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Rise and Fall of Nokia:
Impact on the Finnish Economy
Abstract

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Nokia and Finland have had a special relationship. Nokia’s rise has influenced Finland in such a way as no other company did. With the company’s downfall, a part of the country was lost as well (Derek, 2015). This work aimed to examine Nokia’s influence on the Finnish economy over the last three decades. In doing so, several factors were considered. The history of the company and the country was depicted to better understand Nokia’s impact on Finland’s economy. This thesis tried to verify the following hypothesis: Nokia’s rise and downfall strongly influenced the Finnish economy. In order to demonstrate whether the hypothesis is true or not, literature was reviewed, and several statistics were taken into account. The hypothesis was testified as partly true. Whereas Nokia’s rise had a great impact on the Finnish economy, its downfall influenced Finland’s economy less strongly due to interventions by the country’s government and Nokia’s attempts to support dismissed employees concerning their job hunting. Though the company’s influence on the Finnish economy shrank, it is still one of the most important firms in Finland. Further research could be done regarding the impact of Nokia’s downfall on the Finnish startup scene or about the extent to which the ICT sector in Finland is still shaped by Nokia’s influence.
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<td>Alcatel-Lucent</td>
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<tr>
<td>AT</td>
<td>Advanced Technologies</td>
</tr>
<tr>
<td>BERD</td>
<td>Business Enterprise Expenditure on R&amp;D</td>
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<td>CEO</td>
<td>Chief Executive Officer</td>
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<td>CIO</td>
<td>Chief Information Officer</td>
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<tr>
<td>COMECON</td>
<td>Council for Mutual Economic Assistance</td>
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<td>EC</td>
<td>European Community</td>
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<td>EEA</td>
<td>European Economic Area</td>
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<td>EFTA</td>
<td>European Free Trade Association</td>
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<td>EPO</td>
<td>European Patent Office</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<tr>
<td>GSM</td>
<td>Global System for Mobile Communications</td>
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<tr>
<td>HTML</td>
<td>Hypertext Markup Language</td>
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<td>ICT</td>
<td>Information and Communications Technology</td>
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<tr>
<td>ISB</td>
<td>Integration Steering Board</td>
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<tr>
<td>KPI</td>
<td>key performance indicator</td>
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<td>NFC</td>
<td>Near Field Communication</td>
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<td>NMT</td>
<td>Nordisk Mobil Telefon</td>
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<td>NSN</td>
<td>Nokia Siemens Networks</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
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<tr>
<td>OS</td>
<td>Operating System</td>
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<tr>
<td>ROI</td>
<td>Return on Investment</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>SMEs</td>
<td>Small and Medium Sized Enterprises</td>
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<tr>
<td>UBI</td>
<td>Universal Basic Income</td>
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<tr>
<td>USSR</td>
<td>Soviet Union (officially: Union of Soviet Socialist Republics)</td>
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Introduction

Nokia, older than Finland itself, has impacted Finland in such a way as no other company did. The company was not just any company to Finns. It influenced their national identity and self-confidence. The company was a symbol of economic growth after Finland’s recession in the early 1990s. For more than a decade, Finland and Nokia were tantamount to cell phones. On the grounds of the company, Finland gained international attention. Its psychological significance for Finns made it difficult for them to bear Nokia’s decline and sale to Microsoft (Yle, 2013b). Siilasmaa (2019) depicts how Nokia’s success changed the way he did business during his time at F-Secure, a Finnish cybersecurity firm. F-secure tried to hide the fact that it was headquartered in Finland before Nokia became worldwide successful. After Nokia’s success in the later 1990s, the company proclaimed that it was Finnish. This small example shows that Nokia made Finns proud to be Finnish as well as how much the company impacted the self-perception of Finnish citizens.

Apart from the psychological influence, how and particularly how strong did Finland’s economy suffer from Nokia’s fall? According to Wollaston (2018), the annual budget of the Finnish government was smaller than Nokia’s. This indicates that Nokia could invest more money than the government, particularly in its booming times. Therefore, the company could boost innovations in Finland through increased spending on R&D, leading to more patent applications. Patents are not only a sign of innovation but also of economic growth and knowledge sharing (Phelps, 2015). At a time, Nokia accounted for more than half of Finland’s EPO patent applications, which implies that the company had a large impact on the Finnish innovation system (Nikulainen & Pajarinen, 2010). Hence, one might assume that Nokia influenced Finland’s economy in many ways.

This work aims to examine Nokia’s influence on the Finnish economy over the last three decades. In doing so, several factors will be considered such as the company’s contribution to Finland’s employment, Finnish GDP, and R&D spending in Finland. For a better understanding of the company and the country, their history will be depicted before dissecting Nokia’s impact on Finland’s economy. Thereby, it tries to verify the following hypothesis: Nokia’s rise and downfall strongly influenced the Finnish economy. In order to demonstrate whether the hypothesis is true or not, literature will be reviewed, and several statistics are taken into account. The structure of this work is as follows: First, the history of Nokia, from its beginning in 1865 over its time as the world market leader until today, is outlined. The next chapter is concerned with the development of the
Finnish economy since the 1980s. Then if and how Nokia has influenced and is influencing Finland’s economy is described. Finally, a conclusion and discussion of this work are given.
2 Nokia

This chapter delineates the history of Nokia. Thereby, it focuses on the factors which made Nokia to a world market leader in the cell phone sector as well as on the reasons for Nokia’s downfall. Last, the transformation of Nokia to the company it is today will be outlined.

2.1 Transferring another text to the template

Nokia’s history began in 1865 when Fredrik Idestam established a paper mill in Tampere, Southwest Finland. A few years later, he launched another one at the river Nokianvirta – the name giver of Nokia. During the 1960s there was close cooperation between the paper mill and two other companies:

- Rubber Works: a rubber entity, which produced, for instance, gumboot and raincoats. Eduard Polón established it in 1898.
- Finnish Cable Works: founded by Arvid Wickström in 1912. The firm operated in electronics from 1960. Three years later it started producing cordless telephones for the army and emergency services.

In 1967, the three companies merged and became the Nokia Corporation. The new corporation had five business divisions: rubber, cable, forestry, electronics, and electricity generation (boerse.ARD.de, n.d.; Frost, 2013; NZZ, 2013). Nokia started to cooperate with Salora Oy in the 1970s. Salora, launched as a radio manufacturing company in the 1920s, also produced televisions (since the 1950s), and radiophones (since the 1960s). Nokia and Salora made an agreement that they would coordinate and cross-market their branding and promotion activities in 1975. This means that Nokia merchandised Salora’s cell phones while Salora marketed Nokia’s professional mobile radio base stations and handsets. The cooperation between those two companies became closer and resulted in a joint venture, Mobira Oy, in 1979. Three years later, Nokia bought Salora’s share of the joint venture and renamed it ‘Nokia-Mobira Oy’ (Steinbock, 2001).

With the 1980s, Nokia’s rise to the world market leader as a cell phone manufacturer started. Several acquisitions of electronics companies strengthened the position of Nokia in the consumer electronics and telecommunications market. At this time, the cellular market in the United States
was behind the one in Europe. When the U.S. market had evolved, Mobira wanted to enter this market. Therefore, it needed a partner who had a distribution network in the United States. Hence, it created a joint venture with Tandy Corporation in the mid-1980s. They started a production site in South Korea and distributed their cell phones in the U.S. The joint venture taught Nokia lessons about overseas manufacturing activities. This was important for the company’s attempts regarding the preparations of the Asian market entry (Steinbock, 2001).

Between 1986 and 1988 Nokia had 11 business lines due to its own historical background as well as takeovers. The significance of core business areas shifted throughout the years which can be seen in Figure 1. The cable business line was the most important business segment from the late 1960s until the early 1980s. Then the electronics business line gained increasing significance until it became the only core business area of Nokia in the 1990s. The rubber and forest business lines experienced the same as the cable business line: In 1967 they were more important than the electronics. With the rising primeness of the electronics business segment, they became more and more irrelevant to Nokia. After several acquisitions and divestments, Nokia transformed itself into a telecommunication company (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000).

Figure 1 Sales of Nokia by industrial group, in %

While Nokia undertook changes regarding its major businesses, there were also shifts concerning sales: Whereas approximately one-half of Nokia’s sales were domestic sales until 1980, Nokia started to increase its international activities in the 1980s. The company did not only increase its exports also it acquired production units abroad and foreign subsidiaries (most operating in the electronics industry and producing goods directed to consumers). Those acquisitions were part of Nokia’s strategy: fast growing and expansion concerning operations to new business lines. Consequently, Nokia’s net sales and workforce increased rapidly. In the Nordic countries, the company became the second biggest electronics enterprise. Figure 2 shows the development of Nokia’s exports, production abroad and domestic sales during 1980-1998. Production abroad is obtained by subtracting exports from foreign sales (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000). The figure illustrates that Nokia’s exports and production abroad increased more and more, while domestic sales declined.

Figure 2 Net sales of Nokia, in billion FIM


Nokia had made large investments when the Finnish Economy experienced a serious recession in the early 1990s. As a result, the company faced a crisis and had to sell several business groups, which led to 15,000 layoffs between 1989 and 1993. Nokia’s competitor Ericsson saw the struggle of the enterprises due to the crises and tried to acquire it in 1991. The deal failed because Ericsson
wanted to buy the company without its consumer electronics business line (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000; Milne, 2013).

The next major strategic decision was made in 1992 when Jorma Ollila became CEO of Nokia. He decided that the company should focus increasingly on the telecommunications industry. Consequently, future sell-offs took place. During 1995 and 1999 Nokia’s average yearly growth rate was more than 30% due to a booming telecommunication business. In contrast to the rapid growth in the 1980s, Nokia grew mostly internally during the 1990s. With the growth, there also arose challenges for the company. Over the years, Nokia outsourced more and more operations. Therefore, it had to enlarge their own as well as their suppliers’ capacity to satisfy the demand. As a result, Nokia’s workforce increased by a few thousand (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000). The third generation mobile systems required an expansion of Nokia in its R&D operations in order to develop new models and technologies made for these mobile systems. Besides the new mobile systems, the tighter competition was another reason why Nokia had to raise its R&D efforts. Net sales by market area experienced a change as well: While Europe remained the major market area with more than 50%, the Asia and Pacific area, as well as the North and South America area, gained more importance. This can be seen in Figure 3, which shows Nokia’s net sales by market area in the years 1994 and 1999 (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000).

![Figure 3 Net sales of Nokia by market area](source: Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000, p. 41.)
Nokia’s major competitors at that time were Ericsson and Motorola, which are both larger than Nokia measured by net sales. Nokia focused more on cell phones than its core competitors that produced semiconductors instead of buying them (as Nokia did). Nokia Mobile Phones grew on average about 50% yearly between 1997 and 1999 due to an increased demand for Nokia cell phones. Consequently, Nokia gained market share. Based on those reasons, Nokia’s growth rate was substantially faster than the ones of its competitors. Moreover, at this time, Nokia was more profitable than Ericsson and Motorola measured by the ROI ratio and operating profit (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000). This can be seen in Table 1, which shows a comparison of the three enterprises.

<table>
<thead>
<tr>
<th></th>
<th>Nokia</th>
<th>Ericsson</th>
<th>Motorola</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales, bill. FIM</td>
<td>117.6</td>
<td>144.9</td>
<td>172.5</td>
</tr>
<tr>
<td>Return on investment, %</td>
<td>55.4</td>
<td>19.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Earnings before taxes, bill. FIM</td>
<td>23.3</td>
<td>11.0</td>
<td>6.5</td>
</tr>
<tr>
<td>% to sales</td>
<td>19.8</td>
<td>7.6</td>
<td>3.8</td>
</tr>
<tr>
<td>R&amp;D expenditures, bill. FIM</td>
<td>10.4</td>
<td>19.0</td>
<td>19.2</td>
</tr>
<tr>
<td>% to sales</td>
<td>8.9</td>
<td>13.1</td>
<td>11.1</td>
</tr>
<tr>
<td>Year-end employment</td>
<td>55,260</td>
<td>103,290</td>
<td>na</td>
</tr>
<tr>
<td>Market capitalisation, bill. FIM (at the end of 1999)</td>
<td>1,256.0</td>
<td>466.7</td>
<td>518.7</td>
</tr>
<tr>
<td>Global market share of mobile phones (1-3/2000)*</td>
<td>27.9</td>
<td>11.5</td>
<td>16.0</td>
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* Source: Dataquest.

Table 1 Major global telecommunication companies in 1999


In contrast to the company’s competitors, Nokia understood customers’ needs, which was one reason for its success. It spent many efforts in the product design and user experience. Another reason was a prosperous marketing strategy. In fact, Nokia changed its marketing strategy for cell phones in the early 1990s. Up until then, Nokia advertised them as a status symbol. The new marketing style promoted them as a regular consumer product. Nokia left the idea behind, that cell phones had to be linked to luxury. As a result, the company’s sales rose not only to business but also to private persons. Marketing and an understanding of customer needs helped Nokia to increase its brand value (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000). For the company, it was important to improve its worldwide attention due to its lack of brand recognition. Nokia’s products
were either sold by the company’s competitors under their names or almost exclusively used in larger systems. Only a few products with Nokia’s name on it were sold by dealers. Therefore, Nokia seemed to be invisible (Steinbock, 2001). That is why it was crucial for Nokia to attain worldwide attention. It achieved this by offering innovative products or features of its products such as:

- The ‘Mobira Cityman’, Nokia’s first handheld cell phone. It was launched in 1987 and became famous through a call by the Russian president Michail Gorbatschow.

- The ringtone ‘Nokia Tune’ (1998), which was first launched in 1994 under the name ‘Grande Valse’.

- The ‘Nokia 9000 Communicator’, launched in 1996, was a combination of a computer and a cell phone. Thus, it was the first cellular, which was able to send and receive emails and fax, as well as open websites that are HTML-based. Moreover, it had an entire keyboard and users could open it like a laptop.

- The ‘Nokia 6110’, which was launched in 1997, quickly became one of the most sold cell phones. Its multifunctional plug enabled the users to connect the Nokia 6110 with a computer, headset, car handsfree or computer modem card. (boerse.ARD.de, n.d.; Curtis, 2013; Frost, 2013).

Furthermore, Nokia had a huge advantage over other competitors in the late 1980s due to its support in developing the GSM, which became the mandatory standard for all European cellular networks. Before the GSM was developed, wireless carriers did not support all communication standards. Therefore, it was a crucial step to evolve a unified mobile communication standard for cell phone vendors. Due to the company’s influence in the developmental process of the GSM, it had a head start regarding the development of GSM devices and equipment. Moreover, Nokia had a leadership role (through memberships of the enterprise’s engineering and technical employees) in key standard-setting committees within the European Telecommunications Standards Institute, which is responsible for further development of mobile communications standards and cellular specifications. In addition, the company was part of other standards-setting groups, that helped Nokia to become the world market leader in cell phones in 1998. It holds its positions for more than a decade (Cronin, 2014; Frost, 2013).
2.2 World market leader

As described in the previous subsection, Nokia became the world market leader in the cell phone market due to right strategic decisions, high profitability, a smart marketing strategy, increased brand value, investments in R&D (innovative products, understanding and meeting customer needs) and participation in standards-setting groups, which gave the company the opportunity to influence further developments in the cellular industry.

In 1998, Nokia started a joint venture with other handset manufacturers, Ericsson, Motorola and Matsushita (Panasonic), and Psion Computers, which ‘brought EPOC, its latest PDA [Personal Digital Assistants] operating system, into the group and the new OS was renamed Symbian’ (Cronin, 2014, p. 45). Since Nokia was the dominant cell phone producer, it was the largest licenser for Symbian. Furthermore, it could put pressure on its partners to focus on features and developments which favored Nokia. Later the Symbian OS will become a problem for Nokia due to its complicated structure, which it had because it was not designed for internet access. The Symbian OS became a nightmare for developers since they had to adjust each app to every single cell phone model on the basis of Symbian’s complex structure. This made app development for the Symbian OS costly (developers needed to test their apps for each Symbian phone model) especially after the entrance of iPhone AppStore and Android Marketplace into the market (Cronin, 2014).

During the years, Nokia’s main competitors lost market share (measured by sold units to end users), whereas Nokia managed to increase its market share up to almost 40% in 2008, which is a rise of about 20% in 11 years. In 2008, Motorola and Ericson, both coming from a double-digit share of the world market in 1997, had each less than 10% of the world market share. Four years later, both companies’ share of the world market is less than 2% each. Besides Nokia, Samsung managed to gain market share as well. In 2012, Samsung overtook Nokia and became the leader of the cell phone world market (Gartner, Mobile phone vendor’s market share in sold units to end users worldwide from 1997 to 2014. In Statista - The Statistics Portal., n.d. b). This is depicted in Figure 25 (see appendix 1). Nokia’s growth of market share worldwide is also reflected in the company’s net sales, which are illustrated in Figure 4. Nokia sold its billionth cell phone in 2005. Net sales peaked in 2007 (€51,06 billion), the world market share in 2008 (38,6%). Both declined in 2009. Although it seemed that Nokia had recovered a little bit when looking at net sales in 2010, the company’s market share fell about 7,5%, and it continued to decrease. Also, net sales of the enterprise will not rise again until the selling of Nokia’s Device and Service unit to Microsoft

![Graph showing Nokia’s worldwide net sales in billion euros, 1999 – 2012](image)

**Figure 4** Nokia’s worldwide net sales in billion euros, 1999 – 2012


The company spent much money on R&D expenses due to rising revenues. Hence, the enterprise had advanced technology, which made it successful and kept it on its position as a world market leader. At a time, Nokia had 40,000 issued patents in its portfolio. This demonstrates how crucial it was for Nokia to be an innovative company. However, this stood in contrast with the interest of the company’s primary customers, the wireless carriers, which had a huge impact on the decision about which innovations of the company would make it to commercial production. The dependence of Nokia’s annual growth on GSM mobile phones demand as well as the GSM networks expansion worldwide resulted in not bringing many of the enterprise’s innovations to the market. Wireless carriers wanted low price products in order to gain new customers. Therefore, expensive innovative products were out of their interests. Nokia wanted to meet the requirements of its customers (wireless carriers) to gain further market share (Cronin, 2014). This reliance resulted in problems for Nokia. For instance, although Nokia developed NFC and Wi-Fi enabled prototypes, it decided not to launch them to not disgruntle its wireless carriers. Furthermore, the company had no data about how their customers used their phones. Consequently, Nokia underestimated how crucial third party mobile applications in terms of customer preferences were. For keeping cost low and quality high, it focused on efficiency, automation, and innovation for internal processes. At a time, the company attained the utmost gross margin in the industry. For instance, in
2006 Nokia’s production costs for its most popular cell phone were about €69, but the enterprise sold it on average for €102 (Cronin, 2014). Up until that year Nokia manufactured over 325 million wireless phones annually in its nine production plants worldwide. The enterprise’s factories had to handle more than 100 billion parts due to a large number of phone models. In addition, Nokia had to adjust the phone models according to the requirements of its cell phone provider customers, which means that some features needed to be turned off because wireless carriers did not want that their customers can use them (for instance, Bluetooth, Wi-Fi or GPS, which are all alternatives to mobile telephony connections). Cell phone providers had made large investments to upgrade their networks to the new 3G standard. Therefore, they feared a decline of their average revenue per user, if they intensively use those unregulated networks. Moreover, Nokia lacked flexibility in the design during its peak of success. This can be seen on the fact that the company was slow in adopting the folding clamshell designs, which was very popular at this time (Cronin, 2014).

An American enterprise, Interbrand, ranks companies according to their brand value. Nokia achieved to be the first non-American business ranked on position 11, whereas the top positions are taken by American companies such as Coca-Cola, Microsoft and IBM (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000). Figure 5 illustrates how Nokia’s position in the Top 100 Ranking changed during the years 2000 and 2014. The enterprise managed to stay under the Top 10 for more than ten years. Then in 2011, it dropped to the 14th place, and three years later it declined to position 98 (Best Global Brands Previous Years, n.d.).

![Figure 5 Nokia in the Top 100 Ranking of Interbrand, 2000 – 2014](image)

Source: own depiction. Data: Best Global Brands Previous Years, n.d.
On June 19, 2006, the public was informed about a joint venture of Nokia Networks and Siemens COM Carrier, which was named NSN. The 50/50 joint venture was favorable for both companies because they could split up R&D costs. Together they had a global distribution organization (present in more than 100 countries) as well as the usage of synergy effects with savings of €1.5 billion. Both companies assumed a reduction of the workforce by 10-15%. To ensure that the joint venture would not fail, both enterprises decided to create the NSN Integration Steering Board, which consisted of six members, three from each company. In addition, they launched a large integration program in order to make the joint venture successful. The CIO soon became the seventh member of the ISB (Novák, 2010). The planned Day 1 for the joint venture was January 1, 2007, but the date had to be postponed to April 1, 2007, due to the events regarding the Siemens bribe scandal. Complicated about this joint venture was the point of finding an own identity and corporate culture so that it is clearly distinguished from Siemens and Nokia. NSN, Ericsson, and Alcatel/Lucent were three global operating companies, each twice as big as all other remaining companies in the industry (Novák, 2010).

In autumn 2007, Nokia announced that it would acquire the US-company Navteq for $8.1 billion. Navteq was one of the largest providers of electronic maps, especially those used in navigation systems for cars. With the acquisition, Nokia wanted to increase its supply of cell phones with which its user can use a navigation system (Nokia steigt bei Navteq ein, 2007). Navteq and NSN played an essential role in Nokia’s future, which will be depicted in the next two subsequences.

2.3 The downfall

Nokia’s downfall started with the introduction of the iPhone in June 2007. Although the company was still on top of the world at this time, it neglected to find the right answer to the newly introduced smartphone by Apple over the next years (Siilasmaa, 2019). The cell phone market changed with Apple’s iPhone: It was no longer a market in which hardware, developing the best device, was important. Having the best ecosystem, i.e., ‘a combination of hardware, operating system, and applications’ (The Economist, 2012) was the key to success. One of Nokia’s major weaknesses was its operating systems. Like mentioned earlier, the Symbian OS was a nightmare for developers due to its complex structure. According to Risto Siilasmaa (2019), chairman of Nokia’s Board of Directors and founder of F-Secure, a Finnish cybersecurity company, Nokia put the hardware before the software. This led to the complexity of Symbian which often had to be customized for a new Symbian device. Moreover, the customized versions of the OS had many incompatibilities.
For instance, changing the screen resolution might lead to customization of each application. Furthermore, the user experience with Symbian was not good, especially after there were other operating systems on the market: Microsoft’s Windows Mobile, Apple’s iOS and Google’s Android. All three were led by a single firm so that each of them could focus on making it innovative and beneficial for themselves. In contrast to them, Symbian was a joint venture, which was dominated by Nokia. Nokia’s partners saw an advantage in hurting the company in order to strengthen their position in the market. Therefore, Nokia decided that it wanted to buy out its partners by establishing a foundation. The Symbian Foundation guaranteed that the Symbian OS code was open-sourced, so everyone had the same access to the OS. With this argument, Nokia persuaded its partners to sell their shares to it. However, the company lost already much time in the fast-changing industry (Siilasmaa, 2019).

Another problem was Nokia’s wireless carriers: They would not have liked it if the company reduced the number of prompts in order to improve the user experience of Symbian. The Symbian OS required many command prompts due to the fear of the company’s operator customers that their clients will complain about extra billing. Nokia’s weakness was the strength of its competitors: Apple’s OS was simple. It was compatible with previous OS versions meaning developers created applications for the latest version of the OS and the application would still work on devices with an older OS. Additionally, it provided a good user experience that led to a rise in buyers. Thus, Apple’s iOS became attractive for developers of third-party software because a rise in the number of iPhone buyers meant an increased number of potential buyers of their software. Finally, more applications that are available for a device make it more attractive for buyers, which makes the OS only more attractive for developers leading to more third-party software obtainable for the devices running with this OS (Siilasmaa, 2019). The global market share held by the leading smartphone operating systems measured in sales to end users is depicted in Figure 6. It is clearly visible that Symbian still dominated the market in the late 2000s, but Apple’s iOS and Google’s Android as well as other operating systems gained market share. Today, Android is the number one OS, followed by iOS (Gartner, Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 2nd quarter 2018. In Statista - The Statistics Portal., n.d. a).
The structure was not the only problem with Symbian: The OS was the reason why many launches fell behind schedule. Furthermore, Nokia used older (= cheaper) components to increase its gross margins. The shipping delays made it even worse for Nokia because on the day the new device was shipped it was ‘practically ready for the dust bin’ (Siilasmaa, 2019, p. 40). Moreover, Nokia started to lack quality. Thus, the return rates for its N97 were very high. Customers had a bad experience with Nokia, and it was likely that they turned away from the company. In addition, the cell phone’s launch was delayed by six months. Hence, its components were only ordinary and not outstanding as at its announcement in December 2008 (Siilasmaa, 2019). At this time, Nokia had high hopes on its upcoming N900 which ran with an early version of Maemo, which was based on Linux. Although the new OS’s Appstore could not offer many apps, the firm was confident that this would change over time. In 2010, Nokia made a deal with Intel: They merged their Linux based operating systems (Maemo and Moblin) to one OS (MeeGo). Both companies hoped that their new expanded OS would be more attractive for app developers. MeeGo’s flagship smartphone, Dali, should be shipped in the second half of 2012, but it was delayed by a full year. Additionally, Nokia’s competitiveness was weakened by another delay of the new Symbian^3, which should increase the user experience and reduce Nokia’s developmental gap to other operating systems. This delay was bad not only because it meant product launch delays,
but also since the workers who should work on the next update needed to work on the delayed launch. Moreover, future devices were automatically late as well (Siilasmaa, 2019). The situation became even worse when Nokia’s board heard of Symbian’s developmental problems. As Siilasmaa (2019) wrote in his book “Transforming Nokia - The Power of Paranoid Optimism to Lead Through Colossal Change”, the overall build time (build = a program version (Definition of build in English, n.d.)) was two weeks and the process of compilation, translating the developer language into machine language, was reduced from 48 hours to 24 hours. This means that any adjustments to the software version took a long time and the people who had worked on it, worked already on something else when they received the results. Furthermore, the outcomes of the tests were two weeks old. The technological problems were not the worst problem that Nokia had: The board members learned that the top management was not informed about that issue in time. The top management heard about this problem only slightly earlier than the board. This implies that the company had a cultural problem: Obviously bad news was not communicated to the superior, which were in turn not able to discover the problems (Siilasmaa, 2019).

The Symbian issues resulted in more and more companies, also Nokia’s former partners of the Symbian joint venture, that had abandoned the OS and moved to Android. 2010, became the year of Android. Its global market share was 9.6% in the first quarter of 2010. In the fourth quarter, its market share was 30.5% - almost as high as the one of Symbian (32.3%). In 2011, Android overtook Symbian as the global leader which put the company on top of chipset vendors’ priority list. Samsung, which was the greatest manufacturer for Android devices, increasingly caught up to Nokia until it became the world market leader in cell phones in 2012. (Gartner, Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 2nd quarter 2018. In Statista - The Statistics Portal., n.d. a; Gartner, Mobile phone vendor's market share in sold units to end users worldwide from 1997 to 2014. In Statista - The Statistics Portal., n.d. b; Siilasmaa, 2019).

The discovery of the cultural issues resulted in a new CEO in September 2010. Nokia had their first non-Finnish CEO with Stephen Elop, who previously worked for Microsoft. At this time, the company was divided into three businesses:

- Devices and Services (D&S): smartphones and mass-market phones
- Location and Commerce: comprising among others Navteq and NSN
- Nokia Technologies: storehouse of patents that generated revenues (Siilasmaa, 2019).
Mr. Elop tried to understand the company and its culture, as well as uncover the current problems within it. Therefore, he sent an email to every employee and asked what they wanted to be changed, remain as it is as well as what they are afraid that he would not understand. Although this way of communicating was new for Nokia’s workforce, more than 3% answered. He continued to use direct communication with employees via SharePoint, so the conversations were accessible to others. Furthermore, the newly announced CEO launched ‘Project Sea Eagle’. It should reveal insights about the company’s capabilities and competitiveness. Additionally, he hired a management consulting firm, McKinsey, for an outsider perspective regarding the project. He also decided to rename the Group Executive Board, which consists of the top management, to the Nokia Leadership Team, because he heard that it was associated with negative connotations (Siilasmaa, 2019).

Problems with Nokia’s operating systems did not decline. Symbian became apparent to be not competitive, and the company was not able to launch more than three devices over the next three years with MeeGo. This was not a good strategy for Nokia, who tried to catch up. One device per year was not enough to be an attractive platform for app developers due to an insufficient volume number. For developers, it was distinct that they support Android and iOS. They were not happy about supporting another one or even a fourth OS. If they had to choose between MeeGo and Windows Phone, it was likely that they would have picked Windows Phone instead of MeeGo. Furthermore, other manufacturers did not endorse MeeGo. There was just Samsung, the leader of Android phones, who considered it as an option. Therefore, MeeGo could not survive. Another problem for Nokia was the fact that it had no salespeople. The company delivered its devices to operators who sold them to customers. In addition, ‘Nokia dictated the number of phones each operator was allowed to sell” (Siilasmaa, 2019, p. 86) during the good time of Nokia up until 2009. This practice led to the operators’ disfavor regarding Nokia which became a problem for the company (Siilasmaa, 2019).

Mr. Elop wrote a memo and sent it to all employees within Nokia on February 8, 2011. He described what happened to Nokia and the cell phone market since the introduction of the iPhone, as well as about the reasons why the company was performing poorly:

‘The first iPhone was shipped in 2007, and we still don’t have a product that is close to their experience, Android came on the scene just over 2 years ago, and this week they took our leadership position in smartphone volumes. Unbelievable.
We have some brilliant sources of innovation inside Nokia, but we are not bringing it to market fast enough. [...] Symbian is proving to be an increasingly difficult environment in which to develop to meet the continuously expanding consumer requirements, leading to slowness in product development and also creating a disadvantage when we seek to take advantage of new hardware platforms. As a result, if we continue like before, we will get further and further behind, while our competitors advance further and further ahead. [...] 

And the truly perplexing aspect is that we’re not even fighting with the right weapons. [...] The battle of devices has now become a war of ecosystems [...]. Our competitors [...] are taking our market share with an entire ecosystem. This means we’re going to have to decide how we either build, catalyze or join an ecosystem. [...] 

I believe we have lacked accountability and leadership to align and direct the company through these disruptive times. We had a series of misses. We haven’t been delivering innovation fast enough. We’re not collaborating internally.’ (Ziegler, 2011).

As the memo implies, the management team was in the process of understanding that the firm was slowly running out of time and needed a breakthrough in order to survive. The other part of the company was officially still not realizing it because nobody told them. However, Nokia’s employees knew that there were issues. The memo obtained positive feedback because someone was telling them the truth (Siilasmaa, 2019).

As Mr. Elop wrote in his memo, Nokia’s management level had recognized that the company needed to offer a good ecosystem. Since neither Symbian nor MeeGo would be successful, it had to discuss other options regarding the OS: Android or Windows Phone. Android offered access to the whole Android ecosystem, which was not limited to phones. On the other hand, for Android Nokia was late and lacked experience with the OS. More importantly, Google did not need Nokia to become the world market leader in OS. There were no signs that Google would have developed Android in favor of Nokia. Moreover, Nokia had to sell Navteq if it wants to become a part of the Android family because Google already had a navigation software (GoogleMaps) (Siilasmaa, 2019). On the contrary, Microsoft would adjust its OS to Nokia’s wishes. It needed, as well as Google, manufactures for their OS since Microsoft did not produce devices for its Windows Phone OS. However, Microsoft was not a big player in the world market. It was uncertain if the Windows Phone would be successful. Its failure signified the end of Nokia. As opposed to this, with Android, a failure was far less likely to happen. In the end, Nokia chose the Windows Phone which was announced on February 11, 2011. The deal between the two companies had a duration of ten
years with an option for Nokia to terminate it after three and five years. It was not an exclusive
deal, meaning that Nokia was allowed to launch devices with other operating systems than Win-
dows Phone – with one exception: Android (Siilasmaa, 2019).

Although Microsoft and Nokia respected the strengths of each other, their collaboration had its
first problems shortly after the deal was made. Nokia realized that Microsoft had not as much
experience with the design of products that shall be shipped globally than the company hoped.
Nokia needed support for many languages and local applications, but the initial version of Win-
dows phone was only designed for a support of eight languages. Therefore, Microsoft was not
happy about Nokia’s demand to support more languages. However, Nokia could have known
about those issues, if it checked it thoroughly before signing the agreement. Furthermore, it ap-
peared that it was difficult to obtain the latest and thus fastest chips for the company’s new de-
vices because chip vendors preferred Android. The change of the OS was not the only major one
in 2011: Nokia’s chairman of the board, Jorma Ollila, announced to resign from his position. Risto
Siilasmaa became his successor and holds this position until today (Siilasmaa, 2019).

China was one crucial market for Nokia. The company received subsidies, which are essential in
the industry in which Nokia was operating, from Chinese cell phone operators. This changed when
China shifted from the GSM to the TD-SCDMA standards (both are radio standards which have an
impact on cellular phone modifications). Due to efforts to save costs Nokia’s management de-
cided not to invest in the TD-SCDMA standards. Consequently, the company lost a large portion
of the market to which it could sell. Moreover, the competition in the remaining market was very
tough. With the change of the standard, the mobile phone operators also changed their criteria
for subsidizing products at different price points. Whereas the Chinese manufacturers managed
to offer products which met the subsidies criteria, Nokia was not able to do the same. Therefore,
the company could no longer benefit from subsidies (Siilasmaa, 2019).

All these circumstances ended in layoffs and cost cuttings in order to survive. Already in 2009,
there were layoffs at Nokia. The D&S revenues dramatically declined, and the company searched
for ways to save costs (such as closing factories or cancel projects). Furthermore, Nokia was ‘com-
pletely surprised by the magnitude of the drop’ (Siilasmaa, 2019, p. 30). Thus, it was not prepared
to deal with the situation which made the situation worse. At this time, the company missed the
understanding why it was in this situation, why revenues were dropping and what seriously
caused its crisis. Within one year, Nokia lost 70% of its stock market value. In 2011, there was
another round of dismissals (7,000 people) that represented 12% of its workforce. Most people
who worked for Symbian were released due to its termination (Kalb, 2011; Siilasmaa, 2019). Nokia
introduced the so-called Bridge program which should help its laid-off employees to find new employment opportunities. It offered five paths:

- Transition:
  - attain training for a new job,
  - study at a university or another educational institution or
  - doing something distinctly different such as founding a nonprofit organization

- Innovation: establishing their own business

- Finding a job at another company (Siilasmaa, 2019).

The result of the Bridge program was that 60% of dismissed employees knew their next steps on their last day at Nokia. One thousand companies were started by former Nokia employees. Those newly founded firms helped to reduce unemployment in communities where Nokia was the major employer by providing new jobs (Sucher & Winterberg, 2015).

Nokia also faced problems with its cash flow: The company paid its suppliers after it received the money from its distribution channel. Since sales declined, the money came no longer from the firm’s distributors. Nevertheless, the company needed to pay its suppliers. Therefore, Nokia’s cash flow was negative. In January 2012, there were first rumors about Nokia declaring bankruptcy. Later in that year, the rumors were no longer about if Nokia would declare but when. The company declared its second negative profit warning within a year in April 2012. A month later, it announced additional 10,000 layoffs and the third reduction of its earnings forecast in a little bit more than a year (Ante, Grundberg, & Troianovski, 2012; Blodget, 2012; Siilasmaa, 2019). Moreover, the company’s credit rating was downgraded by three rating agencies in spring 2012. First Fitch Ratings downgraded Nokia from BBB- to BB+ in April (Savitz, 2012). Shortly after its announcement, Standard and Poor’s did the same (Cox & Virki, 2012). One month later, Moody’s downgraded Nokia to BA1 (Duronio, 2012). In May 2012, the firm’s share price on the New York Stock Exchange dropped to the lowest point since March 1996 (Yahoo! Finance, n.d.). The decline of Nokia’s share price had an impact on the share prices of its subcontractors and suppliers, meaning that they sank as well (Siilasmaa, 2019).

Furthermore, the Lumia phones had quality issues, and their rump-up was still slow. Even though the Lumia 900 had positive feedback, overall sales for Lumia were not good. When Microsoft
announced that the upgrade from Windows Phone 7.5 to Windows Phone 8 would mean that all apps needed to be adjusted to the new OS, the situation became worse. Applications developed for Windows Phone 8 did not work on phones with an older Windows OS. Thus, app developers decided to no longer support older operating systems than Windows Phone 8. When Microsoft announced that it would launch the Surface tablet on June 18, 2012, it forced Nokia to think about their future cooperation. There was no announcement in advance for Nokia, so the company had no heads-up. Nokia did not expect this move from Microsoft which is the reason why there was no restriction for Microsoft to manufacture devices for its OS in their agreement (Siilasmaa, 2019).

Therefore, the company’s management team generated four scenarios of Nokia’s future in the smartphone market. The first scenario was about renegotiating with Microsoft in order to keep the cooperation alive. Introducing a cloud device platform based on HTML5 (an open web platform for which developers can create apps that are used by all browsers so they can be utilized by all operating systems) was the next scenario. Nokia had thought about this already in 2011. At that time, the company estimated it would need less than three years until such a platform was developed. Consideration of other non-Android options was the third scenario. The first three scenarios did not exclude each other, so all three could have happened at the same time. The last scenario was about moving to Android and included two options. The first option was about creating an Android device internally which would have taken about 9 to 12 months. However, this was almost impossible to do for Nokia due to their agreement with Microsoft: It was not allowed to develop any Android devices for the duration of their agreement. Also, if the company had tried to develop them in secret, it was most likely that it was discovered by Microsoft or anyone else sooner or later. The other option was buying an enterprise which did already ship smartphones that are running with Android. This option would have meant automatically losing control because Nokia’s cash flow was low and its share price down (Siilasmaa, 2019).

At the beginning of 2013, Microsoft and Nokia started to talk with each other about their cooperation and its future. For this purpose, Nokia’s management level created some scenarios about the future of this cooperation and the company. Roughly summarized the first scenario plan was about Microsoft acquiring Nokia (partly or completely). The next two were about Microsoft becoming a handset manufacturer either externally (by acquiring another handset manufacturer than Nokia) or internally (by launching a smartphone production). During the conversations the two companies had, it became clear that Microsoft did not want to start their own handset production because it would have taken too much time. However, it wanted to buy either Nokia’s
D&S division or another company. On April 22, 2013, there was the first round of four merger and acquisitions discussions between Nokia and Microsoft. This first round failed due to opinions about the valuation that were too different (Siilasmaa, 2019). With the next negotiating round, they changed the way of how those discussions had proceeded. Instead of having a room full of people, they decided to first discuss everything in small groups. This helped to create trust between the two companies. However, also this round was not successful. Nevertheless, both companies managed to negotiate a deal in June. The deal only needed to be approved by the enterprises’ boards. This time the deal was off because Microsoft’s board rejected it. At the same time, Microsoft informed Nokia that it would not buy another handset manufacturer. So, the only option was to start another round of negotiations. On July 21, 2013, there was a deal containing the sale of Nokia’s D&S division together with all required licenses for €5.44 billion (Siilasmaa, 2019). The deal was announced on September 3, 2013, and the global press reacted positively about it.

Besides the Microsoft deal, Nokia made another deal with Siemens about NSN. In spring 2013, after the joint venture contract ended, Siemens announced that it wants to sell its share. In the beginning, NSN was a money-losing company, but at the time of the announcement, it seemed like NSN turned the corner. In 2009, Nokia and Siemens spent €250 million each to NSN in order to ensure its survival. Three years later, both companies agreed to invest another €500 million each. Together with the €1.5 billion from a revolving credit facility, they approved the plan to restructure NSN. In the same year, Nokia’s board constituted a committee which analyzed NSN. It developed several plans for selling NSN. All of them involved to buy out Siemens for which Nokia needed an investor. The next step was about merging with Alu, a French publicly listed company, which is one of NSN’s competitors in the wireless infrastructure industry. In June 2013, Nokia’s board and management decided to buy Siemens’s shares if they are willing to sell it at a reasonable price. They agreed that Nokia would pay €1.2 billion in cash for the shares. In addition, Siemens loaned the missing €0.5 billion to Nokia. So, NSN was entirely owned by Nokia. The deal with Siemens had a positive impact on Nokia’s share price: it increased by 5%. Later, Nokia managed to persuade Microsoft to finance its deal with Siemens. NSN will become the core of the
new Nokia (Abbound & Kinnunen, 2013; Siemens will großen Anteil an NSN verkaufen, 2013; Siilasmaa, 2019).

2.4 The reinvention of Nokia

The transformation of Nokia to the company it is today started before the deal with Microsoft was done. When Risto Siilasmaa became chairman of the board, he changed some fundamental things: He created together with the board the ‘Golden rules’, which were about how the board is going to operate in the future. Additionally, they determined some principles about decision-making and values (Siilasmaa, 2019). Those rules in its latest version can be found in appendix 2. Moreover, he led the Board with the entrepreneurial leadership style which consists of ten components:

1. Hold yourself accountable

   It means that people, who care about everything, are willing to go the extra mile because they feel accountable for it. Furthermore, it is important to show everyone else that someone cares about those things, so that unacceptable things will not become somehow acceptable (such as the Symbian build-time issue).

2. Face facts

   Facts should always be looked like something good. Bad news is good news because without it people would not know what the situation really is. Therefore, everyone should be encouraged to tell the bad news. (For instance, Nokia would have been able to recognize its issues earlier, if the problems (bad news) had been told to the top management.)

3. Be persistent

   If there is a problem and a person gives up, this person will not find a solution. However, if the person is persistent, he/she will find something that solves the problem.

4. Manage risks

   It is not possible to avoid taking risks, but there is always the possibility to choose which one will be taken and which one will not be taken. This decision should be based on analytical thinking and be done deliberately with open eyes.
5. Be a learning addict

‘To stop learning is to stop living.’ (Siilasmaa, 2019, p. 137). There is always something important to learn and improve yourself.

6. Maintain an unwavering focus

Rather than trying to solve small issues that are not going to enhance the situation in a proper way, focus on the essential things (time effort versus outcome).

7. Look to the horizon

It is important to spend time worrying about the future (horizon) and its potential problems so the person will not be surprised about suddenly occurring issues (like Nokia was with the iPhone and the further development of the cell phone market).

8. Build a team of people you like and respect

In order to become successful, everyone needs a team of people that the person likes, respects and that are loyal to him/her, because they will contribute to the person’s happiness, and happy people are doing better work.

9. Ask why

Nowadays, people tend to ask what instead of why. Of course, it is important to know what exactly will be done. However, it is more important to know why this what is beneficial for the company.

10. Never stop dreaming

If a person stops dreaming, he/she stops to believe that it is impossible to create something new and that the world will remain as it is (Siilasmaa, 2019).

Moreover, Mr. Siilasmaa believes that in order to lead with entrepreneurial leadership, you need to be a paranoid optimist, which means that on the one hand, it is about getting prepared for potential problems. On the other hand, it means being optimistic and convinced that there is always a solution. This implies that a leader, who is a paranoid optimist, will develop several scenarios about how the emerged problems could be solved (from the worst till the best case). Nokia did this when it started to plan all the different scenarios about its future (regarding the
cooperation with Microsoft and NSN). With scenario mapping, the company tried to make decisions instead of taking them. Nokia was surprised by many things and had to take them as they were. For instance, it was surprised by Apple’s iPhone (Siilasmaa, 2019). If the firm had imagined that someone would launch such a device, it could have been the one introducing it. But Nokia did not, so it was surprised which led to a company crisis. Scenario mapping is about seeing the big picture which offers the possibility of making choices. It also makes it easier and faster to react to an occurred situation if there is already a plan for it. Additionally, the company started to transform itself into a firm with an atmosphere of transparency and trust, and it started with the board. Mr. Siilasmaa added more time to the board meetings and changed the content of it. Furthermore, he and the board sent a clear message to the management team saying that they will appreciate it, if one of the managers is telling them that he/she has a problem and need some advice because he/she either does not know how to address it or which of his/her solutions will be the right one. However, if the managers had only one solution for their issue, they will not earn the board’s respect. With this approach, the company’s board wanted to prevent that problems and bad news are not reported to superiors. In addition, there were many other small changes that were initiated by Nokia’s new chairman of the board, such as changing his office into an open office (like everyone else had including the CEO) or taking a photograph of a departing CEO or chairman instead of ordering a painted portrait (in order to save costs) (Siilasmaa, 2019).

After the deal with Microsoft was done, Nokia had to think about its future without the D&S business. Therefore, the company established the New Nokia Steering Group, which was responsible for strategy work. It started with analyses of the three remaining businesses: NSN, HERE (former Navteq) and AT, which consist of the patent portfolio and will later be renamed Nokia Technologies. In autumn 2013, the company decided to build the new Nokia around NSN. On the board meeting on October 31, 2013, the board discussed the structure of the new Nokia. In the end, its chairman had an idea of how the structure could be so that both camps could accept it. One camp preferred a holding company, whereas the other one preferred an integrated organization. His idea was to structure the new Nokia in such a way that it would be a holding company as well as an integrated organization, as it is shown in Figure 7 (Siilasmaa, 2019).
Figure 7 Company structure of the new Nokia

Source: own depiction based on Siilasmaa, 2019, p. 243.

This structure means that there will be only one CEO for the entire group and NSN. HERE and AT will each have a president who reports to the group CEO. Both will be relatively independent entities. The corporate support functions will be shared and taken from NSN due to its size and setup. After the structure was set, Nokia needed to decide on its new strategy. As time passed, it became more and more obvious that it would operate in the programmable world, or as others say in the internet of things (Siilasmaa, 2019). ‘The idea behind the Programmable World is the ability to continuously analyze the real world through billions of miniature sensors, making sense of what is happening based on the data collected and weaving a web that transforms our everyday world into a designable environment.’ (Siilasmaa, 2019, p. 245).

When the deal with Microsoft was completed, Nokia lost its headquarter due to an agreement with Microsoft that each building would belong to it, if more than half of the employees are moving to Microsoft. Therefore, the new headquarter of Nokia was on the NSN campus. On April 4, 2014, the new CEO of the Nokia Group was announced: Rajeev Suri. He was the CEO of NSN since 2009. The enterprise determined four values which were based on old Nokia values from the early 1990s. The should help to transform the different businesses into one company. The four values are:

- **Respect**: the basis for trust
- **Achievement**: feeling accountable for constant improvements
- **Challenge**: never be self-satisfied
- **Renewal**: continuous development of oneself (Siilasmaa, 2019).

In April 2015, Nokia announced that it wants to sell its HERE business. Three German premium car manufacturers, Audi (part of Volkswagen), BMW and Daimler, bought the entity for
€2.8 billion in the summer of 2015 (Bryant, 2015). Already, at the time when Nokia was busy due to its deals with Microsoft and Siemens, ALu approached the company about cooperating with or buying NSN in order to strengthen its market position. In autumn 2014, both companies started serious discussions about a merger. However, the situation changed a little bit due to ALu’s troubles with its restructuring process. Thus, the discussions were not about ALu’s wireless unit or the entire company, but vice versa. There were discussions about acquiring only ALu’s wireless unit or the entire company. In January 2015 it became clear that ALu’s leadership had lost faith about ALu surviving alone. Moreover, the acquisition was in favor by the management team, the board and the representatives of the two labor unions. Tough, Nokia was still not sure if it wanted to buy the whole enterprise. Finally, the company decided to make the acquisition. The takeover was announced on April 15, 2015, and on November 2, 2016, the deal was completed. ALu was sold for €15.6 billion (Nokia, 2016b; Siilasmaa, 2019). Before the deal was done, Nokia only provided the mobile part of the network. Hence, it could not offer a complete solution to its customers. Together with ALu’s portfolio, Nokia was now able to supply its clients with many crucial components for an end-to-end solution. ‘The two companies complemented each other perfectly’ (Siilasmaa, 2019, p. 275). ALu’s weakness, the radio business, which drew the whole firm down, was Nokia’s strength, its mobile broadband business. Together they could fulfill the requirements for large investments in R&D. Due to their different portfolios, there was no overlapping which made the integration of ALu easier. Two of the most demanding customers were part of ALu’s client base which could be only beneficial for Nokia since they want to be competitive. Therefore, they want products that help them to be more competitive. Ultimately, the companies offering them products need to be competitive as well. Bell Labs, a subsidiary of ALu, is an R&D institution that invented many technologies which were fundamental. Its research was awarded with many prizes such as the Nobel Prize (eight times) or the Turning Awards (twice) (Siilasmaa, 2019). Already in January 2016, both companies acted like one firm in order to prevent that both companies are forced to operate like rivals due to not complete ownership of ALu by Nokia. This could have happened if ALu’s shareholders decline the deal in order to earn a higher price for their shares. Hence, Nokia made an agreement with ALu that allowed them to take control as soon as Nokia owned more than 50%. Now, Nokia was able to start the integration and restructuring process. At the end of 2016, Nokia was among the top three companies in the global telecom infrastructure industry and holds its position till today (Siilasmaa, 2019). The world market share of IT network vendors between 2015 and 2018 is depicted in Figure 8. Today, Nokia’s main competitors are Huawei, Cisco, and Ericsson.
Figure 8 Market share of IT network vendors, 2015 – 2018

‘* Year to end of the month shown in the statistic

** On November 3, 2016, Alcatel-Lucent was acquired by Nokia and was merged into the Nokia Networks division.’ (ITCandor, Market share of IT network vendors from 2015 to 2018. In Statista - The Statistics Portal., 2019).


The rise of Nokia’s net sales from €12.5 billion in 2015 to €23.64 billion in 2016 was originated by the completed takeover of Alu in November 2016. Since then the net sales are slightly decreasing as it is illustrated in Figure 9 (Nokia, Nokia's net sales from 1999 to 2018 (in billion euros). In Statista - The Statistics Portal., n.d. a).
Nevertheless, the company’s workforce increased slightly from 2016 to 2017 as it is shown in Figure 10. The rise in 2007 occurred due to the establishment of NSN. In 2013, many employees moved to Microsoft because of the sale of Nokia’s D&S business to it, which led to the large downfall of the workforce (Nokia, Number of Nokia employees* from 2005 to 2017 (in 1,000s). In Statista - The Statistics Portal., n.d. b).


Source: Nokia, Number of Nokia employees* from 2005 to 2017 (in 1,000s). In Statista - The Statistics Portal., n.d. b.
The Finnish economy

This chapter briefly outlines the history of Finland’s economy from 1985 until today. Thereby, the focus is on the relevant events for this work. The chapter is subdivided into three parts. First, it focuses on the last two decades of the bygone millennium. Then, the first years of the new millennium are depicted. Finally, the performance of the Finnish economy over the last decade is discussed.

3.1 1985 – 2000

At the beginning of the 1980s, Finland’s economy grew steadily. Its financial sector was undergoing a rapid structural change such as several other OECD countries. The change aimed to shift this sector in a more market-oriented system due to the internationalization of business and banking. Finland became a full member of EFTA on January 1, 1986. Unemployment was low (at around 5% in 1987) because exports to Western markets grew fast. In 1986, energy taxation was changed in order to improve the country’s competitiveness in the international market. Furthermore, the tax on corporate profits was reduced from 43% to 33%. The economy, in general, was more internationalized than the average of OECD countries (measured by foreign trade as a share of GDP). In addition, between 1981 and 1986, companies invested 30% more (in terms of volume) every year abroad. The ownership of the Finnish industry was restructured in the 1980s. In the period from 1984 to 1986, almost 1,400 firms in Finland changed hands, and 179 foreign companies were acquired by Finnish enterprises. At this time, the Finnish economy was mainly dominated by forestry and its products, and mechanical engineering (OECD, 1985; OECD, 1988).

Up until the collapse of the Soviet Union in 1990/1991, bilateral trade with this country was important for Finland, particularly in the 1970s after the first oil price shock. After, the second oil price rise, Finland could benefit from its bilateral trade conditions with the USSR. It was able to rapidly gain market share in the Soviet Union due to the stagnation of imports from other OECD countries to the USSR. The bilateral trade agreement between both countries was provided that Finnish exports were dependent on imports, which were liable to volatile prices. The Soviet Union imported mainly ships, machinery, and tools from Finland. Also, paper and paperboards, clothing and shoes, food, and chemical products were among the imported goods. Finland imported mainly oil from the Soviet Union. Therefore, when the oil price decreased, Finnish exports to the
USSR declined and forced Finland to a reorientation of its exports. In the mid-1980s exports to the Soviet Union were accountable for about 16% of employment in Finland. Finnish exports to the Soviet Union decreased by 17% in 1987 and continued to decline over the next years. In 1990, these exports represented about 13% of total Finnish exports, and one year later only about 5% (OECD, 1988; OECD, 1989; OECD, 1992).

After overheating at the end of the 1980s, the country went into a recession and banking crisis during the early 1990s. Exports dropped in 1989, which first had mainly an impact on the output of export-related industries (including forestry). In early 1990, domestic demand weakened throughout the country (OECD, 1991). In the second quarter of that year, ‘private sector investments, corrected for seasonal variations, dropped by an annualised rate of close to 27 per cent’ (OECD, 1991, p. 12). The recession led to a drastic increase in the unemployment rate as it can be seen in Figure 11.

![Figure 11 Unemployment rate (in %), persons aged 15–64](image)


While exports to the Eastern European countries decreased, exports to the unified Germany increased strongly in 1991 due to the high demand for the reconstruction of Eastern Germany. Finland’s corporate sector faced increased financial difficulties. Between 1990 and 1991, the number of bankruptcies nearly doubled. The Government lowered the income tax rate for both personal (highest tax rate from 51% to 39%) and corporate income tax (from 33% to 19%). During these years, Finland harmonized its provisions with the EC regulations due to negotiations
between EC and EFTA countries about the establishment of the EEA. The EEA provided its members access to the single market, and the freedom of moving goods, services, capital, and labor. In March 1992, the country applied for membership of the EC. In order to become a member of the EU, Finland had to adjust its regulations regarding its agricultural sector, which was in the past to a high degree protected and subsidized (OECD, 1992).

Exports started to increase rapidly in 1992. Whereas export growth in Finland’s traditional export markets in OECD-Europe stagnated, exports to Asia and the United States rose strongly. Moreover, exports to former COMECON countries recovered considerably. Imports remained weak. During the 1990s, Finland was undergoing privatization and deregulation of its economy, which aimed to be more market-oriented. Before the process of privatization started in the early 1990s, the Finnish state was largely involved in the business sector through direct ownership of companies. The telecommunication sector has been deregulated. By the end of the 1990s, full liberalization of the telecommunication and electricity market was achieved (OECD, 1995; OECD, 1999).

After three years of negative GDP growth, Finland’s GDP started to increase in 1994 (see Figure 12). In the same year, the unemployment rate peaked (at about 19%). Then it started to fell slowly and dropped to the euro area average by the end of 1998 (Official Statistics of Finland (OSF), 2019; OECD, 1999).

![Figure 12 GDP year-on-year change in %, 1985 – 1999](image)

In 1995, Finland became a member of the EU, which confirmed the trend towards a more open economy. As it is illustrated in Figure 13, the importance of Finnish export industries changed in the period from 1970 to 1995. Whereas the food and paper industry declined, metal and engineering, in particular, telecommunication goods, gained primeness. In addition, the economy shifted gradually from primary to higher value-added producer goods (OECD, 1997). In contrast to the industrial output (with exempt of electronic equipment), which began to fall in mid-1998, the electronic equipment industry’s performance rose by 38% in 1998. In the same year, Finland’s GDP per capita was above the EU average. Ownership of companies in Finland became more internationalized. Foreign-owned enterprises achieved better economic results than those owned domestically. Foreign direct investments and foreign portfolio investment influenced productivity and employment positively and helped the country to recover from its recession in the early 1990s. Furthermore, those investments had an impact on the corporate governance of Finnish companies. Whereas they had aimed to gain a robust turnover growth and secure existing jobs, they then focused more on a rise in shareholder value, which affected the companies’ profitability positively, by the end of the 1990s (OECD, 1999).

Figure 13 Finland’s exports by industry in percent of total exports

Source: OECD, 1997, p. 15.

On January 1, 1999, Finland joined the euro area. A consequence of the recession was a structural change in the banking sector through restructuring and merges. The banking sector adopted itself quickly to new technologies (for instance, the internet). A rapid increase of internet-banking and
telebanking happened in the late 1990s (with almost two million clients in 1999). In 2000, banks in Finland were well-developed in offering internet services. Two Finnish companies had a strong impact on the development of the Helsinki stock exchange: Nokia and Sonera. Together they accounted for three quarters of total stock exchange value and turnover. At the Helsinki stock exchange, share prices rose by 126% in 1999. In the same year, the growth of business investment decreased by about 5% (OECD, 1999; OECD, 2000).

In the latter half of the 1990s, the electronic equipment industry was the major reason for the growth of the Finnish economy. Between 1994 and 1999, the output growth of this industry was 25% per year. In general, this sector increased the economy’s orientation towards exports (OECD, 2000).

Within a short period of time, Finland became a knowledge-economy. According to Dahlman & Chen (2006), a knowledge economy can be defined as an economy ‘that utilizes knowledge as the key engine of economic growth. [...] [The] knowledge is acquired, created, disseminated and used effectively to enhance economic development.’ (Dahlman & Chen, 2006, p. 4). In such an economy, networking or inter-firm contracts are important. Thereby, firms get access to knowledge resources of other companies of which they are depended in order to encourage innovation. The strategic significance is of greater importance than the product volume and cash flow between the cooperating firms. A cluster can evolve from a network that consists of interdependent companies. It does not necessarily mean that all firms within the cluster have direct relationships with each other. However, the whole cluster does benefit from the intra-cluster interactions, which yield spillovers and positive external effects. Business companies, as well as non-business organizations (such as universities), are part of a cluster. Finland shifted its focus from raw material-based industries towards high technology goods (especially telecommunications equipment). The country’s ICT cluster developed and made Finland one of the leading countries in this area. (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000; Blomström, Kokko, & Sjöholm, 2002). Its structure is depicted in Figure 14.
The key industries are the core of the cluster. In the case of the ICT cluster, those industries are the information and communication equipment industry and the information network operation industry. Both are selling their products to the buyers or appliers, that in turn demand good and innovative products. Therefore, the companies within the cluster are challenged to meet their demands. Input of specialty is provided by the supporting industries. Furthermore, the related industries offer complementary products and/or share activities in the value chain. The cluster enterprises’ functional preconditions are enhanced by associated services. If a cluster is viable or not can be indicated, for instance, by its performance on the international market. It is measured by a country’s specializations in the cluster goods. The cluster’s competitive advantage is strongly dependent on input factors, which were created and specialized. In particular intellectual capital, such as R&D, national innovation systems, skilled labor, and knowledge infrastructure, is vital for it (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000).

The ICT cluster in Finland can be traced back to the 1880s when several private operator licenses were distributed with the aim to circumvent Russian telegraph regulations. With its independence in 1917, Finland established a public telephony operator and regulator in order to conduct the telegraph and military telephone network. Thus, the Russians were left behind. Moreover,
there were various hundred private telecommunications operators in the 1930s. This dual market structure was the basis for balanced competition. In 1971, Finland launched its first mobile telephone network. The country’s public sector was a demanding customer for the ICT sector. Therefore, it had a crucial role in the development of this sector, for instance, with the agreement of the Nordic telecommunications administrations about a common analog mobile network (NMT). The creation of a Nordic mobile telephony market and generating competition was the aim of the establishment of the NMT in the beginning of the 1980s. The world’s first GSM phone call was made in Finland in 1991. This implies the country’s leading position in ICT. The ICT cluster demanded much-skilled labor, especially in the 1990s. Due to the chronic shortage of skilled labor force, the recruitment of the firms within the cluster was not as high as it could have been. An increase in the quantity of vacancies at higher education institutions was the government’s reaction to this situation. As a result, it was possible to accept more people at those institutions. The number of people accepted at universities almost doubled, and at polytechnics, it almost tripled within five years (Ali-Yrkkö J. , 2001) (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000; Hyytinen, Paija, Rouvinen, & Ylä-Anttila, 2006; Rouvinen & Ylä-Anttila, Finland – A Prototypical Knowledge Economy?, 2006).

Between 1990 and 1997, Finland’s degree specialization in the ICT cluster rose substantially. In 1999, 14% of total Finnish exports were telecommunications products. Hence, other ICT goods were only of minor importance for exports from Finland. Nokia was crucial for the development of the ICT cluster. However, it was more than just Nokia. The cluster would have never been as successful as it was without other advanced companies. One of Finland’s advantage was its early openness to foreign equipment producer in the telecommunications market. It enabled the country to develop its technological competence in this field. Since the very beginning, there were private and public network operators for the telephone network in Finland. Due to their competition, technological development in Finland was quick. The country held a leading position in this area decades before the ICT cluster emerged. Already at the end of the 1990s, the ICT cluster in Finland was very international. Foreign companies sought to settle in order to absorb technological spillovers. This happened mainly due to Finland’s good education skills, which led to skilled labor, innovative enterprises, and a high level of R&D. On the other side, Finnish firms had to invest in foreign markets for expanding their market potential and customer base, as well as following a vital client. The global competition forced many small companies in Finland to specialize in a niche market in order to be successful (Ali-Yrkkö, Paija, Reilly, & Ylä-Anttila, 2000).
3.2 2000 – 2007

The ICT sector experienced a downturn at the beginning of the new millennium. Exports of the Finnish electronic equipment industry declined in general in the early 2000s due to lack of foreign demand. Moreover, second-generation systems were shipped less than before, which led to a slowdown of telecommunication network equipment exports. Nonetheless, it seemed that the Finnish electronic equipment industry performed better than its competitors and managed to gain market share. Not only exports of the electronic equipment industry dropped, but also exports of the forestry and other industries. The price of ICT products decreased which had a negative impact on the merchandise export and import prices. As a result of the difficulties experienced by the ICT sector, it announced layoffs, which were considerable for the sector. Nevertheless, those job cuts were relatively small concerning the total employment in Finland (OECD, 2002). R&D expenditures were high and increased in Finland. The ICT sector was accountable for about 50% of total business R&D expenditures in the early 2000s. Finland’s government spent about 0.4% of GDP on R&D in 2000. The R&D expenses financed by the country’s government was large in international comparison, although it represented only a small part of total R&D activity. However, the private sector funded about 66% of total R&D. The success of the ICT sector was partly based on the high expenses on R&D (OECD, 2002; OECD, 2003).

The country’s unemployment rate remained high. In the early 2000s, it increased due to the downturn depending on market conditions. Low skilled workers lacked financial motivation to find a job because of the unemployment benefits which they have received. Those benefits were raised in spring 2002. The unemployment rate fell between the years 2000 and 2007 (see Figure 11). Another significant impact on the unemployment rate had young adults that attained education. During that time, they were categorized as unemployed. The proportion of those young adults was greater than in any other OED country. Additionally, most students studied longer than scheduled in their study program. Consequently, public costs increased. Also, most students started their studies later (median age of 21.5 years) than in many other countries (median age under 20 years). Both factors resulted in late graduation which led to a loss of high-quality labor supply (OECD, 2002; OECD, 2003). Regarding employment, Finland faced (and still faces) the problem of an aging population, leading to an increase in public expenses concerning pensions. Therefore, the country reformed its pension system in 2005. Moreover, the country was (and will be) in need of more young skilled workers in order to maintain productivity. In addition, it was important to increase productivity as well, particularly in the service sector as its productivity was lower than the productivity of the manufacturing sector. Since 2000, especially low-skilled
workers lost their jobs, while jobs for high-skilled adults were increasingly created. It seemed that Finland’s economy was not able to provide more jobs in the low-paid service sector. Furthermore, the older population was not as well educated as young adults. Hence, they worked mostly in jobs that require low-skills which led among others to the high share of older people in the unemployed population. Additionally, old people are not as flexible as younger unemployed persons due to deeper roots. However, also families are more inflexible than younger job seekers because of the high costs regarding geographical relocation for families. Thus, the lack of labor mobility was a major problem of Finland’s labor market. (OECD, 2004; OECD, 2008).

The agriculture sector experienced high subsidies, not only from the country’s national aid but also from the EU. Besides this direct aid, the sector also received indirect aid due to prices paid by consumers, that are in many cases higher than world market prices. In contrast, national aid regarding the manufacturing sector and other sectors remained low and lower than the EU average. Furthermore, in many network industries companies were still in public ownership, leading among others to an increase of competition difficulties (OECD, 2002; OECD, 2003; OECD, 2004).

In 2002, the Finnish economy started to recover due to an increase in exports of the ICT sector as well as forest-based exports. Those exports depended strongly on the performance of the ICT sector. Also, forestry recovered modestly in 2002. Finnish exports benefited from its markets in terms of geographical diversity. 60% of total exported goods were exported to other OECD countries in 2001. Non-OECD Europe countries and Asia, which is particularly significant for the electronic industry, were the countries in which Finland was more involved than almost any other country in the euro area. Whereas the volume of exports increased in 2003, their value decreased due to a decline in export prices, in particular of ICT goods. Tax rate remained as one of the highest of the OECD countries. Regarding developing and using e-government, Finland was one of the leading countries. For the whole public sector of Finland, a common portal was introduced in 2002 (OECD, 2003; OECD, 2004). The experienced downturn at the beginning of the new millennium was also reflected in the GDP growth rate which decreased between 2001 and 2002. Afterwards, it increased with one exception in 2005 (see Figure 15).
The performance regarding the production of high- and medium-technology producers in Finland was good. Those sectors managed to increase their share of value added. Though, their share of total value added remained relatively small. Goods of these sectors accounted for about half of total Finnish exports in 2005. That share was even lower than in China. This reflected not only the importance of exported low-tech goods but also the rise in outsourcing of the production of those goods to lower-cost countries. The importance of low-grow sectors declined. Nonetheless, their share of total value added was higher than in most of other advanced economies. Surprisingly, the Finnish economy had a low import penetration, which is important, especially for small countries, in order to raise competitive pressure on domestic markets (OECD, 2004; OECD, 2008).

3.3 2008 – today

The last years of the 2000s were scarred by the global financial crises and recession in 2008/2009. Finland’s GDP growth was minimal in 2008, and in 2009, it was negative to a high extent (see Figure 16). The next following years were difficult for Finland. However, the country finally started to recover since a few years. Due to a judiciously way of managing its financial sector, Finland was not affected by the direct effects of the worldwide financial crises. Nevertheless, the country was hit hard by the global recession and the collapse in trade. Export volumes decreased, mainly because Finnish exports were highly dependent on ICT and capital goods. Furthermore, Finland’s exceptional engagement in countries, that had been strongly impacted by the crisis, was another reason why the country was more affected than most other OECD countries (OECD, 2010).
Despite the downturn, the unemployment rate rose less than expected. This was possible through subsidized temporary layoffs. Also, high fixed costs of firing and hiring employees in Finland together with the apprehension of skilled worker shortages in the future (as happened before the recession) might have caused a hoarding of employees by companies. Moreover, the downturn was driven by less labor-intensive export sectors which contributed to the not as much as expected increase of unemployment. Unit labor cost surged faster than in many countries of the euro area since 2000. This happened due to a rise in wages, which were among the highest in the OECD, and a decrease in productivity performance (OECD, 2010; OECD, 2014). Productivity in public services declined between 2000 and 2008 by more than 10%. The fragmentation of municipal services is the main problem regarding the achievement of better efficiency. This is attributable to the small size of the municipalities which makes it impossible for them to gain economies of scale. Furthermore, due to their small size, they face difficulties in hiring qualified workers. Part of the municipal responsibilities are health and long-term care for which demand rose. Therefore, municipalities are even more pressurized concerning fiscal resources. The increase of the size of municipalities respectively the cooperation between them was the aim of municipal reforms since 2005. In that year, there were about 416 municipalities in Finland and only 336 in 2011. However, the median population remained low: around 6,000 (compared to other Nordic countries). Economy-wide productivity was influenced by the productivity of the public sector. The first one was mainly affected by the strong drop of value added per worker in the ICT sector which happened at the same time as the recession (OECD, 2012).
In 2014, the Finnish Prime Minister, Alex Stubb, blamed Apple that it would have caused the ongoing troubles of the Finnish economy. According to him, the iPhone was responsible for the downfall of Nokia, and the iPad ruined the Finnish paper industry (Yle, 2014). Nevertheless, there are also other reasons why the Finnish economy was suffering, such as the recession in Russia, which caused a collapse of exports to Russia. Due to the collapse of electronics and forestry, Finland’s economy was undergoing a deep restructuring. The chemical and metal sector, as well as services, could not compensate the losses made by the electronic sector and forestry (OECD, 2014; OECD, 2016).

Energy and food prices increased worldwide in 2008, which led, together with the rise in unit labor costs, to an increase in inflation in the euro area. In contrast to most of the other countries within the euro area, the inflation in Finland did not decrease in the same way. Hence, Finnish inflation was among the highest in the euro area, which was a harsh change for the country as its inflation had been among the lowest before mid-2008 (OECD, 2010; OECD, 2012). In 2009, credit conditions were tightened. As a result, it was difficult for companies to access loan. Even after the conditions were loosened, it remained hard for small firms to obtain credit. In 2013, the situation for SME was better. They could access credits easier than in most other euro area countries (OECD, 2010; OECD, 2014).

In 2010, R&D spending was nearly 4% of GDP, which was funded to three-quarters by private sources (OECD, 2012). Three years later, Finland’s expenditures on R&D were about 3.5% of GDP. The private sector funded more than two-thirds of the spending. The level of R&D spending in Finland was among the highest in the OECD. Nowadays, the country focuses on clean technologies, and it has a leading position concerning energy efficiency, clean industrial processes, and bio-energy (OECD, 2014). In 2014, almost 0.12% of GDP was spent on R&D expenditures that were used to do research on energy technologies. Among the OECD countries, this share was among the highest. However, since 2013, Finland’s R&D spending declined in real terms, which is mainly a reflection of the difficulties concerning the ICT sector, that accounts for a large share of R&D. This emphasis one of the main weaknesses of the Finnish innovation system: Non-ICT sectors have a low level of R&D and patents. Nevertheless, Finnish R&D spending seems recently to recover slowly (OECD, 2016; OECD, 2018).

At the beginning of 2017, Finland’s economy began to recover as exports increased. From 2017, unit labor cost declined by about 4%, which should raise employment. Moreover, changes regarding unemployment benefits were made to the end that work incentives were strengthened. The unemployment rate declined but remained over 5% (see Figure 11). In September 2017, Nordea,
the largest bank in the Nordic countries, announced to move its headquarter to Helsinki. By doing this, the bank has to follow the regulations and rules of the European banking union. Furthermore, this will strengthen the profile of Finland’s capital city as a regional financial center (OECD, 2018). In order to deal with the problem of an aging population, Finland implemented a pension reform in 2017. Thereby the retirement age will be raised from 63 to 65 until 2027. This shall happen in a gradually rise, and after 2030 the retirement age will be linked to life expectation (Hietaniemi, n.d.; OECD, 2018).

The Finnish Government searched for possibilities to reform the social security system. The new system shall include less bureaucracy and increase work incentives. Therefore, an experiment about a UBI was launched in 2017. Two thousand unemployed persons, aged between 25 and 58, received €560 per month over two years. The participants were chosen randomly. During 2019 and 2020, the results of the experiment will be published (Kangas, Jauhiainen, Simanainen, & Ylikännö, 2019). Preliminary results were published in February 2019. They show that the UBI did not affect the employment status during the first year of the experiment. Moreover, bureaucracy was not reduced for individuals with children in the treatment group because they had to apply for unemployment benefits in order to receive child increases just as before (Hämäläinen, Kanninen, Simanainen, & Verho, 2019). Nevertheless, the results expose that the UBI had a significant effect on the person’s wellbeing. Though, these findings need to be considered with caution since not all data has been evaluated yet (Kangas & Ylikännö, 2019).
In order to demonstrate whether the Finnish economy was or/and is influenced by Nokia, various KPIs will be considered. KPIs ‘are a set of quantifiable measures that a company uses to gauge its performance over time’ (Investopedia, 2018). This chapter is divided into three parts. First, it focuses on the time when Nokia was still rising and the world market leader in cell phones. Then the impact of Nokia on the Finnish economy during the company’s downfall is outlined. Finally, how and if Nokia does influence the Finnish economy today is discussed.

4.1 Before the downfall

Nokia had an essential impact on the GDP of Finland (see Figure 17). In the early 1990s, Nokia accounted for less than 1% of Finland’s GDP. As the Finnish economy recovered from its recession and Nokia’s net sales increased, the company’s share of GDP and exports rose as well. In 2000, its share of Finland’s GDP was about 4%. During the following seven years, the share remained high (above 2.9%). The global recession in 2008/2009 caused a drop in Nokia’s share of Finland’s GDP. (Ali-Yrkkö J., 2010; Kelly, 2013). The company’s share of Finnish exports increased during the 1990s. Nokia’s exports accounted temporarily for more than 20% of total exports of Finland. Due to a faster increase of exports from other industries, Nokia’s share decreased in the 2000s. Figure 18 illustrates the company’s contribution as well as the contribution of the electrical and optical equipment industry to Finland’s GDP growth. In 2000, Nokia was responsible for almost half of Finland’s GDP growth. However, the firm has negatively contributed to Finnish GDP growth in 2008 and 2009, which happened because of the global economic crisis. The graph also reveals that the contribution of the electrical and optical equipment industry has developed similar to Nokia’s contribution (Ali-Yrkkö J., 2010).

In 2000, Nokia accounted for a little more than 1% of total employment in Finland. The following years, this share decreased slightly to 0.89% in 2009. (Nokia, 2004; Nokia, 2005; Nokia, 2006; Nokia, 2007; Nokia, 2008; Nokia, 2009; Nokia, 2010; Statistics Finland - Labour force survey, n.d.). The decline of employees in Finland can be explained with high labor costs, which made it too costly for the company to retain the main production in Finland. Nokia focused more on R&D in its home country. In fact, Finland was always one of the major countries for the company’s R&D activities (Bartlett, 2005; Kelly, 2013). Nokia’s share of employment in Finland is depicted in
Table 2. Nevertheless, the table shows only Nokia’s direct effects on Finnish employment. It does not take into account employees from other firms which benefited from Nokia’s existence.

Figure 17 Nokia as a share of exports and GDP, in %


Figure 18 Contribution of Nokia and the electronics industry to Finnish GDP growth, in %

### Table 2 Nokia’s share of employment in Finland, 2000 - 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Employed persons in Finland (age 15-64)</th>
<th>Nokia employees in Finland (Dec. 31)</th>
<th>Nokia employees in Finland as a share of total employed persons in Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,318,000</td>
<td>24,379</td>
<td>1.05%</td>
</tr>
<tr>
<td>2001</td>
<td>2,350,000</td>
<td>22,246</td>
<td>0.95%</td>
</tr>
<tr>
<td>2002</td>
<td>2,354,000</td>
<td>22,535</td>
<td>0.96%</td>
</tr>
<tr>
<td>2003</td>
<td>2,345,000</td>
<td>22,274</td>
<td>0.95%</td>
</tr>
<tr>
<td>2004</td>
<td>2,345,000</td>
<td>23,069</td>
<td>0.98%</td>
</tr>
<tr>
<td>2005</td>
<td>2,378,000</td>
<td>23,485</td>
<td>0.99%</td>
</tr>
<tr>
<td>2006</td>
<td>2,416,000</td>
<td>23,894</td>
<td>0.99%</td>
</tr>
<tr>
<td>2007</td>
<td>2,459,000</td>
<td>23,015</td>
<td>0.94%</td>
</tr>
<tr>
<td>2008</td>
<td>2,497,000</td>
<td>23,320</td>
<td>0.93%</td>
</tr>
<tr>
<td>2009</td>
<td>2,423,000</td>
<td>21,559</td>
<td>0.89%</td>
</tr>
</tbody>
</table>

Source: Author’s calculation. Data: Nokia Annual Accounts; Statistics Finland – Labour Force Survey.

In the early 2000s, Nokia accounted for more than 20% of Finland’s tax revenue of corporate income tax. Then Nokia’s share declined to about 12% in 2008 (Nokia, 2004; Nokia, 2005; Nokia, 2006; Nokia, 2007; Nokia, 2008; Nokia, 2009; OECD, n.d.). Therefore, the company’s contribution to the government’s income tax revenue shrank, but it was still significant. However, Nokia benefited from government spending on R&D. The Ministry of Trade and Industry (now Ministry of Economic Affairs and Employment) founded the National Technology Agency (Tekes), that was responsible for supporting enterprises’ efforts concerning R&D and innovation. Tekes’ support consisted of grants and subsidized loans (Ministry of Economic Affairs and Employment, n.d.; OECD, 2012). The share of Tekes’ support for Nokia differed throughout the decades. In the 1970s, this share varied between 5.3% and 9.0% whereas Tekes financed 26.3% of Nokia’s R&D expenses.
in 1980. At the end of the 1980s, Tekes funded less than 4.5% of the company’s R&D expenditures. The National Technology Agency supported more and more firms in the ICT industry in the 1990s. During Finland’s recession, it was essential for Nokia to receive financial support from the government in order to maintain its R&D activities. In the mid-1990s, the share of Tekes’ support for Nokia started to decline and dropped to 1.0% in 1999. Since the new millennium, the government’s support through Tekes accounted for less than 1% of the company’s R&D expenses (0.3% in 2000 and 0.16% in 2009) (Ali-Yrkkö & Hermans, 2002; Ali-Yrkkö J., 2010). However, Nokia increased its R&D expenditures (see Table 3), which indicates that government funding lost on importance for Nokia. Nevertheless, government funding in Finland was in general low. Although the government spent more money on R&D in nominal terms, its share on total R&D expenditures in Finland declined from 14% in 1997 to under 10% in 2009 (see Figure 19). This is attributable to a higher increase in R&D expenditures in the other two sectors, but especially from the business enterprises. Whereas over €2,000 million were spent on R&D by business enterprises in 1998, almost €4,850 million were spent in 2009. On the contrary, R&D expenditures of the Finnish government and private non-profit organizations were more than €440 million in 1998 and more than €650 million in 2009 (Statistics Finland, 2018).

![Figure 19 Share of R&D expenditures by sectors in Finland, in %, 1997 - 2009](image)

### Table 3 Nokia's R&D expenses, 1998 – 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D expenditures €m</th>
<th>as % of net sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>1,150</td>
<td>8.6%</td>
</tr>
<tr>
<td>1999</td>
<td>1,755</td>
<td>8.9%</td>
</tr>
<tr>
<td>2000</td>
<td>2,584</td>
<td>8.5%</td>
</tr>
<tr>
<td>2001</td>
<td>2,985</td>
<td>9.6%</td>
</tr>
<tr>
<td>2002</td>
<td>3,052</td>
<td>10.2%</td>
</tr>
<tr>
<td>2003</td>
<td>3,760</td>
<td>12.8%</td>
</tr>
<tr>
<td>2004</td>
<td>3,733</td>
<td>12.8%</td>
</tr>
<tr>
<td>2005</td>
<td>3,825</td>
<td>11.2%</td>
</tr>
<tr>
<td>2006</td>
<td>3,897</td>
<td>9.5%</td>
</tr>
<tr>
<td>2007</td>
<td>5,647</td>
<td>11.1%</td>
</tr>
<tr>
<td>2008</td>
<td>5,968</td>
<td>11.8%</td>
</tr>
<tr>
<td>2009</td>
<td>5,909</td>
<td>14.4%</td>
</tr>
</tbody>
</table>

Nokia's share of total R&D in Finland was one third and of total business sector R&D more than 40% in the mid-2000s. In order to achieve a high-level of R&D results, the company needed highly skilled employees. Therefore, Nokia supported a rise of offered study places at universities and polytechnics that were related to its operational field. Additionally, it strengthened its cooperation with them as well as research institutes. Projects done in collaboration with universities were used for recruiting new employees (Ali-Yrkkö & Hermans, 2002; Hyytinen, Paija, Rouvinen, & Ylä-Antilla, 2006). Nokia’s R&D workforce in Finland rose significantly between 1993 (less than 4,000) and 2000 (over 12,000) (Ali-Yrkkö J., 2010). In the first half of the 2000s, over 50% of Nokia’s employees in Finland (more than 20,000) worked in R&D. Between 2006 and 2009, the number of Nokia’s employees in Finland decreased by less than 10%. In the same period, employees
working in R&D in Finland declined by more than one third. The share of Nokia’s R&D workforce to total workforce in Finland was almost 40% in 2009 (Nokia, 2004; Nokia, 2005; Nokia, 2006; Nokia, 2007; Nokia, 2008; Nokia, 2009; Nokia, 2010).

Nokia’s impact on the Finnish economy cannot be examined by only looking at the company and its direct effects on the economy. As mentioned above, the firm cooperated with research institutions and universities, especially those with a focus on technology, in research projects. Through the projects, Nokia could acquire research information and recruit new employees. Moreover, the firm had also cooperation with other companies concerning production, and research and development. Its ‘first tier’ partner network was composed of about 300 companies in 2000. Over the years, the nature of Nokia’s cooperation with its suppliers changed. Back in the 1980s, Nokia mainly cooperated through traditional subcontracting. However, there were some companies with which Nokia worked closely. The company had no systematic cooperation strategy at this time. This changed in the first half of the 1990s when the company searched for partnerships that helped to deal with the market expansion and the challenge caused by shorter product lifecycles. At the end of the 1990s, Nokia started cooperations with other firms in R&D. In the new millennium, the company started to establish partnerships also in R&D. Nevertheless, those different stages of cooperation did not exclude each other, meaning that Nokia used subcontracting as well as partnerships (Ali-Yrkkö J., 2001; Ali-Yrkkö & Hermans, 2004).

Cooperation between Nokia, other companies, universities, and research institutions also happened in Tekes’ technology programs. Every participant of a project within a technology program of Tekes was involved in all major stages of the project (planning, implementation, and monitoring). At the end of the 1990s, an increasing number of Nokia projects funded by Tekes were part of Tekes’ technology programs. Through such R&D cooperations, knowledge diffuses from one participant to another. This process represents the externalities, which are highly significant for the society. Nokia cooperated with companies of all sizes (small, medium and large) and different industries (such as contract manufacturers, software houses or operators). Figure 20 shows the cooperation network of Nokia in two Tekes programs: Electronics for the Information Society (ETX), and Telecommunications: Creating a Global Village (TLX). Both programs include business as well as research projects. Only companies that had three or more cooperation projects with Nokia are included in the figure. Therefore, the actual cooperation network concerning these two programs was greater because Nokia also had cooperation projects with numerous other parties, which are not depicted in the figure since the number of cooperative projects with Nokia was less than three (Ali-Yrkkö & Hermans, 2002).
Particularly small enterprises benefited from these cooperations. Due to lack of marketing know-how and channels, that made internationalization more difficult for SMEs, Nokia served as a marketing channel. Furthermore, those companies incorporated their products into Nokia’s products which could have resulted in issues. This was related to the problem that the companies in question ‘have not created their own brand, and not always own the intellectual property rights, which could be marketed or utilised together with other companies’ (Ali-Yrkkö & Hermans, 2002, p. 18). Consequently, the future growth possibilities of these firms could have been hampered. Thus, the process of expanding their customer bases could experience difficulties. Additionally, Nokia did not only cooperate with national universities but also with numerous universities abroad. In total, Nokia had cooperations with more than 100 universities at the beginning of the new millennium (Ali-Yrkkö & Hermans, 2002).

Figure 20 Nokia’s cooperation network in Tekes’ ETX and TLX programs


In Finland, the R&D expenses as a share of GDP was higher than in other EU countries on average. This is also true if Nokia’s share is subtracted from the share of total R&D spending of Finnish GDP (see Figure 21). Nokia essentially influenced the innovation system of the ICT cluster in Finland.
Thereby, not only the company’s own activities concerning innovations were crucial, but also its large cooperation network within the country (Ali-Yrkkö & Hermans, 2004).

The Finnish ICT cluster consisted of approximately 6,000 firms in the early 2000s. It was mainly driven by Nokia and highly specialized in mobile telecommunications. Smaller companies were dependent on Nokia although they tried to gain independence (Paija & Rouvinen, 2004). The company’s turnover accounted for about 66% of total turnover accomplished by all ICT companies (domestic and foreign) that were operating in Finland. Moreover, ICT became apart from metal and engineering, and forestry one of three industrial pillars in Finland. Its share of Finnish GDP grew by 6% in the 1990s. (Hyytinen, Paija, Rouvinen, & Ylä-Antilla, 2006).

Another indicator of Nokia’s impact on the Finnish economy is its share of EPO patent applications in Finland. Whereas the number of non-Nokia applications rose steadily between 1990 and 2001, Nokia’s applications increased rapidly, especially between 1994 and 2001. After the peak of applications in 2001, Nokia decreased its applications, while non-Nokia applications remained more or less constant. This, as well as Nokia’s share of EPO patent applications in Finland, are illustrated in Figure 22. Due to the increased number of patent applications by Nokia in the 1990s, its share surged from about 12% to 55%. The high share indicates that Nokia essentially influenced the domestic technological landscape in Finland (Nikulainen & Pajarinen, 2010).
Figure 22: Nokia’s share of EPO patent applications in Finland, 1990 - 2006


4.2 During the downfall

While Nokia was among the Top 10 EPO patent applicants in 2007, it fell to place 39 in 2011. This came along with a downturn of the company’s patents applications at EPO between 2007 and 2011 by about 450. Nokia accounted for around 17% of total EPO patent applications in Finland in 2011 and for almost 50% in 2013. This rise is attributable to an increase of Nokia’s patent applications at EPO while simultaneously non-Nokia EPO patent applications declined from 2076 in 2011 to 1135 in 2013. That led to a drop of total EPO patent applications in Finland (see Figure 23) (EPO, n.d. a; EPO, n.d. b; EPO, n.d. c; EPO, n.d. d; EPO, n.d. e; EPO, n.d. f). From this, it appears that Nokia started to increase its R&D efforts concerning innovations, whereas other parties reduced them. Nokia’s global R&D expenses as a share of net sales, confirm the trend of refocusing on innovations. While the company spent almost 14% of net sales on R&D in 2010, this share increased by more than 6% to 20.6% in 2013 (Nokia, 2011; Nokia, 2012; Nokia, 2013; Nokia, 2014). With the rise on R&D spendings and patent applications at EPO, Nokia climbed to the 19th place in the top applicants ranking of EPO (EPO, n.d. d; EPO, n.d. e; EPO, n.d. f). Nokia’s share of corporate R&D in Finland was 31% in 2012. The company’s impact on Finnish GDP declined since 2007.
In 2012, its contribution was even negative. According to forecasts, the company has positively influenced the Finnish GDP again since 2013 (Ali-Yrkkö, et al., 2013). Nokia accounted for less than 5% of Finland’s corporate income tax revenues during its downfall with the exception of 2012. In that year the company’s contribution to Finnish income tax revenues was about 25%. This is attributable to first less corporate income tax revenues in general, and second higher tax losses and temporary differences with no tax effect from Nokia (Nokia, 2010; Nokia, 2011; Nokia, 2012; Nokia, 2013; OECD, n.d.).

Nokia’s share of employment in Finland decreased from 0.82% in 2010 to 0.48% in 2012. This implies that Nokia’s impact on employment in the country was small. The unemployment rate affirms it as well: Whereas the unemployment rate rose in 2009, it declined slightly between 2010 and 2012 (see Figure 11). The increase in unemployment happened due to the global recession in 2008/2009 (see subsection 3.3). Between 2010 and 2012, Nokia reduced its number of employees. In Finland, the number decreased by more than 8,000 to 11,767. While almost 15% of Nokia’s workforce was employed in Finland in 2010, this share declined to about 12% in 2012 (see Table 4). Finland was the home of the maturity of Nokia’s workforce for a long time. In 2010, this changed as India and China accounted for more than 20,000 employees each in 2010 (Nokia, 2011; Nokia, 2012; Nokia, 2013). The last production unit in Finland, which was also the last mobile handset plant in Western Europe, was closed in 2013 (Rouvinen & Ylä-Anttila, 2015).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Nokia employees (Dec 31)</th>
<th>Nokia employees in Finland (Dec 31)</th>
<th>Share of total Nokia employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>132,427</td>
<td>19,841</td>
<td>14.98%</td>
</tr>
<tr>
<td>2011</td>
<td>130,050</td>
<td>16,970</td>
<td>13.05%</td>
</tr>
<tr>
<td>2012</td>
<td>97,798</td>
<td>11,767</td>
<td>12.03%</td>
</tr>
</tbody>
</table>

Table 4 Nokia employees, 2010 - 2012

Source: Author’s calculation. Data: Nokia Annual Accounts.

Another reason why the fall of Nokia had no great impact on Finland’s unemployment is Nokia’s Bridge Program, which was launched in 2011. Like mentioned in subsection 2.3, it aimed to help employees to find a new job, become an entrepreneur or offered them training in a profession that is distinctly different from their current one. Globally almost 18,000 employees from 13
countries received aid, and over 1,000 start-ups were founded. In 2013, many of these newly established companies operated in the ICT sector (42%), 21% in professional services and consulting, and the rest was active in other fields (Vanska, 2013). The program was available for 5,000 employees in Finland. From the over 400 established companies in the country, 40% were ICT start-ups, 30% were active in professional services and consulting, and another 30% operated in other fields in 2013. 85% of global participants were satisfied with the offerings of the Bridge program (Pesonen, 2013).

4.3 Today

Between 2014 and 2018, EPO patent applications in Finland declined from 2193 to 1728. In the same period, Nokia’s patent applications at EPO decreased from 1040 to 738. Contrary to total EPO applications in Finland, Nokia had increased its numbers of applications from 866 in 2015 to 1059 in 2016 before they fell again. The company’s share on total EPO patent applications in Finland peaked in 2016 (58.25%). Since then Nokia’s share is declining, and total EPO patent applications remained more or less steady. This implies that the number of non-Nokia patent applications rose. Currently, the company accounts for about 43% of all EPO patent applications in Finland (see Figure 23). Additionally, Nokia increased its position in the ranking of top patent applicants of EPO between 2013 and 2014 (from 19 to 11). In the following years, the company lost positions and was ranked between the 14th and 18th place. Currently, Nokia is ranked at the 20th place. The Top 5 positions are taken among others by Huawei, LG, and Samsung since 2014. (see Table 8 in the appendix 3). Table 9 (see appendix 3) illustrates the European patent applications per million inhabitants by country between 2014 and 2018. Finland was among the top 5 positions with one exception: 2018, in which Germany overtook Finland. Denmark, the Netherlands, Sweden, and Switzerland are the other countries that are ranked between position 1 and 5. Finland’s good ranking is a sign that the country’s innovation system, in which Nokia holds an essential position, is strong (EPO, n.d. d; EPO, n.d. e; EPO, n.d. f; EPO, n.d. g; EPO, n.d. h; EPO, n.d. i; EPO, n.d. j; EPO, n.d. k).

Nokia’s spending on R&D as a share of net sales increased overall between 2014 and 2018 from 19.6% to 20.5%. In this period, the lowest share was 17% in 2015 and the highest 21.2% in 2017. In nominal terms, R&D spending increased rapidly between 2015 (€2,126 million) and 2016 (€4,904 million). Currently, the company invests about €4,600 million in R&D (see Table 5) (Nokia, 2015; Nokia, 2016a; Nokia, 2017; Nokia, 2018; Nokia, 2019).
Figure 23 Nokia’s and Finland’s EPO patent applications and Nokia’s share of Finland’s EPO patent applications, 2011 – 2018

Source: Author’s calculation. Data: EPO Annual Reports.

<table>
<thead>
<tr>
<th>Year</th>
<th>Global R&amp;D expenditures €m</th>
<th>as % of net sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2,493</td>
<td>19.6%</td>
</tr>
<tr>
<td>2015</td>
<td>2,126</td>
<td>17.0%</td>
</tr>
<tr>
<td>2016</td>
<td>4,904</td>
<td>20.8%</td>
</tr>
<tr>
<td>2017</td>
<td>4,916</td>
<td>21.2%</td>
</tr>
<tr>
<td>2018</td>
<td>4,620</td>
<td>20.5%</td>
</tr>
</tbody>
</table>

Table 5 Nokia’s R&D expenses, 2014 – 2018

Source: Nokia Annual Accounts.

Whereas Nokia accounted for about 50% of Finnish BERD in 2010, its share decreased to 20% in 2015. In the same year, Microsoft Mobile represented 10% of BERD in Finland. In general, Finnish BERD declined recently, mainly due to Nokia’s smaller spending on R&D. Nevertheless, over 41% of the country’s BERD is spent on ICT manufacturing even though Nokia reduced its investments (OECD, 2017a; OECD, 2017b). In addition to the decrease of BERD, the government’s spending on R&D declined (see Figure 24). This led to an overall decline between 2011 and 2016. Afterwards,
total R&D expenditures increased slightly. According to the OECD Economic Survey of Finland 2016, the company is recently positively affecting the output growth of Finland.

Figure 24 Research and development expenditure by sector, 2010 – 2018


The company currently employs around 6,000 workers in Finland. More than 50% of them (3,700) are working in R&D (Nokia, n.d. c). The workforce in Finland accounts for about 6% of all Nokia employees. This is a decline of 6% between 2014 and 2018 (see Table 6). This is mainly attributable to the merger with Alu in 2016, which increased Nokia’s workforce abroad. The company accounted for 0.25% of total employment in Finland in 2018, which is a decrease of 0.04% compared with 2014 (Nokia, 2015; Nokia, 2016a; Nokia, 2018; Nokia, 2019; Statistics Finland - Labour force survey, n.d.). In March 2019, Nokia announced that it will reduce its workforce by 280 employees in Finland due to its plans for saving money. The company will provide help for the affected employees concerning finding a new job or founding their own start-up. With one exception, the production site in Oulu, workers all over the country will be laid off (Yle, 2019).
<table>
<thead>
<tr>
<th>Year</th>
<th>Total Nokia employees (average)</th>
<th>Nokia employees in Finland (average)</th>
<th>Share of total Nokia employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>57,566</td>
<td>6855</td>
<td>11.92%</td>
</tr>
<tr>
<td>2015</td>
<td>56,690</td>
<td>6942</td>
<td>12.25%</td>
</tr>
<tr>
<td>2016</td>
<td>102,687</td>
<td>6564</td>
<td>6.39%</td>
</tr>
<tr>
<td>2017</td>
<td>101,731</td>
<td>6359</td>
<td>6.25%</td>
</tr>
<tr>
<td>2018</td>
<td>103,083</td>
<td>6159</td>
<td>5.97%</td>
</tr>
</tbody>
</table>

Table 6 Nokia employees, 2014 – 2018

Source: Author’s calculation. Data: Nokia Annual Accounts.

Nevertheless, it is also important to consider former Nokia employees that were transferred to Microsoft due to the sale of Nokia’s D&S business unit. This affected, 32,000 workers globally of which 4,700 were working in Finland (Yle, 2013a). In 2015, Microsoft announced that it plans to reduce its workforce by 18,000 globally and by up to 2,300 workers in Finland. The Finnish government intervened and provided support for the dismissed, such as government grants or training. Those supportive activities should help the unemployed to establish their own business. Due to the availability of workers, foreign companies started to open offices in Finland. Furthermore, Finland’s government insisted that Nokia, as well as Microsoft, offered aid for former employees concerning re-entering the labor market (Scott, 2015). Therefore, the unemployment was not as strong as one could have expected affected by Microsoft’s and Nokia’s layoffs.

Regarding, the layoffs of both companies, two cities were hit hard: Salo and Oulu. Salo was Nokia’s center of cell phone production in Finland. The city lost a fifth of is local labor force in the 2010s. Its unemployment rate was above the national average in 2014. However, it could have been higher due to the extent of job losses. Salo’s location in the southern parts of Finland, which have a higher population density, helped former employees to find a new job due to more job opportunities. Another reason why the unemployment rate in the city was lower than expected, was the decline of the labor force by 2%. This implies that some of the unemployed found a job somewhere else (Wessman, 2015).
When Microsoft closed its cell phone unit in Oulu in 2014, 2,500 people lost their jobs. Also, in Oulu, unemployment was above Finland’s average unemployment rate. Though, Oulu’s unemployment rate was already above the national average in 2008, meaning that unemployment did slightly increase faster than in the rest of Finland. In contrast to Salo, Oulu is a growing city due to a high birth rate, as well as the university and polytechnic, that make the city attractive. Oulu launched a project to encourage its townsfolk to establish a business. Ninety-two companies were founded within four years (Wessman, 2015). In 2013, Polar Bear Pitching was founded in Oulu. During the yearly event, startups get the chance to pitch their ideas to investors while standing in an ice hole. The coldness shall shorten the pitching time and force the entrepreneurs to focus on the essential things about their idea. Investors decide about the winners. The first place is prized with €10,000. Besides the prizes, all startups attain media attention through the international livestream. Moreover, entrepreneurs can use their own pitch-clip for marketing purposes. Additionally, the event affords the opportunities to meet the right people and increase the networks of the startups (Polar Bear Pitching, n.d. a; Polar Bear Pitching, n.d. b; Polar Bear Pitching, n.d. c).

Jolla is one of the 400 startups that were established due to the bridge program. Three former Nokia employees, of which two received €25,000 (the maximum grant amount) from Nokia, founded the company in 2011. It offers an alternative to Google’s and Apple’s OS. Jolla’s OS, Sailfish OS, is based on the former Nokia OS MeeGo and its base platform is open-sourced. The company launched its first smartphone in 2013, followed by its first tablet one year later. Today, the OS is used in a few smartphones, such as the Sony Xperia X. In addition, Jolla is now focusing more on enterprise customers that search for products which provide security and reliability (Bosworth, 2014; Jolla, n.d.; Summers, 2018).

Nokia is, regardless of the layoffs, the largest company in Finland by the number of employees. It is followed by KONE Oyj, which employs slightly more than half of Nokia’s workforce. The third largest company is Stora Enso Oyj. Its workforce is about a fourth of Nokia’s workforce (Nordic Market Data AB, n.d. b). Also, Nokia is the largest company when measured by turnover, followed by Neste Oyj and Kesko Oyj (see Table 7). The latter one’s turnover is less than half of Nokia’s turnover (Nordic Market Data AB, n.d. a).
<table>
<thead>
<tr>
<th>Company</th>
<th>Turnover in thousand euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nokia Oyj</td>
<td>23,147,000</td>
</tr>
<tr>
<td>Neste Oyj</td>
<td>13,217,000</td>
</tr>
<tr>
<td>Kesko Oyj</td>
<td>10,675,900</td>
</tr>
<tr>
<td>Stora Enso Oyj</td>
<td>10,045,000</td>
</tr>
<tr>
<td>UPM-Kymmene Oyj</td>
<td>10,010,000</td>
</tr>
<tr>
<td>Kone Oyj</td>
<td>8,942,400</td>
</tr>
<tr>
<td>Suomen Osuuskauppojen Keskuskunta, SOK</td>
<td>7,074,005</td>
</tr>
<tr>
<td>Outukumpu Oyj</td>
<td>6,363,000</td>
</tr>
<tr>
<td>Sampo Oyj</td>
<td>6,363,000</td>
</tr>
<tr>
<td>UPM Sales Oyj</td>
<td>5,815,000</td>
</tr>
</tbody>
</table>

Table 7 Top ten of the largest companies by turnover in Finland, 2017


This implies that Nokia is still important for the Finnish economy. However, it is to notice that the statistics are based on the consolidated statements of the companies. Therefore, not only the workforce in Finland but also workers from abroad are included in the statistic. The same applies for the turnover statistic, which includes the worldwide net sales and not only the turnover in Finland. Since the companies are headquartered in Finland, they are considered for the statistics.
The relationship between Nokia and Finland has been special. Nokia’s success influenced Finns to be more self-confident and made them proud. With the company’s downfall, a part of the country was lost as well. For a better understanding of Nokia and Finland, their history was outlined in chapter 2 and chapter 3. In order to demonstrate the company’s influence on the Finnish economy, several factors were considered in chapter 4. As depicted in that chapter, Nokia impacted Finland’s economy in several ways. Back in the early stages of the Finnish ICT sector, the company affected its development and success. The country’s innovation system and R&D efforts were also influenced by Nokia as evidenced by Nokia’s share of EPO patent applications and business sector R&D. While both shares declined in comparison to the beginning of the 2000s, they are both still substantial. During the booming years of Nokia, the company accounted for a significant share of Finland’s GDP and corporate income tax revenues. Also, those shares declined in the 2010s. Albeit it is difficult to comment on the development of recent years since data is not available. Data from Nokia’s annual accounts and the OECD revenue statistics were collected, for calculating the company’s share of corporate income tax revenues in Finland. It is to note that the reported income tax in Nokia’s annual reports can differ from the actually received income tax of Finland’s government. Whereas Nokia had a great impact on the factors studied so far, the company has not so much directly influenced employment in Finland. However, it is difficult to measure the company’s indirect influence through its network on Finland’s employment. During Nokia’s booming years the company’s network was large. Firms within Nokia’s network benefited from the company’s success (Ali-Yrkkö J., 2001). Therefore, not only Nokia’s workforce in Finland should be considered when examining the company’s contribution to employment in Finland, but also those employees who are working at other firms and are dealing with Nokia in some way. Nevertheless, this is almost impossible to investigate as every single company needs to be scrutinized because not all employees of those companies are working on products or services for Nokia.

In conclusion, the hypothesis ‘Nokia’s rise and fall strongly influenced the Finnish economy.’ is partly true. Whereas Nokia’s rise had a great impact on the Finnish economy, its downfall influenced Finland’s economy less strongly due to interventions by the country’s government and Nokia’s attempts to support dismissed employees concerning their job hunting (for instance, Nokia’s bridge program). Without the preparations for the foreseeable decline of Nokia, the consequences could have been far worse than they actually were. However, the fall had an impact in
that way that the entrepreneur environment evolved in order to compensate for the job losses at Nokia. Though the company’s influence on the Finnish economy shrunk, it is still one of the most important firms in Finland.

Inasmuch as this work did not exhaustively outline Nokia’s impact on the Finnish ICT cluster and its evolution, that is one possible opportunity to do further research. Although there is already research on this area, it would be interesting to see to what extent the ICT sector in Finland is still shaped by Nokia’s influence. Furthermore, how the Finnish startup scene was impacted by Nokia’s downfall would be another research opportunity for the future. An extensive depiction of the development of the Finnish economy and Nokia’s history before 1980 is not given in this work because it would go beyond the scope of it. Additionally, it will be interesting to watch the further development of Nokia and its influence on Finland’s economy. Nevertheless, it is unlikely that the Finnish economy will be impacted by a company as much as it was by Nokia.
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https://polarbearpitching.com/about/.

https://polarbearpitching.com/faq/.

https://polarbearpitching.com/startups/.


Appendices

Figure 25 Vendors’ market share of cell phone unit sales to end users worldwide, 1997 – 2014

Source: Gartner, Mobile phone vendor’s market share in sold units to end users worldwide from 1997 to 2014. In Statista - The Statistics Portal., n.d. b.
The Golden Rules

‘1. Always assume the best of intentions from the actions of others. Operate openly, honestly, and directly, and expect others to do the same. [...]’

2. Our philosophy is data-driven and based on analysis. We always aim to analytically map out the alternative future scenarios for the company and strive to understand the triggers and levers related to those scenarios. This sometimes leads us to invest more time in our board work than some other boards do, but we believe this effort pays off in the long term. [...]’

3. Be well educated in the company’s business and deeply engaged in the discussions with the management. Expect the management to support you in learning more and to be open, straightforward, and engaged in its dealings with the board. [...]’

4. Be prepared to debate, but do it in an informed, unemotional, respectful way. Affirmatively support the decisions, even if you did not win the debate. [...]’

5. Firmly and respectfully challenge the management while keeping in mind that the board is successful only when the management is successful. [...]’

6. We seek to constantly improve in everything we do. All board members are expected to contribute to the improvement of our work, tools, and processes as well as the way we work as a team. [...]’

7. We encourage the management and board members to engage with each other outside the board meetings as well. [...]’

### Table 8 Top 5 Epo applicants, 2014 -2018

Source: Author’s depiction. Data: EPO Annual Reports.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2018</td>
<td>Siemens</td>
<td>Huawei</td>
<td>Samsung</td>
<td>LG</td>
<td>United Technologies</td>
</tr>
<tr>
<td>2</td>
<td>2017</td>
<td>Huawei</td>
<td>Siemens</td>
<td>LG</td>
<td>Samsung</td>
<td>Qualcomm</td>
</tr>
<tr>
<td>3</td>
<td>2016</td>
<td>Philips</td>
<td>Huawei</td>
<td>Samsung</td>
<td>LG</td>
<td>United Technologies</td>
</tr>
<tr>
<td>4</td>
<td>2015</td>
<td>Philips</td>
<td>Samsung</td>
<td>LG</td>
<td>Huawei</td>
<td>Siemens</td>
</tr>
<tr>
<td>5</td>
<td>2014</td>
<td>Samsung</td>
<td>Philips</td>
<td>Siemens</td>
<td>LG</td>
<td>Huawei</td>
</tr>
</tbody>
</table>

### Table 9 European patent applications per mio. Inhabitant by country, 2014 – 2018

Source: Author’s depiction. Data: EPO Annual Reports.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2018</td>
<td>Switzerland</td>
<td>Netherlands</td>
<td>Denmark</td>
<td>Sweden</td>
<td>Germany</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(955.9)</td>
<td>(416-3)</td>
<td>(411.4)</td>
<td>(332.3)</td>
<td>(332.3)</td>
</tr>
<tr>
<td>2</td>
<td>2017</td>
<td>Switzerland</td>
<td>Netherlands</td>
<td>Denmark</td>
<td>Sweden</td>
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