the rise and fall of new firms as well as incumbents. Dosi (1982) added insight by proposing paradigms in technology and innovation as similar to what had been previously argued as paradigms in science by Abernathy and Utterback (1962).The proposal was very much in line with the Schumpeterian, evolutionary research stream, as described above. According to the theory, there is an inbound force keeping development along a certain path. The two mechanisms of evolution, variety and selection, which Dosi (1982) proposed could combine the two perspectives of innovation emerging from a technology push or from a market pull, have an induced constraining effect upon the development. A variety of technological development possibilities provide a foundation for development paths, which will eventually become filtered through the evolutionary selection provided by the market and its true need and preferences. In line with Abernathy and Utterback (1975) description of the pattern of evolution of an industry, within a paradigm this will eventually lead to a development looking similar to that of a cone. In the early phases of a paradigm or industry, variety will be large since uncertainty will be high, as the gap

between the technological possibilities and the needs and desires of the market is big. With time, variety and uncertainty will get reduced.

In addition, Dosi (1982) argued technology push and market pull alone cannot fully explain the development of paradigms, and further, shifts in between paradigms. Institutional factors such as firm organizational structure, incentives and goals, government policy, as well as the fundamental Schumpeterian economic drive towards new revenues and profits, need also to be considered. This is furthermore also in line with the above description of industry maturity eventually leading to declining growth and thus pushing actors towards new revenue streams (Mensch et al., 1981). This is also well in line with the notion of "techno-economic paradigms" which emphasizes the external and institutional forces as presented by Perez (1985), although the focus of the concept "techno-economic paradigms" is on longer and larger business cycles compared to Dosi (1982).

Through a process similar to that described earlier of variety and selection, there will be an institutional drive towards finding the next paradigm; the next wave of innovation that will supersede the previous paradigm (e.g. Dosi, 1982; Mensch et al., 1981; Nelson & Winter, 1982; Perez, 1985). This has several consequences since there will naturally be two paths for any firm; to optimize development along an existing paradigm or search for the next one. Since the existing paradigm has technological development building upon previous development within the paradigm, further steered by the market need within the paradigm as well as existing institutional factors, a mere cumulative development (on top of the current leading offering) is needed to increase the revenues and profits. On the other hand, in order to create a new paradigm, technology needs to be developed as well as the ideas of how the technology fits the market along new, uncertain and different paths from previous ones. Such an example can include a new dominant base for value in the industry, for example the replacement of steam engines by combustion engines (Clark, 1985). Usually, this is a larger jump since the new technology often starts farther behind the existing paradigm as investments tend to have been focused upon existing paradigms, as they have for long provided the less uncertain base for development, and thus revenue and profits, within the industry.

In total, and as summarized by Kaplan and Tripsas (2008), an industry will develop along a frame that guides the development, diffusion and eventual discontinuity and disruption. This frame will emerge through the actors within the industry, such as markets, i.e. users, producers, governments, universities and similar, in interplay between the actors. The development will start off with large uncertainty and variety, but will transform to a more clearly defined and narrow frame as development progresses. Eventually, a new industry will emerge, as diminishing returns and a focus on cost will reduce the attractiveness to stay along the existing path. To summarize, both internal and external factors play an important role in explaining discontinuities and disruptions in industries (Afuah & Bahram, 1995).

3.2. An Internal Perspective

Building on top of Schumpeter's (1950) notion of "creative destruction", Tuschman and Anderson (1986), argued innovations can either be incremental improvements or technological discontinuities, based on whether they are competence enhancing or competence destroying to the firm. They argued incremental innovations are built upon existing technological frames and enhance the existing competence the firm has built up around it - thus enhancing and furthering the already pre-existing competence within the firm. On the other hand, discontinuous innovations are built upon new technological trajectories and paradigms. Since these new technological trajectories subsume the previous trajectories, and further often rely upon a different base of competency, the value of the old competence will be destroyed. However, it might also be built upon a technological trajectory that exists within the firm, and hence, there can be a technological which disrupt an industry because it is competence destroying, but also discontinuous innovation that do not disrupt an industry because it is merely competence enhancing (Abernathy & Clark, 1985; Tushman & Anderson, 1986).

3.2.1. Inherent Inertia and Path Dependency of Organizations

Tuschman and Anderson (1986) showed competence destroying innovations as being more likely to be introduced by new entrants than incumbents, in comparison to competence enhancing innovations which are more likely to be introduced by established players. They argued this is due to that *"liabilities of age and tradition constrain existing, successful firms"* (Tushman & Anderson, 1986, p. 461) – i.e. path dependency. This is well in line with other researchers who have argued and presented a similar relationship (e.g. Abernathy & Clark, 1985; Abernathy & Utterback, 1975; Christensen & Rosenbloom, 1995; Clark, 1985; Dosi, 1982; Henderson & Clark, 1990; Teece & Pisano, 1994), although researchers have since further explained what underlying factors cause this path dependency.

Important aspects to take into account are organizational factors such as legacy, capabilities and structure, when explaining the path dependence of firms. As pointed out by Leonard-Barton (1992), capabilities of the firm that are of strategic importance, often referred to as core capabilities, can easily constrain the firm and become core rigidities. Along the development of an organization, a subset of its skills and knowledge base, technical systems, managerial systems and its values and norms can form a set of capabilities that become the essence of the competitive advantage the firm enjoys vis-à-vis its competitors. In other words, certain routines and processes within the firm can form a base for the firm, which if focused on can become the underlying power of the firm driving its continued ability to differentiate.

However, as an organization grows and develops, procedures and routines might also be limiting for the firm in finding new sources of future competitive edges (Nelson & Winter, 1982), i.e. they become core rigidities (Leonard-Barton, 1992). Hannan and Freeman (1984) explain this by examining the evolution of an organization. They argue

an organization cannot be fully explained by the rational motives of the individual members in the organization. Rather, their argument is based upon an interplay between the organization and its environment. The organization exists in large because of actors' willingness to support it and allow it to exist, such as that of investors and employees. These actors, regardless if acting inside the organization or in the environment of the organization, expect the organization to produce certain output. However, it is difficult to control how well the organization aligns with the goal to produce output. Hence, these actors will want the organization to strive for reliability when it comes to quality, timeliness, and accountability. This will push the members of the organization to choose paths along the certain and incremental path, often along existing paradigms. Naturally, however, it will often also constrain the organization from discontinuous changes. As argued by Hannan and Freeman (1984), this can become a severe problem for the organization when major changes in the environment destroy the underlying value of the existing organizational structure, such as when competence destroying innovation is introduced in an industry.

3.2.2. The Mirroring Hypothesis

Organizational inertia is relevant in explaining the constraints and limitations of a firm in developing discontinuous innovation because the organization and its structure are directly linked to the ability of the firm to efficiently produce, as well as develop new products (Baldwin, 2007; Colfer, 2007; Henderson & Clark, 1990). In other words, in order for a firm to introduce discontinuous, competence destroying innovation, major changes will be required within the organization. This interdependency, between the product and the organization is often explained by linking the architecture of the product to that of the structure of the organization, referred to as the mirroring hypothesis (e.g. Baldwin, 2007; Colfer, 2007).

The mirroring hypothesis claims to explain how an organization balances modularity with integration - both in organizational structure and product architecture (Baldwin, 2007; Colfer, 2007). High modularity is attractive to decrease complexity by hierarchically structure a product's architecture. In a highly modular architecture, each specific part or task does not need to know and understand the internal workings of another specific part or task, i.e. module, only how to interface with the specific modules it needs to interface with. This can be effective when bounded cognition is limiting actors' ability to grasp all aspects of the whole (Williamson, 1991). On the other hand, high modularity may hamper the ability of an actor to develop and innovate across different modules because of the limited understanding he possesses, which may be needed for discontinuous innovations. In such a scenario, a more integrated architecture and structure may be needed.

3.2.3. Coordination versus Cooperation

In essence, the underlying issue described by the mirroring hypothesis is the one of coordination versus cooperation (Colfer, 2007). Two different thought streams,

transaction cost economics (TCE) and knowledge based theory (KBT) (Baldwin, 2007; Colfer, 2007), further elaborate on the underlying fundamentals of the issue of coordination and cooperation. Colfer (2007) neatly summarizes respective school of thought's arguments when examining why coordination within a firm is advantageous compared to coordination in between firms:

"The TCE perspective focuses on the hazards of opportunism. Here, the key problem is how to align the potentially conflicting interests of contributors so that their exchanges can take place safely—that is, without much risk of opportunistic behaviors like the withholding of valuable information and materials. [...] the key benefits of collocating contributors within a firm are the firm's superior capacity (relative to the market) for (1) incentive alignment, (2) conflict resolution, and (3) performance monitoring [...] In contrast to the TCE approach, the KBT perspective stresses the hardships of bounded cognition over the hazards of opportunism. Here, the key benefits of collocating contributors within a firm are the firm's superior capacity (again, relative to the market) for (1) central planning (Alchian and Demsetz, 1972) and (2) rich, contextual, bilateral communication" (Colfer, 2007, pp. 15-16).

Thus, the coordination vis-à-vis cooperation issue in regards to optimizing innovation output is best solved by optimizing the organizational structure based upon how integral vis-à-vis modular the product architecture is, due to integral product development requiring *"(1) extensive communication and exchange among the individuals who perform them, as well as (2) efficient resolution of disputes arising from the individuals' differing technical perspectives, product knowledge, and/or self-interests."* (Colfer, 2007, p. 16). In other words, in order to develop innovation requiring a new product architecture, such as many times disruptive innovation, an organization model based upon a modular architecture will face difficulties because it needs to shift into a more integral structure. This will be costly and inherently difficult, as there will be organizational inertia due to the pressure from its actors to strive towards reliability and accountability as presented earlier, but also because it will require management apt to handle a different, more integrated organizational structure.

3.2.4. Dynamic Capabilities - How Firms cope with Change

The ability, and capability, of firms to change when facing external environmental changes is thus critical, since it will be a baseline for the firm's capability to innovate which hence will be needed to remain in the competitive game. Teece and Pisano (1994) labeled this the dynamic capability of the firm, when arguing this to be critical for a firm's continued success, in particular through Schumpeterian waves of creative destruction. In their perspective, competitive advantage is built up by certain capabilities within the firm that are valuable to the customer, but scarce and difficult to imitate or substitute for other actors. In a broader sense, in order for a firm to not have its profits driven down by the market forces of its competitors, the firm needs to enjoy one or many capabilities with which it can appropriate value from. Thus, in order to build a sustainable advantage, the underlying processes and routines inside the firm that build up the valuable capability must not be easily copied.

However, if sustainable advantage are built upon not easily copied capabilities, that posits those capabilities must be rather tacit, since otherwise they are likely to actually be copied and thus diminish in value to the original firm where the capability was first developed (Teece & Pisano, 1994). This implies that the capabilities are not easily understood. In fact, according to Teece and Pisano (1994) the underlying capability a firm is gaining its competitive advantage from is often not understood by any actor in its industry, including the firm having the capability itself. This can become problematic for the firm since even a well-protected competitive advantage will eventually dissipate through new waves of innovation. Hence, the firm will need to transform and reconfigure its capabilities in order to stay ahead of, or even to keep up with, its competitors innovative capabilities, but this might be difficult if the firm does not understand what it is that have gained its previous advantage in the industry that needs to be changed (Argyris & Schön, 1999). In other words, albeit difficult, the firm will need to have dynamic capabilities in order to remain competitive through innovation and a changing environment. The organization will need managerial and organizational routines and processes for how to transform and reconfigure its resources and assets, as well as learn, coordinate and adapt the level of integration within the organization according to changes in the environment. This will, arguably, make the organization able to, based upon its previous historical path, shift its direction towards new avenues of innovation and profits, in comparison to eventually become benighted by other more innovative competitors.

Naturally, core competences and core capabilities are often considered for reconfiguration when facing new waves of innovation. This reflects the position of the firm and it's business assets, including technological, financial and locational assets (Teece & Pisano, 1994). However, a firm may also survive through creative destruction through utilizing complementary assets, and specialized complementary assets (Harrison et al., 2001; Teece & Pisano, 1994; Tripsas, 1997). Complementary assets; assets that are creating value in combination with other products, services and offerings, can be used to form alliances with partners, which when joining assets can be used to create new value. Specialized complementary assets, on the other hand, are assets that protect existing revenue streams through their importance (Tripsas, 1997). This is an important distinction, as complementary assets in and by themselves do not protect against new waves of creative destruction, where specialized complementary assets may. In sum, not only core competences and core capabilities can be reconfigured through dynamic capabilities for withstanding threats of competence destroying innovation, but also complementary assets.

3.2.5. Breaking through the Cognitive Frame through Learning

The need for learning is critical for the change needed to develop disruptive innovation, not only due to its part in a firm having dynamic capabilities (Teece & Pisano, 1994), but also because it can form a cognitive barrier keeping the firm in the old and dying paradigm (e.g. Argyris, 1976; Dosi, 1982; Henderson & Clark, 1990; Tripsas & Gavetti, 2000). Thus, in order to avoid the path dependency and inertia often

negatively correlated with the capability of a firm to achieve disruptive or discontinuous innovation, it becomes necessary to unlearn in order to break the old cognitive frame, and learn a new one (e.g. Kaplan & Tripsas, 2008). Some researchers even attribute learning to be the core of the innovation process in achieving disruptive innovations (Assink, 2006).

Learning can take place at different levels; on an individual level as well as on an organizational level, which are often discussed by researchers in conjunction (see for example (see for example Argyris, 1976; Robinson, 2001). Two strands of research on organizational learning exists; a descriptive and a normative strand (Robinson, 1995). The descriptive strand focuses on how organizational learning occurs, and the normative strand focuses on how organizational learning can be directed to make firms achieve their targets and goals faster (Robinson, 2001). Argyris (e.g. 1976) and their research on the topic combines both strands, and tries to further the knowledge on how practitioners can achieve organizational learning through different processes and what underlying factors affect different processes, as well as propose how it can be done efficiently within organizations.

Based upon Argyris (1976, 1995); Argyris and Schön (1989, 1999) research on more than 300 organizations they argue it is important to break the cognitive frame that typically surrounds the first level of learning; what they refer to as double loop learning - in contrast to single loop learning. In single loop learning there is an established frame, which sets the context for the specific learning. In comparison, double loop learning does not only focus upon the first loop of learning, but on an additional loop where the cognitive frame is questioned. Further, Argyris (1976) found throughout his studies that most firms do not apply double loop learning when looking at what actions were actually taken within the studied firms; their theory-in-use, in contrast to their espoused theories of action; what actions the studied firms thought they were taking. This can become a problem, as the actors within a firm hence might believe that there does not exist any cognitive frame withholding discontinuous innovation.

Argyris (1976) arguments, based upon his extensive empirical studies, are quite similar to previously presented theory. For example, inside a highly modular organization, learning within a specific module can be seen as being single loop learning. Further, if also questioning the cognitive frame, such as the goal of the specific module and thus the whole architecture, this can be seen as double loop learning. Then Argyris (1976) empirically based suggestion that double loop learning is not often the actual theory-in-use, can also be considered to be along the lines of other researchers suggestions; that new entrants without an existing cognitive frame are often the ones to introduce disruptive and discontinuous innovations rather than incumbents (Christensen & Rosenbloom, 1995; Henderson & Clark, 1990; Kaplan & Tripsas, 2008).

3.2.6. The Difficulties of Decision Making in Organizations

Argyris (1976) suggested reasons why firms have difficulties breaking through the cognitive frame is also very much in line with previous outlined theory and other researchers. Complete information is not given nor cheaply acquired - in particularly when complex decisions such as those on potentially disruptive and discontinuous innovations are to be made (Argyris, 1976 see also previous presented theory on KBT). Further, humans are not rational in their decision making, in particular under these circumstances (e.g. Armstrong, 1984; J. H. Barnes, 1984; Kahneman, 2011; Slovic et al., 2004; Tversky & Kahneman, 1974, 1983). Furthermore, within organizations incentives are not necessarily aligned between different actors, as presented earlier through TCE see also (see also Argyris, 1976). In other words, it seems logical that it becomes difficult for organizations to make good decisions since it is difficult to acquire proper information through learning as well as learn to be apt at making decisions.

Further, Argyris (1976), in his review of previous research, give many examples and further details of the underlying issues. These include various organizational and bureaucratic factors, such as incomplete resolutions of interdepartmental and interpersonal conflicts; ineffective and incomplete search for information; uncertainty avoidance; political exchanges and annexation of other departments; but also bargaining, shortsighted priorities, personal beliefs and goals; as well as power plays such as using misperception and miscommunication to further one's interests (Allison, 1999; Halperin, 1974). Many examples of misperception and miscommunication is given; only presenting supportive factors of one's view, biasing reports, not reporting negative factors as well as avoiding sending reports to certain senior managers (Halperin, 1974). Further, these power plays do not only happen in between actors at the same level and upwards in the organization, from lower level employees to senior managers, but also downwards from senior managers and down. These many times accepted games easily leads to secrecy by actors who want to remain in control and power, which directly inhibits decision makers, in particular at the higher levels, from acquiring accurate information and thus make correct decisions (Argyris, 1976).

Furthermore, George (1972, pp. 769-780) presents nine general malfunctions in decision-making in his studies of the President of the United States, also verified by (Janis, 1972). Most of the malfunctions focus on how factors such as asymmetry of information and incentives, as well as the advocacy of a decision maker's advisors can negatively affect her ability to make the correct decision. Further, George (1972) argues in favor of multiple advocacy to enhance the decision capability and reduce the occurrence of above malfunctions, also supported by (Argyris, 1976). Finally, George (1972, p. 759) presents three conditions for effective use of multiple advocacy:

    1) *No major maldistribution among the various actors of the following resources:*
        a) *Power, weight, influence.*
        b) *Competence relevant to the policy*
        c) *Information relevant to the policy problem.*

d) Analytical resources.

e) Bargaining and persuasion skills.

2) *Presidential-level participation in organizational policy making in order to monitor and regulate the workings of multiple advocacy.*

3) *Time for adequate debate and give-and-take.*

In sum, there are many factors that can possibly damage learning as well as effective and accurate decision making, which in turn may through this cognitive frame, or as presented by others as groupthink (Janis, 1972, 1983), cause organizations to get stuck along an existing innovation paradigm and reduce its capabilities to produce disruptive and discontinuous innovations.

3.2.7. Dualism and Matrix Organizations

Very much in line with George's (1972) suggestion on multiple advocacy and (Argyris, 1976) arguments for fostering a collaborative double-loop learning environment is the concept of matrix organizations. The matrix organizational structure is a suggestion on how firms, in particular large firms, can cope with optimizing and balancing several critical dimensions for success when needed for sustaining growth and development (Davis & Lawrence, 1977; Degen, 2010; Galbraith, 1971). Most often it is a combination of how a company can combine the need to stay close to the market, sometimes due to the need to keep innovative, through market oriented processes and routines while still maintaining economies of scale and scope by also utilizing a functional setup. In essence, the matrix organization is most often described as a mix of a skewed, but completely balanced, matrix where on one dimension are the market processes and teams, and on the other dimension functional processes and teams, such as depicted in figure 1 below. Each member of both the functional senior management and the market senior management reports directly to the top leader; e.g. Chief Executive Officer (CEO).
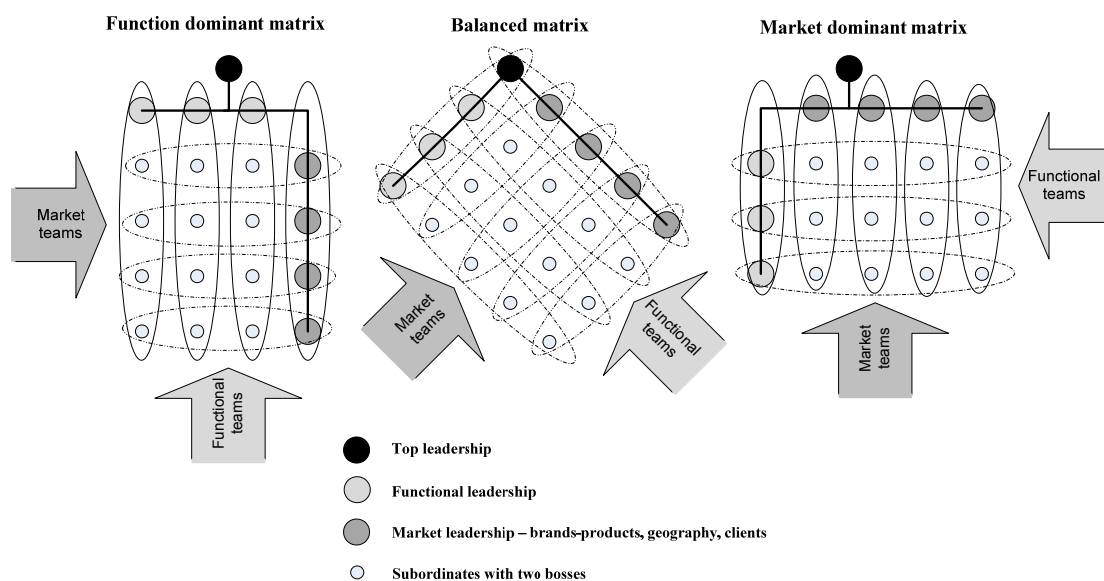
Figure 1 – Different styles and ways to balance matrix organizations (Degen, 2010)

18

The popularity of adopting a matrix structure has varied since its initial introduction in the 1970s and 1980s (Degen, 2010). Degen (2010) presents evidence pointing to the matrix structure losing its popularity because of the many failures in implementing the structure at the time, but later regaining popularity in the 1990s as some firms showed great success with using it despite these initial failures. Hence, it is far from non-trivial to implement a matrix structure and great care needs to be taken to several factors (Degen, 2010; Galbraith, 1983).

The essence of the matrix structure is the duality, which needs to be instilled into the organization, in sharp contrast to a single-minded, one winner culture as is typical in many mechanistic and hierarchical organizations (Degen, 2010; Galbraith, 1983). This duality needs to span across the strategy and vision of the firm, the skills and mindsets of the people within the organization, the power and thus organizational structure, as well as rewards, processes and systems. Each part needs to be aligned with the overarching goal of duality in order to feed the organization the right motivation and information and drive the desired behavior. Only then will the proper culture be shaped within the organization and the expected performance increase happen.

At least three quite distinct roles can be distinguished within a matrix organization (Davis & Lawrence, 1977; Degen, 2010); the top leader, the matrix leaders and the subordinates below. The top leader needs to manage and balance each dimension, including efficiently and decisively resolving disputes and conflicts while still ensuring each dimension is equally prioritized according to the overarching strategy and vision. In other words, the top leader will need to mix an autocratic leadership style with that of a participatory style. Further, the top leader also needs to instill a culture of collaborative and joint decision-making, as this will be required among the matrix leaders and subordinates. The matrix leaders, in turn, needs to be able to achieve results not necessarily based upon their position in the hierarchy, but on personal skills and abilities such as bargaining, making compelling arguments, and similar, since they are not the sole leader of each subordinate. Last, the subordinates needs to be able to cope with demands and goals set based from different dimensions of the firm - many times often competing demands and goals. Thus, in order to succeed with a matrix organization significantly higher requirements will be put upon management, for example if comparing with a purely mechanistic and hierarchic organization (Degen, 2010).

3.2.8. Entrepreneurship inside existing Profitable Organizations

Albeit the matrix organization, if implemented correctly, can yield great results for firms it does not necessarily address discontinuous and disruptive innovation in and by itself. It may address efficiency and incremental, continuous innovation but it does not necessarily break the firm out of its path dependency, which may be needed in order to remain profitable. In O'Reilly and Tushman (2004) studies, they found that ambidextrous organizations; organizations where the discontinuous innovation projects were separated from all but the top management but still utilizing the resources of the

whole organization were vastly more successful than the alternatives; functional, completely integrated teams, cross-functional teams and unsupported teams. This, in addition to the matrix structure, also speaks in favor of the duality albeit outside of a potential matrix structure within the firm. O'Reilly and Tushman (2004) argue the innovation team needs to have a different mindset, culture, structures, control and reward systems and processes compared to the rest of the organization. Since discontinuous and disruptive innovation projects are path breaking and vastly different from incremental innovation projects as explained above, they need to live under different rules (also supported by Blank & Dorf, 2012).The more different it is from the regular innovation process of the organization, the greater the need for separation from the regular organization (Galbraith, 1983). The discontinuous innovation team might even need to work under a completely different logic, such as the hypothesis-testing action approach (Berglund et al., 2007; Blank & Dorf, 2012) or an effectuation approach (Sarasvathy, 2001a, 2001b).

Despite the quite different set of rules for the innovation team, O'Reilly and Tushman (2004) also argue that a tight link to the rest of the organization must be held through senior management. Otherwise, the innovation project would not enjoy the benefits of existing organization and utilize its resources. This may include expertise, financial means and other resources required for the continued success of the innovation project. Hence, this further stresses the importance of the duality of top management, similar to that of George (1972), Argyris (1976), Degen (2010) and others. All of top management needs to support the innovation efforts made outside of the regular organizational structure, and there needs to be a clear vision and strategy which is clearly communicated to the whole organization. If the top management does not succeed, the innovation project may get hampered by routines and processes made for efficiently delivering results according to the existing revenue streams, or not able to utilize the resources of the rest of organization and thus reduce the likelihood of cross-fertilization and hence the success wanted.

In sum, because of organizational inertia, the link between innovation and organizational structure, the inherent lucidness and uncertainty that accompany discontinuous and disruptive innovation (e.g. Blank & Dorf, 2012; Eisenhardt & Martin, 2000; Teece & Pisano, 1994) as well as the cognitive frame surrounding an organization and its members, it can easily become difficult for established firms to come up with discontinuous and disruptive innovation. Albeit the matrix organization balances different needs within an organization, it does not necessarily facilitate discontinuous and disruptive innovation, such as the ambidextrous organization. However, underpinning all theory presented above lies dualism, the critical importance of top management capability to simultaneously manage an existing organization as well as skunkwork teams or separated teams (such as described in this subchapter), and learning to break through the path dependency that often surrounds incumbents firms. Either part may break the delicate system and hence hinder existing firms' continued success through new waves of creative destruction (Assink, 2006; O'Connor, 2008).

20

3.3. *An External and Integrated Perspective*

In addition to the many internal factors affecting incumbent firms' ability to achieve discontinuous and disruptive innovations, there are several external factors significantly affecting as well (also argued above; Afuah & Bahram, 1995). However, internal and external factors are not necessarily separable as there is an obvious interplay them in between, since many external factors affect a firm's ability to innovate through affecting internal factors. Thus, external factors affecting a firm's ability to achieve disruptive and discontinuous innovation do so both directly; through constraining the firm in various ways, but also indirectly; through internal factors. Hence, in order to understand an external and integrated perspective on inhibiting factors for incumbents' disruptive innovation ability we first need to understand what factors are critical for successful innovation in general; both internally and externally.

3.3.1. **Innovation and Value Networks**

Based upon one of the most comprehensive empirical studies on success factors for innovation, Freeman (1991) suggests six to be the most critical; User needs and networks, coupling of development, production and marketing activities, linkage with external sources of scientific and technical information and advice, concentration of high quality R&D resources on the innovative project, high status, wide experience and seniority of the "business innovator", and basic research. Many similarities can be found with the theory presented of internal factors. Coupling of development, production and marketing activities suggests that innovation is more likely when an integrated perspective can be taken – similar to the discussion on modularity versus architectural, integrative innovation above. Further, it can also be argued that it falls naturally that a high concentration of resources needs to be brought together, since, as described earlier, discontinuous innovation, arguably, by nature requires a greater leap in newness. Moreover, the criticality of high status, wide experience and seniority of the "business innovator" is very aligned with the presented theory on successful ambidextrous organizations.

However, the internal aspects do not cover all factors presented. This points to the earlier discussion on both markets as well as institutions being critical in order to explain shifts and discontinuities in industries. Further, these parts have effect in an integrated manner and include competitors and suppliers of the industry (DeBresson & Amesse, 1991; Freeman, 1991; Kaplan & Tripsas, 2008). In other words, in order to explain the failure of incumbents to produce disruptive innovation there is a whole network of actors to consider. This is well in line with recent thinking (e.g. DeBresson & Amesse, 1991; Freeman, 1991; Kaplan & Tripsas, 2008) and follows naturally from the somewhat simplistic value chain concept, popularized by Porter (1985). These networks are often referred to as value networks (e.g. Peppard & Rylander, 2006; Sandström, 2010) or ecosystems (e.g. Adner, 2006; Basole, 2009; Leavy, 2012; Moore, 1993).

There exists many definitions on networks in management literature (DeBresson & Amesse, 1991). DeBresson and Amesse (1991, p. 364) describes a network as a *"loose form of an inorganic and decomposable system"*. They emphasize that the importance is that *"there is more to the network than the sum of its interacting components"* (DeBresson & Amesse, 1991, p. 364). In other words, a network can in large be seen as a loosely formed organization and thus lives under similar conditions and can expect similar effects as an organization. In reference to innovation, networks can be seen as a way to cope with systemic innovation (Imai & Baba, 1991); innovation that spans outside any single autonomous part (Teece, 1996), much similar to how architectural innovation spans across multiple autonomous modules as discussed earlier. Thus, a network can be attributed to similar effects and conditions as an organization, and will be affected by both TCE and KBT (Colfer, 2007), affecting such as a firm's ability to enjoy economies of scope and scale (Freeman, 1991). In other words, the difficulties of balancing coordination and cooperation, integration and modularity are not only a matter within the firm, but also in between firms.

One scenario where the concept of value networks is especially useful is in two-sided markets; markets existing of two distinct user groups (Eisenmann et al., 2006). This scenario cannot easily be explained using other, more simplistic concepts such as the concept of value chains. Two-sided markets are enabled by linking the two user groups by providing them with a platform – a product or service that facilitates transactions between the two groups through providing necessary infrastructure and rules. Further, they operate under positive feedback loops (Forrester, 1968), and network effects, where increasing demand of one side lead to increasing demand on the other side. Since they operate quite differently, both sides need to be managed in specific ways.

According to Eisenmann et al. (2006) specific strategies should be employed in two-sided markets. The more quality and price sensitive side should be subsidized, since this will enlarge the market and spur accelerate growth. Exclusive participation of marquee users, particularly important users such as early adopters, should be secured to further increase the growth speed. Further, platform providers should avoid envelopment (Eisenmann et al., 2006). In such scenarios, alternative business models (the business model concept is further elaborated below) should be considered. Furthermore, it is critical to be aware of and cope with winner-take-all dynamics. In some scenarios, one platform will completely dominates due to the aforementioned network effects. This will happen when the following criteria is fulfilled: multi-homing costs, the cost a user incurs by belonging to multiple platforms, are high for at least one side of the users; network effects are positive and strong for at least the users with high multi-homing costs; and no side of users have a strong preference for special features. In such scenarios, the firm must either go for a complete win, or share the single winning platform with competitors.

3.3.2. Effects and Risks of Innovation Networks

Arguably, it will be harder to manage innovation across firms since any specific firm has less control over other firms, than actors within the firm (Colfer, 2007). Along similar lines, it can be argued that it reduces risk, i.e. uncertainty, as the firm does not necessarily need to take responsibility for all aspects and parts of the innovation. This uncertainty includes both uncertainties in how to create value, such as through technology, but also how to appropriate this value (Adner, 2006; DeBresson & Amesse, 1991; Leavy, 2012). One way in which uncertainty can be divided between firms is through complementary assets. Complementary assets in firms can through collaboration lead to great value (Harrison et al., 2001), as briefly touched upon in the earlier discussion on dynamic capabilities, and help firms cope with destructive waves of innovation. This can happen both directly, as well as indirectly, such as through networks, for example through alliances, joint ventures, research associations, and similar (Freeman, 1991). Not only can it help directly through greater immediate innovation success through the actual collaboration, such as the outcome of a joint venture, but research suggests it can also significantly increase knowledge transfer, organizational learning and development of new capabilities, irrespective of the immediate goal of the collaboration (Harrison et al., 2001). As discussed previously, all these factors can greatly impact a firm's innovation success.

However, due to the lack of control a firm has in an innovation ecosystem, such as a network of firms, there are also great risks with such a setup (Adner, 2006; Leavy, 2012). According to Adner (2006; Leavy, 2012), firms have typically only focused on execution risk when innovating, but missed both interdependency risks in the ecosystem and adoption risk. Execution risk pertains to the risk of failing with the innovation itself. This may be both internally as well as externally, if the innovation is jointly developed. Adner (2006) refers to this as the initiative risk. However, this does not address the full risk of innovation endeavors. There may be other complementarities the innovation needs to be ready before the end user realizes the full value of the innovation. Thus, the innovating firm may also be dependent on the innovation capability of other firms, or groups of other firms. This Adner (2006) refers to as the interdependence risk. Further, there may also be a chain of actors, other firms as well as users, who needs to adopt the innovation before its value is truly realized, what Adner (2006) refers to as the integration risk.

In essence, three types of problems may arise due to these three innovation risks (Adner, 2006; Leavy, 2012). First, in a complex scenario an innovation may be dependent on a lot of actors' technological success, for example their capabilities to invent new products. Hence, there is an interdependency risk of innovation. Second, there is further uncertainty in if the innovation actually yield its hypothesized value. Third, there may also be an issue of timing. There may be an optimal time for introduction of the product or service to the market. Delays in any of the three risks may delay final adoption to the extent where the original business case does not hold because it is expected that the innovation will no longer be novel enough to compete. In other

words, it is important to weigh the full innovation risk to the potential first mover advantages and disadvantages (Adner, 2006). Advantages may include technological leadership through utilizing a falling learning curve and patents, preemption of scarce resources such as the acquiring of specific assets, geographical locations, product space, plants and equipment, as well as the addition of switching costs and buyer uncertainty to followers (Lieberman & Montgomery, 1988). Disadvantages may include free rider effects such as when imitation is cheaper than the initial development, the cost of resolving the initial uncertainty in technology and market characteristic of the early phases of industries, shifts in technology or customer needs as well as other causes of incumbent inertia (Lieberman & Montgomery, 1988). In sum, albeit many positive effects can come out of collaborating when innovating, there are also many great risks that must be properly evaluated, analyzed and managed (Adner, 2006; Leavy, 2012).

3.3.3. Managing Innovation in Networks

As discussed, to properly manage risk and benefits it is important to balance collaboration and cooperation, but also modularity and architecture, when innovating due to inter firm effects of TCE and KBT (Colfer, 2007). In order to achieve discontinuous and disruptive innovation, an architectural innovation is often desired. Based upon TCE and KBT, it may seem this is always best done vertically integrated; i.e. inside of one firm (Colfer, 2007), since the innovation risks according to these theories would be easier to manage internally. An alternative, which has shown success in some scenarios, is for one firm to take on the role of being a systems integrator, or lead firm (Colfer, 2007; Langlois & Robertson, 1992). The systems integrator takes on the role of managing the overarching architecture, enabling architectural and systemic innovation, while still enabling a high level of modularity. For example, to achieve success with joint development programs in the auto industry, Takeishi (2001) found through empirical studies that, in addition to the joint capabilities of the actors and face-to-face communication, architectural knowledge held by automaker engineers were positively correlated with success. Thus, systems integrators can be useful and needed in innovation networks when it would be too costly for all actors to acquire enough knowledge to innovate across all, or a majority, of actors, as well as efficiently align all involved actors.

Chesbrough (2003) outlines additional strategies and roles in an innovation network. As Chesbrough (2003) argues, closed innovation, internal innovation managed successfully through control, has become less prevalent since it is not any longer necessarily the most efficient for success (also Freeman, 1991). Since complementary actors exists more readily today, such as external funding and highly skilled knowledge personnel, firms may successfully innovate through networks. Rather, in such a scenario realizing that external R&D and innovations can benefit the firm may be better, regardless if the ideas originated internally or not. Further, internal ideas may lead to more revenue if further developed and commercialized externally. This is very much in line with previously presented theory.

Three categories of activities exists in such an open innovation network; funding, generating innovation and commercializing innovation (Chesbrough, 2003). Funding includes investments for economic rewards as well as indirectly benefitting from the innovation becoming realized, such as needing it as a complementary component to one's own innovation. Generating innovation includes fundamental exploration, specific exploration for a narrower target such as a specific commercial application, architectural innovation such as done by the previously described systems integrator, and innovation made for a specific, higher, cause such as open source innovation. Commercializing innovation includes marketing of innovation, such as by realizing the actual value through insights from users by keeping close to them, or by turning into a "one-stop-shop"; a place where users and buyers expect to find new products and services. In sum, a firm must not necessarily perform all activities, and may specialize on certain activities and let others perform other needed. In particular when lacking specific resources, or to reduce other risks such as market and appropriability uncertainty, such as often when striving for discontinuous and disruptive innovation.

3.3.4. Network Forms and Institutions Role in Innovation

As argued above, networks can provide useful for overcoming certain barriers when firms innovate. However, there exists many forms of innovation networks and different forms may be useful in different scenarios. As pointed out by DeBresson and Amesse (1991), a network should not necessarily be seen as an intermediate state between a firm and a market, as may portrayed through TCE. Rather, they argue there are too many different forms and types of connections making networks something different. A purely modular structured network of innovators might be structured according to a market structure. As presented earlier, this may not be suitable for achieving discontinuous and disruptive innovation. Freeman (1991, p. 502) proposes a list of ten main forms of cooperation for innovation, useful under different scenarios:

1. *Join ventures and Research Corporations*
2. *Joint R&D agreements*
3. *Technology exchange agreements*
4. *Direct investment (minority holdings) motivated by technology factors*
5. *Licensing and second-sourcing agreements*
6. *Sub-contracting, production-sharing and supplier networks*
7. *Research Associations*
8. *Government-sponsored joint research programmes*
9. *Computerized data banks and value-added networks for technical and scientific interchange*
10. *Other networks, including information networks*

Albeit it may be beneficial to enter into one, or many, of the above types of collaborations in order for a firm to achieve higher efficiency of innovation investments, or in order to enable discontinuous and disruptive innovation, there is naturally also a cost of establishing these collaborations. Hence, these networks may not form themselves. Thus, it follows naturally that governments may want to assist firms in

forming innovation collaborations. Further, research has shown that clustering may be beneficial (Baptista & Swann, 1998). Strong demand in a specific geographical area and lower consumer search cost are some potential benefits, but clustering can also facilitate innovation through closeness to users, as presented above, and in particular through utilizing lead users such as described by Von Hippel (2005). In addition to market side factors, supply side factors, such as labor market pooling, closeness to suppliers and inputs, and knowledge spillovers may make clustering beneficial. In particular, knowledge spillovers may be important for innovation(Baptista & Swann, 1998).

Hence, it poses natural for governments to aid firms in establishing these collaborative network since it may lead to clustering, thus enabling higher innovative output and, in turn, greater economic development for the region. In fact, in recent years it has become quite popular, in particular since other stimulus may not be positively seen upon as they may not be in line with free market thinking (Freeman, 1991).

However, institutions do not only affect innovation success among firms through enabling formation of networks. Institutions may also play a role in other aspects of the innovation process, such as regulations hampering certain innovations' level of commercial success or through enabling knowledge transfer from universities. In other words, in particular in the case of path breaking, disruptive and discontinuous innovation, there might be a need to change certain institutions, and thus there might be a need for institutional entrepreneurship in order to achieve innovation success. Leca and Naccache (2006) argue this can be done through trying to convince other actors of changing the institutional logic in use, which in turn shapes the institution. By nature, however, this is an uncertain process since institutional logic, built up by certain structures, is not easily grasped, if at all graspable. Further, different institutional logic may cause different causal effects in different contexts, further complicating this process of transforming institutions for strategic reasons.

3.3.5. Resource Dependency of Incumbent Firms

In addition to previous examples, another institutional lock-in is when firms get stuck in their value network through resource dependency (Pfeffer & Salancik, 1978). Considering a value network's development, such as a specific industry, a dominant design on how value is created will take form as discussed earlier. This creates a dominant logic on how business is done (Prahalad & Bettis, 1986), similar to the cognitive frame discussed previously under internal factors. Further, this will also be the established way, and thus dominant logic, actors inside of the value network actually create value and thus revenue, in contrast to new innovation projects that do not necessarily generate significant revenue streams and profits. In particular, this may be prevalent with discontinuous and disruptive innovation projects where uncertainty of both value and appropriability is large. This may lead to discontinuation of these projects. However, it may be premature if these projects are what Chesbrough (2004) would refer to as false negatives; they will eventually lead to great value, in particular this may happen if they break the existing dominant logic.

Christensen (Bower & Christensen, 1995; Christensen, 1993; Christensen & Bower, 1996; Christensen & Rosenbloom, 1995) presented his theory of disruptive along similar lines, based upon studies in the disk drive industry. When an innovation project within an incumbent firm establishes a new technology trajectory, such as a new set of features, performance or price attributes relative to existing technology trajectories, but initially fails to compete in the mainstream market on the same premises as products on existing technology trajectories, he argues the incumbent firm may have difficulties. Since the new market best suitable for the innovation will not necessarily initially yield significant revenues, the incumbent may discontinue the project. However, if the value of the existing technology trajectory is nearing its end and if other firms, such as new entrants, continue to develop the new product, it may eventually catch up. In these scenarios the new product may overthrow the existing mainstream market since it provides both the value from the old technology trajectory but also the new. By then, however, it may be too late for the incumbent to catch up with the new technology. In such a scenario, Bower and Christensen (1995) argues, the new entrant will outcompete the incumbent and cause disruption in the industry.

Christensen's theory caused much discussion among researchers. Danneels (2004) questioned the theory's ability to make ex ante predictions since disruption by definition emerges ex post. Christensen and Raynor (2003) provided evidence and argued that disruption may happen even if the innovation targets the lower end of the existing market, since the lower end will neither generate significant revenues. Govindarajan and Kopalle (2006) argued further that disruption may also emerge through high-end market segments. Sandström (2011) explained this through empirical studies of incumbents in the digital imaging industry and the IP video surveillance industry by arguing it to happen if the high-end market segment is willing to make an initial trade-off to get the new set of features the new technology trajectory brings. To summarize, disruption due to resource dependency may emerge through any market segment except the mainstream segment, but including new markets. Thus, great care must be taken by management within incumbent firms when making investment decisions, in particular on discontinuous innovation projects.

3.3.6. Business Model Innovation

As previously argued, disruptive and discontinuous innovation projects often entail architectural and systemic innovation. As such, these innovation projects may be path-breaking and require a new paradigm of underlying logic. Hence, it is not necessarily enough to look at innovation as only product, service, position and paradigm innovations, but the underlying business logic, the business model, must be considered as well. A business model can be seen as a way to describe, in an integrated way how value is created and captured within a firm (Björkdahl & Holmén, 2013). According to Chesbrough and Rosenbloom (2002), a business model clearly describes the value proposition, identifies a target market segment and specifies why this market segment is in need of the value proposition, outlines the value network making it possible to create and distribute the offering, describes cost structure and revenue mechanisms, estimates

profitability, formulates the competitive advantage relative to competitors, and outlines the position of the firm in the value network relative to other relevant actors. Osterwalder (2004) suggested a business model consists of nine interdependent components; client segments, client relationships, distribution channels, key activities, key resources, partner network, cost structure, revenue flows and value proposition, as depicted in figure 2. In other words, the concept of business model is useful since it provides an integrated, fully encompassing and mapped out description of the underlying business logic of a firm, including its external components and its relations to these components (Osterwalder, 2004). As such, the concept can facilitate discussion on how a firm through business model innovation (BMI) can achieve sustainable competitive advantage (Berglund & Sandström, 2013), such as surviving destructive waves of innovation.
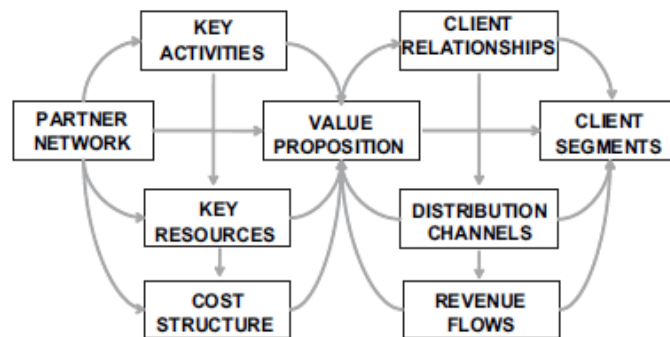
Figure 2 – Relations between the different factors of Osterwalder's business model canvas (Chesbrough, 2010)

Previous research suggests BMI to be important to many established firms in order to both sustain competitive advantage in existing industries as well as to find new sources of revenue (Björkdahl, 2009). For example, in order to remain performant when changes are made to product market strategies, corresponding changes needs to be done to the underlying business model (Klang & Hacklin, 2013). However, there exist barriers to successfully achieving BMI. According to (Berglund & Sandström, 2013), research has identified five main issues: resource inertia such as conflicting resource configurations between the new business model relative the old; cognitive inertia, lack of top management to aptly establish the new business model within the organization; conflicts between the new and old business model; and a lack of organizational structures and processes for managing multiple business models.

Furthermore, Berglund and Sandström (2013) proposes additional hinders for successful BMI. For similar reasons as in value networks as previously presented, interdependence risks may also exist in a business model context. Heterogeneity in incentives may also negatively affect the likelihood of BMI since other actors may when in disagreement block essential parts of the innovation. This may however be partially mitigated if the focal firm has good knowledge of other actors' incentives and can manage them appropriately. Further, since control is lower outside of the focal firm and because of the added uncertainty with systemic innovation, Berglund and Sandström (2013) suggests that the more changes to the business model relative to

28

previous business models, the less likely BMI is to succeed. Furthermore, with more actors involved, control, and thus most likely predictability, becomes even more difficult. Partially due to the same reasoning, a weak appropriability regime, controlled through legal means rather than informal institutions and social norms, may further reduce the likelihood of successful BMI since it is important to foster an open, creative and generous attitude among participants (Berglund & Sandström, 2013). This follows naturally since innovation networks are reinforced by social, cultural and symbolic bonds (Baptista & Swann, 1998). This is in particular so in informal networks and networks where knowledge is very tacit, such as often when disruptive and discontinuous innovation is sought after, since tacit knowledge by nature makes it difficult to achieve explicit agreements, if even possible (Freeman, 1991). Along similar lines of reasoning, hard-power tactics may also hamper BMI success. Much like the previously discussed importance of learning and the difficulties discussed when arguing for systems integrators, inadequate knowledge sharing among relevant actors may also further hamper success of BMI. Lastly, since instability causes increased uncertainty, instability among actors in the emerging value network may furthermore negatively affect BMI.

Klang and Hacklin (2013) suggests three successful strategies for established players when adapting their business models due to changes made to their product market strategy, in turn made due to changes in the environment such as when industries converge: The infringing behavioral pattern, the orchestrating behavioral pattern and the riding behavior pattern. Fundamentally, each strategy breaks existing linkages and resource dependency. The infringing pattern is based upon gaining full control of supply, which thus secures a power position to the extent upon which the focal firm arguably can steer other actors, thus extricate itself from any dependencies. Firms adopting the orchestrating pattern actively and deliberately search for alternatives, in order to ensure alternatives are readily available. The riding behavior pattern is based upon establishing partnerships with firms who act as channels, thus deliberately depending on their ability to open up new avenues. In this strategy, the only active action by the focal firm is lobbying towards transformation of institutional arrangements, such as government regulations.

4. Empirical Data

In this section we will give an overview of the mobile industry, the dynamics within it during and how it has transformed in the period between 2003 and 2010. Furthermore, we will give a thorough insight into the inner workings of Nokia during the period, with a special emphasis on the structure and organization of the company, its strategy and how it managed its innovation.

We will start this section with an overview of the mobile industry, giving a short overview of the industry and how it has changed over the period as well as describing the technological shift that has happened there, namely the shift from feature phones to smartphones. Further, we will describe the value network of the industry and how the smartphone revolution has affected it. The second part of this section will focus on Nokia in specific, starting with explaining the inner workings of the company and finally relating the development of Nokia to its exterior environment and its value network.

4.1. An Industry Overview

The roots of the mobile industry we know today can be traced all the way back to experiments with mobile telecommunications after World War II, while the first device that was truly mobile in the same sense we put to the word today, was made by Motorola in 1973 (Agar, 2013; Wikipedia, 2013i). However, the first mobile networks that were commercially available for the public were not launched until the late 1970's and in the 1980's (Wikipedia, 2013e). These networks were based on analog technology which were replaced by the digital GSM network standard in the 1990's, with the world's first GSM call being made on Radiolinja's network in Finland (GSMA, 2013a). Ever since the advent of the GSM standard, digital mobile communications have developed extremely fast with mobile being one of the fastest growing industries of today, to illustrate this we can look at mobile phone subscriptions. From 2003 till 2010 the number mobile phone subscribers increased from circa 1,3 billion to 5,2 billion (Ahonen, 2011). It should therefore come as no surprise that the mobile industry of 2010, at the end of the period in focus here, was radically different from the industry that existed at the beginning of the period in 2003.

In 2003 Nokia and Motorola were the dominating mobile device manufacturers in the industry, with a combined market share of around 50%. Both these firms along with Ericsson, which later became known as Sony Ericsson when it entered into a joint venture with Sony, were very early in introducing mobile phones to the market and together controlled a dominant portion of the market in the beginning of the 2000's (Gartner, 2001).

Mobile Industry Market Share
Global Terminal Sales
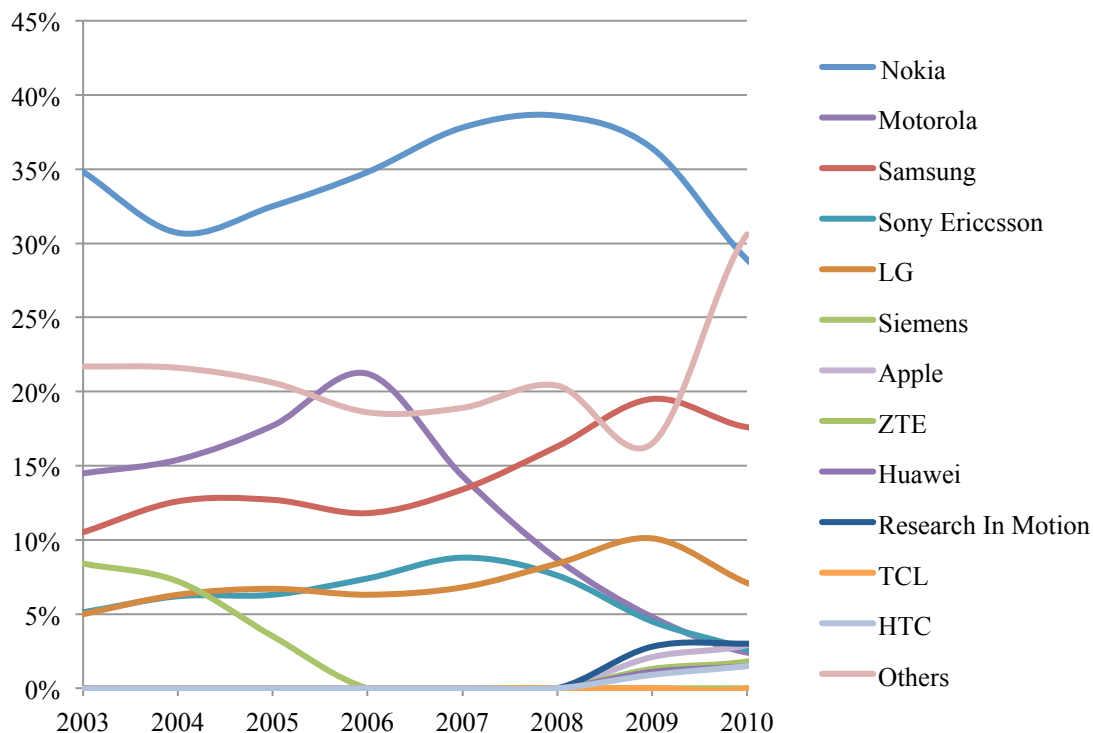
Figure 3 – Global market share of mobile device manufacturers from 2003 until 2010 (Gartner, 2005, 2007a, 2009a, 2011)

The mobile devices available on the market in 2003 were still very rudimentary compared to the mobile devices we know today. The majority of devices offered to customers at the time comprised a small feature set consisting of few and simple additions to the standard calling and text messaging features, such as an alarm clock, phone book, calendar, as well as simple games. However, more complex devices were also available, offering features such as faster data transfer, email communications, integrated cameras, color displays, and the ability to run external applications. These devices were marketed towards niche segments of the market based on the specific feature set they contained; for example, email communications and faster data transfer appealed to business users while color displays and availability of external applications were important for the tech savvy high-end of the market (Garner, personal communication, November 26, 2013; Maharaj & Parumasur, 2011; Martinez, personal communication, October 31, 2013).

Furthermore, in the early 2000's there was much more variation to the form factor of the devices available on the market than there is today, where the dominant design has been set on a device consisting of little else than a large touchscreen (Wood & Garner, 2012). While many devices back in the early 2000's were designed in a style that is known as a "bar", where the device consists of a screen and a keypad, there was not only variation as to whether the device had a numerical keypad or a QWERTY keyboard but also considerable experimentation with more radically different form

32

factors. These include "clamshell" devices that are folded together over a hinge, "slider" devices that usually have a keypad that slides from underneath the device, as well as more unusual form factors, such as on the Nokia N-Gage that was released in 2003 (Nokia, 2013d; Wikipedia, 2013d, 2013j).

Ever since Nokia entered the mobile phone industry in the 1990's, the company has placed much emphasis on meeting the needs and demands of different customer segments by continuously releasing new devices targeting that specific segment. What this meant for Nokia's device release strategy was that the company released relatively many devices each year, reaching a peak in the period 2003 until 2006 when Nokia released an average of about 44 devices annually. What this further entailed was that when Nokia at its height, the difference between different devices was often small, such as the addition of an extra feature or better performance on a single technological parameter (Anonymous-Interviewee-14, personal communication; Jönsson, personal communication, October 30, 2013). However, our interviews indicate that this strategy had not always been predominant in the market but was something that started with Nokia (Jönsson, personal communication, October 30, 2013). The predominant product release strategy prior to Nokia's entry to the mobile industry had been Motorola's approach to release new devices targeted at the high end segment of the market while letting older models serve more price sensitive segments. This is a strategy that has in recent years been used by other actors in the industry, such as for example Apple since their release of the iPhone 3G in 2008 (Anonymous-Interviewee-14, personal communication).

Even though the largest focus in the mobile industry in the early 2000's was on the actual mobile devices, consumers rarely dealt directly with hardware makers such as Nokia or Motorola. These companies usually sold their products through third party retail distribution channels, with the majority being sold through the MNO along with a cellular service plan (Peppard & Rylander, 2006). This is exemplified by Mr. Roth's statement on the current state of the mobile industry, which he believes is less advantageous to MNOs than it was in the beginning of the 2000s: *"On some markets, e.g. Estonia, the network operators is the only distributor, while in Sweden we [the MNO] sell 60% of all mobile phones."* (Roth, personal communication, September 13, 2013 Translated from Swedish). Furthermore, another interviewee argues that *"Approximately 80% of all phones are sold via operators"* (Anonymous-Interviewee-11, personal communication). Peppard and Rylander (2006) adds that the MNOs also own the relationship with the customer. The MNOs therefore compete to retain customers on their network by locking devices so that they cannot be used on another network and by offering subsidies on more expensive devices in exchange for a service contract commitment binding the customer to the same MNO for up to two years (Peppard & Rylander, 2006). This has historically been the preferred model in the North American market, with sales of unlocked devices through alternate distribution channels such as consumer electronics retailers, specialized mobile phone retailers or even supermarkets being more prominent in other markets (Garner, personal communication, November 26, 2013).

The strong position the MNOs had in the market made them one of the most powerful actors in the mobile value network (Basole, 2009; Nyström et al., 2005; Peppard & Rylander, 2006; Roth, personal communication, September 13, 2013). Apart from the MNOs and the mobile device manufacturers, the value network consists of a number of actors, most notably the mobile platform providers as well as various mobile service and content providers (Basole, 2009; Peppard & Rylander, 2006). In the early 2000's most device manufacturers supplied their own platform or operating system with their devices and the MNOs and the device manufacturers provided most of the mobile services and content available, such as media, games and applications (S. J. Barnes, 2002; Brunzell, personal communication, September 24, 2013; Peppard & Rylander, 2006). According to interviewees this was a remnant of the mobile industry of the 1990's, where mobile devices were simple, mobile platforms and software were capable of only basic operations, and mobile services were almost non-existent (Andersson, personal communication, October 7, 2013; Anonymous-Interviewee-11, personal communication).

When mobile devices became more technologically advanced it enabled more software intensive features and the power of mobile platform and mobile service providers in the value network increased (Basole, 2009; Dediu, personal communication, Novemvber 11, 2013; Garner, personal communication, November 26, 2013). When this development was starting to manifest, in first years of the 21st century, the mobile value network was dominated by the MNOs and mobile device manufacturers, even though other actors and roles did of course exist (Basole, 2009). However, competition among mobile platform providers soon started to intensify and platforms such as Microsoft's Windows Mobile, Linux and Symbian, which was largely controlled by Nokia, battled for market share (Garner, personal communication, November 26, 2013) . In addition to the central roles of MNOs and mobile device manufacturers in the value network, a number of additional roles can be identified (Basole, 2009). These include the roles such as that of network and infrastructure providers, such as Ericsson and Nokia-Siemens Networks, which do not directly affect the end-user and therefore won't be covered in much detail in this report.

In the middle of the first decade of the 21st century the mobile industry started shifting from a focus on simple feature phones to more complex and data centric smartphones (Brunzell, personal communication, September 24, 2013; Dediu, personal communication, Novemvber 11, 2013; Garner, personal communication, November 26, 2013; Roth, personal communication, September 13, 2013). This was a shift that would have immense impact on the industry and the actors within it. Now we will try to explore this shift; what caused it, when it started to occur, and how it affected the industry, the ecosystem and the actors there within.

4.1.1. The Technology Shift

To start exploring this technological shift we must understand the difference between a feature phone and a smartphone. Furthermore, in order to understand the difference between the two, we must establish a definition of what exactly a smartphone is; something that has evolved over time and has not always been crystal clear even for industry specialists (Brunzell, personal communication, September 24, 2013; Garner, personal communication, November 26, 2013; Jönsson, personal communication, October 30, 2013).

As we have already discussed, the 1990's was the era of simple mobile phones, what we today call feature phones. However, in the early 2000's more complex and feature intensive devices became increasingly prominent, giving rise to various definitions with the aim to separate these devices from the simpler feature phones. Gartner, an information technology research company, for example divided mobile devices into four categories in a report published in early 2007 (Gartner, 2007b). Their definition appears to divide feature phones into two separate categories; Basic phones, which is the original mobile phone with limited multimedia and data features, and Enhanced phones, which are more evolved versions of the mobile phone with additional features such as cameras and GPS functionality. The third category Gartner (2007b) specifies is Smartphones, which they categorize as *"advanced voice- and data-enabled devices that run open, multitasking operating systems"* (Gartner, 2007b, p. 1). The fourth and final category is Cellular PDAs, encompassing devices whose primary function is data-centric while also functioning as mobile phones. The devices in this category are today commonly referred to as Smartphones, although the definition of what exactly a smartphone is and how the market would be segmented might not have been completely clear back in 2007. Others have pointed out this confusion of terminology, especially in the time when smartphones were relatively new to the world and a dominant design had not been set (Dediu, 2010a September 12; 2010b January 31).

Today, most of this confusion has been resolved and the definition we use here is that a smartphone is a device that: runs an operating system that supports generic applications built for the platform; is optimized for computation, programmability and data connectivity; and its features are partly decided by third party applications installed on the device (Nokia, 2005a, 2006b). This is a definition that is common in the industry and all interviewees agreed on. Even with a set definition for what a smartphone is, the line between them and feature phones is often blurred. A key factor we will use in this report that distinguishes between the two, is that smartphones are optimized for programmability and are based on operating systems or platforms that can run native applications, while feature phones offer limited programmability and only the option of running embedded applications, if any.

The definition of what constitutes a smartphone has also evolved along with the device category itself. Precursors to modern day smartphones can be traced back to devices such as the IBM Simon and the Nokia 9000 Communicator (Wikipedia, 2014f).

The first reference to the term "smartphone" in Nokia's annual reports is from the year 2004, when it is described as a *"new category of mobile device that can run computer-like applications"* (Nokia, 2004, p. 26). Smartphones conforming to the modern day definition we use here, can be seen as starting to emerge already in the year 2002, with devices such as the Palm Treo, the first BlackBerry models, and the Nokia 7650. At this time mobile operating systems that supported third party applications, such as Nokia's Symbian Series 60, were starting to emerge (Wikipedia, 2013l). However, third party applications development was not common and installing new applications was difficult, especially for mainstream users (Mosconi, personal communication, October 15, 2013). From this time and until 2007 mobile device technology improved rapidly; the devices got faster and more capable, software got more sophisticated, and cameras and multimedia options became more important. Furthermore, considerable experimentation was done on the form factor of devices until 2007, when the modern day smartphone emerged with devices such as LG's Prada and Apple's iPhone - a device consisting of little else than a large touchscreen (Wood & Garner, 2012).

This advancement of mobile technology, increasing sophistication of mobile platforms and software, and the convergence of the mobile industry with the internet, media and entertainment industries drove the shift from a market focused on simple feature phones to one ruled by smartphones (Hacklin et al., 2013; Nokia, 2004, p. 25). As smartphones became more widespread and sophisticated the importance of faster data transfer protocols, such as 3G and HSPA, and better software platforms and operating systems increased dramatically (GSMA, 2013a). Two platforms that emerged in 2008 had a significant impact on how the mobile industry would evolve in the years to come.

The first is Apple's iOS, which initially appeared on the first iPhone that was released mid-year 2007. In 2008 Apple changed the way end-users thought of third party software by creating the App Store, an online store where users could purchase and download applications to their phones (Dediu, personal communication, Novemvber 11, 2013). With the App Store Apple managed to create a distribution platform that connects third party developers and consumers, making installing and using third party software a simple and easy task for the mainstream user (Dediu, personal communication, Novemvber 11, 2013). Furthermore, the App Store was the necessary infrastructure for developers to monetize their software, creating a viable business model for selling software and services in the mobile industry. Apple's App Store concept, which is commonly known as an application store, became the de-facto standard for third party software distribution and would later be adopted by all competing platforms (Dediu, personal communication, Novemvber 11, 2013).

The second platform that would affect the industry in a dramatic way is Google's Android, which is based on the Linux kernel (Wikipedia, 2013a). Android, which also featured an application store called the Android Market, is open source and available to use by anyone free of charge (Wikipedia, 2013a). This created unique opportunities for hardware manufacturers, especially those trying to enter from connected industries or

low-cost markets such as China, to enter the market without having to develop their own software platform. Instead of developing capabilities in software development these actors could take Android off the shelf and run it on their devices (Garner, personal communication, November 26, 2013). However, most hardware manufacturers using Android try to differentiate themselves by adding some sort of customization to the operating system, such as a slightly different user interface (e.g. TouchWiz from Samsung and HTC Sense from HTC).

More than just changing the mobile industry and introducing new business models, these two mobile platforms managed to take over the market in a short period of time, reaching a combined market share of 90% in the fourth quarter of 2012 (Gartner, 2013). The operating systems that dominated the market prior to 2008, Nokia's Symbian and Microsoft's Windows, were by then reduced to marginal market shares.

Smartphone Platform Market Share
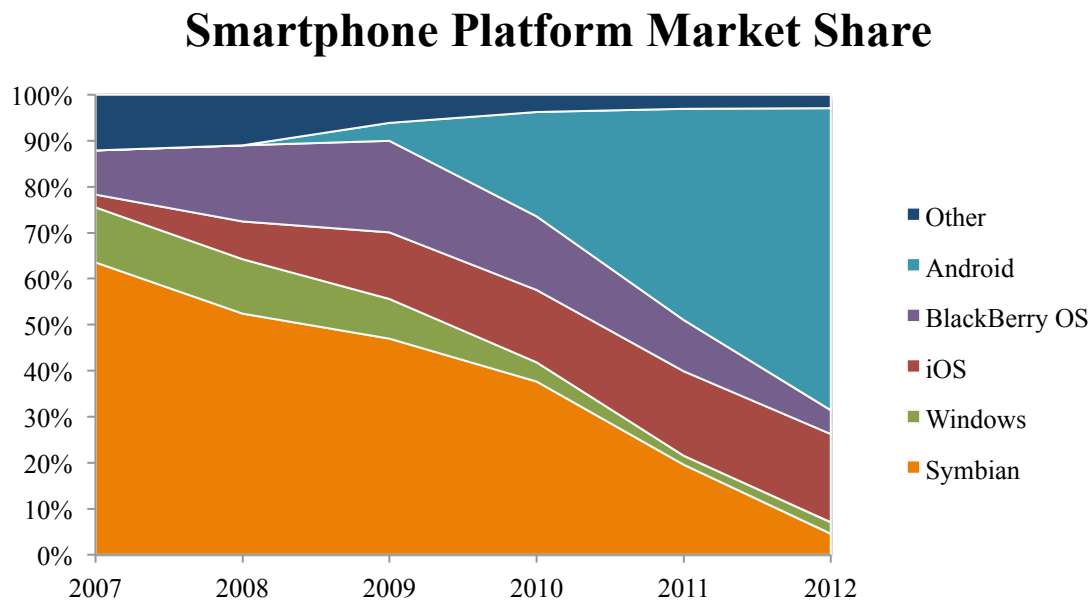
Figure 4 – Market share of smartphone platforms from 2007 until 2012 (Gartner, 2009b, 2011, 2012a, 2012b, 2012c, 2013)

The business model change that the application stores brought further enforced the importance of the ecosystem around the software platforms. Competition shifted from being focused solely on the hardware of the devices to be more centered on the software they run. Stephen Elop firmly asserted this development soon after he took over as President and CEO of Nokia in 2010 by stating that *"the battle of devices has now become a war of ecosystems [mobile platforms]"* in an internal memo to all Nokia employees (Arthur, 2011; Ziegler, 2011). In the next section we will look at how the value network of the mobile industry has evolved during the period 2003 to 2010, and how power has shifted between different types of actors.

4.1.2. The Value Network of the Mobile Industry

As mentioned above, the value network of the mobile industry was small and underdeveloped in 2003 and the beginning of the 2000's compared to today's standards (e.g. Brunzell, personal communication, September 24, 2013; Garner, personal communication, November 26, 2013). Since devices had very little data or computation capabilities the availability of software, games and multimedia content was very limited and mostly restricted to that provided by device manufacturers. The roles of platform, software, game and content providers in the value network were therefore very limited, with the device manufacturers and the MNOs being the most important and powerful players (Basole, 2009; Peppard & Rylander, 2006). As devices developed and became more capable, both types of actors wanted to add various services and provision of content to their product portfolio. Owning the customer relationship, the MNOs had a strong position vis-à-vis the device manufacturers, especially those with a lower market share and a weaker position towards consumers (Dediu, personal communication, Novemvber 11, 2013). Larger device manufacturers, such as Nokia, whose devices were sought after by consumers had a much stronger position against the MNOs as the position of the MNOs towards consumers would be weakened if they did not offer the most popular and sought after devices on the market (Garner, personal communication, November 26, 2013).

Apart from these two powerful roles in the value network there is an array of other roles to fill. These are roles such as that of network infrastructure providers, which were mentioned above, as well as those of various upstream component manufacturers who often specialize in certain technologies and provide device manufacturers with necessary components and parts for assembling their devices (Basole, 2009). This is by no means an exhaustive list of all roles in the mobile value network. As more and more industries converge with the mobile industry the value network expands (Basole, 2009; Peppard & Rylander, 2006). Furthermore, there are a number of roles that don't interact directly with consumers and therefore go mostly unnoticed. These are roles such as that of 20:20 mobile, a logistics and distribution integrator that bridges the gap between MNOs and device manufacturers (Jönsson, personal communication, October 30, 2013). These sorts of roles are however not seen as important for explaining the case of Nokia and will therefore not be the focus in this report.

As the mobile industry evolved and smartphones become more sophisticated the value network changed as well. It grew to become a large and complex network of more than 7.000 global companies that are interconnected in over 18.000 different ways (Basole, 2009). As mentioned earlier, both MNOs and device manufacturers wanted to add various services and other content to their portfolio. According to interviews with Brunzell (personal communication, September 24, 2013); and Roth (personal communication, September 13, 2013), MNOs were mostly interested in providing content and service to drive the need for data transfer, while the following quote from a Nokia quarterly report from 2009 indicates that services were important for device manufacturers in order to make their offering more appealing to end-users.

38

"I am especially pleased with the performance of […] the Nokia 5800 XpressMusic. Together with Comes With Music, it is a great example of Nokia providing solutions that consumers value." (Nokia, 2009a, p. 2)

Of course, a second reason for both MNOs and device manufacturers to pursue provision of content and services is the potential for monetization. Even though the incentives these types of actors had for taking on the content and service provision roles, most of them did not achieve a good foothold there (Roth, personal communication, September 13, 2013). With widespread adoption of the smartphone and the business model change that application stores on the mobile platforms brought to the industry power shifted in the value network(Basole, 2009; Dediu, personal communication, Novemvber 11, 2013). The power of the MNOs and the device manufacturers decreased while new actors started to increasingly take on various roles in the value network, such as that of providing services and numerous types of content. As new actors increasingly took over this segment of the value network the MNOs and device manufacturers released their hold of it, decreasing their power and the power struggle between them.

For device manufacturers the loss of power was perhaps even more dramatic than for the MNOs. Device manufacturers historically provided complete solutions, offering a device complete with a software platform, applications and services. With the emergence of open source third party software platforms, such as Android, it became increasingly common for device manufacturers to use these platforms and focus their attention on the hardware instead of software and services. This lead to the rapid growth of Android, which emerged in 2008 and reached a market share of approximately 70% in the fourth quarter of 2012 (Gartner, 2013). Even though Android has become the most popular mobile platform there are still examples of device manufacturers using proprietary platforms and providing an array of services to complement that, such as Apple does with its iOS platform.

As the power of device manufacturers and MNOs decreased, the platform providers became increasingly powerful and they are today in a position to become one of the most important actors in the value network (Basole, 2009). As mentioned above, competition in the mobile industry has shifted from being focused on a battle between devices to becoming a war of platforms, leaving the role of the platform provider as a powerful role in the value network. Platform providers now serve to connect various roles in the value network together, with platform providers such as Apple and Google serving key roles (Basole, 2009). They connect end-users with an array of application and game developers, content providers, and service providers.

Content and service providers have also grown more important and powerful in the value network with the evolution and widespread adoption of the smartphone. These include media and entertainment providers such as YouTube, Netflix, Hulu and Spotify, as well as providers of various mobile services, including communication services such as the widely adopted WhatsApp service; location services which are often built into the platform itself, such as Google Maps and Nokia's HERE; and last but not least various social media services, including Facebook, Twitter and Instagram.

The role of application and game developers within the value network has also grown significantly since the beginning of the 2000's. Since their role is mostly limited to developing software they are very dependent on the platform providers and the platform application stores, both for reaching users and being able to monetize their software offerings. Developers therefore flock to platforms with a large installed user base, which in turn attracts even more developers.

Even though the mobile value network is populated by a number of different actors, it is not uncommon that a single actor fills more than one role in the value network. Google, for example, is a platform provider with its Android platform. They provide content through YouTube, they have various services such as Google Maps and Google+, and Google also develops also an array of applications and is involved in device manufacturing through its Nexus line of devices and the subsidiary Motorola, which they purchased in 2011 (Wikipedia, 2014e). This is also true for Apple, who apart from being a device manufacturer and a platform provider is also involved in other roles such as application development, content provision through its iTunes store and various services, including messaging and location services (Wikipedia, 2014a).

The fact that these giants are so ubiquitous in the mobile value network and that they rarely offer their applications and services on other platforms than their own creates lock-in effects for end-users who start using one of the platforms these actors provide. As end-users become more and more involved in the platform, learn how to use all the services and get accustomed to all the platform specific applications, it becomes increasingly costly for them to switch to another platform. Moving from one platform to another would incur switching costs associated with learning how to use a different platform and moving from one set of services to another. With that said, as the value network settles on a limited number of platforms switching costs also decrease, since application developers and service providers are more likely to support a few large platforms that dominate the market than an array of smaller platforms that fragment the market.

4.2. Nokia's Early History

Since 1865, when Nokia was founded as a pulp-mill, Nokia has been active in multiple industries. During the 1960's Nokia merged with Finnish Rubber Works Ltd and Finnish Cable Works and formed Nokia and entered the telecommunication industry. Until the beginning of 1990 Nokia was structured as a conglomerate, active in multiple industries (Steinbock, 2010). As the company presented weak figures and had declined steeply on the Helsinki Stock exchange, Jorma Ollila was appointed as new CEO in January 1992 (Steinbock, 2010).
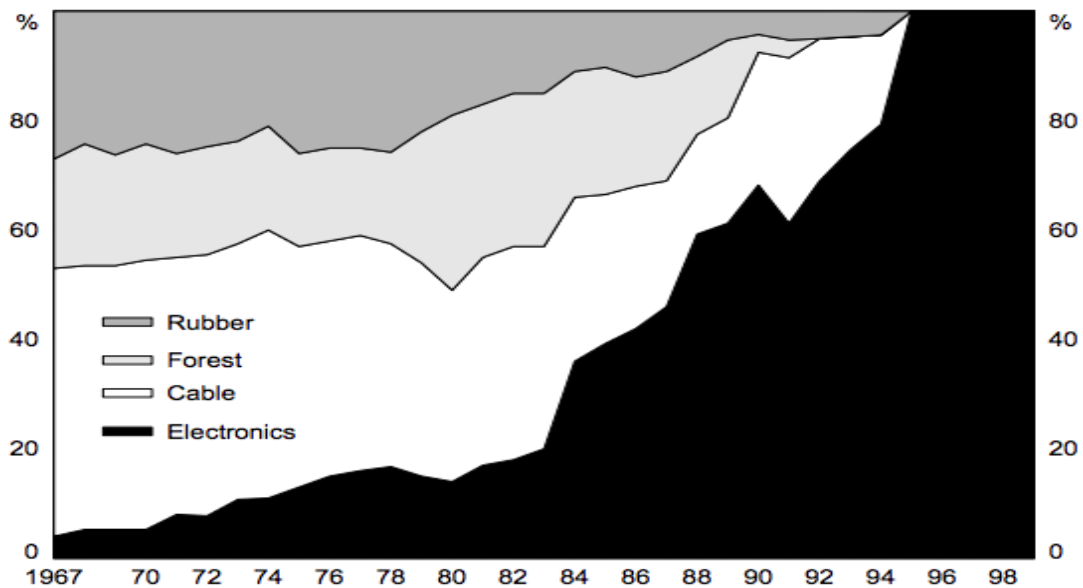
Figure 5 – Nokia's revenue divided by business segment from 1967 until 1998 (Ali-Yrkkö, 2001)

Mr. Olilla commented on the 1992 edition of Nokia when he left the company 15 years later:

"In 1992 Nokia was a conglomerate. It was growth driven and innovative in terms of finding new growth opportunities, but it had no real focus, a low level of R&D, and no heavy bets on new technology, it was focused on the Nordic countries [...]. It had a very strong, healthy engineering culture." (Steinbock, 2010, p. 96).

A new strategy was put forward by Ollila in 1992 arguing for less horizontal focus, thus leaving the conglomerate structure and focusing more vertically on a core business, telecommunication with *"the goal of establishing market leadership in every major global market."* (Nokia, 2004, p. 22). This increased vertical focus is depicted in figure 5, depicting revenue streams by business.

As a result of this decision Nokia divested all none telecommunication operations and formed three business units *Nokia Mobile Phones, Nokia Networks* and *Nokia Ventures*.

"Nokia Mobile Phones is organized according to vertically focused business units, global functions and geographical regions. A global network of research and development centers delivers product designs to nine regional manufacturing and distribution centers in eight countries. Customer sales are affected through local sales organizations." (Nokia, 2002a, p. 28)

Mobile Phones managed all development, distribution and sales of phones. Nokia Network focused on mobile infrastructure while Nokia Ventures Organization was created *"to foster new businesses"* (Nokia, 2004, p. 22). This development continued with further increased vertical focus and during 2001 nine new business units were

founded and made responsible for product and business development in defined markets segments (Nokia, 2003b, p. 6).

4.2.1. Sales and Growth

Throughout the 1990's Nokia's sales grew gradually, presented in figure 6 and 1998 Nokia became the world leader in mobile phones (Nokia, 2013e). Together with higher demand for telecommunication Nokia's Organization grew from 32,000 to about 59,000 employees between 1995 and 2000 (Nokia, 1997, 2005a).
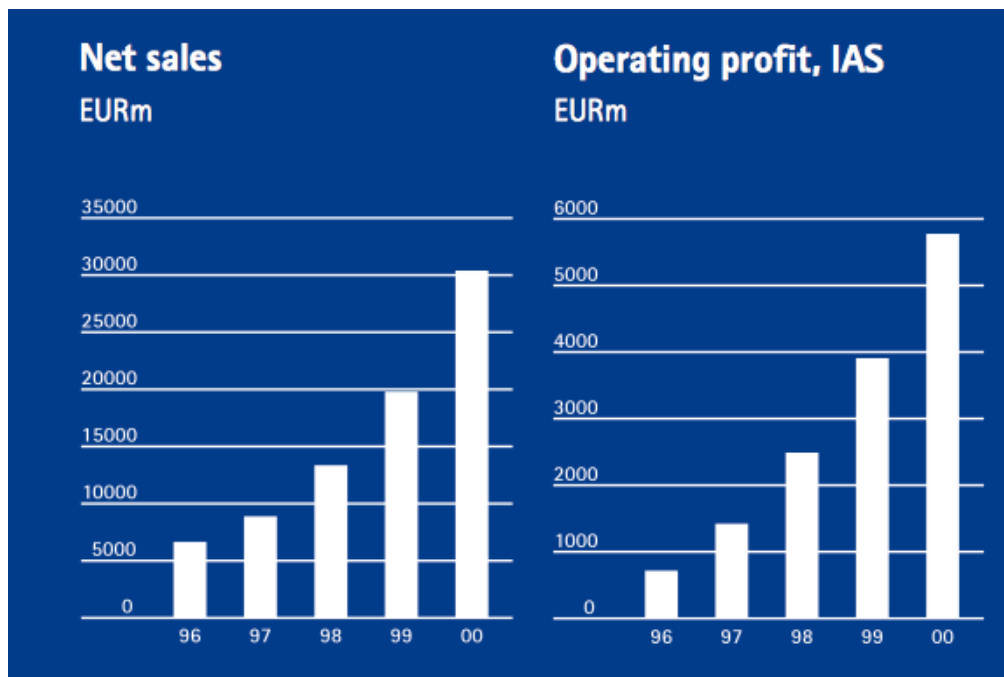
Figure 6 – Nokia's net sales and operating profit between the years of 1996 and 2000 (Nokia, 2001a)

As the "internet bubble" burst in 2000 and due to increasing industry competition Nokia reported a halt in the rapid expansion both in employee numbers and sales, however staying as the number one handset maker in the mobile phones industry (Nokia, 2002a).

After giving a short review of Nokia's development up to 2003, a more in-depth description of Nokia spanning from 2003 to 2010 will follow, this will be divided into two parts covering the internal and external factors affecting Nokia.

4.3. Internal Factors

The aim in this section is to describe the evolution of Nokia from an organizational, product portfolio and offering perspective followed by a review of Nokia's attempts to mutate from being a hardware centric company to being more focused on software and services, which require different approaches and business models.

42

4.3.1. Organizational and Cultural Factors

In 2003 Nokia was renowned for its management approach, *the Nokia way* (TNW) (Masalin, 2003), a philosophy that aimed to define values, competencies and models that together would endorse growth and competitiveness of the Nokia brand. In an Annual report from the year 2000 Nokia describes TNW as *"a frame of mind based on respect, an eagerness to learn and a pride in the achievements we have made to delight our customers"* (Nokia, 2001a). This was then broken down to how the Leadership Team was to manage the company. An interpretation of this was presented by former CTO, Yrjöo Neuvo, when he explained Nokia's organization in the following way:

''Nokia's organization is a jazz band, not a symphony orchestra. A symphony orchestra is very hierarchical and everybody has strict guidelines that must be obeyed. In a jazz band, the musicians play the same song, but there is not often a clear leader and each must have the opportunity to improvise. That's the Nokia way." (Steinbock, 2010, p. 107)

Nokia was also considered to have a highly entrepreneurial and innovative spirit and was widely recognized for the ability to remodel corporate structure and focus when new opportunities emerged (Abetti, 2000). All former Nokia respondents also confirm this picture, claiming that the internal climate within Nokia encouraged pursuance of new ideas and discouraged blame of failures. However, according to six of the nine former Nokia respondents, the relevance of TNW as well as rewarding risk-taking gradually decreased throughout the period of interest (Anonymous-Interviewee-12, personal communication; Anonymous-Interviewee-14, personal communication; Dediu, personal communication, Novemvber 11, 2013; Jönsson, personal communication, October 30, 2013; Martinez, personal communication, October 31, 2013; Mosconi, personal communication, October 15, 2013). Among the reasons proposed by the respondents were: increased bureaucracy due to a larger organization; decreased focus on core values such as TNW from senior management; and increased political discussions and strive for consensus, killing discontinuous ideas.

It has previously been argued that Nokia had a long tradition of being a firm with strong leadership, where senior management was highly involved in the drastic strategic turn around conducted when Nokia decided to divest in favor of a more vertical focus on telecommunications in the early and mid 1990's (Steinbock, 2010). This strategic shift was driven by then-CEO Jorma Ollila and when entering the 21st century the bulk of the Group Executive Board (GEB) was comprised of what would later be known as the Nokia Dream Team, a name received due to the success the group brought to Nokia. Members of the Dream Team were Matti Alahuhta, Pekka Ala-Pietilä, Sari Baldauf and Olli-Pekka Kallasvuo (Steinbock, 2010). Mr. Ollila was known for his entrepreneurial spirit and charismatic ways (Abetti, 2000). Many of the team members were active in various positions on Nokia for a big part of the period of interest.

Organizational Change of 2004

As mentioned in the above section on Nokia's early history, in 2003 Nokia was organized around three business units: Mobile Phones, Mobile Networks and Nokia Ventures. In 2004 it was however announced that this structure was to be abandoned and replaced by a matrix organization from January 1st, 2004. (Nokia, 2004).
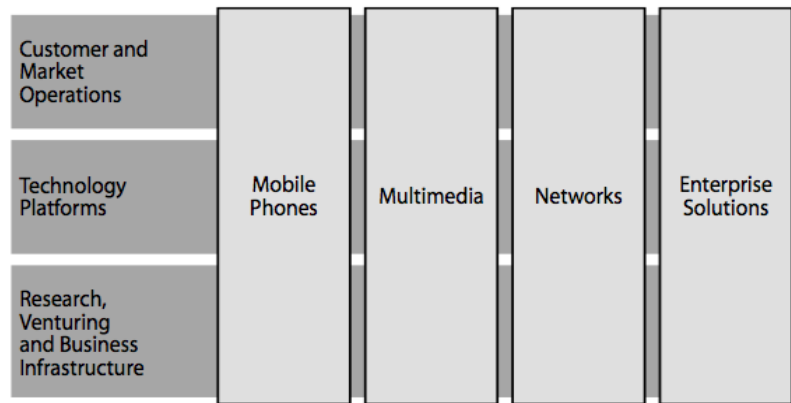
Figure 7 – Nokia's organizational structure, implemented in the 2004 reorganization (Nokia, 2004)

The new structure was comprised of four vertical business groups and three horizontal cross-business unit groups. In figure 7, the new organizational structure is presented. The management board used a matrix organization chart to visualize the structure (Nokia, 2004), with Enterprise, Multimedia, Mobile Phones and Networks as vertical business groups. These four groups were then supported by the horizontal groups of Customer and Market Operations, Technology-platforms, as well as Research, Venturing and Business Infrastructure. The vertical groups of the structure targeted different market segments, as explained below.

- *Mobile Phones* was responsible for catering to the mass market, constituting the core of the company. The business unit developed *"mobile phones for all major standards and customer segments in over 130 countries"* (Nokia, 2004, p. 28) and was divided up into six customer segment units named Broad Appeal, Focused Appeal, Entry, CDMA, TDMA and Vertu (Nokia, 2005a).
- *Multimedia* was aiming to *"bringing mobile multimedia to consumers in the form of advanced mobile devices"* (Nokia, 2004, p. 28). Multimedia was comprised of four business units named Imaging, Entertainment Products, Convergence Products and Mobile Enhancements, each responsible for a specific product archetype (Nokia, 2005a).
- *Networks* took over the responsibilities of Nokia Network business unit catering to customers of mobile infrastructure.
- *Enterprise* solution aimed at the corporate clients supplying them with an *"end-to-end mobility architecture"* (Nokia, 2004, p. 28). This business group had two branches, Mobile device and the Security and Mobile Connectivity (Nokia, 2005a).

44

The horizontal groups were formed to fulfill various supporting roles for the vertical groups. While Customer and Market Operations were responsible for sales and marketing activities, Technology Platforms were held responsibility for managing and developing all Nokia-wide technology exemplified by the mobile software development that was placed under the tech platform unit. The Research, Venturing and Business Infrastructure group was responsible for R&D and Business development (Nokia, 2004).

The Underlying Idea Behind the Change of 2004

"Within the new structure [implemented on January 1], we believe that each business group is positioned to meet the specific needs of diverse market segments, while the horizontal groups are designed to increase Nokia's operational efficiency and competitiveness and to maintain our strong economies of scale." (Nokia, 2004, p. 27).

This is a quote from Nokia's annual report of 2003, explaining the purpose of the above named reorganization. As an effect the three business units were responsible for developing their own product-lines e.g. multimedia was responsible of all the N-series handsets, Enterprise all the E-series handsets, etcetera.

The reorganization was also conducted to align the organization better to the business strategy outlined by senior management. This Business strategy was divided into three parts described below, where each business unit was to target one specific part of the strategy. This would lead to a higher specialization and thus a greater and better understanding of the various needs of the different segments. (Nokia, 2004)

Expand mobile voice:

Nokia argued their economy of scale and an efficient supply chain would give them a base to further grow within the mobile voice market where Nokia saw the greatest opportunity to grow. A special focus was turned to regions with low mobile subscriptions rates relative to population size and regions where the fixed-line infrastructure was underdeveloped. (Nokia, 2004, p. 25)

Drive consumer mobile multimedia:

Nokia believed that due to converging industries new niches would appear within the multimedia segment. Nokia argued, however, that that these segments were not yet well pinpointed, thus further exploration would be needed. Nokia's strategy was, hence, to identify the fastest growing and most profitable segments of the consumer multimedia business by anticipating customer needs. (Nokia, 2004, p. 25)

Bring extended mobility to enterprise:

The corporate markets was seen as a highly profitable segment and here Nokia aimed to appropriate revenue via offering solutions targeting the special need of corporations and its workforce. In the annual report Nokia argued that business's special needs are mobile connectivity with a high level of security (Nokia, 2004, p. 26). Respondents

pointed out to us that mail services was a focus area for the enterprise department (Jönsson, personal communication, October 30, 2013; Martinez, personal communication, October 31, 2013).

A former Nokia manager argued in an interview that the prevailing view, at the time, was that customers had increasingly different preferences and needs, and further, to better understand and supply these different needs more specialized business groups were required(Anonymous-Interviewee-14, personal communication). This line of thought further encouraged the reorganization of 2004. The idea was that Mobile Phone would focus on optimizing the core business of handset design, manufacturing and distribution, while the two remaining business units would enable Nokia to pursue the second and third part of the above stated strategy (Nokia, 2004).

The Reorganization of 2008

On June 20 2007, a press release announced that Nokia would once again re-organize:

"Nokia's current business group and horizontal group structure in the device business will be replaced by three main functional units: Devices; Services & Software; and Markets. From January 1, 2008 onwards, under the new structure, Nokia will have two reportable segments: Devices & Services and Nokia Siemens Networks." (Nokia, 2007a, p. 8)

The reason proposed in the annual report of the same year argued that the reorganization would *"allow it [Nokia] to manage its device portfolio with greater effectiveness, speed up time to market for new products, and increase the efficiency of its marketing and production efforts" (Nokia, 2007f)*. It has also been put forward that the reorganization was due to that customer segment focused business groups had failed to differentiate the products enough. (Doz & Kosonen, 2010). A former Nokia marketing manager commented on the topic saying that, *"if a customer bought a multimedia phone or an enterprise phone the features w*ere *very similar [...] making the customer only more* confused" (Anonymous-Interviewee-13, personal communication). Another factor, according to (Jönsson, personal communication, October 30, 2013), contributing to the change was Nokia's aspiration to increase the focus on developing and vending services .

Performance Between Business Units

As a result of the reorganization effectuated January 1 2004, there were three business units responsible for developing and launching handsets to different market segments. Between the years of 2004 to 2007 the net sales per business unit were distributed very unevenly between the three business units, as depicted in figure 8. The Mobile Phone business unit was responsible for between 50% and 80% of Nokia's total net sales in this period. Furthermore, between 2004 and 2008 the Mobile phone unit was never contributing less than 65% to Nokia's overall profit, as can be seen in figure 9. In

46

the organizational restructuring of 2008, the three business units were merged back into a single unit called Devices and Services. Entry level feature phones, represented by the Mobile Phones business unit prior to the restructuring in 2008, continue to account for most of Nokia's sales, reaching a level of approximately 78% in 2010 (Nokia, 2011a).

Net sales by department
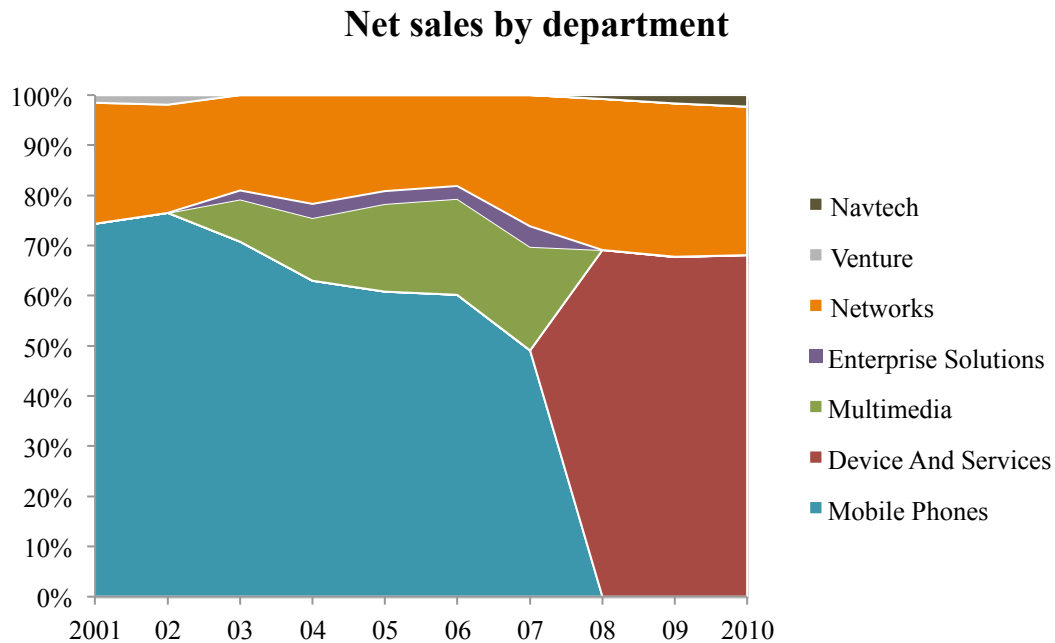
Figure 8 – Nokia's net sales by departments/business units from 2001 until 2010 (Nokia, 2002a, 2003b, 2004, 2005a, 2006b, 2007b, 2008a, 2009b, 2010a, 2011a)

The large difference in sales numbers and operating profit between Nokia's different business units created a battle for attention and resources within the company, according to many interviewees (Anonymous-Interviewee-12, personal communication; Jönsson, personal communication, October 30, 2013; Mosconi, personal communication, October 15, 2013). These interviewees further argue that since the Mobile Phone business unit was representing the main part of Nokia's business, in both sales numbers and operating profit, it was natural to allocate more resources to running that business unit than the others. However, some interviewees argue that the Multimedia business unit retained some power and received attention and resources beyond what could be considered proportional to its contribution to the company's operating profit and sales (Jönsson, personal communication, October 30, 2013). Some interviewees mention that a limited amount of resources were put into some of Nokia's more radical innovation projects, such as the Maemo/MeeGo software platform project, but these interviewees argued that they regarded this as perfectly normal, since large uncertainty was associated with these projects and they did not return a profit (Anonymous-Interviewee-13, personal communication; Mosconi, personal communication, October 15, 2013).

Contribution to Operating Profit by Business Unit
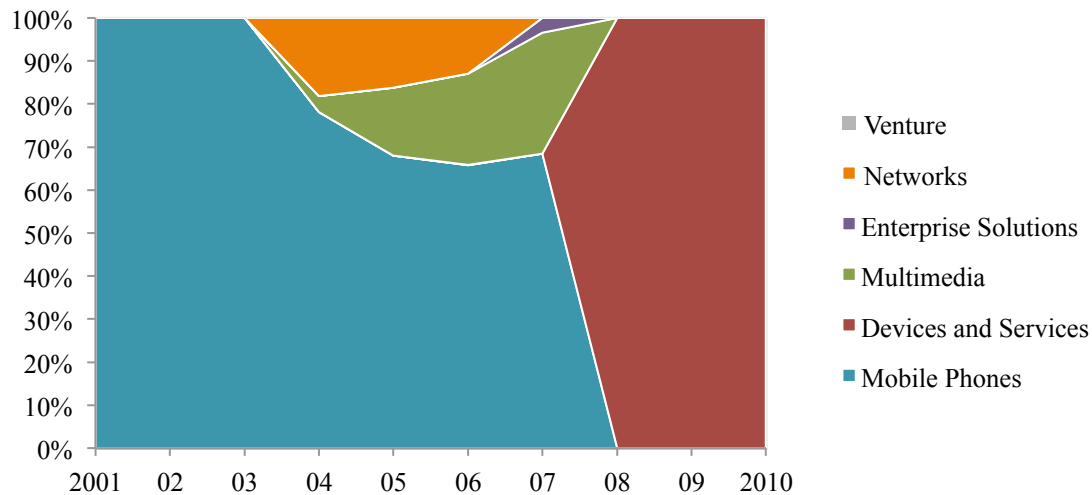
Figure 9 – Contribution to Nokia's operating profit of different departments/business units from 2001 until 2010 (Nokia, 2002a, 2003b, 2004, 2005a, 2006b, 2007b, 2008a, 2009b, 2010a, 2011a)

4.3.2. Devices and Hardware

To illustrate Nokia's product strategy, a look back on where they came from is in order. In Nokia's annual report from 2001 the company describes in the following way their idea of what constitutes a successful product portfolio as well as how that portfolio will aid in the quest to maintain market leadership.

"Nokia's comprehensive portfolio consist of several categories catering for the very diverse sets of values, need, lifestyles and preferences of our consumers. Up until now category evolution has revolved around voice-centric models driven mainly by style related aspects. [...] We believe that the comprehensiveness and competitiveness of our product portfolio is one of the key reasons that Nokia has succeeded as the world's leading mobile phone manufacturer." (Nokia, 2002a, p. 27)

They continue on to describe how they believe their product portfolio will evolve in the future and how this evolution will be driven by new technologies, both faster cellular data transfer technologies and technologies that improve media and application capabilities of devices. Further, they argue that a device manufacturer that strives to achieve a market leading position globally must offer a specialized device for each customer segment (Nokia, 2002a). At this point in time, when mobile software was still undeveloped, this differentiation between market segments was achieved through providing different hardware features to different segments. However, as smartphones started to evolve and software became more capable, device makers started to shift their differentiation efforts to being more software focused (Garner, personal communication, November 26, 2013). That is, instead of providing each market segment with a specific set of hardware features, device manufacturers rather provide an array of segments the same hardware and instead allow the users themselves to customize their devices through the software they choose to use on their devices. In that sense, the software

48

becomes the main part of the device with the hardware serving the purpose of running the software efficiently, rather than vice versa.

As Nokia's strategy for being a global market leader was to supply every single market segment with a phone specifically designed and manufactured for the needs of the customers in that segment, this meant that a large amount of devices had to be developed and released every year. To keep their market leadership, Nokia strove to continuously offer mobile devices with new features and functionality, both in existing product categories but also in new ones (Nokia, 2002a). These new product categories constitute early smartphone like devices with enhanced messaging, media and imaging capabilities.

In order to understand the needs and wants of every customer segment, Nokia developed a structured way to segment; the so-called "Nokia Product Matrix", which segmented the market based on style and functional needs of the users. Nokia used this product matrix to identify which products they needed to develop to fully saturate the market with a device for every segment, as is described in the below quote (Nokia, 2002a).

"Nokia's product matrix has six style dimensions (basic, expression, active, classic, fashion and premium) and five functional dimensions (voice, entertainment, media, imaging and business applications). The matrix helps Nokia identify potential new products in each cross-section of the two dimensions. By combining each of the styles with each of the functionalities, we should be increasingly able to address specific user needs. We believe for the different models to be successful, they need to be differentiated from one another by optimizing them for their primary usage" (Nokia, 2002a, p. 27).

This quote illustrates well the extent of Nokia's intention to develop handsets for low to high end segments, and that a diverse product portfolio was a necessity for success. This picture is also confirmed by interviewees (Anonymous-Interviewee-14, personal communication; Garner, personal communication, November 26, 2013)

With these statements in mind, it is not surprising to see that Nokia increased and widened its product portfolio from 2001 to 2003. As can be seen in figure 10, the number of handsets introduced to the market per year increased from ten in 2000 to 45 in 2003. The idea that a broad and deep product portfolio was critical for success was continuously expressed in annual reports up until the annual report of 2008. Furthermore, Nokia's strategy to cater to all customer segments was repeated until the 2010 annual report (Nokia, 2004, 2005a, 2006b, 2007b, 2008a, 2009b, 2010a).

In the 2003 annual report Nokia is articulating that one of the company's core strengths is the strong product offering not only focusing on voice-centric features but also on gaming, multimedia and communication (Nokia, 2004). This discussion is widened further in the following year, by arguing that there is an increased convergence within the telecommunication industry giving examples of new technology incorporated

in mobile phones. Examples of these technologies are digital cameras, mail functionality, and multimedia features such as movies, music and games. Nokia argues that the aim is to increasingly incorporate cellular and non-cellular technologies in the same handsets (Nokia, 2005a).

Device Models Released Annually
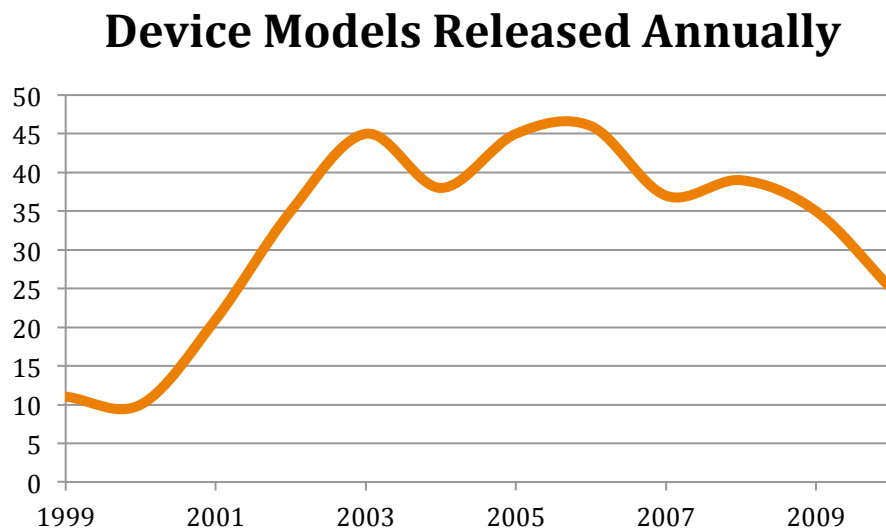
Figure 10 – Number of different device models released annually by Nokia between 1999 and 2010 (Wikipedia, 2014c)

Throughout the period of interest between eight to ten different product lines were produced simultaneously (Wikipedia, 2014c). Series 1000 were the 'ultra-basic' phones targeting mostly developing countries (Wikipedia, 2013g). Series 2000, basic phones, were between the series 1000 and series 3000 phones, designed as an entry-level phone also catering mostly to emerging markets (Nokia, 2006a). Series 3000 targeted young male users. The series 5000 was series 3000 phones feature wise but with more rustic and targeted users that wanted more durable phones withstanding usage in harsher environments. Series 6000, the largest product line, targeted mid to high-end business oriented users. Series 7000 were fashion phones targeting female consumer users. For the premium segment Nokia had the 8000 series, using more exclusive materials (Wikipedia, 2013g).

The C-series was design to optimize social networking and the E-series was optimized for business users. N-series was considered the most advanced phones classed as smartphones. X-series targeted young users, with focus on music and entertainment. The N-gage line was a combination of a phone and a gaming-console (Wikipedia, 2013g).

When asked to comment on portfolio strategy, all interviews with insight confirms that the early years was characterized by a belief that Nokia had a competitive advantage over its competitors due to its wide and well segmented product portfolio. Nokia's product matrix was, according to one interviewee, an attempt to formalize product development where user behavior and needs were over ambitious (Garner, personal communication, November 26, 2013), and one of the respondents have argued

50

that this effort created a more rigid development process (Anonymous-Interviewee-14, personal communication). This rigidity was for example present in new software development where the product portfolio created a need for extensive customization of software (Anonymous-Interviewee-14, personal communication). Over time the number of released models decreased to 25 models launched 2010. This is however far from today's industry standard.

Converged Devices versus Feature Phones

The mobile device market underwent a shift from feature phones to smartphones, as presented earlier in this report. Nokia, mostly referred to smartphones as converged devices and defined a converged device as follows:

"The term smartphone, or converged device, refers to a generic category of mobile device that can run computer-like applications such as email, web browsing and enterprise software, and can also have built-in music players, video recorders, mobile TV and other multimedia features." (Nokia, 2006b, p. 28).

The converged device market size appears approximated from 2006 and onwards in Nokia's annual reports, as well as the number of shipped converged devices. In figure 12 the total market size and Nokia's market share is presented from Nokia's own point of view.

Market share of converged vs. other devices
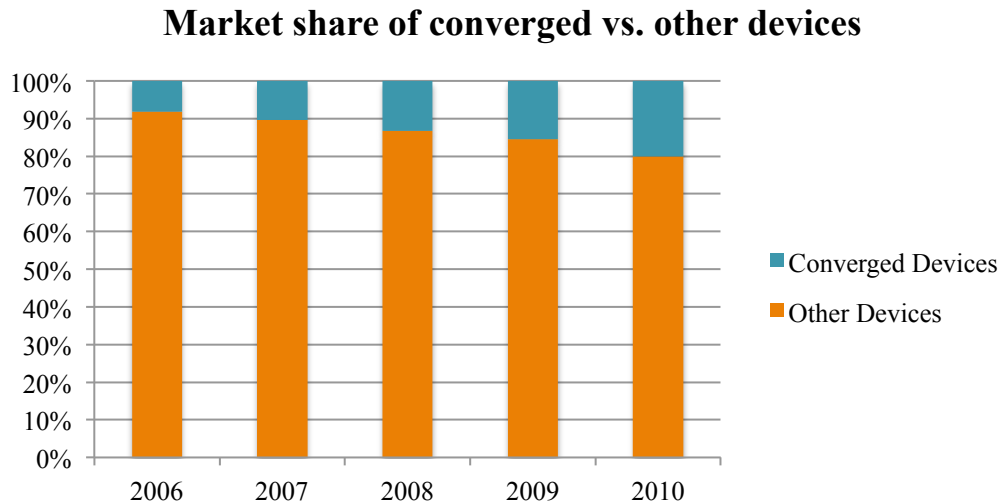
Figure 11 – Global market share of converged versus other devices (Nokia, 2007b, 2008a, 2009b, 2010a, 2011a)

From figure 12 it is vivid that Nokia's market share was decreasing but yet from very high levels. In 2010 they were still the market leader, shipping 35% of all sold converged devices worldwide. This in a market where converged devices had increased from representing 8% of the total mobile market in 2006 to 20% of the same market in 2010, see figure 11.

Market size convered device
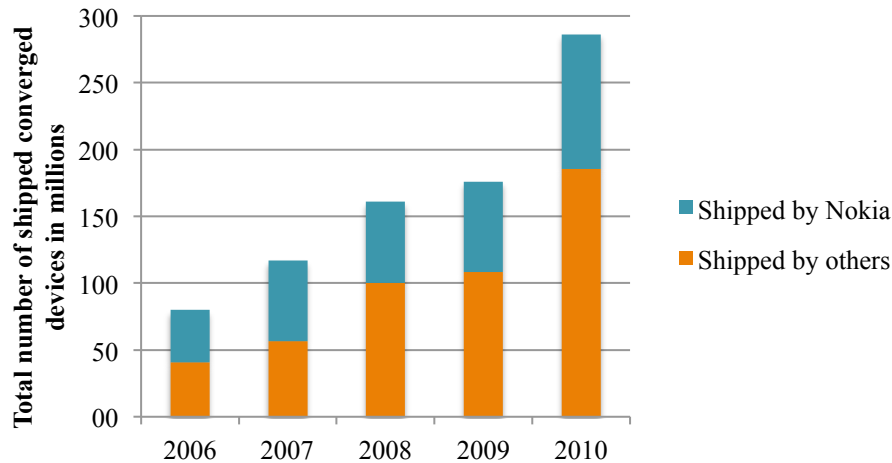
Figure 12 – Market size of converged device market segment and Nokia's share in the market (Nokia, 2007b, 2008a, 2009b, 2010a, 2011a)

Geographical Markets and Average Selling Price

As stated in the chapter "the underlying idea behind the change of 2004" a part Nokia's strategy was to target the market with the highest growth in terms of mobile handset diffusion per capita (Nokia, 2004). Figure 13 illustrates from which geographical areas Nokia mobile received its revenues. One can see that from 2003 the developed markets stood for 65% of the volume and 67% of the net sales while eight years later, in 2010, Nokia shipped 37% of their handsets to developed markets contributing with 37% of Nokia's net sales.

Net Sales Per Geographical Area
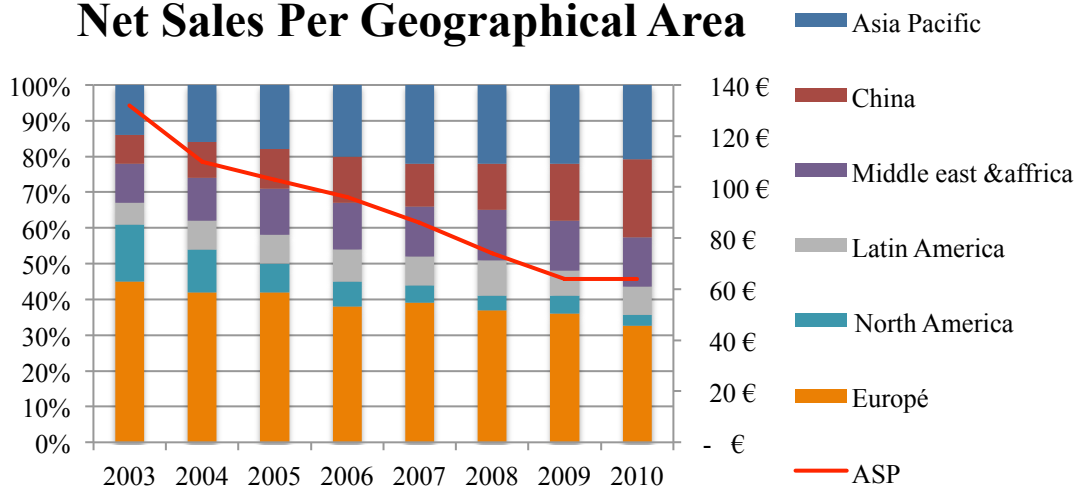
Figure 13 - Nokia's net sales divided by geographical markets (Nokia, 2006b, 2007b, 2008a, 2009b, 2010a, 2011a)

52

Figure 13 also show data over the average selling price (ASP) for a Nokia handset over time decreasing with 51,5 % from 132€ 2003 to 64€ 2010. The decline was predicated and Nokia saw *the "Price erosion as a natural characteristic of the mobile device industry" (Nokia, 2004, p. 51).*

4.3.3. Software

As has been discussed above, improvements in mobile software and services were extremely important in the shift from feature phones to smartphones. In fact, one of the main differences between the two lies in the possibilities the user has to use third party software and mobile services on the device. To make this possible, the device must run a software platform and operating system with suitable support for installing software applications and accessing various online mobile services.

Over the course of the period in question here, from 2003 until 2010, Nokia worked on different software platforms and operating systems. At the beginning of the 2000's, when smartphones were starting to emerge, Nokia was maintaining two software platforms based on a simple proprietary operating system called Nokia OS; the Series 30 and the Series 40 (Nokia, 2009d, 2013f; Wikipedia, 2013k, 2013m, 2013n). These platforms were used on Nokia's low-end options and had a simple feature set. The Series 30 was used on entry level, no-frills devices while Series 40 devices typically had more sophisticated features, such as support for simple Java applications and a simple browser. In addition to these, Nokia was also maintaining three software platforms based on the Symbian operating system; Series 60, Series 80 and Series 90, which together constituted Nokia's early efforts towards making smartphones (Nokia, 2003a). Symbian is a mobile operating system originally developed by Symbian Ltd., a consortia at the time owned largely by Nokia but also by other actors involved in the mobile industry, such as Ericsson, Motorola and Samsung (West & Wood, 2008, 2013; Wikipedia, 2013p). Since more device manufacturers than Nokia used Symbian, there existed various software platforms on top of the operating system, which provided the user interface (Tsuji et al.; West & Wood, 2008, 2013; Wikipedia, 2013o). The Series 60, 80 and 90 software platforms served this purpose for Nokia, with the Series 60 being the biggest one by far when it comes to the number of devices it was used on. The Series 80 platform was used on some devices in Nokia's Communicator line and supported a full QWERTY keyboard (Nokia, 2013h), while Series 90 was only ever released on two devices, the Nokia 7700 and 7710, but featured touch screen support (Nokia, 2013i).

Changes to Software Strategy Following Restructuring in 2004

Following the organizational restructuring that took place within Nokia in the beginning of 2004, the decision to scrap the Series 80 and Series 90 software platforms in favor of Series 60 was taken by the management team (Anonymous-Interviewee-11, personal communication; Anonymous-Interviewee-13, personal communication). Following the decision to scrap the two software platforms resources previously

committed to the platforms were to be transferred over to the development of Series 60. Further, certain features such as the touch screen support from Series 90 were planned to be implemented in Series 60 as soon as 6 months after receiving the additional resources (Anonymous-Interviewee-11, personal communication; Nokia, 2005b). It turned out this did not happen and touch screens was not supported in Series 60 until the 5th edition, almost four years later (Nokia, 2009f).

The organization restructuring of 2004 therefore left Nokia with three software platforms to maintain, two low-end platforms based on Nokia OS which were used by the *Mobile Phones* business unit and Series 60 which was based on Symbian OS and was used by the *Multimedia* and *Enterprise Solutions* business units. After the restructuring the base platform development was done within a part of the organization called "Technology platforms" (see figure 7), which was situated horizontally across all the new business units which dealt with mobile devices: Mobile Phones, Multimedia and Enterprise Solutions (Anonymous-Interviewee-11, personal communication). Further, development specific to each device model was done by product development teams. As a result of this organizational structure and division of labor, the dependencies between different devices running Symbian S60 were not always the same, resulting in a fragmented software platform (Anonymous-Interviewee-11, personal communication; Anonymous-Interviewee-13, personal communication). According to various interviewees this hindered software development, as device specific releases were needed for applications developed for Symbian S60.

In 2002 Nokia started a project to develop a Linux based mobile operating system. The project was called OSSO but would later become known under the name Maemo. It was originally developed only for tablet devices without cellular connectivity and first saw the light of day in 2005 when the Nokia 770 Internet tablet was released (Nokia, 2013c). According to e.g. Andersson (personal communication, October 7, 2013); Anonymous-Interviewee-14 (personal communication); Mosconi (personal communication, October 15, 2013), the Maemo project was initially started to create an operating system for high-end smartphones that would serve Nokia as an alternative for Symbian S60 in the future.

Further Platform and Software Development

Over the coming years after the organizational restructuring in 2004 Nokia continued to develop all these different software platforms and operating systems. The Series 40 and its less capable sibling, the Series 30, were developed and used for Nokia's low-end and feature phone devices. Various new versions were released of the two software platforms, incrementally adding features as technology progressed. These included features such as support for color displays as well as larger screens, with the 3rd edition of Series 40 released in 2005 providing support for display resolutions up to the QVGA standard (Nokia, 2013g).

Furthermore, development of Nokia's Symbian based Series 60 platform continued to move forward. The platform was renamed to S60 in 2005 and until the year 2008 two new major editions of the platform, the 2nd and the 3rd editions, were released along with various minor improvements or feature packs (Nokia, 2013b; Wikipedia, 2013l). In October 2008 the 5th edition of the S60 software platform, later known as Symbian^1, was released (Wikipedia, 2013l). The first Nokia phone to feature this new edition was the Nokia 5800 XpressMusic, which was released on October 2nd the same year and is widely known to be Nokia's response to Apple's iPhone, as it features a similar form factor and features (Nokia, 2008d; Wray, 2008).

Mid-year 2008, on June 24th, Nokia made public their plans to fully acquire Symbian Ltd. and make the operating system open source (Nokia, 2008b). This was to be done by moving Symbian and S60 to a new entity called the Symbian Foundation, to which other technology giants such as AT&T, Samsung, LG and Texas Instruments would also contribute. In the end of the same year, on December 2nd, Nokia finalized its purchase of all remaining shares in Symbian Ltd., thereby completing a vital first step in establishing the Symbian Foundation and letting Symbian free (Nokia, 2008c). In 2010, towards the end of the studied period in this report, the result of these actions were introduced with a new edition the operating system called Symbian^3. This new edition was different from previous edition in that all the software platforms and user interfaces that the companies involved in the Symbian Foundation had contributed, from companies such as Ericsson and the Japanese DOCOMO as well as from Nokia, were merged with the Symbian operating system (Nokia, 2013c). After this time, an additional layer of a software platform and user interface was not needed but was included in future open source Symbian releases.

Nokia's Maemo operating system also continued to evolve during the period from 2005 until 2010. Features such as GPS connectivity and QWERTY keyboard support were added to Maemo 4, which was first announced 2007, with the Nokia N810 Internet tablet (Nokia, 2007h, 2013c). The next release of the operating system, Maemo 5, was released with the N900 smartphone on November 11th 2009 and featured cell-phone connectivity, live multitasking and a redesigned user interface (Nokia, 2013c). Furthermore, the 1st of December the same year Nokia announced they would be releasing Qt 4.6, which would support the upcoming Maemo 6 operating system (Nokia, 2009c). Qt was a cross-platform software development framework that Nokia acquired through its acquisition of the Norwegian company Trolltech in mid 2008 (Nokia, 2008e, 2008g). Nokia had already implemented Qt with its S60 platform to help reduce dependency issues between different Symbian S60 devices. Qt therefore constituted Nokia's plan to unify software development across all its devices and platforms and introducing Qt for Maemo meant that software developers could develop one application for both Symbian and Maemo Nokia devices.

In February 2010 Nokia announced a collaboration with Intel to merge Nokia's Maemo operating system with Intel's Moblin (Nokia, 2010b). Together these two mobile operating systems would create MeeGo, a Linux based mobile platform and

operating system that was to be hosted by the Linux Foundation (Nokia, 2010b). The first release of MeeGo was scheduled for the second quarter of 2010, but the first and only MeeGo based device that was publicly released by Nokia was the Nokia N9, which was released in September 2011 (Wikipedia, 2013h). According to interviews with Anonymous-Interviewee-13 (personal communication); Anonymous-Interviewee-14 (personal communication), the development of Maemo (and later MeeGo) was slowed significantly first by the integration with Qt and then later by the collaboration with Intel, resulting in few and sparse releases of devices featuring the operating system. Furthermore, some respondents believed that more resources should have been put into development of Maemo and MeeGo to speed up the project instead of putting the same resources into Symbian and S60 development, which many thought would not serve Nokia well as smartphone platform for the future.(Anonymous-Interviewee-11, personal communication; Anonymous-Interviewee-14, personal communication)

As previously mentioned, Nokia completely changed direction regarding software development strategy in February 2011, just after the end of the studied period in this report. Nokia's new CEO at the time, Stephen Elop, took the decision to adopt Windows Phone for the company's smartphone portfolio and discontinue most internal activities in relation to software platform development. Since this large decision in Nokia's software strategy was put in effect after the period being investigated here it will not be described in further detail.

4.3.4. Increased Focus on Mobile Services

Like with many other things, Nokia was an early mover when it came to providing mobile services and providing various types of content to their end-users. To begin with, these services were simple additions to their feature phones, such as new ringtones or wallpapers. They then evolved into more complex and advanced services, such as Nokia's Photo Zone service that was available through Club Nokia, an online service portal Nokia worked on evolving in the beginning of the 2000's (Nokia, 2000, 2001b, 2002b). Through the Club Nokia portal end-users could also access various types of downloadable content, such as games and media content (Nokia, 2002c). Later on, Nokia tried offering additional content through services such as the Nokia's Download*!* Client, which for example offered end-users the ability to download additional applications to their devices (Nokia, 2006e). As smartphones started to become more ubiquitous, Nokia started extending their service offerings to areas that proved more successful for them with services such as the Nokia Music Store, Nokia Maps and the Ovi suite of services (Nokia, 2007c, 2007d, 2007e; Schenker, 2007).

The reorganization of 2004 was based on the assumption that different customer segment should be targeted with different business models (Doz & Kosonen, 2008). However, during mid 2006 as Olli-Pekka Kallasvuo took over as CEO, there was an increased understanding that the business model did not differ, to any large extent, between different customers. Researchers have also put forward that it was at this time Nokia realized that it was not only good hardware that created customer satisfaction but

also, to an increasing extent, services and application (Doz & Kosonen, 2008). This is exemplified by Mr. Kallasvuo's statement: *"Devices alone are not enough anymore, [...] consumers want a complete experience"* (Schenker, 2007). Interviews conducted for this report indicates that this awareness emerged earlier than 2006 but did not get traction on executive level until 2006 (Dediu, personal communication, Novemvber 11, 2013).

In 2006 Nokia bought Loudeye (Nokia, 2006d), the largest independent competitor to iTunes at that time, and Gate 5, a navigation services (Schenker, 2007). Anssi Vanjoki, then head of Multimedia business unit, commented on the purchase of Gate 5 *"We see that location based experiences, such as search, mapping and navigation will be a fundamental platform for many applications in Nokia Nseries devices going forward"* (Nokia, 2006c).

The ideas to expand Nokia into a more internet based, service focused, company materialized in August 2007 when Mr. Kallasvuo announced the launch of the Ovi brand (Nokia, 2007c). He argued that *"The industry is converging towards Internet driven experiences and Ovi represents Nokia's vision in combining the Internet and mobility. Nokia is the number one mobile device company in the world. Looking into the future, we will deliver great devices, combined with compelling experiences and services, to make it easy for people to unlock the potential of the Internet." (Nokia, 2007c).* With the Ovi brand Nokia created one access point from where users could find the Nokia locations services, Nokia Music and N-gage services (Nokia, 2007c).

Later the increased focus on finding new features adding value to the customer resulted in the purchase of Navteq in October 2007, further increasing Nokia's abilities in location service (Nokia, 2007g). Another example is the service Comes With Music, introduced to the market in 2008. As the Ovi brand was developed further Nokia launched the Ovi store, an application store where customers via their Nokia handset could start *"downloading, personalizing and making their devices smarter and more fun with applications, games, videos, podcasts, productivity tools, web and location-based services and much more"* (Nokia, 2009e).

Nokia was, as pointed out previously in this report, at this stage losing the smartphone battle to Apple (Garner, personal communication, November 26, 2013; Nokia, 2008f). However Nokia tried to attract software developers to develop more applications via different initiatives. These initiatives involved trying to reduce the reported hassles that the Symbian platform brought via its many versions by acquiring Trolltech in order to decrease the need for native coding via Trolltech's Qt software development kit (Nokia, 2008e, 2008g). In October 2010 Nokia argues that *"Qt Software Development Kit (SDK) have resulted in a 70 percent reduction in the number of lines of code required when developing for the company's family of Symbian smartphones"* (Nokia, 2010c). According to Garner (personal communication, November 26, 2013), a senior telecommunication industry analyst, Nokia also gave

monetary incentives to external developers by paying them for making applications to the Ovi-store.

The Ovi Store was an attempt to create an application store similar to that of Apple's App Store. However Nokia tried to differentiate the Ovi-store by giving users personalized application and service recommendations and using MNOs as billing providers instead of Apple's direct billing approach (Garner, personal communication, November 26, 2013).

In the press release "Ovi services gains momentum" from October 1, 2010 (Nokia, 2010c) Nokia argues that Ovi store passed the one million download mark. However, eight months later Nokia revealed that Ovi store and brand was to be discontinued (Fraser, 2011). Figure 14 depicts the devices sold versus applications available in native application stores in time between Q4 2008 and Q3 2011.
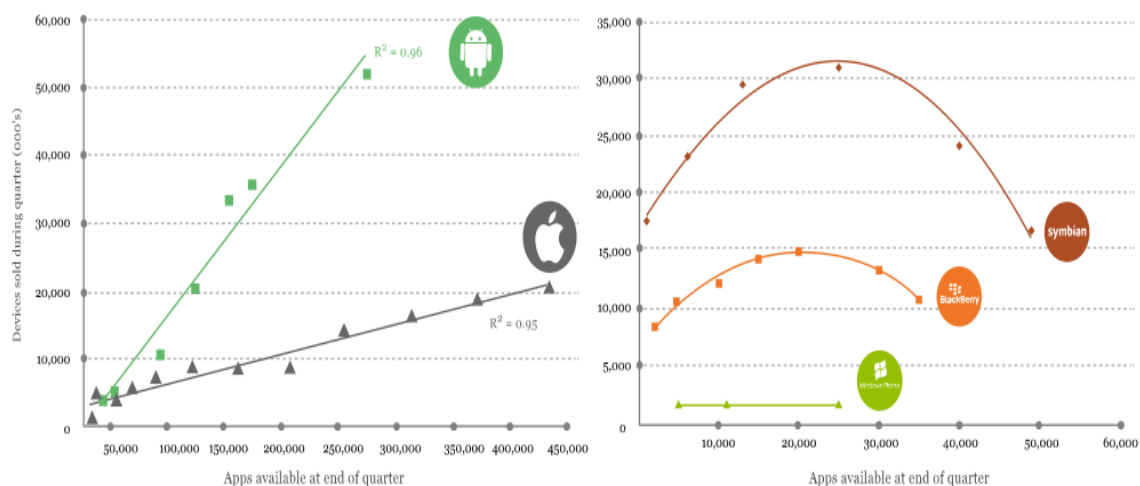
Figure 14 - Devices sold versus applications available in native application stores (Vakulenko et al., 2011)

4.3.5. Business Model Evolution

The business model for Nokia in the early 21 century was to supply low to high end handsets to end customers via MNOs distribution network while the Network department supplied MNOs with infrastructure (Camponovo & Pigneur, 2003). Customer segments and potential target customers were defined via the Nokia Product Matrix (Garner, personal communication, November 26, 2013). One of the cornerstones of this business model was to leverage on the economy of scale that Nokia argued they gained via their supply chain and manufacturing capabilities. Particular focus was put on the fast growing emerging markets (Nokia, 2004). Interviewees report that there was very little cooperation between the Network and Mobile Phones business units regarding bundling deals. According to personnel working at Mobile Phones and Network as well as at MNOs, Nokia did not try to leverage on the fact that they were selling both infrastructure and handsets when dealing with operators (Anonymous-Interviewee-13, personal communication; Anonymous-Interviewee-14, personal communication; Jönsson, personal communication, October 30, 2013).

As the mobile industry was converging (Hacklin et al., 2013; Nyström et al., 2005), Nokia did not want to become just a marginalized handset assembler with marginalized potential to appropriate value. This is illustrated well by one of the interviewees, stating *"They [Nokia] were looking at Dell and HP in the PC industry. Who had just become hardware manufacturers and were dying"* (Anonymous-Interviewee-13, personal communication). Hence Nokia made a shift towards an increased focus on services as described in previous chapter. However there was, at the time of the Ovi brand launch in 2007, still confusion around how to monetize on services in the industry (McGrath, 2010). Nokia proposed and tried different models. Subscriptions, as in the case of Comes With Music, where it has been argued that the revenue model was to embed the cost of the service in the selling price and thereby creating a feeling that the service is free for the customer (McGrath, 2010), and then a fee is paid to the music labels sitting on the complementary assets of the music (Teece, 2010). Another proposition was 'micro transactions', where users ought to pay every time they used a service. Nokia argued for example that people would be willing to spend small amounts of money to get directions to nearest cinema (Ewing, 2007).

As mentioned above, Nokia continued to have a tight relationship with MNOs when it came to services. Nokia later launched tailor made Ovi-stores for Orange France and Deutsche Telecom and argued that with such collaborations *"operators can leverage Nokia's local support to create relevant offerings and easily publish apps"* and on increased value to the Ovi-Store due to *"operator-branded experience and operator billing benefits"* (Nokia, 2011b).

4.4. External factors – Nokia and the Value Network

After looking at Nokia from an internal point of view and explaining the inner workings, strategies, business models and product offerings of the company, it is essential to examine Nokia from an external perspective as well. As mentioned above, the value network of the mobile industry is a complex value network of firms that all work towards providing value for the end-user, in one way or another. Nokia has its place in the value network, serving mainly the role of a device manufacturer, although the company has also served other roles in the period being examined here. These include the role of the platform provider, which has been an important one for Nokia, as well as the roles of a service and content provider, which Nokia has relentlessly tried to fulfill as detailed above.

The fall of incumbent firms in established markets has often been explained by looking at external factors and how the firm interacts with its environment. It is therefore natural to examine how Nokia interacted with its environment and other actors in the value network in the period from 2003 till 2010. It is especially interesting to look at Nokia's interaction with two groups of actors in the industry; the MNOs, which were powerful players in the value network, and new entrants that threatened Nokia's position in the market. These two groups will be covered separately here below.

4.4.1. Towards the Mobile network operators

As has been mentioned numerous times earlier, MNOs are central and influential actors in the value network of the mobile industry. The strong position the MNOs had in the industry was strongly influenced by the relationship they had with the end-users. In the early 2000's, the MNOs were the only actors in the value network that had direct contact with the end-user of the mobile device and had the means to charge the customer for services (Dediu, personal communication, Novemvber 11, 2013; Garner, personal communication, November 26, 2013). This position of the MNOs has however weakened as platform providers have become more powerful in the value network and started having increased direct contact with the end-user.

However, even though the MNOs had significant power in terms of the relationship they had with the end-user, the sheer number of MNOs being operated in the world affects their power negatively. As an example of this, the GSM Association (GSMA), a global interest group of MNOs, consists of nearly 800 MNOs with membership numbers breaking the 700 MNO barrier in 2006 (GSMA, 2013a, 2013b). When these numbers are compared to the number of device manufacturers that operate in the mobile industry it becomes apparent that the increasing number of MNOs is sure to lower the power of the group vis-à-vis device manufacturers, who are generally very big and whose numbers are few. However, there are of course many extremely large MNOs whose size grants them a much favorable position towards device manufacturers. These include MNOs such as China Mobile with approximately 750 million subscribers, Vodafone with around 400 million customers, and the Swedish/Finnish TeliaSonera with 185 million subscribers (ChinaMobile, 2013; TeliaSonera, 2013; VodafoneGroup, 2013).

It is however not only size that influences the power of MNOs. The importance and influence the MNOs have differs significantly from region to region. As mentioned above, the MNOs are the main distribution channels for mobile devices in Europe and North America, with an approximate 60-80% of Nokia's sales being through MNOs according to a former Nokia manager (Anonymous-Interviewee-11, personal communication; Roth, personal communication, September 13, 2013). However, according to an interview with (Garner, personal communication, November 26, 2013), the situation is quite different in other markets, such as where consumer electronics retail stores account for a larger part of mobile device sales. This further degrades the importance and power of MNOs vis-à-vis device manufacturers in these markets, as the device manufacturers are not dependent upon the MNOs to sell and present their devices.

As the above description of the power balance in the mobile industry might suggest, there was a significant power struggle between the MNOs and Nokia. When it comes to the power exerted on Nokia by the large MNOs, six out of nine former Nokia employees interviewed argued that the MNOs had the power to influence strategic decisions within Nokia. These include various customizations demanded by the MNOs

60

as well as Nokia's attempts to introduce various kinds of services to end-users with Nokia devices. According to Roth (personal communication, September 13, 2013), it was very common that MNOs demanded that Nokia and other device manufacturers customized the user interface of devices sold by the MNOs in order to make the device *"look like they belonged to a certain network"* (Anonymous-Interviewee-11, personal communication). These requirements that were put forward by the MNOs were generally not very popular within Nokia (Anonymous-Interviewee-11, personal communication), who tried to push back towards the MNOs, as apparent by the following quote from Lars Roth, a current VP at TeliaSonera:

"I have it on good authority that Nokia was the hardest to get to implement customizations. They thought they knew it better themselves. But they still went along with it."(Roth, personal communication, September 13, 2013 translated from Swedish).

As mentioned above, Nokia started early on to try to add various services and content provisioning to their portfolio of offerings to end-users. These were simple additions to feature phones at first, but gradually became more sophisticated and complex. Even though Nokia was very early in trying to provide various services and content to their end-users, their efforts did not reach any considerable momentum until the year 2007 or 2008 when Nokia started developing the Ovi suite. According to Andersson (personal communication, October 7, 2013), many of Nokia's early attempts of introducing services were not met with much understanding from the MNOs, who wanted to keep provision of services and content for themselves. The services Nokia was trying to provide often competed directly with services provided by the MNOs, such as the Vodafone Live! multimedia portal and the Telia Navigator solution (Schenker, 2007; Telia, 2013; Wikipedia, 2013q). Since distribution through MNOs accounted for approximately 60-80% of Nokia's device sales (Anonymous-Interviewee-11, personal communication; Garner, personal communication, November 26, 2013), Nokia were, at times, forced to abandon established services or cancel plans for introducing new ones (Andersson, personal communication, October 7, 2013). This is especially vivid in the following quote:

"Very few of the MNOs were happy to see Nokia's ambition to expand beyond the traditional hardware business. Nokia was maybe too early [...] When we launched club Nokia, Europe's operators protested arguing that 'If you [Nokia] do not stop with that then we will cancel orders'" (Andersson, personal communication, October 7, 2013 translated from Swedish)

However, towards the end of the studied period Nokia started caring less and less about pleasing the MNOs (Jönsson, personal communication, October 30, 2013). Further, the general trend in the industry went towards services being provided by platform providers and third party actors rather than MNOs. Furthermore, to escape the power of MNOs, Nokia tried to establish an online retail business in Holland, but their efforts failed due to a distribution system that was too centralized (Jönsson, personal communication, October 30, 2013). Interestingly enough, one interviewee suggests that no efforts were made to package deals with both network and mobile devices to MNOs,

most likely because Nokia's small market share in the market for mobile networks would not allow it (Anonymous-Interviewee-14, personal communication).

Even though the above description might depict all MNOs as very powerful actors that could bend device manufacturers such as Nokia to their will, that is not entirely true. As mentioned above, small MNOs had little power in the value network, and according to Garner (personal communication, November 26, 2013) Nokia was known for being tough on MNOs and for being hard to deal with. Further data from interviews with MNOs also supports this claim (Anonymous-Interviewee-12, personal communication; Roth, personal communication, September 13, 2013).

The above description of the relationship between MNOs and Nokia focus on the negative, limiting power the players exerted vis-à-vis each other, it should also be noticed that we have found examples where MNOs has stimulated handset manufacturers in their innovation processes. Mr.Garner (personal communication, November 26, 2013) gives one example of this when he depict the early years of the decade. *"MNOs had bought incredibly expensive 3g licenses via national spectrum auctions. But then there were no traffic, not good-enough phones and therefore no one was using it [3g]."* This created a situation where MNOs and handset manufacturers were incentivized to innovate via cooperation to create handsets and networks good enough for a viable 3g end-user experience (Garner, personal communication, November 26, 2013). This is also confirmed by Mr.Roth (personal communication, September 13, 2013) who also argues that Nokia was one of the front runners in this particular example.

4.4.2. New entrants

As the mobile industry evolved and devices became increasingly sophisticated, the number of new entrants in the industry also increased. These new entrants were both new firms and established firms that were diversifying from industries that were converging with the mobile one. The new entrant firms took on various roles in the value network. Many took on the role of device manufacturer and thus became in direct competition with Nokia. Others took on other growing roles in the value network, such as those of platform providers, which further increased the competition Nokia faced from different directions as the industry converged with others such as the personal computing industry (Nokia, 2004, 2008a).

Many new device manufacturers emerged and gained considerable market share during the early 2000's. In fact, when looking at the market leaders of the mobile industry in the early 2000's, few of them can be considered successful in the mobile industry of today and at least two, Motorola and Sony-Ericsson, no longer exist as independent firms (Dediu, 2012). Most of these new entrant firms originate from adjacent industries, such as HTC which was initially a notebook PC manufacturer when it was founded in 1997 (Wikipedia, 2013f). Other examples can be found in Research In Motion (RIM), which originally made pagers but launched their first BlackBerry device

with phone capabilities in 2002, as well as in Apple, which was successful in many consumer electronics industries, including personal computers and portable music players and introduced their iPhone in June 2007 (Hacklin et al., 2013). Furthermore, many firms competing with Nokia in the low-end emerged from the Chinese market when companies such as ZTE and Huawei, who originated form the telecommunications industry, started diversifying into manufacturing mobile devices and expanding into markets outside of Asia (Wikipedia, 2013b, 2013c). Many of these were also active in manufacturing white label devices that would then be marketed on behalf of someone else, often a specific MNO (Nokia, 2004).

Even though many of the new entrants focused on a specific market segment in the mobile industry, all of them were potential threats for Nokia as the firm was present in virtually all market segments with their extremely diverse product portfolio (Garner, personal communication, November 26, 2013). RIM's BlackBerry devices, for example, were exclusively targeted towards business users with a push email service and QWERTY keyboard, while Apple's iPhone devices were focused on the high-end segment of the market. Other actors, such as the Chinese entrants, focused initially on the low-end segment of the market, which places them as an even bigger threat to Nokia whose main source of revenue has historically come from sales of feature phones in emerging markets (see figure 9 and 13 above). Furthermore, as mobile technology advanced and smartphones became more ubiquitous these actors started moving towards making more complex and expensive devices, further intensifying their competition with actors such as Nokia.

The convergence of digital industries complicated competition in the mobile industry significantly (Hacklin et al., 2013; Nyström et al., 2005). The industry became in general less vertically integrated, with intense competition on multiple levels. Nokia realized this early on, as exemplified by the following quote from Nokia's 2003 Annual Report:

"Historically, our principal competitors have been other mobile communications companies […]. However, in future we will face new competition, particularly in Multimedia and Enterprise Solutions where we will compete with consumer electronics manufacturers and business device and solution providers, respectively. Further, as the industry now includes increasing numbers of participants who provide specific hardware and software layers within products and solutions, we will compete at the level of these layers rather than solely at the level of products and solutions." (Nokia, 2004, p. 39)

Nokia therefore faced increasing competition on different levels as it drew closer to the end of the period in question here. Instead of only competing with other vertically integrated device manufacturers, Nokia now had to compete with various different firms that worked towards providing a limited part of the offering to the end-user. These included not only device manufacturers that only focused on hardware manufacturing and using platforms and software from a third party company, such as Google's Android, but also firms providing mobile platforms, software, services and various

63

types of content (Hacklin et al., 2013). This type competition was though to handle for Nokia since these new big service providers already had viable business models for services, e.g. Google earned most of it's profits from advertising, while Nokia was still struggling with is appropriability regime for services. Other new entrants, such as Spotify and Netflix, was not hampered by legacy and found completely new business models. That means that apart from competing with the low-cost hardware manufacturers that use Android on their devices, Nokia also had to compete with Google and other platform providers on the platform level. The same is true for competition with software, content and service providers, where Nokia had to compete both with providers of integrated solutions as well as with individual providers that had entered the mobile industry from various adjacent industries (Nokia, 2008a, 2009b). This development further intensified as industries continued to converge and smartphones became more popular and widely used.

Some interviews have indicated that MNOs was prone to increase competition among handset manufacturers in the industry because this would lead to a decreased market share and power for Nokia. This is well illustrated by Mr. Brunzell's when he was asked to comment on how MNOs saw upon the new entrant, Apple back in 2008: *"Apple was looked upon as a new player and therefore not as big of a threat as Nokia [...] We saw Apple as a power balance against Nokia"* (Brunzell, personal communication, September 24, 2013 translated from Swedish)

4.5. Summary

As detailed above, the industry convergence and technology shift that occurred in the mobile industry caused increased competition and difficulties for incumbent firms in the industry, such as Nokia. The new firms that entered the industry from the various digital and technology industries that were converging with the mobile one, helped bring new focus for the device manufacturers in the industry – shifting it from the hardware of the device to the software. This caused problems for Nokia, whose product development strategy had historically been very hardware centered. Further, the technology shift brought an increased emphasis on mobile services, a field that Nokia had long struggled to enter and thrive in, but never managed to find a well working appropriability regime.

As Nokia started to lose its market share to other competing firms around and after the year 2008 (see figure 3), its profits started declining rapidly leading the firm to a complete strategic turn-around soon after the period of interest in this report ended, in early 2011 (Microsoft, 2011). Nokia's executive leadership team, whose members were largely the same throughout the period in question here, tried their best to respond to the competition and turn Nokia into a software focused firm that would be fit for the new, converged mobile industry. However, in spite of Nokia's efforts, the decline of the company continued and in both 2011 and 2012 Nokia was run with a significant loss as depicted in figure 15.

Nokia's struggle continued until late 2013, when the company announced that it would be selling its Devices and Services business to Microsoft, with whom the

company had announced a strategic alliance in early 2011, for a mere 5,44 billion Euros. This is a remarkably low number when considering the fact that only 6 years earlier in 2007, Nokia's net sales were almost ten times the amount paid for the Devices and Services business, which has historically accounted for most of the company profits as shown in figure 9. The same year, the operating profit of the company also reached almost 8 billion Euros, roughly 2,5 billion Euros higher than the price Microsoft paid.

This quick decline of a technology giant therefore constitutes a very interesting case to examine, both for practical and theoretical purposes. In the next section we will use the theoretical framework constructed in section 3 above to analyze the empirical data presented here and provide an explanation to why Nokia did not manage to properly and timely respond to the threats it faced in the new converged mobile industry.

Nokia's Operating Profit and Net Sales
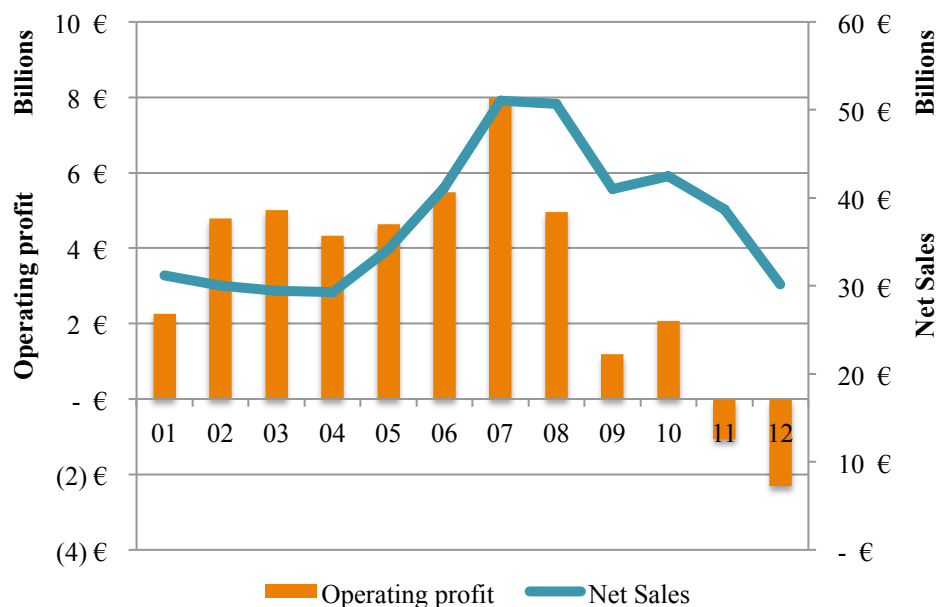
Figure 15 – Nokia's operating profit and net sales from 2001 until 2012 (Nokia, 2001a, 2002a, 2003b, 2004, 2005a, 2006b, 2007b, 2008a, 2009b, 2010a, 2011a, 2013a)

5. Analysis

This section will analyze the empirical data collected during the course of the project and presented in the previous section, using the theoretical framework constructed above. This is done in order to explain why Nokia lost its place as the market leader of the mobile industry and by that, fulfill the purpose of this report. There are various factors to consider when analyzing the complex dynamics of the mobile industry and the events that took place during the period being examined here. First, we will establish that there was in fact a paradigm shift in the mobile industry, from feature phones to smartphones. We will analyze and discuss this shift in detail and explain the effects it had on the industry.

To explain Nokia's fall from a market leading position, as well as to explain in general how incumbent firms fall from power, it is imperative to examine both internal and external factors. We will therefore describe and analyze the most important internal and external factors that affected Nokia's position in the mobile industry. First, we will describe and analyze factors internal to Nokia's organization that are not dependent on the external environment of Nokia, but only on the company's organization and strategy. Second, we will look at the factors that pertain to the external environment of Nokia, analyzing the strategic decisions made at Nokia with respect to these. These factors include interdependence, interaction and pressure from external actors, including resource dependency on Nokia's current markets and customers. To conclude, we will summarize the underlying pattern leading up to Nokia's rapid journey from the top of the mobile phone industry to its bottom.

5.1. Paradigm Shift

Technology based industries, and especially the mobile industry, are very fast moving, often making it hard to distinguish between different technological paradigms. Furthermore, the shift that happens when a new paradigm takes over an old one is rarely a clear-cut shift from one technology to another. Rather, certain markets or market segments start to adopt a new technology, which with time gains mainstream popularity and finally takes over the old technology, denoting the occurrence of a paradigm shift.

There are various changes that occurred in the mobile industry over the period being investigated here that indicate a shift in the technological paradigm in the industry. Here we will go through these changes and explain and argue for why they are signs of a paradigm shift occurring in the industry.

5.1.1. The End of the Feature Phone Paradigm

The dominant design of devices in the mobile industry in the late 1990s and early 2000s was what is now typically referred to as feature phones – devices with the main capability of calling, equipped with a small, low-resolution screen and a keypad. Features were mainly dependent on the hardware, and thus focus of device manufacturers was put on hardware. High-end devices differentiated mainly with

adding a specific feature, and thus adding the value of that feature, rather than redefining the purpose and concept of the device. In essence, as confirmed through our interviews, a device contained many features which added up to the total value of the phone, rather than providing functionality that redefined the value structure completely, such as what later happened when smartphones came around.

The structure of the feature phone paradigm is also defined by the prevailing business model at the time, which was followed closely by market leaders such as Nokia, who dominated the industry during this paradigm. As argued by Nokia in annual reports (e.g. Nokia, 2002a), Nokia's success was in large because of their product market matrix that was the cornerstone of their fundamental business logic and core strategy. Through mapping out customer segments and targeting each segment through specific devices equipped with relevant features, Nokia managed to grow their global market share to 38% in 2007-2008.

Moreover, there were signs of the feature phone paradigm nearing its end. First, the industry was largely characterized according to what is known as the cost minimizing phase of an industry (Abernathy & Utterback, 1975). Cost effectiveness became more and more important, as evident by Nokia's strive towards utilizing a more functional organization, their outspoken strive for increased efficiency and their growth in and targeting of emerging low-end markets. Examples include their transition towards a matrix organization in the first half of the 2000s as well as their increased focus on efficiency and economies of scale throughout the studied period. In 2004, Nokia (2004, p. 27) explained their reorganization into a matrix organizational structure in that *"the horizontal groups are designed to increase Nokia's operational efficiency and competitiveness and to maintain our strong economies of scale."* Their move into a fully functional organizational structure in 2008 was argued to *"allow it [Nokia] to manage its device portfolio with greater effectiveness, speed up time to market for new products, and increase the efficiency of its marketing and production efforts"* (Nokia, 2007f). Further, their constant growth in the emerging markets of Asia Pacific, China, Middle East & Africa, and Latin America, and their constant decline in the developed markets of North America and Europe, as portrayed in figure 13, speaks clearly towards their focus on the emerging, lower end of the global market. Furthermore, this is also evident by Nokia's steep decline in average selling price per device from €132 in 2003 to €64 2010, and Nokia seeing this as a *"natural characteristic of the mobile device industry"* (Nokia, 2004, p. 51).

5.1.2. Signs of a New Paradigm

The feature phone paradigm reached its end phase in the 2000s. Firms such as Nokia began to look for new geographical areas to enlarge their revenues, rather than focusing on product innovation. Even further, the end of the feature phone paradigm can be seen in the dominance of a very small number of actors. Nokia dominated the market with a market share of around 30%, which together with Motorola and Ericsson had a combined market share of well over 50% (Gartner, 2001). With this increasing stability

in the market there will be an institutional drive towards finding the next paradigm, as pointed out in the theoretical section above. As technology progresses, both within the industry as well as outside of the industry, and markets change, actors will start to look for new business opportunities.

There were many signs of a new paradigm appearing in the beginning of the 2000s. First and foremost, many new entrants, focused upon product innovation, started to appear, many from nearby industries. Examples include HTC, originally a PC manufacturer, RIM and their Blackberry phones which differ quite a lot in their value configuration compared to alternatives at the time, and of course, Apple's entry a few years later with their iPhone, which utilized Apple's experience in both consumer electronics, such as their then famous iPod portable music player, as well as in the PC industry, with their Macintosh computers.

Signs of the search for a new paradigm were also apparent within Nokia. Nokia realized early on that a discontinuity was about to happen, confirmed by many of the interviewees both inside and outside of Nokia (e.g. Andersson, personal communication, October 7, 2013; Garner, personal communication, November 26, 2013; Hacklin, personal communication, September 23, 2013; Steinbock, 2010, pp. 219-223). Moreover, the envelopment of the old paradigm through convergence of the mobile industry with neighboring industries, such as the industries the above mentioned new entrants came from, was well established within Nokia. In the 2003 annual report Nokia emphasizes their strength through their broad product offering (Nokia, 2004). The following years the notion and importance of convergence become even more prominent in their official communication (e.g. Nokia, 2005a), further emphasized by the establishment of the Convergence Products business unit within Nokia in early 2004 (Nokia, 2005a).

Further, the search for a new paradigm was also apparent within Nokia through their initiatives to innovate and expand their offerings. As early as 2000 Nokia tried to find new revenue streams from services and content, such as through Club Nokia. Other subsequent service areas that Nokia experimented with include Nokia Music Store, Nokia Maps and N-Gage. They bought services oriented companies such as Loudeye (Nokia, 2006d), Gate 5 (Schenker, 2007) and Navteq (Nokia, 2007g). Moreover, they also started to realize the importance of software, as evident by their increased focus on software development. Examples include Nokia's OSSO/Maemo initiative started in 2002 (Nokia, 2013b), the purchase of Trolltech in order to acquire the technology of Qt (Nokia, 2008e, 2008g) and the acquiring of Symbian Ltd (Nokia, 2008b). In sum, this points to increased product and value offering innovation within Nokia and the search for how Nokia would be able to create and capture value in the next coming paradigm.

5.1.3. Establishment of the Smartphone Paradigm

In contrast to the cellular functionality being the core value of feature phones, possibly with additional features such as a camera put on top, the smartphone paradigm

differs in its fundamental value configuration. This is apparent from the definition of a smartphone put forward in the empirical data chapter; a device that runs an operating system that supports generic applications built for the platform, is optimized for computation, programmability and data connectivity, and its features are partly decided by third party applications installed on the device (Nokia, 2005a, 2006b). Emphasis is put upon enabling the user of the device to install third party applications, in addition to pre-installed applications, which can utilize the phones connectivity and hardware, and by doing so, create a tailor made experienced and another level of value to the user. Hence, the essence lies in providing a platform for users, but also third-party application developers.

Many actors provided smartphone, or smartphone like, devices in the early 2000s. The aforementioned Blackberry devices by RIM, as well as devices by Palm and Nokia all exemplify the beginning of smartphones. However, it was arguably not until the release of devices such as LG's Prada and Apple's iPhone that the new dominant design of the smartphone paradigm was set. With these devices, the original main design feat was the big, high-resolution touch screen used as the primary way to control the device. Further, it can also be argued that the introduction of an accompanying application store by Apple in 2008 was the dominant design of the platform. Such a store facilitated easy downloading and installation of third party applications. With the application store, Apple also set the dominant design on how to best facilitate and monetize the platform and to a large extent services; through some applications being available for free and some available through payments to the developers, where the application storeowner retains a significant percentage of the price.

Since all iPhones, but also an absolute majority of Android devices, adhered to the dominant design, both hardware wise and eventually platform wise, they can be seen as representative of when the dominant designs of the smartphone paradigm were set. According to Tushman and Anderson (1986), a dominant design can be said to have occurred when a certain design achieves a 50% market share. As seen in figure 4, these two platforms passed the 50% market share mark in Q1 2011 (Gartner, 2012a). Hence, this can be seen as the point in time where the dominant design was set in the smartphone market, further providing evidence of the establishment of the new paradigm.

Moreover, further evidence of the dominant design and the new smartphone paradigm exists. The rapid expansion of smartphones, or "converged devices" as referred to by Nokia, shown in figure 11 and figure 12, points to the gradual envelopment and rise of the smartphone market. Furthermore, the financial decline and market share of actors such as Nokia and Siemens that did not rapidly adopt the dominant design, as seen in figure 3, further emphasized the shift.

In sum, it is clear that the mobile industry underwent a paradigm shift. In the late 1990s and the very beginning of 2000s, features phones completely dominated the market. A small number of actors dominated in this paradigm, with a gradually

70

increasing attention spent on cost. However, a new paradigm started to get established, that of smartphones. A lot of experimentation and innovation took place throughout the investigated period, until the dominant design of smartphones was established.

5.2. Internal Factors

As has been presented previously, in order to explain any firm's steep fall in market share, an internal perspective becomes very important. A range of internal factors affect a firm's success, spanning a wide range of implications to consider strategically. When looking at Nokia, it is clearly evident that Nokia enjoyed great success in the feature phone paradigm. Being the most dominant actor in the mobile industry throughout the 2000s as depicted in figure 3, solidifies this claim. However, with the new paradigm shift towards smartphones, Nokia did not manage to remain a key player. Ever since the introduction of the iPhone, setting the dominant design in the smartphone market, Nokia's much-touted Symbian continuously lost its dominance. As can be seen in figure 4, Symbian enjoyed a market share of more than 60% in 2007, compared to less than 10% in 2012. Hence, as described by Teece and Pisano (1994), it becomes important to look at Nokia's internal resources and assets, configuration, leadership, organization, and so forth .

5.2.1. Destruction of Core Competences

In the old feature phone paradigm, hardware was the key differentiating capability of any device manufacturer, as established above. Nokia's success in the old paradigm was substantial; Nokia clearly dominated the feature phone paradigm. They were present in virtually all markets. Further, not only did Nokia dominate due to their hardware capabilities, but also due to their product market matrix. Nokia's product market matrix laid a foundation for their strategy to offer specific market segments with phones developed specifically to target each segment. As presented earlier, it was well established that this was in fact important for Nokia's continued success in the old paradigm.

In the new smartphone paradigm, however, Nokia could not utilize its core competences and capabilities to the extent they could in the previous paradigm. In the smartphone paradigm, software rather than hardware was the fundamental differentiator technologically. Because the basic thinking and design of Nokia's attempt at producing smartphone software, such as Symbian S60, was based upon the old hardware centric paradigm, the software base got excessively complicated as more and more hardware features were added to the devices.

Moreover, services and content, and even more so platforms, became crucial in order to retain power (Basole, 2009). There are evidence pointing to that Nokia did not manage to transform and reconfigure their core assets and resources into what was required in this new paradigm. As presented above, Symbian had a steep decline in market share as soon as the dominant design appeared in the new paradigm, almost completely disappearing from the market in no more than five years, despite once being

completely dominant. Thus, Nokia did not manage to create the necessary core capability and competency needed in this platform centric paradigm.

Further, Nokia did not adopt any other successful platform such as the open source platform Android. Since the platform, and therefore the application store, was such crucial factor for success, Nokia was at a huge disadvantage. Other services, software and content developed inside of Nokia could not be properly commercialized without this critical complementary asset. This complementary asset could have become the specialized complementary asset that could have protected Nokia from envelopment and enabled other innovations successful commercialization.

The platform was thus key in establishing an advantage in the industry. However, why was Nokia not able to take advantage early on and protect themselves from envelopment through the large market share Symbian enjoyed in 2007? It is easy to believe that Symbian was one platform, but in fact, it was a whole collection of platforms since different Symbian versions were largely incompatible, as described in the empirical chapter on software development inside of Nokia. Since it was not very easy for third party developers, nor in house developers, to develop their applications for all the Symbian platforms, there were large multi homing costs on the application developer side of the platforms. Further, it was far from trivial for any user to actually install any third party applications (Mosconi, personal communication, October 15, 2013). Because of this, Nokia did not manage to establish large enough install bases of both developers and users on any single platform, which prevented all their Symbian platforms from enjoying any significant positive feedback loops and networks effects associated with a large install base.

To understand why Nokia did not put more focus upon homogenizing their platforms, it is crucial to remember that Nokia was still optimized towards the old hardware and feature centric paradigm where feature phones dominated. Using Nokia's old perspective, devices were and should be differentiated toward specific market segments through specific features, mainly based upon new hardware capabilities. This also meant that software developed inside of Nokia was done to enable this logic, rather than the other way around. In other words, their once so valuable core competency of a hardware centric organization became their core rigidity. Further, this is also evident by the long time it took to merge all these platforms once Nokia realized the importance of homogenizing their platform structure, such as their effort to merge Series 80 and 90 into Series 60, as well as their attempts to homogenize devices running Symbian S60 (described in the empirical chapter). Furthermore, this points to smartphones, and in particular the platform surrounding smartphone devices, being competence destroying innovations to Nokia since neither hardware nor their product market matrix were valuable in the new paradigm.

5.2.2. Path Dependency along the old Paradigm

As evident from previous analysis, Nokia's strategy was aligned with the hardware centric feature phone paradigm. Having this perspective and definition of the mobile industry, Nokia made the accurate conclusion that the average selling price would decline and that growth would happen largely in emerging markets. Along this strategic direction, however, Nokia lost its entrepreneurial spirit and innovative capabilities. As the industry went into the specific phase, it was natural for Nokia to focus on cost rather than innovation. This is evident by the decline in emphasis and prominence of once very much hailed *the Nokia way*. As presented in the empirical chapter, many interviewees argue that politics became more prevalent. Senior management further declined in their active engagement of supporting and promoting *the Nokia way*; and thus, their support for the open and entrepreneurial culture Nokia was once known for. Further, a larger emphasis was put on consensus when making decisions, which points to that advocacy of unpopular alternatives was inhibited and the trap of groupthink. In other words, a lot of factors inhibited effective decision making of difficult decisions, such as entrepreneurial decisions where uncertainty by nature is high (Blank & Dorf, 2012).

In contrast to remaining entrepreneurially structured, Nokia turned organizationally into being more cost oriented. As presented before, there are clear signs of Nokia's organizational evolution into becoming more and more functional, focusing more and more on cost efficiency and economies of scale. First, their official move into a matrix organization in 2004 (Nokia, 2004). Second, them moving into a more purely functional organization in 2008 (Nokia, 2007a, p. 8). The increased focus on organizing functionally points to a higher-level modularity. Thus, this makes sense from a theoretical perspective as higher modularity can increase efficiency, and hence lower cost. This comes natural since each separate module does not need to be aware of the overall architecture as much in a more modularly structured system (Colfer, 2007). In essence, there is evidence pointing to that the mirroring hypothesis holds true in the scenario of Nokia in the old paradigm. For example, as described in the empirical chapter, software was increasingly separated functionally from hardware inside Nokia. In other words, software development became a service to hardware, where the device, hardware and product oriented business units within the company decided the interface and basically left it up to the software teams to optimize their development based upon these requirements.

5.2.3. Nokia's Need and Attempt for Transformation

As presented earlier, in order for Nokia to become successful in the new smartphone paradigm, the company had to become something different than what it turned into throughout the 2000s. As software and platforms became more prevalent in the industry, the underlying structure and architecture of value creation needed to change. Further, not only a new logic in value creation was needed, but also a new logic for value appropriation. In other words, architectural innovation was required of Nokia if they were to remain as the dominant actor also in the new paradigm. This further emphasizes

Nokia's need to innovate more integrally than their main organization was set up to accomplish. In other words, Nokia's main organization needed to become more integrated than previously. Moreover and as presented earlier, they needed to develop new core competences and capabilities.

All established organizations facing discontinuities face a dilemma in these situations. Optimizing for the old paradigm where the large revenue streams are, or optimizing for the new where the large future revenue streams are to come from. As presented in the theoretical chapter, many researchers (e.g. O'Reilly & Tushman, 2004) rather argue that organizations facing this dilemma should optimize for both through duality, such as through adopting an ambidextrous organization. In essence, Nokia needed to transform and reconfigure resources and assets, and by doing so change its direction and move Nokia into a different position than before. Hence, Nokia needed to possess dynamic capabilities enabling this process. They needed to turn the company towards a competitive position in the paradigm, such as one where Nokia possessed one of the winning, if not *the* winning, platform.

As argued above, Nokia was largely unable to adapt to the new level of integration needed in the main organization. Efforts were however made to break this through duality. The OSSO/Maemo/MeeGo project is one such noteworthy effort. This project was far more vertically integrated than Nokia's regular processes and routines. Many factors contributed to the failure of this project, as further analyzed below when examining external factors. In addition to coordination problems, further elaborated in the external analysis, there were also cognitive issues within Nokia, in particular pertaining to decision making within upper management, which contributed to the failure of the OSSO/Maemo/MeeGo project. As argued above, Nokia had for example inhibiting factors for multiple advocacy, such as groupthink.

Nokia did not fully and properly question the cognitive frame of the old paradigm, hampering Nokia's development of resources and assets able to protect it from the new wave of creative destruction facing Nokia throughout the 2000s. As presented earlier, politics and bureaucracy became more prevalent inside of Nokia throughout the period. Their entrepreneurial culture declined in prominence and more and more factors inhibiting effective decision-making emerged. Moreover, Nokia firmly remained in the old line of thinking, assuming the context of the old hardware centric feature phone paradigm where Nokia enjoyed great success through its product market matrix strategy would prevail and remain effective. This is evident by the same evidence that turned Nokia from being an entrepreneurial company into a cost oriented company, as presented above. In essence, this points to Nokia's inability for double-loop learning. Arguably, Nokia was very apt at single-loop learning under the context of the old paradigm, as seen by their great success in this paradigm. However, they were unable to question the frame that this was built upon. The underlying assumptions such as how to most effectively organize did not hold true when facing the challenge of architectural innovation. Furthermore, albeit Nokia did realize what was coming, as pointed out by many of the interviewees (e.g. Andersson, personal communication, October 7, 2013;

74

Garner, personal communication, November 26, 2013; Hacklin, personal communication, September 23, 2013), this points to their belief that they had the proper cognitive frame – their theory-in-use. However, obviously it was rather their espoused theory-of-action, further inhibiting Nokia.

Since the inability of double-loop learning was organizational, including upper management, this inhibited not only innovation efforts within the main organization, which arguably could have remained optimized along the old paradigm, but also attempts at ambidexterity and duality, such as the OSSO/Maemo/MeeGo project. This is evident by Nokia's failure with these projects, in particular to separate these projects enough from the main organization. In the specific case of the OSSO/Maemo/MeeGo project, Nokia failed to adopt a different, entrepreneurial, logic, such as a hypothesis testing or effectuation approach. For example, no evidence points to frequent releases or that cheap testing was performed. Further, it did not get enough attention and support from upper management and it was many times bogged down by politics and demands from the main organization, such as the diversion of resources to development of Symbian based platforms, further analyzed as an external factor; requirements to implement Qt in 2009 (Nokia, 2009c); or the merge with Intel's Moblin in 2010 (Nokia, 2010b).

In sum, Nokia faced great challenges throughout the 2000s. Before the dominant design was set in the smartphone paradigm there was great market and technological uncertainty, including great uncertainty in how to create as well as appropriate value. Many internal factors contributed to Nokia not being able to cope with this situation. The main organization was transformed along the old paradigm, effectively preventing the required type and level of innovation in the new paradigm. Nokia was affected by organizational inertia, such as described by Hannan and Freeman (1984). Moreover, much due to this, Nokia had cognitive barriers throughout the whole organization, further inhibiting success of any ambidextrous attempts. Their lack of a united vision of duality in their strategy, culture and leadership, as well as separation in organizational structure and operational logic, show evidence of this. In effect, this all contributed to the failure of Nokia.

5.3. External Factors

In addition to the internal factors affecting Nokia's capabilities of innovating for the next paradigm, there were also external factors affecting Nokia. As clearly depicted above, Nokia remained in the old hardware centric feature phone paradigm while the industry progressed and converged into the smartphone paradigm.

5.3.1. The Power of MNOs and their Relationship with Nokia

In the old paradigm, MNOs held the most powerful position in the industry (Basole, 2009; Peppard & Rylander, 2006; Roth, personal communication, September 13, 2013), largely because they possessed and controlled the relationship with the end customer and end user. MNOs handled billing and often bundled together a complete offering to

the end customer, including device and network accessibility. Often the MNO would lock the device to their network through a monthly subscription for a couple of years, and in return give away the device for free or at a discounted price, further locking the customer to the MNO. The MNO landscape was quite diverse however, with a large number of actors. A majority was small actors, but with some really big firms such as China Mobile with approximately 750 million subscribers, the Europe based Vodafone with around 400 million customers, and the Swedish/Finnish TeliaSonera with 185 million subscribers (ChinaMobile, 2013; TeliaSonera, 2013; VodafoneGroup, 2013). Albeit some actors were not as big as powerful as these listed here, the average power position of MNOs made them apt and willful to retain and increase their significance in the new smartphone paradigm. Much due MNOs possessing and controlling the customer relationship, MNOs saw themselves as the main actor that would be able to offer other types services and content, such as music, maps and games, which became enabled through the technological advancements made throughout the 2000s.

In contrast to MNOs, device manufacturers such as Nokia were mainly focused on the hardware technology as well as manufacturing and assembling devices. Hence, device manufacturers as a category of actors had fewer roles in the value network vis-à-vis MNOs. Despite their often limited scope in the value network, much fewer device manufacturers competed and thus they possessed a relatively strong position relative other categories of actors. In particular, Nokia's dominant market position made them quite powerful. However, regardless of their relatively strong position, they were still resource dependent on the MNOs. Device manufacturers, in particular Nokia, utilized MNOs as their main sales channels and sold approximately 60-80% through MNOs (Anonymous-Interviewee-14, personal communication; Garner, personal communication, November 26, 2013). Further, this also makes device manufacturers adoption dependent on MNOs. The pressure due to this relationship is evident throughout the many interviewees arguing that MNOs were able to influence strategic decisions within Nokia. For example, MNOs managed to often make Nokia do certain customizations, such as making devices *"look like they belonged to a certain network"* (Anonymous-Interviewee-14, personal communication). A comment from a TeliaSonera manager paints a good picture of the resource dependency and power situation of Nokia in these situations:

"I have it on good authority that Nokia was the hardest to get to implement customizations. They thought they knew it better themselves. But they still went along with it" (Roth, personal communication, September 13, 2013)

In other words, device manufacturers such as Nokia were largely dependent on MNOs, both through resource dependency as well as adoption dependency. However, it was not only a one-way relationship. MNOs were of course also dependent on device manufacturers for devices, since devices were a critical part of the MNOs end user offerings. MNOs and device manufacturers therefore collaborated tightly in order to be able to offer competitive complete offers and together steer the market in their jointly desired direction. Hence, their interdependence was not limited to resource and adoption

dependence, but also from a business model innovation perspective. As evident from above, MNOs saw business opportunities for strengthening their brand by customizing devices accordingly. MNOs may have been both customers as well as sales channels for device manufacturers, but device manufacturers were also suppliers and hence a part of MNOs business models as well. They provided each other with necessary complementary assets, such as devices, market and user need insight, access to radio frequencies, networks, branding, marketing opportunities as well as financial power. As stated in the theoretical chapter, this can lead to increased innovative output, but also to shared and lower innovation uncertainty. However, it might not always lead to great success, as exemplified by the MNOs tight collaboration with Nokia and other device manufacturers when 3G networks emerged as explained in the empirical chapter (Garner, personal communication, November 26, 2013; Roth, personal communication, September 13, 2013), although it might have reduced the risk any actor would have had if acting alone. Hence, not only did resource and adoption dependencies exist in the industry through supplier-customer relationships between device manufacturers, such as Nokia, and the MNOs, but also innovation interdependency risks and BMI risks; including an uncertainty on the actual value of the innovation as well as appropriation risks.

5.3.2. Service Opportunities in the new Smartphone Paradigm

As established above, the paradigm shift in the mobile industry from a hardware centric feature phone paradigm into smartphone paradigm entailed convergence of many industries. Firms from the PC industry such as Apple as well as from the consumer electronics industry such as Samsung entered and became more prominent in the industry as depicted in figure 3. This convergence of technology paved the way for the new paradigm; a paradigm where services and content provided the fundamental base and greatly enriched the value offered to consumers, all enabled through an increased focus on software rather than hardware.

It was realized early on that services and content provided a significant opportunity for growth and new revenue streams, both by MNOs and by device manufacturers, as depicted in the empirical chapter. Nokia's was naturally interested in these new revenue streams and made many attempts at various services such as Club Nokia, Nokia Music, and Nokia Maps, as described earlier. However, MNOs were also looking to appropriate value from these opportunities. As pointed out above, not only did MNOs have the strongest position in the value network, they did also see themselves as the natural category of actors to offer these new services. This led to misalignment in incentives between device manufacturers such as Nokia and MNOs, in particular in attempts where they ended up directly competing with each other, rather than collaborating. Moreover, these innovative endeavors were exploring new uncertain business opportunities and it was at the time far from clear what the prevailing appropriation regime would be, including what part each actor would play and how much of the revenue would be accrued by whom. How successful business models of the new paradigm would look was in other words very uncertain at the time.

Despite the aforementioned innovation risks and the misalignment in incentives, Nokia kept working closely with MNOs since they were stuck through their strong ties and linkages developed in the old paradigm. Albeit theory suggests collaboration such as this can lead to increased innovative output and greater financial returns, evidence points to the contrary from the perspective of Nokia through the 2000s. There is no evidence to support that Nokia got any substantial financial returns on their investments and attempts at services and content. Rather, theory supports the failure of these attempts since the opportunities of the new paradigm were tainted with lots of risks and uncertainty, but also because the misalignment in incentives typically inhibits the informal and open environment innovation collaboration thrives in. Rather, misalignment in incentives may have led to hard-power tactics, such as the aforementioned power struggles, inadequate knowledge sharing and general instability in the innovation network. In contrast, other actors not tied to the old business and institutional logic and value network of the old paradigm managed better with services, such as YouTube, Netflix, Hulu, Spotify and Google, as evident by their rise to power and financial success. They managed to not get stuck in the old business logic and find new ways to both create, but also appropriate value, such as evident by Google's business model built on advertisement.

5.3.3. The Importance of Platforms

As established previously, platforms became very critical in the new smartphone paradigm. They enabled a new category of innovation networks through enabling third party developers to more easily reach a large customer base. Further, the customer base also gained the opportunity to greatly enhance the value of their mobile devices, through the capabilities provided by third party software. This new logic was characterized by large multi homing costs on both sides, such as can be seen with Nokia's fragmented Symbian based platforms, along with the large cost of developing an application for multiple other platforms simultaneously, such as Blackberry, Android and iOS. Moreover, users also faced significant lock-ins and hence multi homing costs, as an application purchased on one platform was not transferrable to another; the same often applied to configurations and data, further adding to the switching cost for users. Attempts to mitigate these issues were made by some actors. Other platforms, such as iOS and Android, did not suffer the same incompatibility issues, in contrast to the messy situation of Nokia's Symbian based platforms.

Nokia also tried to mitigate their situation regarding multi homing costs by adding compatibility with Qt, but it was arguably a little bit too little, too late. By that time established platforms such as Apple's iOS and its accompanying App Store, as well as Google's Android and its accompanying Play Store, had already accrued enough install base on both sides of their platforms to enjoy strong positive feedback loops and network effects, as evident in figure 14. Third party developers enhanced each platform's offering with the greatly valued complementary asset of a large range of applications and services, and the large amount of users greatly enabled commercialization of these applications for the developers. Moreover, there were also

arguably same side positive network effects. With more developers, developers could better collaborate and increase their efficiency and speed of application development. Further, with more users, users gained value through being able to increasingly reach and communicate with each other.

5.3.4. The OSSO/Maemo/MeeGo Innovation Failure

As has been presented earlier, Nokia realized the increasing importance of platforms and realized the need to develop an alternative platform to Symbian – a platform that was built for the future according to the new rules of the smartphone paradigm. As presented in the internal analysis, Nokia had a need to transform and reconfigure itself, and adopt an ambidextrous organization and hence achieve duality. Symbian was fragmented; it did not adhere to the dominant design of a platform and it was uncertain how it would appropriate value. Hence, it was natural for Nokia to turn to more radical projects such as the OSSO/Maemo/MeeGo project.

The OSSO/Maemo/MeeGo project faced many challenges. Both internal factors contributed to its limited success, as described above, but also external factors. It faced many risks and uncertainties. Initially, the project faced many first mover disadvantages. Before the dominant design of both devices and platforms, and hence business models, were set, there was large uncertainty both in market and technology. It was unclear what new value would be created, as well as how it would be appropriated. Moreover, despite higher cost due to uncertain user needs and technology, i.e. execution risks, the project did not gain any significant first mover advantages. It did not manage to accrue a large enough install base on either side of the platform (see figure 14). Thus, OSSO/Maemo/MeeGo never received any significant positive network effects, which in turn led to much fewer applications, i.e. complementary assets, being developed for the platform. Other potential advantages such as patents were not significant. Furthermore, after the dominant design was set and the OSSO/Maemo/MeeGo project faced significant late-mover disadvantages. Since competing platforms managed to quickly accrue large install bases on both sides of their platforms, all potential first-mover advantages the OSSO/Maemo/MeeGo did not manage to get, these platforms got; including lock-ins, switching costs and development of complementary assets.

Moreover, the OSSO/Maemo/MeeGo project faced additional interdependencies, further causing adoption and execution problems. As presented above, the project's lack of separation from the main organization arguably affected its progress, such as decisions to implement Qt compatibility as well as to merge the project with Intel's Moblin. This led to significant release delays, which further worsened the situation for OSSO/Maemo/MeeGo since other platforms gained a head start in accruing both users and third party application developers. Moreover, as pointed out earlier, this is in stark contrast to what is often argued as a more fruitful entrepreneurial development process (Blank & Dorf, 2012; Sarasvathy, 2001b). Furthermore, as mentioned in some of the interviews, resources were diverted to development of Symbian. This points to the aforementioned resource dependency issue, much in line with what has been brought

forward by many researchers such as Christensen and Raynor (2003), Govindarajan and Kopalle (2006), and Sandström (2010). Nokia's existing revenue stream from Symbian based devices diverted resources from path breaking innovation projects such as the OSSO/Maemo/MeeGo project.

In sum, Nokia had many linkages to MNOs which proved to be problematic, such as through misalignment in incentives and power struggles. Further, both Nokia and the MNOs were stuck in an old line of thinking, still not breaking free of the old paradigm. Attempts at collaboration for innovation within the main organization failed in part due to the strong bond of these linkages. New entrants, free from these linkages managed to establish new appropriation regimes that worked in the new environment. Moreover, Nokia did not manage to properly handle and separate their attempt at duality. Significant timing, separation, adoption, execution and interdependency issues faced Nokia and led to early releases of smartphones within this scope, such as the N900, to lag behind in conforming to the dominant design, as presented in the empirical chapter. Hence, Nokia did not manage to break free from the institutions of the old paradigm, which led to Nokia's fast decline in market share once the new paradigm took over.

5.4. *Nokia's Institutional Lock-in and Path Dependence*

To fully explain Nokia's failure to transition to the smartphone paradigm, we need to summarize and connect each previously presented part of the analysis; the paradigm shift and the internal and external factors that made Nokia not able to reap success in the new paradigm. No single part can explain Nokia's fall, and thus, it becomes vital to understand the connection between the different factors at play, as well as the environment of Nokia throughout the studied period.

5.4.1. Each Paradigm as an Institution and Cognitive Frame

First, it is vital to understand the key aspects of each paradigm. In the feature phone paradigm, the main value driver was to meet specific user needs with specific features; i.e. offer a device not only with the core capability of calling but also adding one or more specific features on top, meeting the specific demands of a specific market segment. The core component of Nokia's successful business model thus became their product market matrix. The key competence needed to be able to efficiently employ a product market matrix based strategy was hardware, since features were mainly enabled through hardware. Further, device manufacturers such as Nokia, but also MNOs, were the key categories of actors that drove progress in this mature industry. Since the industry had reached such a high level of maturity cost efficiency was put into focus, but also finding new markets to target with the same offering as early markets.

In the smartphone paradigm, the two-sided market of software platforms was key. On the user side, the main value drivers were services delivered through applications. To application developers and service providers, a large user install base and hence customer base, was driving value. The key competence thus became software rather than hardware, and platform owners and service providers became the main categories

of actors driving progress. The industry was initially in its fluid phase, with an emphasis on exploration and finding the dominant design. As the dominant design was set, it moved into the transitional phase where focus was rather put adhering and developing along the dominant design and the new technological trajectory set. The core component of successful business models thus became the platform.

These key aspects, as summarized in table 1, became the rules and norms of the game of each paradigm. Hence, these key aspects formed the institution of each paradigm. As the rules and norms of the game, embedded in the actors of the industry, these institutions became the cognitive frame that these actors had in order to efficiently conduct business (Kaplan & Tripsas, 2008). The institution of each paradigm lies in the structure of the industry and included the structure and grouping of users, the market structure, third party actors and other actors influencing which all together co-jointly developed each frame and hence each institution.

Table 1 – Comparison between the Feature Phone Paradigm and the Smartphone Paradigm

	Feature Phone Paradigm	Smartphone Paradigm
Value Driver	Meeting specific user needs with specific features	*To users:* Services through applications *To application developers:* Large user install base
Key competence	Hardware	Software
Main categories of actors driving progress	Device manufacturers, MNOs	Platform owners, service providers
Industry maturity	Specific phase	Fluid phase initially, progresses into transitional after dominant design is set
Strategic emphasis	Cost efficiency New (emerging) markets	*In fluid phase:* Exploration *In transitional phase:* Development along dominant design
Core component of Business Model	Product Market Matrix	Platform

5.4.2. Nokia's lack of understanding the new Institutional Logic

There is much evidence that supports that Nokia did not break free of its development and path dependency on the feature phone paradigm. They failed to restructure their software development along the new smartphone paradigm, as evident by the failure to create the platform needed in the paradigm (see figure 4). Software development was still affected and adapted to hardware decisions, which in turn were still made in accordance to Nokia's product market matrix strategy. As evident by the many models released by Nokia (see figure 10), they were still to a large extent stuck within this cognitive frame. Furthermore, the development of their organization structure into a more cost oriented structure, i.e. through the organizational restructurings done in 2004 and 2008 (Nokia, 2004, 2008a), and their continued focus on emerging markets (see figure 13), very much supports this.

It is clear by their steep decline in profitability and revenue (see figure 15) that Nokia needed to transform along the new institution and cognitive frame of the smartphone paradigm in order to remain as successful as previously in the mobile industry. Although attempts were made to develop along the new lines, such as the OSSO/Maemo/MeeGo project, they did not succeed. As implied Kaplan and Tripsas (2008), this is not surprising considering Nokia was still stuck in the old cognitive frame of the feature phone paradigm.

However, why did Nokia not break free of this old institution and cognitive frame of the feature phone paradigm? To understand this, it is imperative to look at Nokia's early recognition of a new emerging paradigm. As confirmed by many interviewees (e.g. Andersson, personal communication, October 7, 2013; Garner, personal communication, November 26, 2013; Hacklin, personal communication, September 23, 2013; Steinbock, 2010, pp. 219-223), but also their annual reports (e.g. Nokia, 2004; Nokia, 2005a), Nokia recognized early that the industry converged with various digital industries – into what later became the smartphone industry. However, their actions show that they were still stuck in their old line of thinking. Hence, in accordance to Argyris (1976), Nokia differed on an organizational level on their espoused theory of action compared to their theory-in-use. While their espoused theory of action was aligned with the institution and cognitive frame of the smartphone paradigm, their theory-in-use was actually still based upon the institution and cognitive frame of the feature phone paradigm. In other words, Nokia thought they aligned themselves according to the new rules and norms of the smartphone game, but really did not.

In sum, Nokia did not realize the new institution of the smartphone paradigm. This points to that Nokia did not understand the underlying logic, the institutional logic, of the new paradigm. In accordance to Leca and Naccache (2006), this in turn made it difficult, if not impossible, for Nokia to transition successfully to the smartphone paradigm and avoid disruption. In order for Nokia to break free of their institution, they needed to realize and take in the new underlying institutional logic of the smartphone paradigm.

6. Discussion

Even though the picture painted of Nokia in this report is rather dark and gloomy and portrays Nokia as a failure, the company was for a long time a very successful firm that performed very well. Nokia has roots in industries radically different from the mobile one, but shifted towards focusing solely on the mobile industry in the beginning of the 1990s. Nokia quickly climbed to the top of the industry, beating established players such as Motorola and Ericsson, whose history had shaped the industry. Nokia dominated the mobile industry for almost a decade, despite the industry being very fast moving and chaotic, and was generally regarded as a very innovative company. Many of the other old players from the mobile industry did not fare as well as Nokia did, being either acquired by other actors or becoming uncompetitive and dying.

It is however a very natural process that firms are created, that they live their lifetime and then die. It is often difficult to explain how or why this happens and as discussed in the theoretical framework above, the question of how industries evolve and firms live and die has long puzzled researchers, who have come up with many different explanations for this phenomenon. One could even argue that the rise, decline, and eventual death of firms is almost inevitable. However, the longevity of firms such as Nokia (est. 1865), but also others such as Lloyd's (est. 1688), JPMorgan Chase (est. 1799), and IBM (est. 1911), make such claims questionable (Bullock, 2011; Wikipedia, 2014b, 2014d). Other researchers point to specific factors being critical in specific scenarios, internal as well as external factors relative the firm (e.g. Argyris, 1976; Christensen, 1997; Henderson & Clark, 1990; Kaplan & Tripsas, 2008). However, there are many cases suggesting that any one of these single factors cannot solely explain the demise of incumbents (Tripsas, 1997).

Nokia's story may at first not seem so interesting from a research perspective. At first, it may seem like a classical story of The Incumbent's Curse in a fast moving and converging industry. However, the story of Nokia can also be seen in a different perspective. First off, Nokia is still a noteworthy player in the industry, albeit not currently as a device manufacturer. The current enterprise valuation of Nokia is still above 20 billion dollars (Yahoo!, 2014). New opportunities may lay ahead of Nokia, similar to the very successful transformation of the firm in the early 1990s. Moreover, the story of Nokia's demise as a device manufacturer can arguably point to new insight to the research area of The Incumbent's Curse – in particular because Nokia made some efforts to act according to theory, such as their attempts to separate the Maemo/MeeGo project from the main organization. In other words, there still seems to be a research gap in how to approach a situation similar to Nokia's in the early 2000s since Nokia did not manage to survive as a device manufacturer, despite attempting to employ a wide range of well-established remedies to The Incumbent's Curse.

To dwell deeper into the missing pieces explaining how firms in a similar situation as Nokia's can better protect themselves against The Incumbent's Curse, we will first discuss what we believe to be the main strategic differentiator between the feature

phone paradigm and the smartphone paradigm. Arguably, this will establish what Nokia should have paid even more attention to than they did. Then, we will go through the main factors that have been analyzed here and that typically claim to explain disruptions. We will discuss our stance on these factors and argue that they do not provide a complete explanation to why Nokia did not manage to withstand the waves of creative destruction the smartphone paradigm brought. Last, we will discuss and suggest a new perspective, which may enlarge the understanding of disruptions and possibly open up a new avenue of more fundamental remedies to be taken by leaders within incumbent firms to protect themselves from disruptions.

6.1. What made Nokia Fail – A Story of Platforms

Throughout the process of this research project we have heard, discussed, pondered or come across in one way or another, numerous explanations for Nokia's decline. Most, if not all, interviewees had their own view on what caused the fall of Nokia from a market leading position and they were eager to discuss the issue. Furthermore, Nokia has been a frequent guest in the media in recent times, especially following the announcement of Microsoft's acquisition of Nokia's Devices and Services business (Microsoft, 2011). Like others, the media has tried provide its own explanations as to why Nokia has been reduced to a position where a former competitor to Nokia's Symbian S60 platform is acquiring the company.

The explanations provided by these parties are very diverse and touch upon many parts of Nokia's business and can be connected to multiple research streams. As an example, we have come across explanations that seek to explain Nokia's decline by arguing that the company's lack of presence in the USA lead to its downfall; that a too large focus on emerging markets lead the company to lose sight of what's important; that poor usability of their devices caused them to become uncompetitive; that the MNOs hindered Nokia from succeeding; and that Nokia lacked focus on their OSSO/Maemo/MeeGo project, which lead to the firms downfall. Some other explanations tend to focus more on Nokia's leadership, stating that Nokia was too self-confident to realize the position they were in and do anything about it; that internal bureaucracy slowed the organization down to the point where killed innovation in the company; and last but certainly not the least popular explanation, that it was all due to Apple and the iPhone.

First off, it is arguably not very bold to state that Nokia, ever since Apple in 2007 released the iPhone and effectively set the dominant design, failed to transform and extend its value network to create as much value as Nokia's competitors did. What is maybe more interesting is to discuss what the major failure was. Many argue that Apple's release of the iPhone was a major leap in the usability experience, a leap that enabled users to actually value the features and possibilities of smartphones. Thus, it makes sense to point to that usability was the key differentiator. However, although it might seem so, usability was not a new value trajectory in the industry. Usability had for long been a key factor for success also in the feature phone paradigm. Nokia was not

necessarily up to speed with the latest dominant design when the iPhone was launched, but as argued by Clayton Christensen (McGregor, 2007), the iPhone was a sustaining innovation when launched in 2007 and thus incumbents such as Nokia should have been able to repel. There are signs that suggest this to be likely. Nokia had access to resources and assets of similar or even greater value than competitors at the time, and could therefore have adopted a fast follower approach. This is confirmed in the vast majority of interviews conducted.

Rather, we argue Apple's launch of their application store in 2008 is of much more relevance in explaining Nokia's demise. The platform the application store formed provided, in comparison to usability, a whole new trajectory of value. As evident by the fast envelopment of the new smartphone paradigm, this new trajectory enabled a big leap in utility to end-users. The platform enabled a great amount of services and utility to users through utilizing third party developer and service providers, a far greater amount and leap than what arguably any firm was and is capable of doing by themselves.

The importance of platforms in the new smartphone paradigm points to some interesting suggestions, many in line with existing research on two-sided markets (Eisenmann et al., 2006). First off, positive feedback loops such as those evident in the evolution of the two most successful platforms, iOS and Android, should not to be underestimated. Rather, when platforms become evident in an industry, the particulars of the specific case should be carefully analyzed. Since early actors may establish too great of an advantage and head start for any competitors to catch up, followers must take into deep consideration the possibly severe consequences of being late to the game. Moreover, fragmentation will induce multi-homing costs, even within a firm and a platform, as evident by the disperse situation Symbian was in. Further, it was obviously problematic that users were not able to easily install third party applications on Symbian platforms, as argued by one interviewee (Mosconi, personal communication, October 15, 2013). In general, it is in other words critical to not forget the essence of any platform; to facilitate and enable transactions, and to put significant resources into ensuring this value is aptly created and delivered to both sides of the platform.

It seems Nokia did not put enough attention to properly develop a leading platform and release it in time, neither before nor after Apple set the dominant design in 2008. Moreover, this points further to that if Nokia would have done this, lagging on existing trajectories such as usability may not have been, comparably, a significant problem, and rather a problem that Nokia would have been able to sustain through. For example, if Nokia could have better unified and leveraged its large user base, the company may still have been one of the leading, if not the leading, actor in the industry. The install base may have been a specialized complementary asset for Nokia. Arguably, a large install base may, in industries where platforms play a significant role, be a specialized complementary asset, protecting incumbents from disruption. However, as seen in the case of Nokia, a large user base is by itself not a specialized complementary asset. A

large user base needs to be properly managed and leveraged into becoming one, if it is to protect incumbents from disruption when platforms become a key factor for success.

6.2. The Lack of a Deep and Complete Explanation

As presented above, there are a lot of factors brought up that try to explain from various aspects why Nokia failed, including factors established in previous research, such as those presented in the theoretical chapter. It seems logical that inherent organizational inertia, such as presented by Hannan and Freeman (1984), affected Nokia negatively. Although no direct evidence in this study points to inherent organizational inertia affecting Nokia negatively, inherent organizational inertia did arguably cause a certain level of rigidity indirectly, which hampered Nokia's ability to question and develop a new contextual and cognitive frame. As has been argued previously, the cognitive frame may in turn have hampered Nokia's ability to make proper decisions adapted to the new paradigm where the platform was much more prominent than realized within Nokia.

Along very similar lines, another often brought up factor is the increased bureaucracy inside Nokia throughout the studied period, as argued in many of the interviews. Along with the growth and the transformation of the organization towards becoming more cost oriented, bureaucracy seemed to have increased. Arguably, bureaucracy is in fact a part of inherent organizational inertia as described by Hannan and Freeman (1984), and as argued by Argyris (1976) this will along similar lines lead to decreased questioning of the cognitive frame and thus inhibit double loop learning. However, it is uncertain how big of a role these factors actually played in Nokia's demise, and further, how it could have been possible for Nokia to work more actively towards limiting their affect. Moreover, were these factors the original cause of the problem, or does one need to look deeper into the issue to understand where Nokia's dilemma actually came from?

A third aspect brought up in many of the interviews, both internally at Nokia and in its environment, was the self-confidence of the leadership inside of Nokia. Again, it might have inhibited questioning of the cognitive frame within Nokia and thus inhibited double loop learning, which effectively may have prevented Nokia from realizing the shift to a focus on platforms. However, there are a lot of factors that point to that Nokia still realized that a shift was happening, such as the early recognition of the convergence of industries as well as their significant efforts towards finding new opportunities through projects such as the OSSO/Maemo/MeeGo project. This begs the question again, was this actually the original cause?

One factor that may at first seem to be an attempt to remedy the issue of duality within Nokia is their establishment of a matrix organization structure. Certain evidence from the study points to that Nokia established a skewed matrix organization though – in particular one with increasing focus on functional efficiency. This would be natural, considering that Nokia wanted to optimize along the lines of the feature phone paradigm – further supported by the mirroring hypothesis. However, we argue that little

conclusions can, and thus should, be made based upon this study on the matter. Too little empirical data was gathered to establish if their organization was unbalanced or not. As discussed in the theory, even though the matrix organization structure is made to balance multiple goals such as functional efficiency and process orientation, little points to that this in itself helps with innovation requiring separation and ambidexterity. Since a completely different cognitive frame and logic needed to be applied to the innovation effort separated from the main organization, it would not have fit inside a matrix structure. Of course, this does not say that the matrix organization cannot effectively be employed while employing an ambidextrous organization structure, simply because of the separation. However, a matrix organization structure will arguably then not solve The Incumbent's Curse and protect firms from disruption, thus any conclusions made based upon Nokia's decision to move into a matrix organization provide little answer to the research questions and aim of this report.

Another common factor is the interdependence of Nokia and MNOs; including their power battles and Nokia's resource dependency to MNOs. MNOs were, as established both through interview and previous research (Basole, 2009), very powerful relative to other actors in the industry throughout the 2000s. Nokia was due to their massive market share, however, also very powerful, and was often reluctant to adhere to the demands of the MNOs. This of course opened up for power games. One interesting perspective on this topic is how it provided an opening for new entrants, in this specific case Apple, to change the logic of how business was made in the industry, as evident in the empirical chapter. Hypothetically, this may be generally applicable. Whenever a paradigm shift is about to happen, any dominating incumbent actor within a category of actors in the value network, which is not part of the most powerful category of actors, may be at a disadvantage. However, this line of thinking is based upon a static and power centric perspective on competition along the lines of Porter's Five Forces (e.g. Porter, 1980), and thus less relevant in a dynamic and fast moving world where cooperation rather than competition triumph (Freeman, 1991), such as the world of today.

In addition to pure power games, Nokia was, as argued in the analysis, also resource allocation dependent in a similar sense to Christensen's theory of disruptive innovation (e.g. Christensen, 1997; Christensen & Bower, 1996; Christensen & Raynor, 2003). Evidence is brought forward supporting that Nokia was inhibited by not allocating resources to new path-breaking innovation projects, which may have protected Nokia from future disruption, but instead make investments to existing revenue streams. However, is resource allocation not only one factor of many in accomplishing ambidexterity, and perhaps a sign rather than an underlying factor of Nokia lacking a proper cognitive frame matching the smartphone paradigm? Thus again, similar discussion can be made in relation to factors such as inherent organizational inertia, increased bureaucracy and too much self-confidence – was this really the underlying issue? The same can be discussed about power games. Did the MNOs' power really hamper Nokia enough to inhibit them from realizing the great importance of platforms in the new paradigm?

In sum, it seems not completely unfounded to argue that any of the factors discussed above, as well as many others that have been brought up by both practitioners and researchers, do only provide a shallow understanding to why Nokia faced a sudden disruption. Further, Nokia seemed aware of and tried to remedy many of the common inhibitors for path-breaking innovation. Moreover, it seems that the general issue of disruption is still quite common and continues to plague incumbent firms. Thus, it seems like a deeper explanation and perspective is needed in order to fully understand disruption.

6.3. The Troubles of Breaking the Path of Existing Assets

As been repeated many times throughout this report, Nokia realized early that a shift where software would become more prominent was about to happen. Their Symbian development and service efforts throughout the 2000s are evidence of this. Nokia put increasing focus upon developing and unifying Symbian, trying to turn it into a new core competence that could provide Nokia with sustained competitive advantage vis-à-vis competitors. Further, it seems like Nokia realized that Symbian could become the software platform that would enable the company to efficiently build and commercialize services on top on, enabling Nokia to amass more revenues. Thus, it made sense for Nokia to take an active approach and a major interest in Symbian.

Initially, Symbian was developed using a very open and collaborative approach, as presented in the empirical chapter. It seems, however, that Nokia realized a more integrated approach may be needed in order to break free from the old paradigm and accomplish innovation adapted to the new smartphone paradigm. Thus, it made sense for Nokia to try to integrate more parts of the Symbian platform into the core, and, eventually bringing it completely in-house to gain full control. This line of thinking is very similar to that of the mirroring hypothesis and an architectural approach to innovation (e.g. Colfer, 2007; Henderson & Clark, 1990). In order to efficiently achieve architectural innovation, a more integrated structure was needed.

Further, the original collaboration seems to have been structured very much according to the old rules and business logic that was prevalent in the feature phone paradigm. This set of rules and logic was more focused on setting and developing standards jointly through open discussions and collaborations. Software obviously proved to be quite different in this regard compared to the previous focus on hardware related standards. Hence, it may not have been feasible in reaping the potential rewards of innovation networks, as discussed by Freeman (1991). Moreover, this may not have been a feasible path when needing more integrated, path-breaking, innovation unless an actor takes on the job of a systems integrator, as argued by Colfer (2007). Regardless, even though the Symbian development transformed to a certain extent towards a more integrated structure, it does not seem to have been enough as evident by Symbian's steep decline in market share showed in figure 4. It brought legacy from the old paradigm and it seems like its actors were stuck in the old line of thinking, which was

relevant in the feature phone paradigm rather than the new upcoming smartphone paradigm.

6.4. A Suggested Institutional Lock-In underpinning Disruptive Innovation

It seems like the vast majority, if not all, factors discussed in this study seem to be underpinned by Nokia being locked into a cognitive frame – the frame of the old feature phone paradigm. This may not be so surprising, considering previous research on industry evolution and how firms adapt along this evolution and how difficult it may be to break through this path dependency. One theoretical perspective, which may provide further insight and explanation to why this is the case is the mirroring hypothesis.

As claimed by the mirroring hypothesis, an organization will evolve to become structured according to the architecture and structure of the product (Colfer, 2007; Henderson & Clark, 1990). Hence, the mirroring hypothesis can be seen as an evolution of two entities, organization and product, towards a more and more aligned architecture and structure, following along the evolution of the industry. First, we argue that the concept of a product is a rather limited perspective. Hence, we will argue that this side may be seen as encompassing the full value creation structure and architecture, including the way any actor appropriates value from it. In other words, this side may be seen as the direct linkages and components of value creation and value appropriation, and thus, this side represents the business model. In particular, a mere product architecture perspective may be quite limited in the ever-increasing dynamic and more collaborative environment of many industries of today, such as the mobile industry.

Second, we argue that the organization side of the mirroring hypothesis may also be rather limited in perspective. The organization surrounding any successful business model may rather be its complete value network and environment, including any actor that indirectly affects and shapes the current evolution and transformation of the product side; or rather, the business model side. In such a perspective, this can be viewed as comprising the institutions that affect and shape the industry, as defined by Leca and Naccache (2006).

Based upon this enlarged, or different, perspective on the mirroring hypothesis, it seems reasonable that since the value network and environment – the "organization" side of the mirroring hypothesis – continuously evolve along patterns of industry evolution, so will the business model. Further, it would seem reasonable to suggest the opposite; that the value network and environment will evolve along the prevailing business model, or business models, of the industry. Further, since the linkages on either side are often complex, it may be very difficult to break the evolution along a specific path. Even more so, the structure and architecture of each side represent the underlying logic and rationale of the evolution. Put in other words, the structure and architecture of both sides that will co-evolve may in this perspective represent the institutional logic surrounding this evolution. Thus, there may be a need to view the difficulties of incumbents facing discontinuous and competence destroying innovation

from an institutional perspective in order to fully understand why they have such a difficult time responding to threats from new entrants belonging to new paradigms.

This proposed institutional perspective on industry evolution falls well in line with recent suggestions on the relationship between the cognitive frame and industry evolution (Kaplan & Tripsas, 2008). However, this phrasing may open up a broader perspective on the particular issue of disruptive innovation. Further, it may give a better, more concrete explanation to why incumbents face the previously mentioned difficulty of responding to the threat of disruptive innovation. Thus, is can provide further explanations to why incumbents have such difficulty of breaking free from the cognitive frame of old paradigms, as well as the trouble of learning new cognitive frames. Even further, it may open up for new suggestions on how this difficulty can better be managed by incumbents, thus effectively enlarging the solution space for practitioners.

6.5. *The Story of Nokia and Institutional Lock-Ins*

The story of Nokia's demise when facing the paradigm shift into the platform centric smartphone paradigm provides a good explorative case study for the above hypothesis of institutional lock-ins emerging along industry evolution. To start, the institutional logic that underpins the institutional lock-in of Nokia does not, if taking a critical realist approach, belong to the domain of empirical, neither the domain of actual (Leca & Naccache, 2006). This poses some interesting suggestions. First off, this makes it incredibly difficult to comprehend, fully grasp and understand the fundamental logic at play, in particular *ex ante* of the disruption. In other words, the cognitive frame and institutional logic are tacit by nature, and thus very difficult to change, as presented in the theoretical chapter (Freeman, 1991). Further, it is not a matter of changing them, but rather through institutional entrepreneurship select, reconfigure and convince the actors on both sides of the expanded perspective of the mirroring hypothesis to evolve along and adopt this new selection and configuration of institutional logics. This includes not only actors outside of the focus firm, i.e. the incumbent, but also actors within the firm. In sum, incumbents must be able to identify institutional logics before they can focus on selecting the frame most suitable for the firm and finally assimilating to a new frame of institutional logic and thereby, a new paradigm.

Since any firm may want to optimize for multiple paradigms simultaneously, for example both maximizing existing revenue streams adapted to the old paradigm as well as future growth through generating innovation adapted to upcoming paradigms, ambidexterity may be one feasible strategy, as suggested by O'Reilly and Tushman (2004). This may further reduce the need for full immediate cognitive adaption of the whole organization since only the separated part, including its management, needs to understand the new logic. Hence, to be effectively employed, upper management needs still to cope with these dual cognitive frames of institutional logic. This will have to evolve and be developed in tandem. As argued by Kaplan and Tripsas (2008); and Leca and Naccache (2006), development will be more of a process of evolutionary interplay between each entity and actor, spanning the business model side as well as the

institutional frame, rather than a one-sided process where one causes development and evolution of the other. In other words, organizational separation and cognitive duality within upper management is an evolutionary process of interplay them in between which should be carefully managed when incumbents face competence destroying paradigm shifts.

Inside of Nokia, upper management did not, as obvious by the failure of the OSSO/Maemo/MeeGo project, manage to fully evolve this duality and separation. The project lacked enough separation from the main organization and upper management seemed neither apt to fully support the project, nor to understand it needed to be managed using a separate and different logic from the feature phone paradigm logic embedded in the main organization. Rather, both upper management as well as the members of the project needed to learn the new institutional logic of the new smartphone paradigm. In particular before the dominant designs were set and uncertainty was large in areas such as technology and market, which was of course a very difficult task. Thus, this posits that more dramatic actions need to be taken in order to cope with the otherwise firm threatening and potentially disruptive consequences.

To successfully counter the dire consequences of failing to realize that the institutional logic has changed during a paradigm shift and learn the new logic that applies in the new paradigm, we propose that firms needs to take on the role of an institutional entrepreneur. More specifically, we argue that there are two potential avenues of institutional entrepreneurship that firms can follow in order to break free of their cognitive frame as well as explore and finally assimilate to new institutions. First, firms can try to explore new frames of institutional logic by searching for, supporting and incentivizing other actors that operate in similar but different frames of institutional logic. This way, the firm can monitor these actors and identify potential avenues of success, allowing the firm to follow those avenues that might be viable for it in the future – an approach much similar to financial options and a fast-follower approach. Second, the firm can try to assimilate to new frames of institutional logic by acquiring new resources involved in an institutional logic different from that of the focal firm, be it for example through hiring new powerful employees, cooperation with other actors or by acquiring firms. However, the risk with this solution is of course that the newly acquired resources instead assimilate to the old institutional logic of the focal firm. These two suggested solutions of course need to be explored further, validated and developed much further before being applied in a practical setting.

In summary, it may be argued that Nokia did focus on a lot of the factors causing incumbents to fail when facing competence destroying paradigm shifts, factors typically brought up by researchers as the explanation and solution behind to problem. However, as evident in the case of Nokia's demise in the mobile industry, this may be tackling the problem at an improper level of depth. In that sense, Nokia's approach is like treating the symptoms, rather than the underlying cause of their problems. Instead, Nokia would have had to identify that they were locked in a cognitive frame and institutional logic that was about to be outdated as the industry shifted to the smartphone paradigm. If the

company had focused on institutional entrepreneurship, they could potentially have identified new viable frames of institutional logic which they could have assimilated to, thereby getting rid of their old cognitive frame and potentially changing the fate of the company.

6.6. *Hierarchies of Contributing Factors*

An underlying pattern of the line of thinking presented in the analysis, and further elaborated on here in the discussion, is a notion of a hierarchy between the different factors that contribute to The Incumbent's Curse and disruption in industries. At the highest and first level, one can conclude what an incumbent should have transformed into. In this study, it is argued that platforms became critical for success, and thus it seems reasonable to argue that the incumbent, i.e. Nokia, could perhaps have become a platform player in order to sustain their dominance in the industry.

In order to explain why incumbents do not transform into what is needed and develop new capabilities needed in new paradigms, researchers bring up many explanations. These explanations can be said to be on one level deeper in the hierarchy of factors – a second level – and includes various factors, such as the optimization of organizational structure according to the phase of the old paradigm, and resource dependency. In essence, the organizational structure factor describes how an organization rightfully organizes according to its product architecture, in accordance with the mirroring hypothesis (Colfer, 2007), and how cost efficiency becomes the main driver in the final phase of a paradigm (Abernathy & Utterback, 1978). On the other hand, resource dependency may further cause incumbents to divert resources along technological trajectories of the old paradigm (Christensen & Rosenbloom, 1995). Other factors contributing to incumbents not transforming appropriately also include organizational inertia (Hannan & Freeman, 1984), a lack of ambidexterity (O'Reilly & Tushman, 2004), and innovation interdependency risks (Adner, 2006).

Even though these factors have been discovered and incumbents seem to try to manage them, such as evident in this case on Nokia, incumbents still seem to fail when it comes to addressing these issues. Thus, there seems to be a deeper level of explanation to these factors; a third level, which prevents incumbents from fully coping with paradigm shifts. In accordance with our previous outline in the analysis, this will constitute the rules and norms in the industry within a paradigm – the institution and cognitive frame (Kaplan & Tripsas, 2008) of a certain paradigm. This ultimately causes path dependency along the evolution of an industry and paradigm through an interplay between the business models of firms in the industry and the institution surrounding them, as discussed previously. Effectively, this may cause the path dependence that underlies the factors at one level up, and can be remedied by double-loop learning (Argyris, 1976).

Moreover, we argue a fourth level exists that underpins why many incumbents do not manage to break free of their institution and cognitive frame – the institutional logic underpinning the institution of a paradigm (Leca & Naccache, 2006). This, we argue is

the most fundamental level in the hierarchy of factors causing incumbents to fail to adapt to new paradigms. In order to achieve double loop learning and break free from the path dependency on the old institution, actors must first recognize and realize there is a new institutional logic underpinning the new emerging paradigm and then understand how that logic differs from the institutional logic of the old paradigm.

In sum, this poses some interesting thoughts. Actors may have tried to avoid factors at a certain level, but failed due to not addressing the whole hierarchy of factors. Further, it may be argued that the most fundamental level, the one of institutional logics, should be where most effort should be directed within incumbent firms since it arguably may in turn solve the other factors indirectly. If an incumbent firm manages to learn and realize the institutional logic of the emerging paradigm, and choses to let it steer certain decisions, it may in turn break the organization free from its current institution and cognitive frame. This in turn may make the organization find new rationale for factors on the first level, such as how to develop the organization structure and resource allocation. In other words, it may be of great value for practitioners to look at The Incumbent's Curse as a hierarchy of factors, interdependent between hierarchical levels. Further, incumbents should perhaps not put so much emphasis on higher-level factors and instead turn to institutional entrepreneurship in order to survive The Incumbent's Curse, since this may be the underlying cause of higher level factors. Of course, much further research is needed to establish whether this line of thinking is an accurate and useful interpretation of the issue.

6.7. Limitations of This Study

Understanding and discussing those factors that could have been done better during the course of a research project is an important step in establishing the credibility of any study. This study is no different and there are some factors that deserve to be mentioned here, such as the method used during the progress of the research project as well as some limitations that we have imposed on the study itself.

Certain aspects of the method employed during this project can be disputed, especially when it comes to data collection. When looking at the primary data collected for the study, semi structured interviews were conducted where interviewees were identified by snowballing, the method of contacting few initial interviewees who then each provide contact to other potential interviewees. One could argue that this sampling method might provide a rather homogenous sample, as interviewees have some form of relationship to each other and one might therefore argue that their opinions might be similar due to the fact that they might have similar background and context. Furthermore, the fact that all interviewees were male might also impact their opinions. These limitations might have some effects on the results of this study, as a different perspective might have been gained through interviews with a more heterogeneous sample. In relation to the secondary data sources used, one might contest the credibility of some of the sources chosen for this study, in particular the extensive usage of Wikipedia as a source for an academic text. We would however argue that Wikipedia

provides a good overview and summary of the development of digital industries such as the mobile industry, but also that this information is not readily available in more prestigious sources. Furthermore, the credibility of Wikipedia has been established to be as good as that of other encyclopedias (Giles, 2005).

Apart from the method employed in this study, there are some limitations that have been imposed on this report and the analysis of Nokia's decline that should be mentioned and discussed here. The most important one is perhaps that of the differences in the workings of the mobile industry between its various geographical markets. These differences lie both in how the industry itself is structured, but also in the consumer behavior in the different markets. For example, the structure of the mobile industry is quite different in emerging markets from that of the western world; in emerging markets the MNOs have a smaller role in the value network, smartphones are less ubiquitous and mobile device sales through retail stores are quite common. Furthermore, the behavior of consumers in these emerging markets are also different; feature phones are more popular and there are various features and services important to these consumers, which are of no importance to consumers in other markets. These include services for aiding farmers with agricultural information, as well as applications that require low data traffic, as the network infrastructure of these markets is often less developed.

Even though Nokia has been present in virtually every geographical market of the mobile industry and in spite of this contrast between them, we have mostly focused on the smartphone market in the geographical market of the western world – that is, in Europe and the USA. That entails that we have not paid much attention to details of Nokia's business in emerging markets. This is done for simplification, as grasping all details of all geographical markets of the whole industry would quickly become a task too large for the scope of this thesis. Further, access to empirical data and interviewees with knowledge on these markets has been difficult to attain. We of course acknowledge this as a weakness of this study, but are confident that it does not have significant effect our results.

Another limitation imposed on this thesis is the lack of focus on the research stream that is industry convergence. This stream of research focuses on how similar or adjacent industries converge to form a new and wider industry, as well as the effects this has on firms within the respective industries. This group of literature was initially not considered significant to Nokia's case, but could in hindsight have provided some further clarifications and details.

Finally, we have excluded from coverage in this study Nokia's Nokia Siemens Networks business unit, which develops and sells network infrastructure to MNOs. This business unit is quite separate from the rest of Nokia's business and we have found no indication that Nokia Siemens Networks had any significant effect on Nokia's business as a mobile device manufacturer. That is to say, Nokia Siemens Networks did not serve as a complementary asset to Nokia's mobile device business when dealing with MNOs, who in turn did business with Nokia Siemens Networks.

94

6.8. Further Research

This explorative case study provides many opportunities for further research. We will limit our suggestions to efforts that will provide greater insight into the research subject; that of incumbents' difficulties of facing competence destroying innovation in paradigm shifts and disruptive innovation.

First, there seems to be gaps in research exploring successful strategies when platforms become prominent in an industry. Some are discussed by Eisenmann et al. (2006), but their success needs still to be established empirically, in particular, if other factors affect what strategy is best suitable for specific scenarios. Further, this does suggest that there might be further strategies to be explored. For example, a merely two-sided perspective might be limited. There might be markets that can and should be characterized as having more than two sides, and different strategies may be relevant in those scenarios.

Second, there are many factors that are brought up as contributing on different hierarchical levels in this study. These include organizational inertia, increased bureaucracy, consensus thinking/groupthink, multiple advocacy, double-loop learning, but also power struggles and innovation interdependencies such as resource allocation dependencies. These have all been presented in previous theory, but little research has been done on the interplay between the factors, and in particular, the extent to which one is more or less prominent relative the others. Further, this will mostly likely depend on the context, perhaps also the cognitive and institutional frame.

Third, the suggested perspective and model needs to be further analyzed, vetted and explored, both empirically and theoretically. There might exist further gaps in the proposed model, and there might be opportunities to link other research streams to the theory presented in relation to the institutional frame and its evolution here. In particular, there might be a need to better establish the position of other research streams and theory in relation to the model in order to better understand the hierarchy of problems facing incumbent firms. Further, it might be interesting to look at what theoretical implications and conclusions can be drawn by diving deeper into our suggestion to use an adaptation of the mirroring hypothesis to explain why the cognitive and institutional frame evolves with industries.

Moreover, this discussion touches very lightly upon suggestions on what strategies incumbents can employ as remedies to the problem. Further research could, based upon the presented model and the two suggested remedies, explore alternative strategies as well as provide empirical evidence of their practical feasibility, viability and success.

7. Conclusions

The work of disentangling why incumbents' often face difficulties coping with disruptive innovation is far from complete, as evident by the demise of Nokia as a device manufacturer in the mobile industry. In this study, we have analyzed the downfall of Nokia as well proposed an alternative perspective and model, which may contribute to the understanding of what is often referred to as The Incumbent's Curse. Through building up a theoretical framework based upon existing research, as well as looking into Nokia and the environment of Nokia empirically, both by performing interviews with former employees from various management positions, mobile network operators and other industry experts, as well as gathering of relevant secondary data, certain conclusions can be drawn.

First, it can be established that a paradigm shift occurred in the industry. The industry moved from a hardware oriented feature phone paradigm, into a software oriented smartphone paradigm. In contrast to the feature phone paradigm, platforms became the key asset. Second, a list of factors suggested in the presented theory can help explain why Nokia fell so rapidly when facing the shift to the smartphone paradigm; including increased bureaucracy, power struggles, innovation interdependencies, resource allocation dependency and Nokia's inability to properly establish ambidexterity. Others, such as Nokia's decision to move into a matrix organization, provided less value. Further, these factors seem to only have scratched the surface to what the underlying reason for Nokia's demise actually was.

Instead, we argue that the mirroring hypothesis seen from a broader perspective may provide a better explanation to why Nokia faced such difficulties. The mirroring hypothesis states that the architecture of products will shape the structure of the organizations selling these products, and vice-versa (Colfer, 2007). A broader perspective on the product architecture side is discussed to encompass the whole business model. A broader perspective on the organizational structure is discussed as entailing the whole institution of the industry surrounding the business model. This follows since a broader perspective on the organization can be seen as encompassing the whole value network surrounding the business model, and the structure and design of this can be seen as the rules, norms and implied way of doing business.

Taking this perspective, it is argued that the business model and institution surrounding the business model develops path dependently along the evolution of an industry. This is very similar to the concept of how a cognitive frame develops and emerges (Kaplan & Tripsas, 2008). Following along these lines, the institution and the cognitive frame may be seen as the lock-in that prevents the incumbent from adapting to the new paradigm. However, by framing the issue in terms of institutions, further conclusions can be made.

First, taking on a critical realist approach, in order to consciously transition into another institution it is needed to identify and realize the underlying institutional logics of the new emerging institution and paradigm. Hence, it can be argued that there exists a hierarchy of factors that explain The Incumbent's Curse, where a lack of understanding of institutional logics is the root cause. Further, since institutional logics are very difficult to grasp (Leca & Naccache, 2006), this perspective may better explain why it is so difficult for incumbents to make the transition into the new emerging paradigm. Furthermore, this may also point to that much more emphasis should be put upon institutional entrepreneurship by incumbents such as Nokia. This may be a better approach compared to only trying to mitigate higher level factors, since deeper level factors may be needed to be mitigated first. At the deepest level, it may be impossible to achieve double-loop learning if the institutional logics of the emerging paradigm are not understood. Further, without the proper cognitive frame, it may be impossible to break free of resource allocation dependency and other issues, such as those listed above. In sum, this may better explain why Nokia did not manage to successfully transition from the feature phone paradigm into the smartphone paradigm.

Finally, the suggested theory may provide great explanatory value and open up new avenues of research. The model can be further elaborated and explored, both theoretically as well empirically. Further, what strategies incumbents can successfully employ to overcome The Incumbent's Curse based upon this new perspective, as well as their advantages and disadvantages, are yet to explore.

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Appendix A – Respondents

Below a short introductions to the all respondents in contributing in this report.

1. Robert Andersson

Mr. Andersson has served various positions within Nokia between 1985 and 2012, such as President, Vice President, Senior Vice President, and as a member of Group Executive Board (2005-2008). He therefore has good insight into Nokia and the telecommunication industry.

2. Fredrik Brunzell

Mr. Brunzell is specialized and very knowledgeable on telecom business, as well as commissions and subsidies, hardware business, strategy and business development within the area. He has held various managerial positions within TeliaSonera, the world's 13th largest telecom operator, since 2002. His positions include Channel Development Manager, Terminal Commission Director and Senior Business Developer

3. Horace Dediu

Mr. Dediu was a part of Nokia's staff 2001-2009 where he predominantly focused on industry analysis. He served as Senior Analyst and Senior Competitive Analyst. From 2010 he has run the blog Asymco.com and written for the Harvard Business Review blog, analyzing the telecommunication industry.

4. Martin Garner

Specialized in the mobile handset market and active as an analyst since 1991. Today Mr. Garner is Senior Vice President at CCS Insight, an industry analysis firm focused on the mobile communications sector.

5. Fredrik Hacklin

Mr. Hacklin is a management scholar and advisor in the field of innovation and entrepreneurship. He is a research director and junior faculty member at ETH Zurich, heading the Corporate Innovation Lab initiative at the Department of Management, Technology and Economics. Fredrik's area of expertise centers on innovation and entrepreneurship in ICT industries. He has published his results in various journals, and is the author of the book "Management of convergence in innovation".

6. Olof Isestedt

Hi3g Access AB, Sweden's third biggest telecom operator, owned to 60% of Hutchison Whampoa, has employed Mr. Isestedt since 2007. There he has served as head of sales operations up until 2012 when he took over as Director of Operations.

7. **Kenneth Jönsson**

   Mr. Jönsson has served on various positions within Nokia between 1987 and 2009, initially as Export Manager and from 1994 as General Manager in multiple markets such as Hungary, Portugal, Russia and the Commonwealth of Independent States (CIS).

8. **José Luis Martinez**

   Mr. Martinez has served on various positions within Nokia between 1995 and 2011, his work has predominantly been focused around sales activities and Mr. Martinez has served as Vice President Sales & Channel Management, Multimedia business group APAC; Vice President Sales, Go To Market Operations Global; and Vice President Marketing Mobile Computing Category & Gear Global.

9. **Stefano Mosconi**

   Active within Nokia between 2005 and 2012, where he served as an Infrastructure Engineer, Maemo IT Team Leader and MeeGo IT Manager. After leaving Nokia in 2012 he joined a team of former Nokia employees setting up Jolla Oy, a new Finnish handset maker based on the MeeGo platform. At Jolla, Mr. Mosconi serves as Chief Technical Officer.

10. **Lars Roth**

    Mr. Roth has "experience from management, business development, system development, project management and leading people in web and telecom business". Mr. Roth has held various manager positions within TeliaSonera, the world's 13th biggest telecom operator, since 2001. His positions include Head of Business Development, Director of Mobile Consumer Products and Acting CEO of Halebop.

11. **Anonymous Interviewee**

    Former Nokia employee that held upper management positions within business development during the period of interest

12. **Anonymous Interviewee**

    Former Nokia employee that held upper management positions within sales and product development during the period of interest.

13. **Anonymous Interviewee**

    Former Nokia employee that held management positions within hardware and software development during the period of interest.

14. **Anonymous Interviewee**

    Former Nokia employee that held management positions within business and product development during the period of interest.