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Mergers and Inquisitions in High Technology Industries

*Key strategic and practical considerations during the M&A
process for decision makers in the telecommunications industry*

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Acknowledgements

This master thesis was written during the spring semester of 2022 by Albin Eksandh and Axel Lönnqvist. This work marks the final phase of the five-year long journey to receive a Master's Degree in Industrial Engineering & Management at the Faculty of Engineering, Lund University. This thesis has been written in collaboration with a telecommunications equipment provider (from now on referred to as the Company).

During this master thesis project, we have been given the opportunity to immerse ourselves into an interesting and ever-changing industry that will be at the core of tomorrow's technological advancements. In retrospect, we have indeed gotten to use and develop the skills and knowledge accumulated during our studies and can now proudly look back at this experience with fond memories.

We would like to give our sincere thanks to our supervisor at LTH, Carl-Johan Asplund, who has supported us with valuable insights, feedback, and never-ending belief in our potential throughout this project. We would also like to thank our supervisor at the Company, whose extensive network of contacts and passion for this field have inspired and helped us to execute on this project. Our gratitude also extends to the people that made themselves available for interviews, without you, this project would not have been possible.

Albin Eksandh and Axel Lönnqvist
Lund, June 2022

Abstract

The telecommunications industry is the foundation of global mobile connectivity and resides on decades of technological advancements. The introduction of the fifth generation of mobile technology (5G), is expected to bring disruptive changes and has been described as an archetypal example of technological change where technological and business uncertainty remains high. The opportunities for future growth will require significant investment in new capabilities and incumbent players' ability to acquire external capabilities will thus be put to the test. In this context, the strategic and practical considerations of undertaking mergers and acquisitions (M&A), i.e transactions where a firm purchases a controlling majority of another firm, is presented and discussed based on an abductive synthesis of literature covering areas such as M&A best practices and technological change, along with empirical research involving case studies and interviews.

At its core, the resulting model can arguably be said to resemble the word “inquisition”, defined as a period of prolonged and intensive questioning or investigation (Lexico, 2022). In summary, the presented conclusions suggest valuable advice that could benefit M&A decision makers at incumbent firms throughout the M&A process in high technology industries, and in the telecommunications industry in particular. Additionally, this master thesis’ academic contribution involves highlighting relevant M&A motives derived from contemporary literature in the field of innovation and technological discontinuities. Lastly, it corroborates and challenges contemporary findings with regard to the emerging next generation wireless ecosystem and its technological and business implications.

Keywords: Mergers and Acquisitions, corporate decision making, high technology, mobile technology, 5G, telecommunications, technological change, technology strategy.

Table of Contents

1. Introduction	1
1.1 Background	1
1.1.1 Value Chain Transformation	2
1.1.2 Inadequate M&A Preparation	2
1.2 The Mobile Wireless Industry	3
1.2.1 Technology Development and Standards	4
1.2.2 Industry Convergence and Consolidation	8
1.2.3 The Evolution of Wireless Networks and the 5G Value System	14
1.3 Research Objective	18
1.4 Delimitations	18
1.5 Target groups	18
1.6 Thesis Structure	19
2. Methodology	21
2.1 Research Purpose	21
2.2 Research Approach	22
2.3 Research Process	23
2.3.1 Literature Review	23
2.3.2 Case Studies	24
2.3.3 Interviews	25
2.3.4 Model Development	26
2.4 Credibility	26
2.4.1 Reliability	26
2.4.2 Validity	26
2.4.3 Representativeness	27
3. Theoretical Frame of Reference	29
3.1 Defining M&A	29
3.1.1 Different Types of Transactions	30
3.2 M&A Motives	31
3.2.1 Efficiency Theory	31
3.2.2 Monopoly Theory	33
3.2.3 Valuation-Related Theories	33
3.2.4 Agency-related Theories	34
3.3 Strategic and Organizational Considerations	34
3.3.1 Pre-Merger Success Factors	35
3.3.2 Post-Merger Success Factors	36
3.4 Defining Technological Discontinuities	36

3.4.1 Emerging and Converging Technologies	37
3.4.2 Cyclical Explanations	39
3.4.3 Incumbent Challenges	40
3.4.4 Capability Transformation	42
3.4.5 Architectural Advantage	43
3.4.6 Network Positioning	45
4. Results	49
4.1 Case Findings	49
4.1.1 Nokia's acquisition of Alcatel-Lucent	49
4.1.2 IBM's Acquisition of Red Hat	51
4.1.3 Apple's Acquisition of Beats	52
4.1.4 HP's Acquisition of Compaq	54
4.1.5 Cisco's Acquisition of AppDynamics	57
4.2 Interview Results	59
4.2.1 M&A Experts	59
4.2.2 Industry Experts	61
5. Analysis	67
5.1 What are the Strategic Considerations for Incumbent Firms?	67
5.2 What Type of Company to Acquire?	72
5.3 Which Specific Company Should be Acquired?	73
5.3.1 Cultural Fit	73
5.3.2 Relative Size	74
5.4 How to Manage the Acquisition Process?	74
5.4.1 Information	74
5.4.2 People to Involve	75
5.5 What To Do After the Acquisition?	75
5.5.1 Degree of Integration	75
5.5.2 Not Losing Focus on What Matters	76
5.6 Model	76
6. Discussion and Conclusion	79
6.1 Summary of Findings	79
6.2 Discussion of Methodology and Results	79
6.3 Contribution, Generalization of Findings, and Outlook	81
References	83

Figures

Figure 1. <i>Annual Global Tech M&A Spending and Deal Volumes since 2004</i>	1
Figure 2. <i>The mobile wireless industry value chain</i>	4
Figure 3. <i>Stages of development in the mobile wireless industry</i>	4
Figure 4. <i>Submitted contributions at 3GPP for 2G, 3G, 4G and 5G between 1998-2021 per company</i>	5
Figure 5. <i>5G declared patent families as to the year of declaration</i>	6
Figure 6. <i>Global network traffic share of OTTs in 2021 and revenue growth of European telcos, Japan telcos, US telcos, and FANG 2015 vs. 2021</i>	8
Figure 7. <i>The consolidation of telecom equipment manufacturers during recent decades</i>	9
Figure 8. <i>Biggest share changes in the telco network infrastructure market</i>	13
Figure 9. <i>Redistribution of market capitalization in the computer sector</i>	14
Figure 10. <i>The evolution of mobile networks</i>	15
Figure 11. <i>The 5G value system</i>	17
Figure 12. <i>Conceptual overview of the applied Research Process</i>	23
Figure 13. <i>Theoretical Framework</i>	29
Figure 14. <i>Performance improvement for mobile communications, 1G-4G</i>	38
Figure 15. <i>LTE (4G) and other mobile subscriptions as of end 2019</i>	38
Figure 16. <i>The Technology Cycle</i>	39
Figure 17. <i>Network positioning options and path</i>	47
Figure 18. <i>4-step M&A Advisory Model</i>	76

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1. Introduction

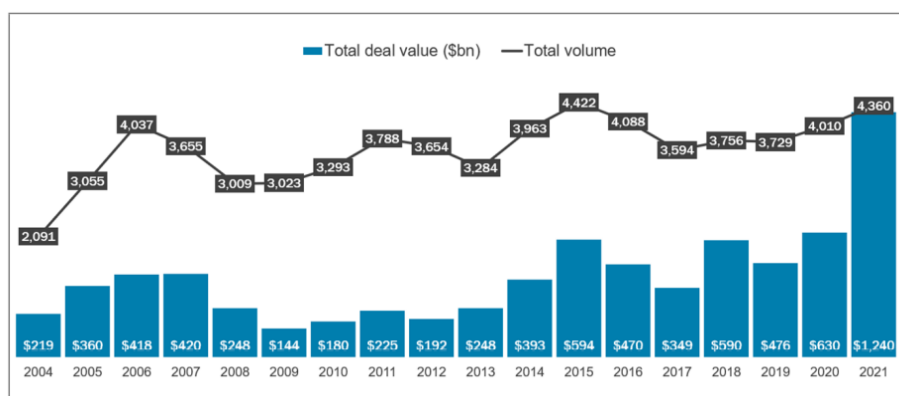
1.1 Background

Converging industry megatrends in the global technology sector has made mergers and acquisitions (M&A) a strategic tool for acquiring new technologies and products in firms' pursuit of maintaining competitive advantage, profitability, and growth rates. In 2021, annual technology M&A spending hit the \$1 trillion mark for the first time in history (451 Research, 2022). In this context, the blurring of the boundary between the software and hardware sectors has been considered a primary driver for M&A deals (Kumar, 2012).

In particular, the traditional telecommunications value chain is increasingly being shaped by information technology in which emergent digital native wireless network technologies, such as 5G, are envisioned to have a greater impact on the overall ecosystem compared to any previous technology standard for cellular networks (Low & Johnston, 2009; Banerjee et al., 2017). As such, software-enabled digital technologies often accelerate the speed of change by reducing the cost of innovation. The significance of digital innovations consequently instills fundamental uncertainty in the future development of 5G technology and its surrounding markets (Bauer & Bohlin, 2022).

Figure 1

Annual Global Tech M&A Spending and Deal Volumes since 2004



Note. From *Tech M&A Outlook 2022: Another year for the ages?*, by S&P Global, 2022

(<https://www.spglobal.com/marketintelligence/en/news-insights/research/tech-ma-outlook-2022-another-year-for-the-ages>).

1.1.1 Value Chain Transformation

Although some causalities of value chain transformation can be continuously isolated and internalized within an industrial network, rapid technology progression can cause major disruption to existing technology standards and reconfigure the industry value chain which can give rise to new sub-markets and sub-networks (Low & Johnston, 2009). Such industry disaggregation and value migration usually occurs when interfaces between various stages of the value chain become open and standardized, allowing value to migrate up or down the value chain (Jacobides & MacDuffie, 2013). As long as traditional players gain and hold on to strategic control and value, such issues can be avoided. In fact, established firms can achieve favorable positions by preparing for value chain transformation. Here engaging in different business relational initiatives such as partnerships, alliances, mergers, and acquisitions is considered paramount for firms to survive and prosper (Low & Johnston, 2009).

1.1.2 Inadequate M&A Preparation

As global investment in M&A continues at unprecedented levels, acquisition activities have become a focus of academic studies in several fields including finance, strategy, and organizational development (Das & Kapil, 2012). Indeed, extensive academic research and expertise of advisors has ensured effective execution in valuation, deal financing, and the entire deal phase of a merger. What appears to be missing in most firms' M&A practices is however the use of relevant theory and best practices during the strategy phase, which in turn provides the all-important foundation and direction for the deal phase and integration phase respectively (Morrissette, 2013).

In connection with a public announcement of a new partnership with Ericsson in 2015, John T. Chambers, former executive chairman and CEO of Cisco Systems, proudly stated that the two companies had already decided on goals and focus areas for the next three to five years, along with details about what will be done and how. He then added that "Most partnerships and acquisitions don't work because that sort of thing isn't done in advance." (Le Maistre, 2015, para. 30). This statement once again points to the dangers of disregarding good M&A preparation and suggests that the telecommunications industry is indeed in need of good advice in this regard.

Seen from this perspective, we through this work intend to highlight vitally important considerations in relation to M&A decision making in high technology industries in general and in the transformative telecommunications industry in particular. Most importantly, incumbent firms should realize that a large part of what makes a deal successful after

completion, is what they do before completing it (Barr, 1997). A well prepared M&A procedure must thus start with a solid rationale tied to the overall strategy, ensuring that the deal will move the firm along a defined strategic path (Morrisette, 2013). In addition, understanding that most of a deal's value is either realized or lost during the postdeal integration phase is deemed essential (Frick & Torres, 2002). Next, an assessment of the telecommunications industry is given to provide additional context. This includes industry traits, competitive landscape, and current trends. 5G is given extra attention in order to highlight what challenges and opportunities incumbent firms are likely to face in the near future.

1.2 The Mobile Wireless Industry

The technological advances in wireless cellular standards have seeded a complex, specialized, and evolving industry spanning a variety of industry segments. In recent times, increased data rates has allowed new players including e.g high-level operating systems, applications developers, and service providers to enter the value chain (Gupta, 2015). As networking technologies converge around the Internet Protocol (IP), competitors in the industry traditionally have various corporate and technological backgrounds whilst targeting different segments (Carpenter and Lazonick, 2017).

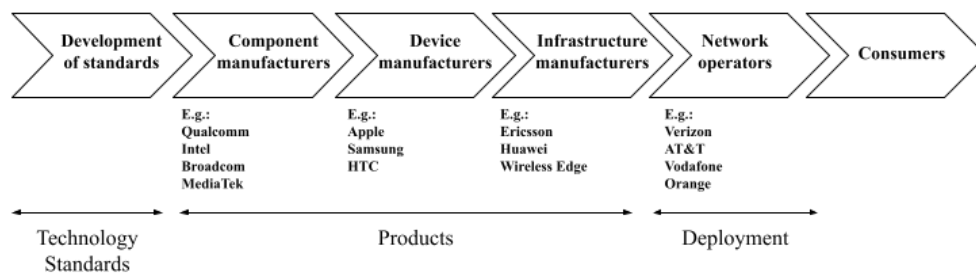
So called pure players, involving for instance Nokia and Ericsson, generate most of their revenues from sales to telecommunication carriers. Similarly, network equipment remains the major revenue source for newer players like ZTE and Huawei who in recent times have also developed significant mobile handset businesses. Asian players NEC and Fujitsu, despite having more IT-oriented portfolios, also have networking equipment sales as a small share of their revenues. American IP firms Cisco and Juniper have furthermore pivoted into targeting carriers with their communication products originally intended for enterprises (Carpenter & Lazonick, 2017). In order to interact with each other, mobile devices communicate with base-stations and servers in the network. To allow for worldwide interoperability and interconnectivity, technology standards thus reside at the core of the industry. In practice, network infrastructure must incorporate the same communications components that are present in mobile devices (Gupta, 2015).

Communication Equipment Providers

The part of the value chain of the telecommunications market that “supplies network equipment, software and services used by telecommunications carriers enabling them to deliver multiple services to end users”, is called the communication equipment industry (Xerfi, 2013). The industry is focused on running the back-end solutions needed to provide

communication services to companies, people, and increasingly things (connected products), via everything from hardware to software and services. Specifically, the industry players, constituted by infrastructure manufacturers, are involved in designing, developing, building, selling, implementing, operating, optimizing, and providing post-sales maintenance services to the equipment needed to build networks by IT and Communication Service Providers (CSPs), also known as operators (Vergel, 2020). Infrastructure manufacturers often focus on providing interoperability between systems or ensuring quality of service (Gupta, 2015).

Figure 2
The mobile wireless industry value chain

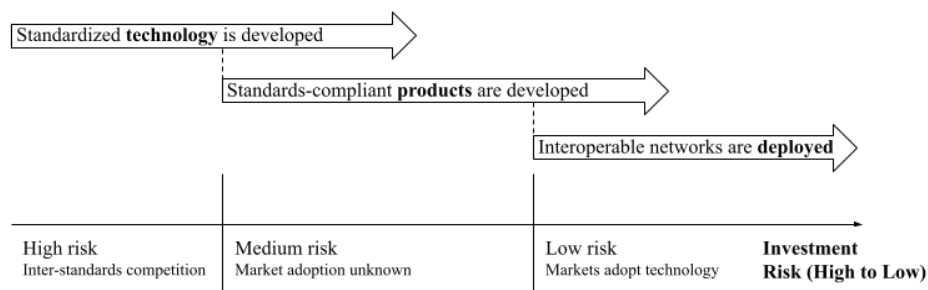


Note. From “Technology Standards and Competition in the Mobile Wireless Industry” , by K. Gupta, 2015. *George Mason Law Review*, 22(4), p. 876. (<https://heinonline.org/HOL/LandingPage?handle=hein.journals/gmlr22>).

1.2.1 Technology Development and Standards

The industry can generally be said to evolve in three stages, each entailing a different type of risk and investment for participating firms, as highlighted in Figure 3.

Figure 3
Stages of development in the mobile wireless industry



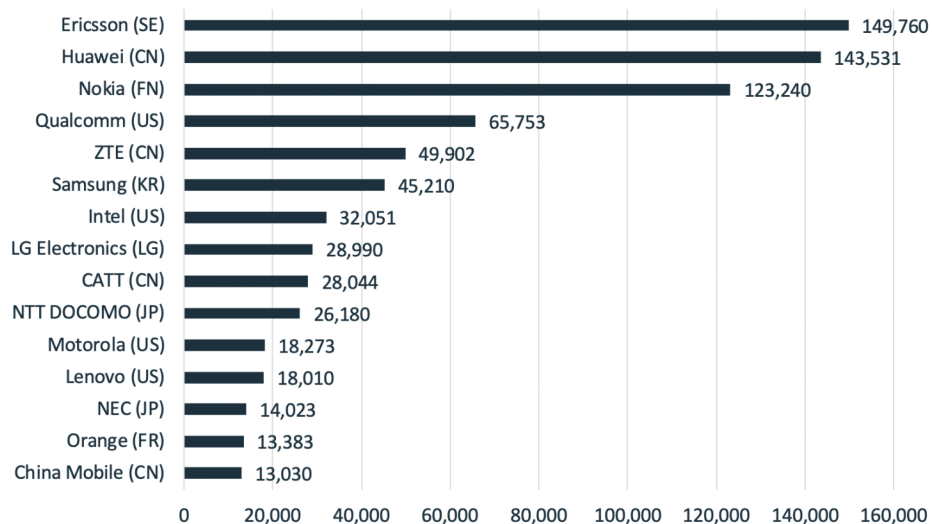
Note. From “Technology Standards and Competition in the Mobile Wireless Industry” , by K. Gupta, 2015. *George Mason Law Review*, 22(4), p. 870. (<https://heinonline.org/HOL/LandingPage?handle=hein.journals/gmlr22>).

The first stage involves the development of technology standards through the means of standards consortia via international standard setting organizations (SSOs). In the case of 5G, this happens through the 3GPP (3rd Generation Partnership Project). The SSO gathers all industry players and collects technical proposals. If consensus regarding the proposed features is reached by all participating firms, the SSO makes efforts to generate common technical solutions which result in the development of technology standards.

However, since R&D investments are considered risky, only a few of the participating firms invest in R&D and contribute substantial technology to the standards. In the case of the 3G and 4G standards, only approximately 30 percent of the firms attending the SSO meetings ever made a single technology contribution. However, the only way for a firm to gain credibility in standards consortia is by regularly participating and developing the best specifications. In this way, firms can bring their own developed and sometimes patented technologies into the standard and the number of submitted contributions thus reflects how much share and influence firms have in standards development (Pohlmann, 2021), as highlighted in Figure 4.

Figure 4

Submitted contributions at 3GPP for 2G, 3G, 4G and 5G between 1998-2021 per company

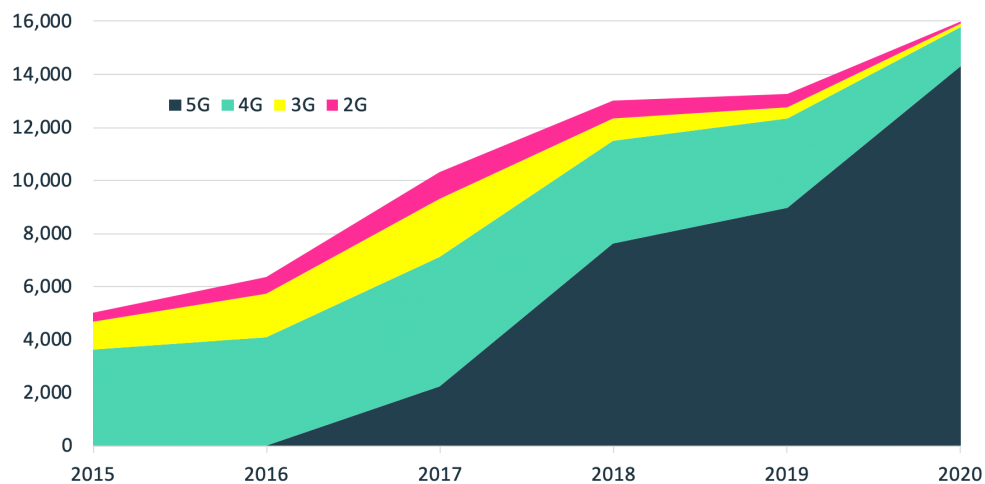


Note. From *Unpacking 5G SEPs and Standards Contribution Data*, by T. Pohlmann, 2021, IPWatchdog (<https://www.ipwatchdog.com/2021/05/15/unpacking-5g-seps-standards-contribution-data/id=133530/>).

Once a standard is defined, firms can start developing standards-compliant products (Gupta, 2015). During the commercialization stage, product manufacturing firms, such as device and infrastructure makers, face a reduced risk of making technology-specific investments in capabilities and complementary technologies due to the reduced uncertainty (Brooks, 2013). Generally, commercialization however continues long after a standard is first defined, as highlighted by the number of declared 5G patents illustrated in Figure 5.

Figure 5

5G declared patent families as to the year of declaration



Note. From *Unpacking 5G SEPs and Standards Contribution Data*, by T. Pohlmann, 2021, IPWatchdog (<https://www.ipwatchdog.com/2021/05/15/unpacking-5g-seps-standards-contribution-data/id=133530/>).

Network deployment

The last step is the actual deployment of networks in which network operators invest into spectrum auctioned by governments. Spectrum is the primary physical asset required for wireless communication and operators deploy and maintain the infrastructure (i.e., the base stations and the servers) to provide the mobile wireless services and manufacturers can offer devices to subscribers through retail shops (Gupta, 2015). However, in the move to 4G and soon to 5G, the cost and complexity of constructing and running networks has gotten out of hand where 60 percent of operators consider business case the biggest challenge in their 5G strategy and only 25 percent expect 5G to deliver a strong business case (Madhavan, 2020; Kapko, 2019).

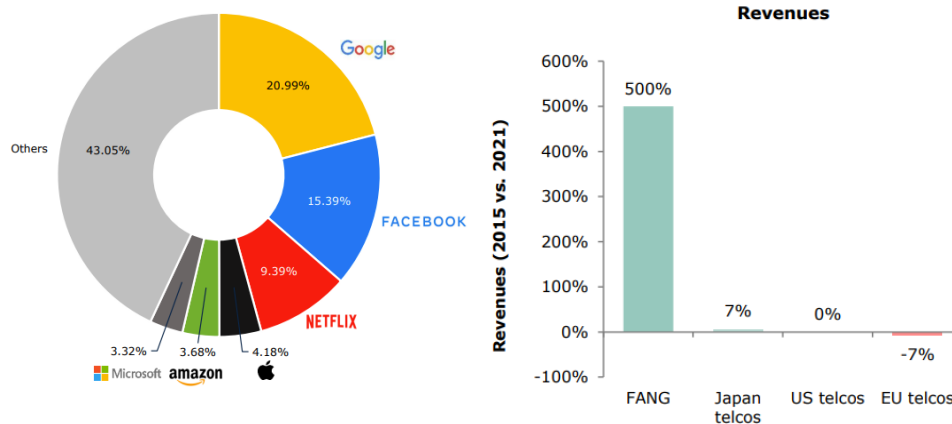
The deployment of 5G and subsequent advancements and development of network architecture will demand more capital expenditure into existing infrastructure as well as maintenance. Potentially, the velocity of such advancements may overtake the speed at which incumbents are able to upgrade their infrastructure which pulls focus and capital away from core network development into potential legacy issues in the future (Yeo & Jhunjhunwala, 2020). At the same time, operators face fierce competition, with the spread of average revenue per user (ARPU) globally falling by 12 percent over the last decade along with flat subscription growth in the EU as a result of customers generally paying for “buckets of network usage.” For this reason, increased demand for data consumption and use of network resources do not scale linearly with revenues in the internet era, this can be noticed by studying the recent decline in revenue growth for telecommunication companies, as highlighted in Figure 6 (Antoun et al., 2019; ETNO, 2022).

Operator action

In order to mitigate the costs of deployment, new partnerships and infrastructure sharing agreements are likely to become common and are already happening to some extent. Such an example include Spanish operators Másmovil and Orange who have reached a 5G and fiber network sharing agreement saving EUR 40 million per year (OECD, 2021). With data traffic increasing by up to 50 percent annually, several operators have recently announced that they think platforms should contribute to the cost of infrastructure. A study sponsored by the European Telecommunications Network Operators association (ETNO) claims that a few big app providers, referred to as over-the-top companies (OTT), including Facebook, Amazon, Netflix, and Google (FANG), represent about 56 percent of the usage of global access networks. The EU furthermore spends about \$28 Bn on capacity directly supporting the operations of these firms. For this reason, the ETNO proposes that these players should contribute just as much to the cost required to support investment in access infrastructure, which is something that is currently being assessed by the EU (Chee, 2022).

Figure 6

Global network traffic share of OTTs in 2021 and revenue growth of European telcos, Japan telcos, US telcos, and FANG 2015 vs. 2021



Note. From Europe's internet ecosystem: socioeconomic benefits of a fairer balance between tech giants and telecom operators. By Axon Partners Group, 2022.

1.2.2 Industry Convergence and Consolidation

Evidence of increasing digitalization of data and a shift towards IP-based networks points to a significant convergence in the telecommunication sector during recent years (Horrocks, 2006). In this fashion, the IT and telecommunication sectors are considered to be converging in a cloud-enabled digital landscape (Carpenter & Lazonick, 2017). With respect to the number of industry players and services provided, the convergence of data and Next Generation Networks has intensified competition in the media, information and telecom markets (Sen, 2009). Over the Top (OTT) service providers such as Facebook and Google have contributed to reduced revenues for telecom operators via applications such as WhatsApp that reduces user demand for traditional CSP services such as SMS and phone calls. This has pressured operators to reduce their investments in capex and opex. Naturally, this pressure has been bypassed to the telecom equipment manufacturers (Vergel, 2020).

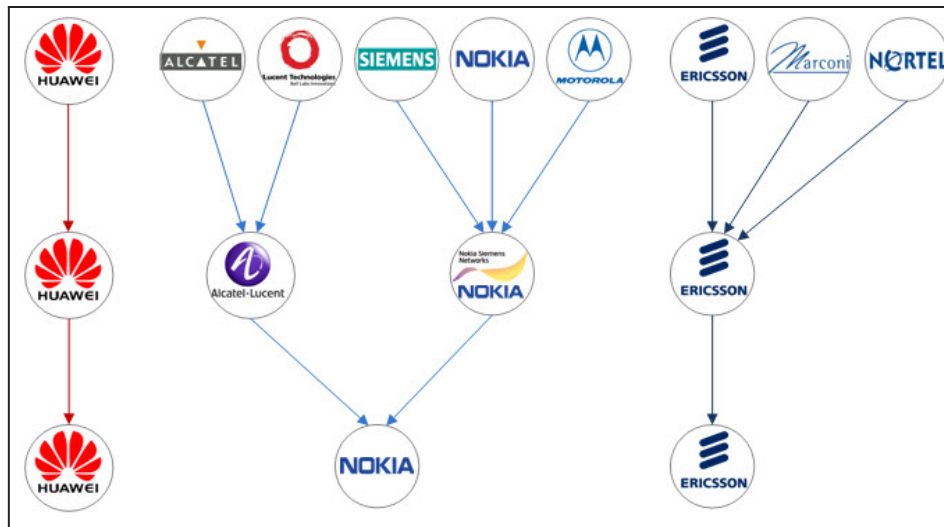
The shift from voice to data

A key milestone highlighting the emergence of convergence as a major theme in the market was the shift in focus from voice to data services during the deployment of third generation networks (3G) roughly two decades ago. Market disruption was caused by Huawei who early on sensed the convergence between telecom and IT. The firm pioneered end-to-end service portfolios for its operator customers and simultaneously came up with cheaper network equipment. Telecom equipment manufacturers, who

in comparison offered relatively narrow product portfolios at the time, were subsequently forced to pivot into ICT companies to stay relevant. Altogether, this transition evoked intensified M&A activity and in retrospect brought down the number of dominant manufacturers from eighth to three, as highlighted in Figure 7 (Kochar, 2016).

Figure 7

The consolidation of telecom equipment manufacturers during recent decades



Note. From *Opinion: Can Nordic rivals stop the Chinese juggernaut?*, by R. Kochar, 2016, Netmanias (<https://netmanias.com/en/?m=view&id=blog&no=10683>).

Software and open standards

Another emerging trend in the industry is the use of open hardware architectures in order to reduce the dependency of dominant telecom manufacturers. Nowadays, most applications run in cloud data centers powered by x86 architecture servers where telecom manufacturers have several products. Other open hardware initiatives including Open RAN, Open Switches, and Open Routers are also under development in the industry. As a result, hardware is becoming a commodity, moving the industry to adopt software as its main differentiator (Vergel, 2020). Accordingly, the main product supplied by vendors in the telecom industry has pivoted from hardware to software based technologies such as edge computing, cloud-native architectures and AI in order to gain capacity and lower radio-access-network (RAN) capex and opex requirements for operators (Sharma, 2019b).

Open RAN and virtual networks

This software trend is also expected to address skepticism towards the three most dominant equipment manufacturers Nokia, Ericsson, and Huawei who have been accused of using closed proprietary interfaces and hardware units referred to as “black boxes” with tight coupling between hardware and software to shut out competition. An operator-led group called the O-RAN¹ Alliance is currently building more open interfaces by taking advantage of virtualization, which is essentially making software independent from the underlying hardware (Morris, 2019). The multiple hardware units currently present on telecommunication antenna towers are required to connect to devices, access user and system information, and process data. With O-RAN technology, much of this functionality is virtualized and containerized by software which allows network operators to customize their own services and choose vendors outside of the big three suppliers (Madhavan, 2020). Such a virtual network is envisioned to “really open the door for a tremendous amount of hardware innovation to come in” since operators can use different hardware configurations and “run the radio network essentially as an app or a software on top of it.” (Ratnam, 2020, para. 21).

Market readiness

A prevailing industry concern is however the operational complexity that comes with this start-up ecosystem and that "money saved on buying individual parts could be time lost putting it together and getting everything to work properly." The added complexity could thus potentially increase the demand for system integrators which would replace the current questioned supplier “lock-in” with another (Morris, 2020; Morris, 2019). Additionally, telecommunications providers are risk averse and unlikely to invest in software-based networks without knowing if they would pay off (Ratnam, 2020).

Cloud technologies

Enthusiasts do believe that O-RAN would eliminate the proprietary, vertically-integrated nature of the system along with bringing what is claimed to be lower capex requirements for operators deploying networks thanks to cheaper commodity hardware. The more pronounced shift from proprietary hardware to open-source software is additionally claimed to reduce the operating expenses where cloud and edge technologies are poised to provide the basic network management stack. Virtualization, automation, and containerization solutions from companies like VMWare, Red Hat, and emerging startups are thus envisioned to replace the black boxes and provide full network transparency (Madhavan, 2020). Japanese firm Rakuten is constructing an O-RAN based mobile network and has claimed

¹ O-RAN stands for Open Radio Access Networks

that their cost for 5G is 50-60 percent cheaper than traditional telecom networks (Madhavan, 2020; Morris, 2019). By collaborating with Amazon Web Services (AWS), the American firm Dish has proven that 5G networks and RAN functions can be deployed and operated in the public cloud. This is expected to yield unit costs that are just 25 percent of the competitors. Presumably, software based networks and public cloud firms like Microsoft, Amazon, and Google will help ensure that everything of strategic relevance to current operators is managed in data centers. Or put in other words, the only thing that software cannot eat are the antennas and cables. For this reason, public cloud technology is said to have the potential to commoditize the telecom industry in the long run (Morris, 2021b; Morris, 2021a).

New market entrants and M&A activity

Altogether, this development has caused a significant consolidation trend among both operators and equipment manufacturers. As the vendors in the industry increasingly seek to build capabilities in areas such as data analytics and Internet of Things (IoT), the competition from other IT-service companies has also grown. Telecom equipment manufacturers including Ericsson, who is devoting 90 percent of its R&D to software and who claims to be the world's fifth-largest supplier of software, nowadays have to compete with software companies (Karlsson & Lugn, 2018). Furthermore, big American technology players have shown interest in selling communication products which has been expressed in recent M&A activity. Microsoft's acquisitions of Affirmed Networks and Metaswitch, companies developing software for use in core networks, highlights this phenomenon (Morris, 2021c). Other recent large-scale M&A deals highlighting the dynamic in the equipment manufacturing industry involve: Nokia and Siemens in 2006, Alcatel and Lucent in 2006, Oracle and SUN in 2010, Ceragon and NERA in 2011, Ericsson and Telcordia in 2012, Tellabs and NSN Optical Networks in 2013, Dell and EMC in 2015, Nokia and Alcatel-Lucent in 2016, Nokia and Comptel in 2017, Infinera and Coriant in 2018, Ericsson and Kathrein in 2019, along with multiple smaller acquisitions and divestments (Vergel, 2020).

Market outlook and incumbent resistance

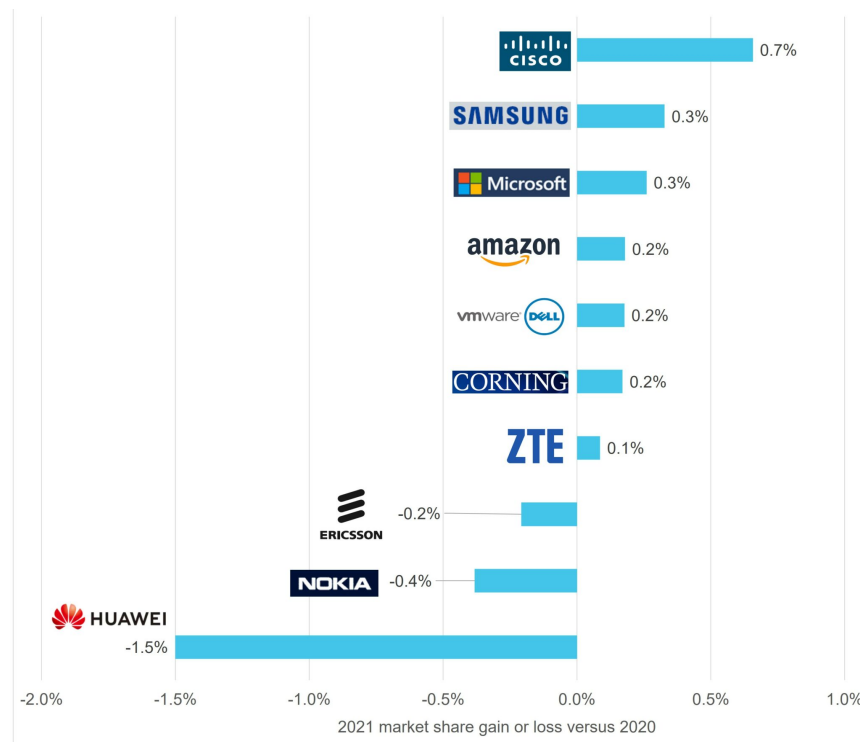
The cloud service industry itself is expected to grow at three times the rate of the overall IT market between 2019 and 2022 and operators and equipment vendors are indeed venturing into OTT services and cloud services to diversify and develop new use cases. For instance, Nokia has announced partnerships with Google Cloud, AWS, and Microsoft Azure respectively to research and enable O-RAN and related technologies (Sharpe, 2021). Similarly, American operator AT&T recently entered into a partnership with Microsoft to build a platform combining AT&T's Network

Cloud technology with Microsoft Azure's security, monitoring, machine learning, and analytic capabilities (Chervek, 2022).

Simultaneously, the RAN market where Ericsson is currently leading with a market share of 26.9 percent, is expected to peak in 2023 while O-RAN will have a 10 percent market share by the mid-2020s and may as well be considered ubiquitous once 6G deployment expectedly starts in 2030 (Morris, 2021c; Kapko, 2022). The big three established equipment makers have shown mixed interest in O-RAN. While Huawei remains firmly on the outside pointing to the bad performance of generic hardware, Ericsson has communicated that the company is determined to be a strong competitor in the O-RAN market despite previously downplaying the significance of open source technology (Morris, 2019b). Based on the firm's perception of the low level of market and technology readiness, their approach to O-RAN has been considered conservative (Takiishi et al., 2022). The company however joined the O-RAN Alliance in 2019 under pressure from customers. Similarly, Nokia became involved with TIP (Telecom Infra Project), an antecedent of the O-RAN Alliance committed to open networks, at an early stage. Despite this display of interest, there has been little mention of O-RAN in both companies' investor presentations and critics consider them bystanders showing low interest in contributing to the ecosystem development (Morris, 2019). Observed from a high level, the telecom infrastructure market shares are seemingly changing slowly, as illustrated in Figure 8. Notably, several cloud providers appear in the top four of infrastructure suppliers with biggest share gains during 2021 while traditional suppliers lost a bit of share (Walker, 2022). One may ask if this pattern can perhaps be an indication of the increased demand for open source and virtualized platforms.

Figure 8

Biggest share changes in the 2021 telco network infrastructure market (Size: \$231.4 Bn)



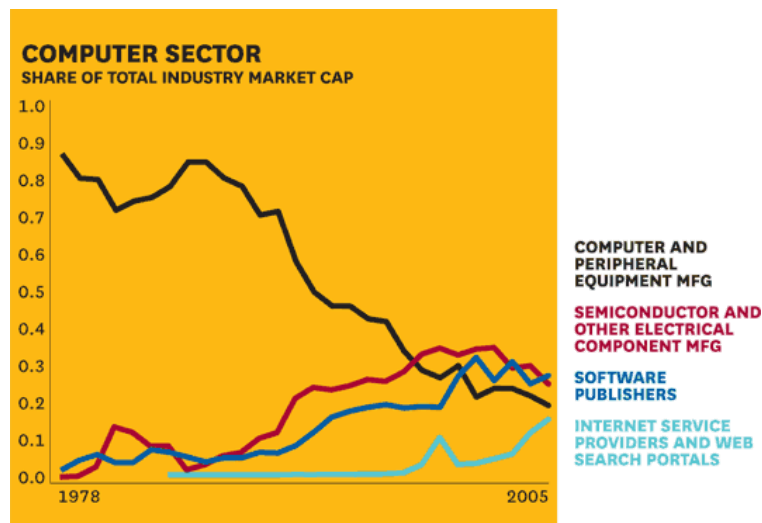
Note. From Cisco, Samsung, and ZTE benefit most from Huawei bans in 2021 telco NI market, by M. Walker, 2022, MTN Consulting (<https://www.mtn-c.com/cisco-samsung-and-zte-benefit-most-from-huawei-bans-in-2021-telco-ni-market/>).

Analogy to the IT sector

O-RAN advocates are convinced that open source computing will eventually transform telecommunication the way it did to IT (Madhavan, 2020). In the 1980s, value in the PC industry initially lay in the design of computers and in providing customer support. But as PCs proliferated, the customer needs changed and individuals and businesses eventually considered interoperability among applications more important than the reliability provided by the OEMs at the time. This progress prompted coordinated efforts by companies to accept open standards which ultimately led to value shifting from the manufacturers to software designers, as highlighted by the redistribution of industry market capitalization the following decades in Figure 9, (Jacobides & MacDuffie, 2013). Altogether, the growing demand for data enabled technologies creates exciting business opportunities for players in the industry value chain, which set the stage for present and future technology M&A deals surrounding communication products.

Figure 9

Redistribution of market capitalization in the computer sector



Note. From *How to Drive Value Your Way*, by M. G. Jacobides and J. P. MacDuffie, 2013, Harvard Business Review (<https://hbr.org/2013/07/how-to-drive-value-your-way>).

1.2.3 The Evolution of Wireless Networks and the 5G Value System

Recent decades have witnessed enormous changes in the mobile industry and have been called out as the largest explosion in technological development since the industrial revolution (Gupta, 2015). Each generation of wireless service has enabled mobile technology to increase customer satisfaction through improved quality of services and number of applications along with bringing more operational effectiveness to carriers (Banerjee et al., 2017).

From 1G to 5G and beyond

1G focused entirely on voice communication. This first generation is usually considered to have begun in the 1980s and allowed more capacity compared to mobile radio networks at the time (Bi et al., 2001). 2G arrived in 1992 and introduced basic data capabilities by using digital multiple access technology, this was considered the start of mobile wireless (Banerjee et al., 2017; Gupta, 2015). To cope with low speeds and incompatible technologies, 3G was introduced in 2002 offering higher transfer rates and improved data performance (MobileInfo, 2002). 3G smartphones subsequently moved Internet usage on to mobile networks. 4G was optimized for data communication and offered speeds up to 10 times that of 3G service and was launched in 2010. This supported more data intensive activities and better mobile broadband speed which i.e. made video streaming possible over mobile networks (Nelson, 2010). Every new generation is built by technology standards with technologies built into the

standards. Together, they create the conditions for a healthy value chain (Gupta, 2015).

Figure 10
The evolution of mobile networks

1G	2G	3G	4G	5G
<p>Released: 1979</p> <p>Standards: NMT, AMPS & TACS</p> <p>Capabilities:</p> <ul style="list-style-type: none"> Analog voice 	<p>Released: 1991</p> <p>Standards: GSM & CDMA</p> <p>Capabilities:</p> <ul style="list-style-type: none"> Digital voice Encrypted communication Limited roaming SMS & MMS <p>Extensions:</p> <ul style="list-style-type: none"> GPRS (2.5G) CDMA2000 (2.5G) EDGE (2.75G) 	<p>Released: 2002</p> <p>Standards: UMTS & EV-DO</p> <p>Capabilities:</p> <ul style="list-style-type: none"> Mobile broadband Location services Multimedia streaming Seamless global roaming <p>Extensions:</p> <ul style="list-style-type: none"> HSPA+ (3.5G) 	<p>Released: 2009</p> <p>Standards: LTE</p> <p>Capabilities:</p> <ul style="list-style-type: none"> High Speed mobile Internet IP-based packet switching HD multimedia streaming Seamless global roaming <p>Extensions:</p> <ul style="list-style-type: none"> Feature extension through new category/releases 	<p>Released: 2019</p> <p>Standards: 5G</p> <p>Capabilities:</p> <ul style="list-style-type: none"> Private networks (local use frequency) IoT Ready Massive Machine Type communication Ultra-low-latency Ultra-high reliability Millimeter wave support <p>Extensions:</p> <ul style="list-style-type: none"> Feature extension through new categories/releases
0.0024 Mbit/s	0.064 Mbit/s	42 Mbit/s	1000 Mbit/s	10,000 Mbit/s
Industry Impact: -	Industry Impact: 0	Industry Impact: +	Industry Impact: ++	Industry Impact: +++
<ul style="list-style-type: none"> No impact on industrial applications 	<ul style="list-style-type: none"> Remote control / Telecontrol Text messages from and to remote machines 	<ul style="list-style-type: none"> Video monitoring Remote Access to machines (e.g. for telepresence) Remote Condition Monitoring 	<ul style="list-style-type: none"> Mobile service Technicians Service via smart phones Wireless Backhaul 	<ul style="list-style-type: none"> Autonomous Logistics Autonomous Machines Assisted Work Wireless Backhaul Edge Computing Mobile Equipment

Note. From *On our way to Industrial 5G!*, by S. Rotmensen, 2019, Siemens Ingenuity, (<https://ingenuity.siemens.com/2019/11/on-our-way-to-industrial-5g/>).

Compared to previous mobile generations that have been based on the same technology, 5G is developed under new standards and prototypes (Adamauskas & Krušinskas, 2017). Compared to 4G that aimed for faster mobile network speeds in radio-access-network technology (RAN) and over-the-air (OTA) interface, 5G is more complex (Banerjee et al., 2017). Unlike previous mobile generations that relied on dedicated hardware for the core and radio access network (RAN), 5G networks are designed as unified, enabling platforms that can support a heterogeneous quality of service (QoS) where network virtualization and software-defined networks will be critical (Bauer & Bohlin, 2022). Like previous mobile generations, 5G is however characterized by a new core network and an access network. The core network is what will truly differentiate the next level of network evolution and where providers and customers will see plans, services, and content. This technology is expected to contribute to industry growth in a less linear and traditional way which will pose challenges for players in the ecosystem where only some will be able to leverage 5G's advantages (Banerjee et al., 2017).

Envisioned use cases

Whereas previous function-oriented generations of wireless services primarily targeted the mass consumer market, many of the envisioned benefits of emerging advanced wireless services will be associated with business and industrial use cases (Bauer & Bohlin, 2022). Fifth generation (5G), and emergent sub-THz wireless networks are anticipated to enable a

wide range of innovative services and use cases including; enhanced mobile broadband, massive, machine-type communications, and ultra-reliable, low latency communications (ITU, 2016). This is expected to support the continued growth of the Internet of Things (IoT) and allow the configuring of specialized services for sectors, such as smart manufacturing, smart transportation, and smart health care (Bauer & Bohlin, 2022). Despite 5G's envisioned 10x efficiency improvement, the continued increase in data traffic is not expected to lead to a profitable outcome for network operators who in recent times have been struggling with decreasing margins. The need for new business models and improved usage of assets, involving spectrum, sites and hardware utilizing collaborations and software to increase capacity at lower cost have been highlighted by industry experts (Sharma, 2019a).

According to a GSMA Intelligence report (2019), 5G could see explosive growth in private enterprise networks which is likely to fuel growth in the next five years. For instance, manufacturers might opt to build 5G networks for their in-factory applications (Fox et al., 2020; Banerjee et al., 2017). CSPs will benefit greatly from addressing the needs of companies rather than exclusively serving consumers. The new 5G technology will thus open up many possibilities for enterprises which reach far beyond improved network performance. 5G's most valuable ability is to offer reliable connectivity to machines and other things and not connecting people to one another. The standards and technologies that are required to provide such offerings are however not yet developed and will thus not be available in the immediate future (Fox et al., 2020).

The 5G value system

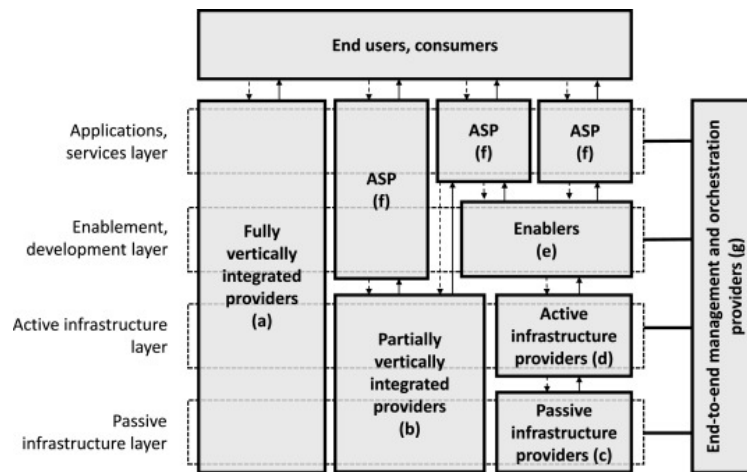
As an Internet Protocol (IP)-based network, 5G technology will consist of distinct layers including a physical network layer (comprising a passive and an active infrastructure layer), an enablement and development layer, and an application/services layer (Bauer & Bohlin, 2022). To increase deployment flexibility and facilitate network dynamicity a move to higher RAN frequencies are likely to require a change in core network infrastructure, most likely to cloud-based RAN architectures. The layer aggregating, connecting, and hands off mobile traffic of the core network - called the transport layer - should be massively scalable to handle traffic from multiple base stations and sufficiently robust to enable dynamic services in real time. To meet these challenges, 5G is expected to require a new core network supporting a wide range of services (Banerjee et al., 2017).

Due to this flexibility, firms have numerous options to build market presence. Bauer and Bohlin (2022), presents a simplified view of the 5G value system and suggests several organizational options across the four

main layers firms can position themselves within, depicted in Figure 11.

Figure 11

The 5G value system



Note. From “Regulation and innovation in 5G markets”, by Bauer, J. M., and Bohlin, E, 2022, *Telecommunications Policy*, 46(4), p. 4 (<https://doi.org/10.1016/j.telpol.2021.102260>).

The ultimate positioning will depend on firms’ core competencies and business strategy. This entails that some players will be fully vertically integrated and others will specialize on one or more of the layers. In addition, intermediaries integrating components across specialized players will emerge (Bauer & Bohlin, 2022).

In summary, the emerging wireless value system will pose new challenges and opportunities for incumbents and decision makers in communications equipment firms must have the abilities and incentives to direct resources to innovative investments to profit from the new technological and market configuration (Carpenter & Lazonick, 2017). Particularly, the innovative decisions of individual firms emerge from the competitive conditions, the technological and economic opportunities, and the conditions for the appropriation of rewards (rents) for taking the innovation risk (Bauer & Bohlin, 2022). Managing internal and external resources whilst overcoming internal and external resistances constitute the basis for good investment decisions as firms take a portfolio stake via a series of value chain integration activities as a result of a changing technology landscape (Low & Johnston, 2009).

1.3 Research Objective

The main objective of this master thesis is to develop a conceptual M&A advisory model intended for decision makers in high technology industries and in the telecommunications industry in particular. Our hope is to provide the reader with new insights and improved understanding for M&A deal making by highlighting strategically and practically significant advice. In undertaking this task, the research questions which we endeavor to answer are as follows:

- I. What critical success factors can be identified in past M&A cases in high technology industries?
- II. In what strategic sense can M&A be expected to benefit incumbent firms in the development of the next generation mobile wireless industry?

1.4 Delimitations

This master thesis is limited in scope due to the time frame of the project, spanning 20 weeks. As such, the following delimitations have been made. First, this master thesis will analyze companies within high technology industries, conclusions drawn will thus have limited significance for companies operating in other industries. In addition, this master thesis solely focuses on mergers and acquisitions, i.e transactions where a controlling majority is purchased and involves at least two corporate parties. This delimitation excludes other restructuring activities such as management buyouts (MBOs), leveraged buyouts (LBOs), and divestitures. Furthermore, this master thesis is written with incumbent firms in the telecommunications industry in mind. This has implied that the selected M&A deals used as a basis for analysis have been limited to cases in which larger companies independently acquire and integrate targets, rather than mergers among equals. As a result, the findings presented in this report will likely not be applicable to deals that do not meet these requirements.

1.5 Target groups

The intended target audience for this project is the M&A department of the case company, the company as a whole, companies in the telecommunications equipment industry, companies from other industries researching strategic M&A considerations, researchers in both the field of technology and business as well as students. This thesis aims to contribute to the existing body of knowledge in two different ways:

To academia, the contribution is a concentration of literature regarding technological transformation and strategic M&A activity as well as a novel analysis of M&A cases.

To companies, the contribution is a structured framework highlighting critical success factors and lessons learned regarding M&A activity in relation to product portfolio as an enabler for growth.

1.6 Thesis Structure

The structure of this master thesis can be broken down into six main parts. The first part is an introduction that outlines the problem at hand. The background to the master thesis is explained as well as the research objective and delimitations put in place. In the second part, the methodology is laid out. This is done by defining the research purpose and research approach. The research process is examined by looking at the different parts of the process. Finally, the credibility of the methodology is assessed. The third part presents a synthesis of relevant literature in the field of M&A and technological change, along with descriptions of the characteristics of the mobile wireless industry to outline the context in a rigorous manner. The fourth part is a presentation of our research relating to the analysis of M&A processes in high-technology industries. This includes the empirical findings from cases as well as the results from the interviews that were conducted with experts. The fifth part presents the analysis of the empirical results in relation to the theoretical framework. This chapter is concluded by presenting a model summarizing the findings. The master thesis ends with chapter six, which presents the final conclusions and discussion related to our own research and ultimately answers the two research questions as well as suggestions for future research topics.

2. Methodology

In this chapter, the methodology that has been applied in this master thesis is described. The chapter aims to explain what type of research that has been undertaken, why the specific methods were chosen, and lastly how these methods help contribute to the scientific character and credibility of the study.

2.1 Research Purpose

When deciding on a research approach, the first step is to understand the character of the purpose. Höst et al. (2006), presents four main types of purposes, descriptive, exploratory, explanatory, and problem solving respectively. These are explained accordingly:

Descriptive: A study where a certain situation or phenomenon is depicted.

Exploratory: A study which aims to gather new insights about a phenomenon, trying to generate new ideas for further research.

Explanatory: A study trying to explain a situation.

Problem solving: A study which aims to improve a part of the phenomenon that has been studied.

As stated in chapter one, the purpose of this master thesis is to develop a conceptual M&A advisory model intended for decision makers in high technology industries and in the telecommunications industry in particular. The purpose type considered most suitable for this master thesis is thus *exploratory*.

2.2 Research Approach

Saunders et al. (2015) defines three main approaches to conducting research that can be applied to draw conclusions. The first approach is the *inductive* approach, the second is the *deductive* approach, and the third is the *abductive* approach, which combines the first two approaches. These approaches are respectively outlined below.

Deductive approach: When a theory is first developed and then tested through a number of propositions. If the premises in the theory hold up to these tests, then the theory is proven correct. This is a suitable approach when there are factors that are to be measured, often in quantitative terms.

Inductive approach: The opposite to the deductive approach, here data is first collected and then used to formulate a theory. The inductive approach is most suitable when the specific context is what is being examined. This means that there is usually a smaller sample of studied subjects than in the deductive approach.

Abductive approach: A combination of the deductive and inductive approach. Instead of moving from theory to data or vice versa it jumps back and forth.

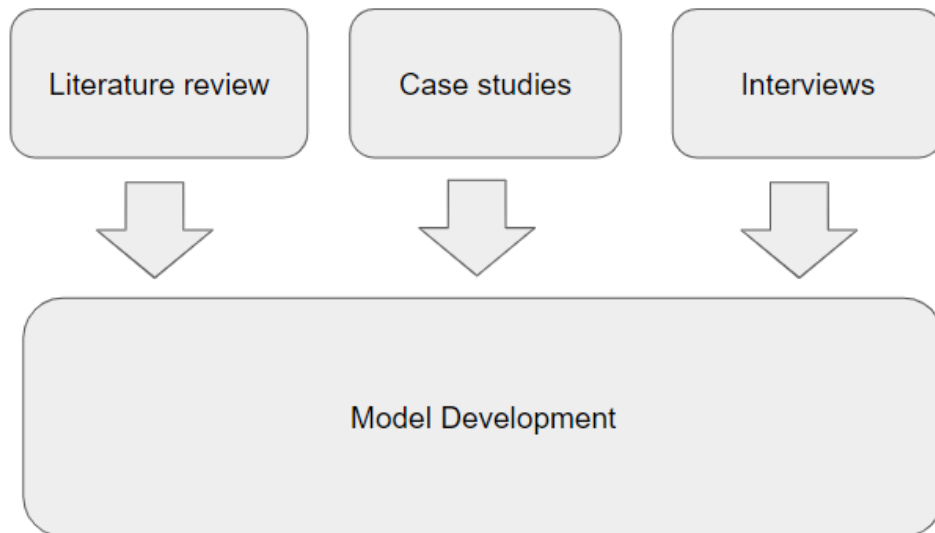
In this master thesis, an abductive approach has been adopted to sufficiently bridge the gap between the theoretical body of knowledge and the empirical data gathered. The iterative nature of this approach further suits this master thesis, as empirical observations are expected to result in a theoretical model that in turn will work as a basis for further research.

2.3 Research Process

This study has been carried out in several steps. In this section, these steps are explained in order to give a clear view of the research process.

Figure 12

Conceptual overview of the applied Research Process



2.3.1 Literature Review

The first step in order to answer the research questions was to complete an extensive literature review in order to create a theoretical framework and set the foundation for the study. We were indeed interested in the intersection between high technology M&A dealmaking and the telecommunications industry, two complex and multifaceted areas. In order to fully understand this context and be able to properly analyze this intersection, a thorough literature review of both areas were deemed essential.

Identifying relevant research

The literature review was conducted using the research engines LUBsearch and Google Scholar respectively. Keywords associated with Mergers, Acquisitions, Technological change, and critical success factors, were generated in a snowballing fashion and applied as search strings. Similarly, keywords associated with the telecommunications equipment industry included: 5G, telecommunications, telecommunications equipment. Combinations of the keywords were additionally used in order to identify search results stemming from the intersection of the two areas. An assessment of each publication was done by including papers, conference papers, books, and trade articles and by excluding non-peer reviewed

sources. Finally, each source was evaluated with respect to its relevance to high technology M&A and the telecommunications industry.

2.3.2 Case Studies

With the literature review completed, it was time to decide on what M&A deals to review in order to extract novel insights. This selection was deemed crucial, as the cases needed to be both relevant and representative in accordance with the purpose of this master thesis. As 5G is still a considerably new and emerging technology, focusing on M&A deals in this field was considered infeasible as published material with regards to such deals is still limited. Instead, the deals were examined in this master thesis from the following two categories:

- I. M&A deals that have taken place during periods characterized by the emergence of earlier generations of mobile cellular networks (e.g. 3G, 4G).
- II. M&A deals that have taken place in high technology industries undergoing transformation.

Cases belonging to the first category were included since learnings from within the telecommunications industry are believed to be beneficial with regard to the objective of the master thesis. Cases belonging to the second category were included due to the arguably transformative market conditions that prevailed during the time when the respective deals were carried out. By combining findings from cases that have taken place under these circumstances, our hope is to resemble the conditions currently present in the telecommunications industry in an analogous way. To gather information about the chosen cases, LUBsearch and Google Scholar were used once again with the addition of official press releases and newspaper articles. In order to obtain an exhaustive understanding of each deal, answers to the following considerations were sought:

- I. The corporate background of the acquirer and the target company respectively: To get an overview of the situation and context.
- II. The deal rationale: In order to understand the acquirer's reasoning behind the acquisition.
- III. The integration process: To understand the degree of integration in each deal.
- IV. The ultimate result and business implications of the deal: To be able to analyze the factors in part I, II and III.

The case study methodology was chosen as it provides rich data and enables the researchers to be explorative in the analysis of connections between various events and actors (Denzin & Lincoln, 2000; Yin, 2017; Halinen & Törnroos, 2005). The findings would furthermore expectedly be transferable to other cases and consequently helps to support conclusions (Hirschman, 1986). A weakness of our case methodology is however the fact that we do not have access to first-hand sources such as interviews with people involved in the deals. This means that the selected cases are portrayed using information originating from secondary sources, often written by third-party observers whose opinions can not guarantee unbiased conclusions from our standpoint.

2.3.3 Interviews

In order to gain additional insight into the topic, as well as to test the preliminary propositions stemming from the theoretical framework and M&A cases, a number of interviews were conducted. With the aim of corroborating, expanding, and challenging our findings, the interviews were divided into two different categories based on the professional background of the interviewees; M&A experts and telecommunications industry experts respectively.

The interviews with the M&A experts involved representatives holding both academic and business experience. This was considered important to obtain diverse perspectives. As none of the interviewees were specialized in the telecommunications industry, findings from these interviews could arguably be considered general for high technology industries altogether.

The interviews with the telecommunications industry experts involved employees and past employees of a multinational telecommunications company, “the Company”. These interviews focused on the current state and development of the industry, but also touched on their views and experiences from prior M&A deals to some extent. These interview subjects were selected by the supervisor at the Company due to their prior experience of M&A deals in the telecommunications industry.

All interviews were held in a semi-structured format with an open-ended question approach (McCracken, 1988). This approach encourages a conversational dynamic between the interviewee and interviewer, based on their common interests (Runeson & Höst, 2008). Each interview lasted between one and two hours and the interviewer’s role was to make sure that certain themes were discussed (M&A experience, views on the industry) and to ask questions that would further develop what was said. This type of interview was chosen because of the open-ended nature of the study as well

as the complexities of the topic. The potential risk of limiting the scope with a structured interview format were considered as the interviewees were experts with many years of experience in their respective fields. Structured interviews could thus potentially have contributed to us overlooking important considerations due to lack of sufficient space for the interviewee to address important issues that had not been encountered earlier in the research process.

2.3.4 Model Development

As the previous steps of the research and data gathering were completed, a conceptual model including the most relevant findings was developed. The findings included in the model were considered highly relevant based on their multiple presence in both literature and empirical findings. With help of the conceptual model, the research questions could subsequently be answered along with conclusions and suggestions for further research. The framework will also be analyzed by a model introduced by Gray (2020) which evaluates the framework's comprehensiveness, utility, validation, clarity, memorability, integration and differentiation.

2.4 Credibility

For a study to be considered contributory, it must be regarded as credible. According to Höst et al. (2006), there are three main criteria that determine the credibility of a study. These are reliability, validity, and representativeness respectively. Each of these criteria are described below along with details about what measures the researchers took to ensure each one.

2.4.1 Reliability

Reliability relates to the accuracy of data and analysis used and applied in the study. The reliability of the literature review was achieved through a thorough selection of peer reviewed literature and by ensuring that each piece of information originated from trustworthy sources. The fact that the interviews were recorded and transcribed ensured their reliability by making sure that there were no misconceptions on what was said and expressed in the interviews. Lastly, the cases' reliability were ensured through the use of official sources for official data, as well as by using multiple sources when it came to opinion pieces.

2.4.2 Validity

Validity refers to the fact that a study should measure what it has set out to measure. A popular way to ensure that validity is met is through triangulation, i.e. by using multiple different sources of data to strengthen

the validity. In this study triangulation was used as theory, practical cases, and interviews with experts were used to triangulate the topic.

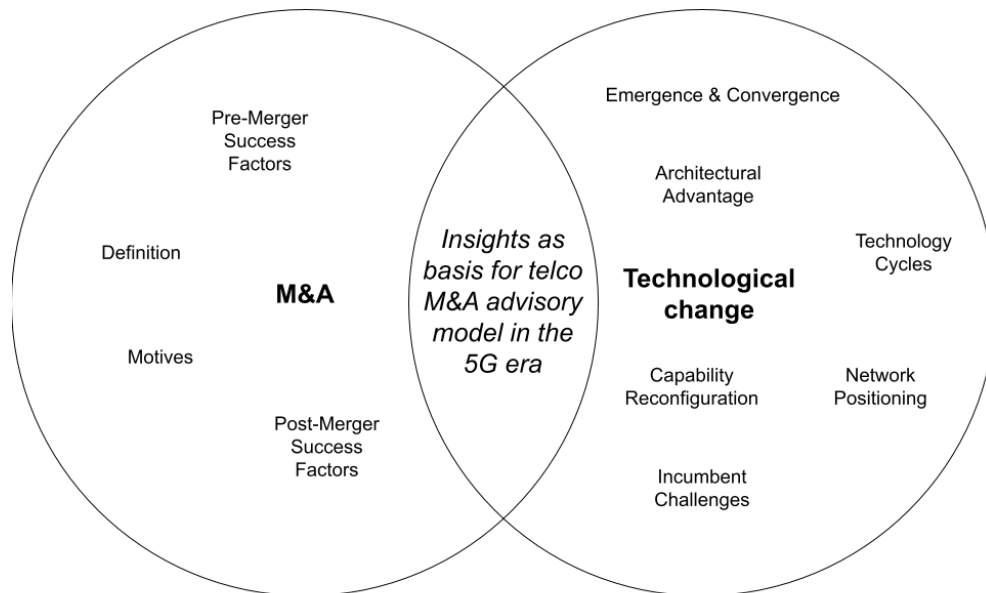
2.4.3 Representativeness

Representativeness means that the study can be generalized for settings outside of the specific setting present in the study. The representativeness of this study can be considered mixed depending on the different data sources. The findings based on literature both have a high level of representativeness, with generally applicable M&A theory as well as very little representativeness due to the very specific nature of the telecommunications industry which was the focus for the master thesis. The cases can be considered varied with regard to their affiliation with diverse high technology industries and can thus be seen as representative for a broader field beyond telecommunications. The interviews, and especially the findings derived from the interviews with the telecommunications industry experts, are the least representative as these experts are only experts within this specific field.

3. Theoretical Frame of Reference

In the following section, the master thesis' theoretical frame of reference is laid out as specified in Figure 13. The section starts by defining key concepts associated with M&A, including different types of transactions, critical success factors, and a selection of general M&A motives which are considered key drivers of acquisition outcomes (Vetter, 2021). Next, a general overview of critical success factors during the M&A process is presented in accordance with the literature in the field. Lastly, a synthesis of literature and theories on technological change is presented to give rise to important strategic considerations which can be used to support decision making during the strategy phase of the M&A process.

Figure 13
Theoretical Framework



3.1 Defining M&A

Mergers and acquisitions are considered to be part of a larger field of corporate restructuring tools and business combinations which includes all types of joint ventures between organizations (Bösecke, 2009). This master thesis solely focuses on mergers and acquisitions, i.e transactions where a controlling majority is purchased and involves at least two corporate parties. This delimitation excludes other restructuring activities such as management buyouts (MBOs), leveraged buyouts (LBOs), and divestitures.

The terms mergers and acquisitions are often used jointly and interchangeably by the public and in scholarly articles which can cause confusion. As suggested by Halperin and Bell (1992), the distinction is

irrelevant because in both instances a firm is being taken over and the ownership of a corporate entity is transferred to another. When looking past the surface level, clear differences regarding strategic, financial, tax and cultural impact can vary based on the type of transaction (Sherman, 2011).

3.1.1 Different Types of Transactions

The different types of M&A-transactions can be divided into three main groups (Ross et al., 2013). Merger or consolidation, acquisition of stock, and acquisition of assets respectively. When a company acquires all assets and liabilities of another company, the transaction is considered a merger. The acquiring party keeps its former status while the target no longer exists as an independent entity. A consolidation implies that neither party keeps their former independent status and instead joins a newly founded corporation. Triangular mergers relate to a form of restructuring where the target is absorbed by a subsidiary set up by the acquiring company (Arzac, 2005). Acquisition of stock refers to the acquisition of a company by purchasing its voting stock with cash, shares, or other assets. This is often done via a public offer called a tender offer, announced directly to shareholders to bypass the target firm's board of directors and management. An acquisition of stock can often however end in a formal merger. Acquisition of assets happens when the acquiring party buys all of the assets of the target firm. This implies that the target does not have to dissolve completely as it can remain as a legal entity. Unlike in acquisition of stock, a disagreeing minority can not form and prevent the complete absorption of the company, which can be beneficial for the acquirer (Ross et al., 2013).

Managerial perspective

It is also interesting to consider the transaction process from a managerial perspective. As highlighted previously, an acquisition can be initiated via a tender offer, hence circumventing the management of the target firm. Here, the goal of the acquirer is often to replace the incumbent management, something usually referred to as a hostile takeover. On the contrary, the transaction can also be perceived as a friendly takeover in which the deal is negotiated between the two parties (Schnitzer, 1996). Hostile bids are more probable if the target firm has performed badly in the past and lacks internal control mechanisms to solve its problems (Martynova & Renneboog, 2008). Literature has pointed out that post-merger performance following friendly takeovers are better compared to mergers initiated via hostile tender offers. At the same time, the stock market seemingly prefers hostile bids (Ravenscraft & Scherer, 1987; Bruner, 2002).

Horizontal, vertical, and conglomerate deals

By focusing on the degree of relatedness between the parties, M&A deals can be classified into horizontal, vertical and conglomerate deals respectively. Horizontal deals involve companies in the same industry, vertical deals relate to companies in different stages of the value chain, and conglomerate deals are deals between companies that operate in separate industries (Ross et al., 2013). Vertical and conglomerate deals are considered to be a less costly and risky way of expanding into new product lines and markets compared to growing organically. The attained synergies and economic value however tend to be higher when the target is in the same line of business or industry (Rosenbaum & Pearl, 2013).

3.2 M&A Motives

The most prominent theories regarding M&A motives involve efficiency, monopoly, valuation, and agency-related theories (see e.g. Angwin, 2007; Trautwein, 1990; Geiger & Schiereck, 2014; Ravenscraft & Scherer, 1987; Brouthers et. al, 1998). Most scholars however agree that M&A activity is caused by a combination of different motives and that no single reason prevails as the ultimate cause. In the context of technology acquisitions, common motives however include: access to resources and technology, access to technical employees' in-depth experience, and portfolio expansion by access to complementary products or services (Vetter, 2021).

3.2.1 Efficiency Theory

Efficiency theory suggests that the main goal of M&A is to exploit synergies. This is based on the assumption that the realization of synergies leads to an increase in company value (Bösecke, 2009). Efficiency related arguments are furthermore the most cited reason for undertaking corporate acquisitions (Phillips, 2008). Synergies can be defined as the positive wealth effects arising from the combination of the separate companies, creating values not available to the parties independently (Damodaran, 2005). Synergies can further be categorized in operational, managerial and financial synergies.

Operational Synergies

Operational synergies are often realized through economies of scale and scope. Economies of scope arise when different products are cheaper to manufacture jointly rather than on their own while economies of scale refer to the spreading of fixed cost across increasing production levels (Bösecke, 2009). Obtaining operational synergies via M&A can be enabled through combining operations or via knowledge transfers. Knowledge transfers can further enable more efficient production through specialization while combining operations can be an effective way to cut costs (Geiger, 2010;

Trautwein, 1990). Operational synergies can also enhance revenues, as the merged entity may attain marketing gains or strategic benefits (Ross et al., 2013). The most likely beneficiaries of operational synergies are horizontal mergers as being in the same industry makes it easy to spread overhead costs, as the merging companies likely have compatible business components which simplifies the sharing of resources such as sales teams and ERP-systems. Conglomerate and vertical mergers can also benefit from operational synergies through vertical integration, technology transfers, or complementary inputs (Ross et al., 2013).

Financial Synergies

Financial synergies relate to synergies that result in lower cost of capital. Lower cost of capital can be attained through: acquiring companies that have uncorrelated cash flows (i.e are in an unrelated line of business), realizing financial economies of scale from lower securities and transaction costs (i.e increasing the company's size) and lastly through better matching of investment opportunities with internally generated funds (i.e using an internal capital market). Financial synergies can occur as a result of increased cash flows and especially when the acquiring company has excess cash, but limited investment opportunities and the target has limited cash with high-return investment opportunities. The financial synergy arises since the combined entity can use the excess cash to seek investments that were not possible independently (Damodaran, 2005). In turn, this potentially creates increased cash flows and higher value which emphasizes how a company in a mature, slow growing industry can benefit from a target in a high-growth industry with a lot of promising opportunities. Tax benefits by using net operating losses from the target firm is another form of financial synergy. In this scenario, the target's incurred losses can be used to offset the combined entity's taxable income. Taxable income can also be reduced by decreasing the value of the acquired assets through reevaluating their market value post-acquisition (Ayers et al. 2003; Damodaran, 2005).

Managerial Synergies

If the acquiring firm has a management team that can increase the target's performance through a better matching skillset, managerial synergies arise (Trautwein, 1990). The capital market can act disciplinarily by replacing management that is unable to generate positive shareholder value. According to Jensen (1986), participants in the capital market fight over the ability to exert their power over firm resources and competing management teams thus act as an external control that can replace current management and raise shareholder value through managerial synergies. If incumbent managers fall behind in understanding market conditions or new technologies, a company's value can increase by replacing such managers.

Since the board of directors is unable to act independently, the only viable way to achieve better management can be through M&A (Ross et al., 2013).

3.2.2 Monopoly Theory

Higher market shares give market power for the surviving companies, hence monopolistic collusion can be a motivation for mergers (Geiger & Schiereck, 2014). Greater pricing power and reduced competition can lead to higher margins and operating income (Damodaran, 2005). Similarly, barriers to enter a specific market and sustain market power can be achieved through vertical mergers. M&A deals that interfere with competitive markets can however be challenged by governing bodies. Hence, market power is rarely stated as a merger motive in public. Negative payoff for society inferred by monopoly power has been questioned by scholars who argue that value gains from M&A is a result of efficiency improvement rather than from higher monopoly power (Ghosh, 2004).

3.2.3 Valuation-Related Theories

Overvaluation of acquirer's stock

Equity can be considered overvalued when a firm's stock price is higher than its underlying value (Jensen, 2005). Firms using stocks to realize M&A transactions can thus leverage private information and may have an incentive to use their firm's overvalued stock as "free currency." Compared to the stock market, managers likely have access to more in depth information as they engage with customers, suppliers, and employees daily (Ross et al., 2013). Due to this asymmetrical information, management has a better understanding of the firm's true value and can leverage in stock market driven acquisitions. In this way, firms can take advantage of firms that are incorrectly valued by an inefficient capital market (Shleifer & Vishny, 2003). By using overvalued stock, the bidder can offer a relatively lower amount of stock to purchase a target, which results in reduced earnings dilution (DePamphilis, 2010).

Undervaluation of target's stock

Similar to overvaluation, stocks can be undervalued due to market inefficiencies. In this sense, firms can achieve value-increasing outcomes by acquiring companies whose underlying assets are worth more than the deal price. To detect an undervalued acquisition target, firms can evaluate possible synergies hidden from the public, identify undervalued assets or underperforming management that can be replaced (Trautwein, 1990). Tobin (1969), suggests that undervaluation can be measured by dividing the market value of assets by their reproduction cost, this is referred to as the q-ratio. Given that the value of a target's assets imply a q-ratio below 1,

acquiring the company instead of investing in new assets would make sense for a firm looking to expand.

3.2.4 Agency-related Theories

Hubris

The hubris hypothesis, introduced by Roll (1986), assumes that firms are valued correctly in the market and that high target bids made by managers end up destroying acquirer shareholder value. The reason for this is essentially management overconfidence and arrogance, which leads to a belief that their valuation is better than the market's (Sudarsanam & Sorwar, 2010). Such hubris can be caused by manager self-importance, media praise, or recent organizational success respectively (Hayward & Hambrick, 1997). Furthermore, hubris has been shown to lead to increased acquisition activity and are associated with lower abnormal returns (Malmendier & Tate, 2003).

Empire-building Theory

Empire-building theory suggests that managers act in their own interest rather than following the interests of shareholders (Trautwein, 1990). Instead of maximizing shareholder value, deals are simply executed to increase management's wealth as increasing company size is correlated with increasing income (Jensen, 1986). Defending the firm's interests, maintaining a specific lifestyle, or being associated with a high-profile M&A deal are other reasons that can lead managers to go through with empire building acquisitions (Gorton, et al., 2009; Steger & Kummer, 2007).

3.3 Strategic and Organizational Considerations

When choosing which firm to acquire, firms have to make two high-level considerations. These can be summarized as strategic and organizational considerations (Larsson, 2005).

The biggest potential for synergies is apparent when the two firms are either highly related, such as an acquisition between two competing firms in the same market. Or when the acquired firm is highly complementary to the buyer's business, for example a vertical integration (Larsson, 2005).

Different organizational cultures are to be avoided when making acquisitions. Whether to prioritize strategic or organizational factors is a contagious issue. One argument in favor of prioritizing strategic fit is that the employees are often very loyal to their company, even if the acquiring company has a similar culture. There will always be clashes. This argument is further supported by the fact that the employees reaction and willingness to 'integrate' has more to do with how the integration process is carried out

rather than how culturally similar the companies are beforehand (Larsson, 2005).

3.3.1 Pre-Merger Success Factors

Over the years, much research has been carried out in order to determine success factors in relation to conducting M&A deals. In academic terms, these success factors can be divided into two separate categories, the first being pre-merger success factors. Gomes et al. (2013), synthesizes the existing body of knowledge on M&A research and subsequently derive the following critical success factors:

The first factor is the evaluation of strategic partners. This essentially means how well the acquiring firm assesses both the strategic and organizational fit of the target company .

The second factor is making sure that an appropriate price is paid for the acquisition target. When a too high sum is paid, there is a risk that value will be destroyed as a decent return on investment is difficult to achieve .

The third factor that is prevalent in the literature is the relative size between the acquirer and the acquired firm. According to empirical research, acquisitions between firms closer in size and smaller firms acquiring larger firms tends to be more successful than when large firms acquire firms much smaller than themselves.

The fourth success factor relates to the firm's overall M&A strategy and experience. Research shows that companies with extensive M&A experience in the past are more likely to be successful than firms that lack prior experience. Furthermore, it is important that the M&A strategy is coherent and consistent over time in order for the firm to be able to leverage the learnings from each deal.

The fifth factor is the so-called courtship period between the two parties. According to the literature, it is important to ensure that the two companies get to know each other before implementing the deal. This can, for example, be done by engaging in a joint project ahead of the deal.

The sixth crucial success factor is communication. Even before the deal it is important to communicate towards key stakeholders such as the employees of the acquired company to avoid unrest.

3.3.2 Post-Merger Success Factors

The first post-merger success factor suggested by Gomes et al. (2013) is to find a suitable integration strategy. Research shows that a lack of integration can be a source of failure just as forcing too much integration upon the acquired company can be.

In the post-merger phase, it is also important to have strong and clear leadership, as this otherwise is a very uncertain time for key stakeholders such as employees and shareholders. This is the second factor.

A third factor is the speed with which the M&A will be implemented. Some scholars argue that the most important factor is to ensure that the process keeps running and holds momentum, even if there is a risk that minor mistakes will be made. This is a contagious issue as others argue that there is a need to keep the implementation at a slow and steady pace in order to reduce the number of conflicts.

The fourth factor is management's ability to keep focus on day-to-day activities. Studies show that management puts a heavy focus on the acquisition, and divert a lot of resources towards it which leads to other important aspects, such as innovation, becoming disregarded .

Fifth is communication during implementation. It is argued that the workers are in dire need of information during this stage and that uncertainty should be minimized as much as possible.

The sixth factor is related to how the acquiring company should deal with corporate cultural differences. While determining how different the corporate cultures between the two firms are is a pre-merger issue, how to deal with these differences once the deal has taken place is however a vital post-merger factor. Data shows that firms choosing to integrate acquired firms according to the recommended way for the degree of cultural differences between the firms had better results than those that did not follow these recommendations).

The seventh factor is human resource management. Gomes et al. argue that there is a lack of research on HR practices after M&A deals but suggest that using better practices in human resources is one way to reduce conflicts and keep the motivation of both management and employees at a high level.

3.4 Defining Technological Discontinuities

Understanding technological change is considered essential to theorize on the evolutionary nature of the telecommunications industry and to build an

understanding of the role that M&A can play in its continued development. Extant literature on technological change and technological discontinuities has to a large extent built on the seminal contributions of Schumpeter (1942), who in essence envisioned technological development as an ongoing process of discontinuous change resulting from innovation. The next section thus synthesizes existing literature in the field that is considered relevant and includes perspectives on organizational considerations in the face of technological change.

3.4.1 Emerging and Converging Technologies

More recently, technological evolution has been conceptualized as an S-shaped curve proceeding in a sequential and progressive manner. According to the S-curve hypotheses, technology performance is slow at first, accelerates over time, and finally flattens out to be supplanted by a new technology initiating another trajectory (Ansari & Garud, 2008). Furthermore, the progressive improvements depicted by the S-curve correspond to the diffusion rate of novel technologies due to the fact that only a few actors adopt an innovation at first. Then, the adoption rate increases sharply as the innovation gains foothold and finally flattens out as laggards adopt the innovation (Rogers, 2003).

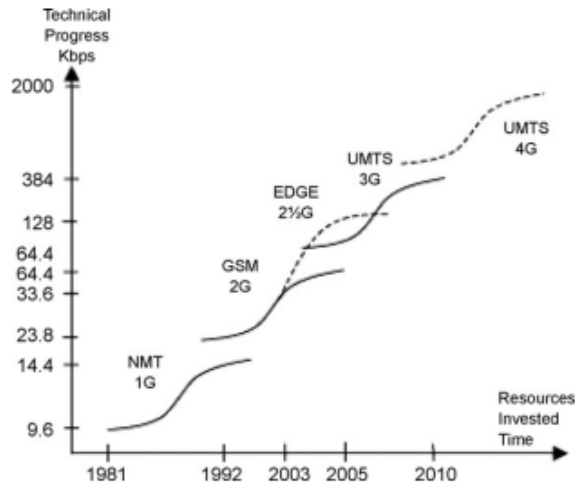
The field of mobile communications has seen five main generations from the early 1980s to the present from a performance standpoint and the next-generation mobile network is generally introduced every decade (Ansari & Garud, 2008; Kim, 2020). The performance improvement over time in terms of technical progress is depicted in Figure 14 for the first four mobile generations. By comparing the number of global LTE subscriptions (4G) vis-à-vis other mobile subscriptions, the S-pattern in the transition to 4G can also be illustrated from a diffusion standpoint, as seen in Figure 15. Despite the clear implications of this framing suggesting that actors should shift investment focus from a mature to a new technology at a given point of saturation on the S-curve, scholars have pointed out that technology transitions is simply more than a shift from one technological trajectory to another (Ansari & Garud, 2008).

Generally, every separate business unit owned by a large corporation lies at a different point on the S-curve at the same time. Thus, a company can assess its position it as a whole occupies on the S-curve by plotting each of these positions and consequently decide what strategic acquisitions and divestitures it must make in order to move in the desired direction (Frick & Torres, 2002). As such, an S-curve can be useful in depicting the outcomes of a “battle” between technological generations once it has been fought, but

is less useful for understanding challenges that arise during transitions (Latour, 1990).

Figure 14

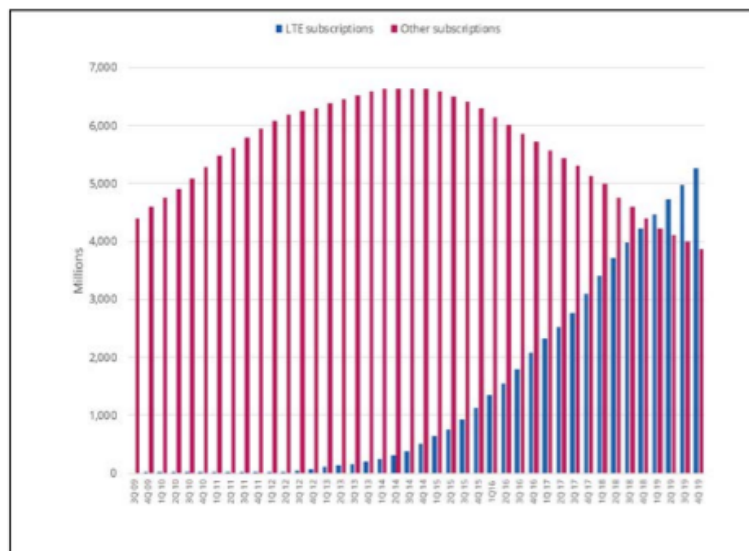
Performance improvement for mobile communications, 1G-4G



Note. From “Inter-generational transitions in socio-technical systems: The case of mobile communications”, by S. Ansari and R. Garud, 2009, *Research Policy*, 38(2), p. 384 (<https://doi.org/10.1016/j.respol.2008.11.009>).

Figure 15

LTE (4G) and other mobile subscriptions as of end 2019



Note. From *LTE and 5G Subscriber Growth and Forecast – April 2020*, by GSA, 2020 (<https://gsacom.com/paper/lte-and-5g-subscriber-growth-and-forecast-april-2020>).

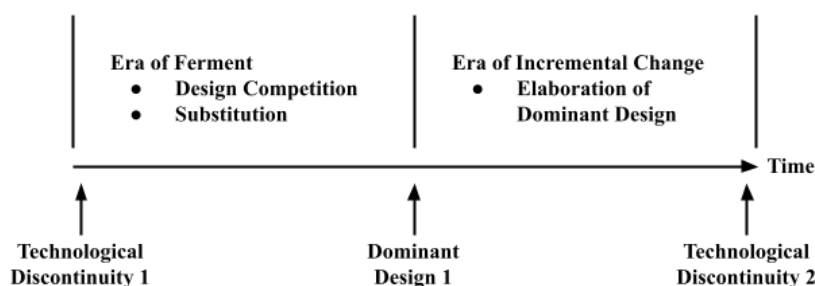
The difficulties in forecasting the pace of emerging and converging technologies and the rate of marketing acceptance complicate investment decisions for firms planning to realize potential value, market, and productivity gains across the value chain (Low & Johnston, 2009). Generally, such firms are expected to invest in technology that contributes to continual improvement of a technology attribute and in a way that is profitable for the firm.

3.4.2 Cyclical Explanations

Scholars Anderson and Tushman (1990) presents a cyclical model of technological change in which a technological discontinuity, defined as an innovation “that dramatically advances an industry's price vs. performance frontier” triggers an era of ferment, as depicted in Figure 16. During this period, the competition between old and new technologies is fierce and the old technology is only replaced when the superiority of the new technology is proven. Simply ignoring discontinuities or losing the battle for industry standards are consequently substantial for organizations.

In the following phase, inadequate understanding of the new technology leads to multiple designs and competition within the new technological regime increases. Ultimately, a dominant design establishes dominance and subsequent technological progress consists of incremental improvements elaborating the standard that stays dominant until the next technological discontinuity arises. Importantly, an organization’s ability to produce incremental innovation and develop competencies in the pursuit of building future technological breakthroughs simultaneously is considered essential during the period of incremental change (Anderson & Tushman, 1990).

Figure 16
The Technology Cycle



Note. From “Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change”, by P. Anderson and M. L. Tushman, 1990, *Administrative Science Quarterly*, 35(4), p. 606 (<https://doi.org/10.2307/2393511>).

Creative accumulation

Not dissimilar to this stream of thought is the concept of creative accumulation, suggesting that firms simultaneously need to develop existing knowledge whilst sourcing and integrating new competencies (Pavitt, 1986). Building on this concept, Bergek et al. (2013) advocate that firms in capital intensive and complex product industries need to handle three challenges simultaneously when technological discontinuities intensify competition. First, firms should fine-tune and evolve existing technologies at a rapid pace. Second, firms should acquire and develop new technologies and resources, and third; integrate novel and existing knowledge into superior products and solutions. Incumbent failure during periods of technological change can thus be interpreted as a result of insufficient investment and integration of multiple technological tracks simultaneously (Bergek et al., 2013).

3.4.3 Incumbent Challenges

The challenges caused by discontinuous technological change for incumbent firms has been addressed in the innovation literature and can generally be divided into competence-based and market-based explanations (Bergek et al., 2013). The competence-based view suggests that the competitive outcome of a discontinuous innovation is determined by its either destructive or enhancing effect on firms' existing technological competencies and capabilities (Abernathy & Clark, 1985).

Competence-based explanations

Competence-enhancing discontinuities refine and extend an established product design and are order-of-magnitude improvements in price/performance that build on existing skills and knowledge, usually by improving individual components (Tushman & Anderson, 1986; Henderson & Clark, 1990). Generally, competence enhancing discontinuities are introduced by incumbent players who also tend to reinforce their competitive positions since barriers to entry are increased in the process (Bergek et al., 2013). Few new firms enter an industry as a result of competence enhancing innovation which explains why older and larger firms seem to have better chances of survival throughout industry revolution (Maine & Garnsey, 2006; Klepper, 1996).

Competence-destroying discontinuities on the other hand make existing knowledge obsolete by fundamentally changing the skills and knowledge required to develop and produce a product (Tushman & Anderson, 1986). This type of innovation tends to be introduced by new entrants and further lowers the barriers to entry for other new entrants since previous competence-based competitive advantages become obsolete. Due to ties to

the old technological paradigm, incumbents have difficulties in responding effectively to the innovation which usually changes the composition of the competitive conditions (Bergek et al., 2013).

Market-based explanations

Central elements in the market-based explanations of the outcomes of discontinuous change consist of disruptive innovations and sustaining innovations respectively. Sustaining innovations reinforce established product performance trajectories in an industry by providing existing customers with something better in the performance attribute they already value. Sustaining innovations thus build on established value networks and therefore require no change in the innovating firm's strategic direction (Christensen & Rosenbloom, 1995).

Disruptive innovations imply a different set of performance attributes than those valued by existing customers (Bower & Christensen, 1995). These innovations tend to underperform in the performance attributes most valued by mainstream customers when they are introduced. Thus, disruptive innovations initially tend to attract niche customers in emerging or small markets that value their nonstandard performance attributes (Adner, 2002; Bower & Christensen, 1995). Over time, a disruptive innovation improves more rapidly than the established technology with regard to mainstream performance attributes, which enables it to compete also in mainstream markets (Bower & Christensen, 1996). Its ultimate market success is facilitated by performance overshooting which suggests that incumbent firms tend to improve technologies faster than their customers need or are willing to pay for (Christensen, 2003).

Essentially, customers in mainstream markets will not make product choices based on differences along established performance parameters once product performance has satisfied their main performance requirements. Instead, they will turn their attention to alternative parameters and thus likely embrace the disruptive innovation based on the new attributes it offers, e.g. cost, reliability or convenience (Christensen et al., 2001). In general, disruptive innovations are pioneered by new entrants and initially tend to be ignored by incumbents who find them financially unattractive compared to existing profit models (Christensen, 2006). Due to the fact that disruptive innovations are initially inferior to mainstream products, the leading firms' most attractive customers will typically not use them (Christensen et al., 2001). Furthermore, leading firms tend to have difficulties in devoting sufficient resources to develop solutions for smaller low-margin segments. This is especially the case when such projects compete with initiatives addressing the needs of known and powerful customers (Bower & Christensen, 1995). Once the disruptive technology

starts to invade the market, it is often too late for incumbents to respond and the pioneering entrants subsequently come to dominate the market (Bower & Christensen, 1995; Christensen & Rosenbloom, 1995). This pattern of change can occur in any product or service market and generally stems from the inability of incumbents to change strategies (Rosenbloom & Christensen, 1998; Christensen et al., 2005).

Even though the competence-based and market-based explanations make different predictions of competitive outcomes, the explanations for incumbent failure are similar. Technological discontinuities that are disruptive or competence-destroying will threaten industry incumbents who will lose market share to new entrants. Simply either because old competences are destroyed or because new performance attributes replace existing ones. In contrast, sustaining and competence-enhancing discontinuities reinforce the competitive positions of incumbents and there will be few successful new entrants. The absence of new entrants can implicitly be considered a key indicator of industrial stability (Bergek et al., 2013).

3.4.4 Capability Transformation

During periods of technological change, Lavie (2006) suggests that incumbent firms resort to reconfiguration mechanisms that occur at the capability level to maintain competitive advantage. In this context, capabilities constitute processes by which firms combine and use resources, enabling them to reliably perform and extend their basic functional activities (Gavetti, 2005).

With regards to the pace and uncertainty of technological change, a firm must first redefine the most valuable capability configuration in the postchange environment and then reconfigure its actual capability accordingly to achieve a fit with the perceived value-maximizing capability. Lavie distinguishes between three separate types of capability configuration mechanisms; capability substitution, capability evolution, and capability transformation respectively.

Capability substitution implies that the portfolio of capabilities is modified by discarding old capabilities and acquiring new capabilities and is likely pursued when the pace of technological change is faster in nature. Second, capability evolution implies that capabilities evolve over time through adjustments of constituting routines and is likely pursued when the uncertainty of the technological change is high. Third, capability transformation is an intermediate mechanism relying on a combination of prior and newly acquired skills and know-how and is likely pursued when

the pace of technological change and level of uncertainty is more balanced (Lavie, 2006).

Generally, incumbents can more easily conceptualize value-maximizing capabilities when the level of uncertainty is lowered and more clearly defined courses of action can be identified, such as at the end of an era of ferment (Tushman & Anderson, 1986; Lavie, 2006).

To transform their capabilities, there are numerous activities and actions a firm can engage in, involving: collaboration with other firms, creating new knowledge internally through search and exploration or simply by absorbing knowledge from public sources (Capron et al., 1998). Scholars Ansari and Krop (2012) suggest that the chances of incumbent survival in the face of radical innovations are higher the more incumbents engage in symbiotic crossboundary management (i.e. effective partnerships with challenger firms), are structured and prepared for disruptive change in terms of organizational form, and through formalization of ambidextrous processes to seek and exploit business opportunities. Furthermore, a firm's ability to effectively build and leverage linkages between an innovation and the complementary capabilities needed to commercialize the innovation makes it more difficult for new entrants to acquire and access such complementary capabilities, which consequently also yields higher likelihood of incumbent survival (Ansari & Krop, 2012).

Perhaps most important to this work, acquisitions constitute an important tool for firms to transform their capabilities (Capron et al., 1998; Capron & Mitchell, 1998). The innovation literature suggests that such external sourcing can constitute a viable option in providing quick and affordable solutions compared to internal development which tend to be risky, time consuming, and expensive (Puranam et al., 2006; Steensma & Corley, 2001; Swan & Allred, 2003).

3.4.5 Architectural Advantage

In 5G and other digital markets characterized by multi-layer systems with interdependencies and complementarities between players, competitive conditions (the degree of contestability), the technological and economic opportunities, and the conditions for the appropriation of rewards (rents) for taking the innovation risk are particularly important in shaping the rate and direction of investment and innovation. These activities are additionally influenced by the complementarities and costs of coordination with players in complementary activities (Bauer and Bohlin, 2022).

Complementarity & Mobility

In understanding when vertical integration (via e.g. M&A) can be a viable option for a firm in a market characterized by such conditions, the contributions made by Jacobides et. al (2006) are highly relevant. More specifically, the authors theorize on the concepts of complementarity, defined as “the extent to which two mutually adapted factors can yield superior value in combination”, and mobility, defined as “how plentiful these factors are in each part of the value chain, and how easy it is to replace one set of complementary factors with another in their vertically adjacent segments.” In essence, firms who can obtain high mobility and high complementarity in their vertically adjacent segments can appropriate value from an innovation without owning the complementary asset and should thus not resort to vertical integration. Similarly, a firm’s ultimate success in maximizing industry control and ecosystem growth depends on its ability to encourage competition in its complementary activities, while restricting mobility, entry and competition in its own segment.

Building on this idea, referred to as architectural advantage, the authors provide a mechanism identifying the strategies and relevant considerations that are available to a profit-seeking innovator, summarized in brief below.

Step 1

As a first step, a firm considering vertical integration needs to assess the mobility of the asset which is controlled in relation to the complement of interest which is not controlled. Given that there is sufficient competition in the complement and weak intellectual property protection, integration should be avoided since the firm can appropriate the complementary assets and/or capabilities through favorable agreements with suppliers. Spurring improved asset mobility in vertically adjacent segments (i.e up or down stream) e.g. through open standards should be pursued if possible.

Step 2

Next, the firm needs to consider the potential benefits of maintaining a narrow business model versus broadening its focus by diverting resources to support its platform. Essentially, “the firm should consider whether it would be better off from getting a reasonable share of a growing pie, rather than myopically focusing on protecting a large share of a shrinking pie.” An important determinant of the focus of the firm’s business model is subsequently its ability to replicate the asset complements and ultimately the costs associated with developing these. However, in case the architecture within which the firm is located is rapidly expanding, a broadening of the firm’s focus is favored. Here, the question of whether the firm is able to invest in sustaining its own vertical ecosystem single-handedly, or in collaboration with others, comes into play.

Step 3

Lastly, the firm should consider the implied effects of integrating on the development of its capabilities supporting future innovation processes. Inevitably, accessing complementary assets will change the scope of the firm which consequently impacts its dynamic capabilities and propensity to innovate. Essentially, costly losses of innovative abilities may be the result of such capability adjustments and the advantage of integrating should thus be balanced with the costs of interfering with the firm's ability to innovate in the future. Essentially, "rather than only caring about how to protect the value of a single golden egg, we might want to think more carefully about the health of the goose that could lay numerous eggs."

The PC sector

To illustrate architectural advantage, the authors highlight Microsoft and Intel who have essentially managed to impose dependency on all other actors in the PC value chain. This has been accomplished mostly without engaging in downstream integration into production of computers and instead by shaping the architecture of the PC sector through standards and relationships with other industry participants.

In this way, the firms facilitate competition in the complementary assets rather than in their own segments without actively participating in these parts of the value chain. For instance, design and assembly of personal computers is a segment exposed to ferocious competition whilst attempting to challenge Microsoft or Intel in their own segments would require huge investment. Simply put, these firms leverage their upstream position and the structure of complementary assets to enhance downstream demand, ensuring they will end up with the lion's share of the benefits although their activities have been joined with many other parties. In other words, they have focused on achieving architectural advantage by nurturing complementarity in an emerging open ecosystem.

3.4.6 Network Positioning

Low and Johnston (2009) highlights the importance of a firm's direct or indirect relationships to other firms, referred to as its network position, in light of a changing technology landscape. Essentially, firms can be considered to operate in networks which over time reflects a structure. As such, the cumulative effects of interrelatedness between the firms are ultimately captured in the positions the firms have in the network.

Ambidexterity

A strategic imperative in a changing technology landscape is preparing for network position change based on the firm's perception of emergent and convergent technologies. To deal with ambiguity and uncertainty, the firm needs to adapt, align, and maintain the flexibility of the organization and develop insights into how changing technologies will impact its network position. Building such ambidexterity into the organization is required for successful identification of the network positioning options that will ultimately enable the firm to redefine its role, identity, and attractiveness. Examples of network relational and/or positioning options include mergers, alliances, and acquisitions.

Positioning path during periods of technological change

The authors envisions a four-part positioning path and proposes various network relational and/or positioning options established firms should consider to reinforce or change their network positions during periods of technological change, as shown in Figure 17. These actions should be taken despite the fact that there are considerable difficulties in anticipating the trajectory of emergent and convergent technologies and subsequently market acceptance and post change network configurations.

Phase 1

The network remains tightly structured and firms have entrenched network positions with high degrees of resource specialization, relational interdependency, and strong investment. Generally, firms are reluctant to embrace impending network changes due to ambiguous competitive and market conditions. To minimize impact, such changes are internalized within the network and relational actions are aimed at reinforcing existing positions. Since this may hurt firms' capacity to react and establish new markets and new networks, some start to invest in resources allowing them to operate within the limits of existing technology barriers or push these limits to set the stage for a future network positioning response path.

Phase 2

Emerging technologies are converging faster than expected and existing products are starting to mature. New products and services are tried and established companies must re-examine their business models. Despite the network still being closed and structured, leading companies reduce uncertainty and improve flexibility by seeking out partnerships or investing in well-positioned start-up companies. By responding in this way, firms get access to resources beyond the immediate network targeting new, emerging networks.

Phase 3

Existing networks are continuously being transformed and becoming less structured as new technologies out-compete the former on performance criteria, application, delivery mechanism, and content. Firms locked into their existing network positions try to further internalize the external changes within the network while others pursue a more aggressive positioning path. To reshape increasingly unattractive network positions caused by the changing technology landscape, firms resort to relational models involving “an active and aggressive merger and alliance agenda.”

Phase 4

Existing business, relational models, and processes are being seriously undermined as emerging and converging technologies have now undergone periods of evolution to revolution. New shifting application domains cause rapid growth resulting in the emergence of new markets and submarkets where new resource specialization unfolds. Requirements for new sets of production, technical, sales and marketing transformation activities increase as start-ups and investors expand their investments. Altogether, this causes major value chain transformation and challenges for established firms. In order to establish a dominant position in the new network immediately and maintain control over the positioning path, established firms need to decide which firms to acquire before scenario 4 unfolds.

Figure 17

Network positioning options and path

	Closed, Structured Network	Evolving, Unstructured Network
Entrenched, Settled Position	<p>①</p> <p>Firms reinforce position by pushing barriers of existing resource and/or technologies specialization</p>	<p>③</p> <p>Firms take leadership role in position change through mergers and alliances</p>
Changing, Unsettled Position	<p>②</p> <p>Firms initiate position change through opportunistic partnership to increase flexibility</p>	<p>④</p> <p>Firms seek position change through acquisitions to dominate other firms, almost immediately</p>

Note. From “The evolution of network positions in emerging and converging technologies”, by B. Low and W. J. Johnston, 2009, *Journal of Business & Industrial Marketing*, 24(5/6), p. 436 (<https://doi.org/10.1108/08858620910966309>).

4. Results

The empirical results of the master thesis are summarized in this chapter. The chapter consists of two main sections, Case findings and Interview findings. These empirical findings are then to be analyzed in conjunction with the theoretical frame from chapter 3.

4.1 Case Findings

We have examined several of the most high profile M&A deals in high technology industries. The chosen cases have been selected due to their nature of being in high-technology industries undergoing transformation. The main objective and consequential commonality between all of the analyzed deals has either been 1. To revamp or broaden the product portfolio, or 2. To position the company during a phase of transformation in the industry.

4.1.1 Nokia's acquisition of Alcatel-Lucent

The first case to be assessed is Nokia's acquisition of Alcatel-Lucent which was a deal first announced in 2015. The acquisition was completed with a buy-sum of \$16.6 Bn (Financier Worldwide, 2015).

Nokia

Nokia is a Finnish telecommunications equipment manufacturer and IT company. In 2006, a decade prior to the acquisition of Alcatel-Lucent, Nokia was focusing its business primarily on mobile handsets, with only 18 percent of revenues coming from its Networks Division. During the coming years, Nokia faced stiff competition in the mobile phone market as players such as Apple and Google increasingly took market shares, resulting in Nokia shifting its focus towards networks. In 2015 the Networks Division accounted for 92 percent of Nokia's revenue (Vergel, 2020).

Alcatel-Lucent

The target company, Alcatel-Lucent, was formed following a merger between French firm Alcatel and American firm Lucent Technologies in 2006 (Bajaj, 2006). The company faced a number of issues after the merger and it was not until 2011 that they had a positive operating profit. In 2013, Alcatel-Lucent made a strategic shift as they planned to go from an end-to-end telecommunications provider to a company with a focus on IP and cloud networking as well as ultra-broadband (Vergel, 2020).

Rationale

Nokia's aim of the acquisition was for Alcatel-Lucent to strengthen their position in network technology. Rajeev Suri, Nokia's CEO at the time, highlighted both companies' strong R&D capabilities and that combining

these could lead to extraordinary results. Furthermore, by accessing Alcatel-Lucent's revenue Nokia's market position would be strengthened and the company would become the second largest player in the telecommunications equipment manufacturing market, adding economies of scale and with hopes of challenging Ericsson, the largest company in this market (Vergel, 2020).

This acquisition is of great strategic importance for Nokia's future in this transforming market, but one also has to consider the short-term financial impact as a possible driver behind the decision. Looking at Nokia's financial results in the quarters before the acquisition one can see that Nokia's Network division had a profitability decrease by 61 percent when comparing Q1 2014 with Q1 2015 (Nokia, 2016).

Integration

The merger resulted in Alcatel-Lucent becoming an integrated part of Nokia's largest division, Nokia Networks. Nokia Networks subsequently got divided into the following four main business groups:

- Mobile Networks
- Fixed Networks
- Applications & Analytics
- IP/Optical Networks

Each of the business groups had full responsibility for their strategy, operations and finances. They were furthermore responsible for fulfilling their targets (GlobeNewswire, 2015.).

Result

Nokia's profitability appeared to be weakened following the acquisition of Alcatel-Lucent and it took the company seven years to achieve the same levels of profitability as before the deal (Nokia, 2022).

An analyst from Liberum Capital Ltd. stated that Nokia now was behind their competition technologically as after their merger with Alcatel-Lucent their focus shifted towards cost cutting rather than staying on track developing and investing in new technology. CEO at the time indicated that the merger with Alcatel-Lucent has put a strain on the company's pursuit of launching 5G network products (Ryan & Seal, 2020). This strain is well exemplified by the many lay-offs that Nokia has been forced to go through since merging with Alcatel-Lucent, one example being the lay-off of 1,233 employees in France during 2020 (Rosemain, 2020).

4.1.2 IBM's Acquisition of Red Hat

In 2019, IBM completed the acquisition of Red Hat for \$34 Bn (IBM, 2019).

IBM

IBM is an American multinational technology company. The company's main strategic focus is cost leadership through outsourcing along with highly flexible operations, allowing IBM to focus their resources on the most profitable business operations (Thompson, 2018). This focus is reflected in the company's M&A strategy as well, with senior vice president of global markets Martin Schroeter testifying of going through with over 150 acquisition deals during his 13 year stint at the company. Schroeter also marks the importance of moving quickly, as with today's technology, the need for long and drawn out due diligence processes is not the same as it was in the past. "Instead of going in with 25 things we need to know, now it is only the two or three things that we need. We use AI and analytics to figure out what is critical, and due diligence can be in a few hours versus a few weeks. The world will continue to move that way" (Rosenbaum, 2019, para. 8).

Red Hat

In 2012, Red Hat was the first open source centric company to surpass \$1 Bn in revenue. A market leader within this rapidly growing segment. In 2019 when the company was acquired by IBM, it was considered one of the leading players in open hybrid cloud technologies (IBM, 2019).

Rationale

IBM's strategy of moving quickly and aligning their business towards the most profitable segments was definitely considered in this case, as the main rationale for the acquisition was to move towards open source cloud, a segment of great strategic importance. IBM's CEO at the time, Ginni Rometty, claimed that companies' transition to the cloud has only been completed by 20% and further that "The next 80% is about unlocking real business value and driving growth." This acquisition is an example of how IBM are shifting from their earlier on-premise solutions to a growing market that is becoming more and more profitable (Red Hat, 2019).

The importance of this market to IBM is clearly shown by the stock market's response to their results in this particular segment. IBM's stock price had its biggest decrease in the last four years the quarter before their acquisition of Red Hat as their growth in cloud revenue had been halved from 20 percent to 10 percent. This once again shows us how closely related the company's M&A activity is to both their long-term strategic goals, but also how in the short-term, it can be seen as a response to a drop in revenue

or share price (Donnelly, 2018). It is important for IBM to not be left behind in this field as it is rapidly moving (Ajay et al., 2019).

Integration

After the acquisition of Red Hat by IBM it was integrated into IBM's cloud and Cognitive Software division, as a stand-alone unit. Red Hat will be independent, keeping their own offices and branding (Donnelly, 2018).

Result

Red Hat has allowed IBM to become a player within other segments due to their added competence in open sourcing and cloud. One account of this is by Priya Nagpurkar, IBM's director of cloud platform research, who claims that Red Hat's experience in open source has been of great importance to IBM that has begun with larger releases of open source based software (Hall, 2020). Furthermore, much of IBM's future products and offerings are running with the help of technology made available by Red Hat. 5G is a future market with an exciting future that IBM of course is interested in pursuing. Red Hat's importance in this area is stated by Dennis Kennelly, IBM Hybrid Cloud's general manager. "IBM is helping clients unlock the full potential of edge computing and 5G with hybrid multi-cloud offerings that bring together Red Hat OpenShift and our industry expertise to address enterprise needs in a way no other company can." (IBM, 2020, para. 3).

4.1.3 Apple's Acquisition of Beats

On the 28th of May 2014, Apple announced its intention to acquire Beats Music and Beats Electronics. The total sum of the two deals equated to \$3 Bn (Apple, 2014).

Apple

Apple is one of the world's largest and most prolific technology companies. Apple specializes in electronics, software and online services. At the time, Apple's size and strong brand recognition was in large part accomplished due to the visionary leadership of Steve Jobs. In 2011 Jobs resigned due to health issues and many outsiders questioned Apple's ability to keep innovating and being a technology leader under the new CEO Tim Cook (Arthur, 2011). There certainly was no negative short term effect as Apple's 2012 launch of the iPhone 5 was the most successful in the company's history with over two million pre-orders as well as successful launches of the new generations of the iPad and MacBook (Etherington, 2012).

Beats Electronics

Beats Electronics was founded in 2006 by the world-famous rapper and producer Andre R. Young, also known as Dr. Dre, and record label executive Jimmy Iovine. Their aim was to create high quality headphones

and speakers that would provide the audio quality that good music deserved (Apple, 2022). Iovine recalls this early vision by quoting an early conversation with Dr. Dre: "Man, it's one thing that people steal my music. It's another thing to destroy the feeling of what I've worked on." The product was a marketing success and in 2013, 59 percent of high-end headphones sold in the US were manufactured by Beats. In September 2013, the company was valued at over \$1 Bn (Dorris, 2013).

In 2012, Beats acquired MOG, an online music streaming service subsequently transformed into Beats Music. Much like Beats Electronics, Beats Music's focus was to be a quality service with close links to artists and producers (Lunden, 2012).

Rationale

Apple's acquisition strategy was very clear and focused and only involves acquisitions that directly can become a part of their product portfolio. Said best by CEO Tim Cook himself: "If you look at the things behind the investigation, the things are acquisitions, and if you noticed, we didn't get any questions on acquisitions because our approach on acquisitions has been to buy companies where we have challenges, and IP, and then make them a feature of the phone." (Leswing, 2020, para. 3).

Apple's iTunes contained a great library of digital music and was a market leader in earlier generations of music devices. The music industry was however moving towards on-demand subscription-based streaming services such as Spotify and Apple needed its own service to not lag behind. Apple's VP at the time, Eddy Cue, noted his opinion that Beats Music was the "first music subscription service done right." (Molen, 2014, para. 2).

Integration

Beats Electronics became an integrated part of Apple, with many of the senior executives taking on important roles in Apple. Beats Music was subsequently integrated, re-modelled and relaunched as Apple Music (Richards, 2022).

Result

With the integration of Beats Electronics and Beats Music, the result of this acquisition can be summarized by answering the two questions: How has Apple's position on the headphone market developed, and Has Apple been able to create a competitive music streaming platform?

The first answer has to be approached from two different angles as Apple have kept Beats as a brand for high-performance headphones but in 2016 announced their own earbuds, AirPods, that in several ways can be

considered a by-product of Apple's Beats acquisition. AirPods have been a great success and are the biggest wireless earbuds on the market with a 65 percent market share in 2019. An estimated \$8 Bn revenue for AirPods is a larger revenue than some Fortune 500 companies (Reisinger, 2019). A breakdown of Apple's Beats revenue is not available since the AirPods launch, but estimates show that around 25 million Beats devices were sold in 2020 (Peterson, 2021).

Apple relaunched Beats Music as Apple Music in 2015 with the aim of becoming a large player in the music streaming industry. Spotify and other competitors were taking a hold of the market and Apple did not have time to develop their own platform from the ground up. As of 2020, Apple Music had a revenue of \$4.1 Bn and by Q4 2021, Apple Music held a 15 percent market share, smaller than the biggest competitor Spotify with 31 percent of the global market at the time (Porter, 2022; Apple, 2014). This market share can be considered impressive considering Spotify's head start and is further strengthened by the fact that Apple Music overtook Spotify's position as the biggest music streaming service in the United States in 2019 (Blumenthal, 2019).

4.1.4 HP's Acquisition of Compaq

Hewlett-Packard announced their intention to acquire Compaq in 2001 in a deal worth \$25 Bn (Sorkin & Norris, 2001).

HP

Hewlett-Packard is an American multinational information technology company. With headquarters in Palo Alto, Hewlett-Packard had a strong history of providing hardware services and launched their first computer back in 1966. In 1984, Hewlett-Packard launched one of their most successful products, the ThinkJet printer. Hewlett-Packard continued to broaden their portfolio and could boast a varied product portfolio including medical equipment, chemical measurement and components in 1995. In 1999, Hewlett-Packard decided to create a new company that would take over Hewlett-Packard's business in industries outside computing and printing. This was in order for the company to stay focused on the core business in the middle of the tech boom (Silicon Valley Historical Association, 2008).

Compaq

Compaq was an American multinational information technology company. After its inception in 1982, Compaq became one of the first manufacturers of computers compatible with IBM's PC technology (Old Computers, 2016). By 1994, Compaq was the leader in the PC manufacturing market, overtaking Apple among others. Compaq was able to survive the price wars

that took place in the early 1990s due to their flexibility and ability to seek out new suppliers (Lazzareschi, 1991). At the end of 1999, Compaq had a market capitalization of \$43 Bn. Compaq's good fortune ended as the dotcom bubble burst in the early 2000s when numerous technology start-up companies went bankrupt (Hayes, 2021). This was a hard blow for Compaq as they lost many of their big customers and to make matters worse, the liquidated companies sold off their assets, often state-of-the-art Compaq products, which flooded the market and prices fell even further as a result. Compaq's woes were compounded as Intel rose to prominence in the market, selling high-quality chipsets and motherboards at a price lower than Compaq (Farquhar, 2018).

Rationale

The first thing that needs to be understood regarding this acquisition is the dynamics between the biggest players in the computer market at the time. IBM was the largest player with revenues of \$90 Bn in 2000, Hewlett-Packard was the second largest with a revenue of \$47 Bn, Compaq was the third largest with a revenue of \$40 Bn, and Dell in fourth place with \$33 Bn (Sorkin & Norris, 2001). From this perspective, the obvious result of the deal would be that the combined size of Hewlett-Packard and Compaq would almost match IBM, and furthermore enable them to challenge IBM in almost every product category. The deal would also give Hewlett-Packard and Compaq a size advantage and possible respite against rapidly growing Dell. Hewlett-Packard's CEO Carleton Fiorina wrote in an internal email: "And, for the first time in a very long time, IBM will have a competitor that's strong enough, bold enough, and talented enough to take them head-on in the enterprise space." stressing the shake-up that this acquisition would have for the industry (Kanellos, 2002, para. 4).

The nature of the computer market in the early 2000s was, as earlier stated, characterized by an ongoing price war where price cuts and effectivisation was the key to success. Hewlett Packard's hope was that the acquisition would lead to cost synergies equating to \$2.4 Bn in 2004. The savings coming mainly from lay-offs but around a quarter is estimated to be due to better logistics. Hewlett Packard's CFO Robert Wayman remained realistic regarding revenues and predicted revenues to decrease by around 5 percent in the same time period. Some analysts at the time speculated that the driver behind the acquisition was for Hewlett Packard to take advantage of Compaq's services business, accounting for 23 percent of their revenue, a larger percentage than Hewlett Packard. The validity of this claim was questioned as these services mainly consisted of simple support and maintenance services with low margins (Kanellos, 2002).

Integration

Compaq was integrated into Hewlett Packard with Hewlett Packard introducing a new structure based around the following four operating units (Burgelman & McKinney, 2005):

- Imaging and printing
- Access Devices
- IT infrastructure
- Services

Result

It is difficult to say whether a huge deal made twenty years ago was successful or not. Considering the situation that both Hewlett Packard and Compaq experienced at the time, with cut throat price competition in a high technology field, it makes sense to assess the result in a short term and long term perspective. This is done by assessing the success rate of the short term operational integration and implications on the long-term strategy respectively. In the short term, Hewlett Packard's integration of Compaq worked better than many had expected due to the diligent pre-integration planning undertaken. This led to the acquisition avoiding many of the usual pitfalls that plague acquisitions of this size in the short term. The synergy target of \$2.4 Bn was met and exceeded by over \$1 Bn. The loss in revenue and market share became lower than what Hewlett Packard expected and procurement was successful in leveraging the combined size of the companies to make huge savings (Burgelman & McKinney, 2005).

Aligning the short term operational objectives with the long term strategy proved to be much more of a challenge for the company. Much focus was put on the integration phase of the acquisition and Hewlett Packard overlooked stakeholder concerns about the long term strategic impact. Shortly after the acquisition, a CIO at one of Hewlett Packard's customers said: "HP has done a good job integrating Compaq rapidly. They have taken costs out. Tactically, they have done a fine job, making it work so far. The question is, where are they headed strategically, beyond the merger integration? They have tried to change HP, make it more market-driven, but HP has a legacy of breakthrough innovation, and that part has been significantly de-emphasized. Some great technical people have left the company. HP is becoming more like IBM Global Services. Selling ink and services is fine, but they have de-emphasized innovation (in spite of using words like "Invent"). . . . But as CIO, they only get my attention if they screw up. I not only expect great (economic) value, but also want to be able to view them as a strategic partner in helping me drive innovation within my company. Long term, it will be tough not to have extreme creativity, especially if you don't have control points." (Burgelman & McKinney, 2005, p. 25).

This illustrates the difficulties facing companies trying to match short-term goals in an industry with tight margins, while simultaneously having to convince stakeholders of the long term strategy.

The long term post-merger strategy was heavily disrupted by the fact that the decision makers had severely underestimated the long term effect of the Internet bubble bust during the planning phase. The market growth estimates, which were in line with other experts at the time, proved to be overly optimistic. At this point, a core problem for Hewlett Packard was the lack of a clear feedback loop. Without it, continuous strategy improvements and sensible adaptation of performance goals became a challenge. This meant that management was not able to change their strategy accordingly and were also unable to curb their stakeholders expectations. Altogether, this led to Hewlett Packard not being able to meet their outlined 2004 targets (Burgelman & McKinney, 2005).

4.1.5 Cisco's Acquisition of AppDynamics

In 2017, Cisco acquired AppDynamics for a sum of \$3.7 Bn (Lynley, 2017).

Cisco

Cisco is a global American company with a pronounced focus on IT and networks. When the Internet Protocol gained a foothold in the 1990s, Cisco was quick to react and consequently became one of the market leaders by providing products such as e.g. modems and routers. In 2000, Cisco had a market capitalization of over \$500 Bn, making them the most valuable company in the world. Throughout the 2000s, Cisco continued developing their products with the aim of becoming a household name (Zippia, 2021).

In the mid 2010s, Cisco started their push towards becoming a software-oriented company through a number of major acquisitions. Under the new CEO Chuck Robbins, Cisco has accelerated its M&A activity, acquiring 14 companies during the 18 months between 2015 and 2017 (Cooney, 2017).

AppDynamics

AppDynamics was founded in 2008 as an Application Performance Management and IT analytics company. The company garnered a lot of interest and received over \$200 million in funding. In 2012, AppDynamics were able to establish their main cultural values of innovation, openness and customer success. AppDynamics were able to continue growing as they identified the need of creating a full and functioning platform in order to broaden their product offering (Bansal, 2017).

Rationale

Cisco's CEO clearly expressed his admiration for AppDynamics' product, and emphasized that adding this to Cisco's offering was the main rationale behind the acquisition: "Combining Cisco's infrastructure, networking and security analytics with the application analytics from AppDynamics, we will provide customers with unprecedented insights to improve business performance." (Cooney, 2017, para. 5). The acquisition also allowed Cisco to gain capabilities in application visibility (Salwan & Sharma, 2018).

AppDynamics' high level of growth can also be considered a possible rationale behind the acquisition. The possibility of adding a company with such excellent figures as 50 percent growth year-on-year is indeed an interesting prospect. Furthermore, Cisco had been a customer for two years before the acquisition, establishing good relationships with the company (Cooney, 2017).

Analysts and experts in the industry had a clear understanding of the deal and the complementary nature of AppDynamics platform and how it would fit into Cisco's product portfolio. According to industry expert Kerravela, Cisco looks at customer experience from a bottom up perspective while AppDynamics looks at it from a top-down perspective, meaning that they will complement each other in a great way (Cooney, 2017).

Integration

AppDynamics became a separate software business unit in Cisco and continued being led by CEO David Wadwhani (Alleven, 2017).

Result

After becoming a part of Cisco, AppDynamics has continued delivering strong results, much thanks to Cisco's commitment as they increased R&D spend by 80 percent. In fact, AppDynamics has been considered a market leader in application intelligence, being positioned as such by Gartner for seven years in a row (Wyatt, 2019).

Cisco's platform and software portfolio has continued to evolve during the past five years, supported by additional acquisitions that have helped to further develop Cisco and AppDynamics joint product offering. This indicates that Cisco has indeed been satisfied with the AppDynamics acquisition, as they have continued to dedicate resources and invest into their software as a service businesses (Cisco, 2021).

4.2 Interview Results

In order to complement the empirical case results in a rigorous manner, interviews were conducted with a number of experts, both professional M&A practitioners and people with extensive experience from the telecommunications industry. In this chapter, we present relevant excerpts and statements from these interviews.

4.2.1 M&A Experts

Two experts in the field of M&A were interviewed, the first one being Sofia Nordenskjöld, Partner at PriceWaterhouseCoopers specialized in M&A deals and integration. The second expert to be interviewed was Rikard Larsson, a recognized M&A researcher who has published several dissertations and papers on the subject.

Defining characteristics of M&A in Technology Industries

According to Nordenskjöld, many employees in technology industries actively choose to work for start-ups and other smaller companies, whose incentives and ways of working differ vastly in contrast to larger corporations such as Microsoft or Ericsson. During M&A processes, this is considered a big challenge for acquirers, as the competence within the acquisition target is where the value lies. Nordenskjöld also claims that it rarely works when big technology companies simply force new employees to become an integral part of big corporate offices. For this reason, there has been a general shift towards allowing acquired firms to retain their own culture and incentives to avoid risk losing their competence (S. Nordenskjöld, personal communication, April 20, 2022).

Nordenskjöld also believes that valuations of technology companies differ vastly from traditional industries. This is because it is often very difficult to estimate the future value of digitally based companies who generally have the potential to scale their businesses indefinitely. Nordenskjöld describes that this is very different compared to valuations made in traditional manufacturing industries. Here, companies can usually rely on standard multiples and are offered a lot more predictability. This dilemma instills difficult challenges for technology companies looking to access technological competences via M&A (S. Nordenskjöld, personal communication, April 20, 2022).

Larsson believes that technology M&A deals are more talent-oriented compared to deals in other industries. This is simply because there is a dearth of IT talent, meaning that acquisitions are the best way for companies to access and hire talented employees. This approach can be contrasted to deal rationales in other industries, where realization of cost synergies

through lay-offs are usually considered very desirable (R. Larsson, personal communication, April 22, 2022).

Strategic or Organizational fit

Generally, strategic fit is considered more important compared to organizational fit by most firms in M&A scenarios according to Nordenskjöld. In the technology field, strategic fit has been given increased focus in the last couple of years as deals have become more expensive. This has resulted in firms putting more thought behind each deal. According to Nordenskjöld, there has also been a shift in the general motives behind M&A deals, as companies have realized that cost savings are not the only gains that can be realized from M&A. While strategic fit has been given a bigger role in recent years, firms can however not overlook the fact that there is still a lot of work to be done in terms of finding and implementing sufficient organizational fit. A major obstacle in achieving better results with regard to cultural fit is that the people involved in the earlier, strategic phase of the M&A process, usually tend to contribute significantly less during the integration phase later on (S. Nordenskjöld, personal communication, April 20, 2022).

Larsson shares the view that companies today are better equipped to deal with the strategic issues rather than organizational issues. Data related to companies' approach towards people management during M&A processes shows no significant improvements during the last decades. One reason behind this is the fact that focus is put on the cultural fit between companies, something that Larsson states that there has been research that shows that cultural closeness does not lead to less conflicts on its own. There are also individual and intrapersonal reasons for resistance to change, all of these issues have to be mitigated together in order to be successful (R. Larsson, personal communication, April 22, 2022).

Integration challenges

Nordenskjöld believes that a shortcoming in many deals is the lack of information shared about the acquisition and its implications for the employees at the acquired firm. In general, employees will not be satisfied until they feel assured that neither they nor any of their colleagues will lose their jobs (S. Nordenskjöld, personal communication, April 20, 2022).

Is experience a success factor?

When it comes to the importance of a firm's M&A experience, Nordenskjöld believes that firms can be split into three main categories. The first category is companies that are experienced and have established processes when making M&As. The second category is companies that do not have experience in making M&A deals, but realize that they lack

expertise and need expert help. The third category is companies that neither have experience in making deals, nor realize that they need expert help. Nordenskjöld is of the opinion that firms in the two first categories can be very successful when making deals. Thus experience in itself is not the most crucial factor, it is rather a company's ability to understand what they know, and do not know that is vital. Nordenskjöld highlights the case of an industrial company. The key improvement during the last few years is that management has learnt to realize how many problems are involved when acquiring a company, and what help is needed (S. Nordenskjöld, personal communication, April 20, 2022).

Is relative size an important factor in M&A deals?

According to Nordenskjöld, the relative size of two firms involved in a M&A deal is of little importance. She believes that the success solely depends on a case by case basis and deals involving large discrepancies in terms of firm size can be successful, just like deals between two firms of similar size. In practice, there are so many different factors that are important, no clear trends can be observed in terms of relative size (S. Nordenskjöld, personal communication, April 20, 2022).

What are the motives behind M&A deals?

Larsson suggests that the motives behind M&A deals can be separated into three main categories; economic, organizational, and personal respectively. The difficulty lies in identifying the true motivation, as the public claims made by decision makers always involve an economic rationale (R. Larsson, personal communication, April 22, 2022).

Organizational motives essentially involve thought processes such as "everyone else is acquiring companies, so we should too." Personal motives relate to scenarios when deals are expected to provide management with personal benefits. Larsson believes that most deals include all three motives and that uncovering the extent of all three in each deal is a crucial factor in how successful the deal will be (R. Larsson, personal communication, April 22, 2022).

4.2.2 Industry Experts

Interviews were held with experts in the telecommunications equipment industry. These experts all have a long experience in working in the industry, either being currently employed by the Company or as past employees of the Company. A few of the interviewees also had experience from being part of an acquisition as their former employer was acquired by the Company. Expert A is a former product manager at the Company and is currently working with innovation development. Expert B is currently

working at the Company and earlier worked for a company that was acquired by the Company. Expert C is a current employee of the Company with a focus on IoT. Expert D worked at the Company until 2016 and has since then founded his own company which provides support to start-ups and innovation consultancy services. Expert E currently works with product management within enterprise solutions and 5G IoT at the Company.

Differences between companies?

A believes that the main difference between the Company and his previous employer in the telecommunications industry was the decision making process. At the previous employer the decisions are made top-down rather than bottom-up which was the case at the Company. This meant that the process was longer but once something was decided it was easier to implement as more people have been involved. He describes the cultural differences as minor and believes that this was a key factor in making the acquisition swift and successful (A, personal communication, May 13, 2022).

B comes from a different background as he worked at a start-up that was acquired by the Company. He highlights the differences in the process of product development as at the Company, it was important to conduct studies and pre-studies before developing products while at a start-up you just think of a use case and get going. B believes that this was an issue for many of the software engineers that joined the company as they much preferred the way they worked before being acquired. As a result most, if not all, left the Company within a few years (B, personal communication, May 3, 2022).

Has the Company's strategy changed?

C believes that there is a large difference between how the Company handled acquisitions in the past compared to today. Today when the Company acquires smaller companies, they make sure that the firms are given the opportunity to maintain their unique culture and traits. They do not want to rush this process but rather do it slowly. C is also of the opinion that a strategic mistake in the past was difficulty the Company had in acquiring resources that were *just* out of reach. The distance to the new resources cannot be too far away as there has to be possibility to grow into it nicely. B shares C's opinion that the Company today has learnt from their mistakes in the past regarding forcefully integrating small companies too quickly (C, personal communication, May 9, 2022).

What is important in the acquisition process?

A is currently working with helping to scale-up start-ups and believes that this has given him a new perspective on the acquisition process. One thing that he believes is vital is which people are involved in the acquisition

process. When trying to sell a product or technology to a large company D believes that one should not sell to the R&D department as they will believe, or at least say, that they can create equivalent products in-house. Instead they should sell to the product managers as these are the people that will directly benefit from the company acquiring new products. He also adds that there are many examples of conflicts involved in acquisitions, one example being companies that sell optimization or effectivisation will be seen as threats by some parts of the company. A also adds the fact that the Company was very welcoming to him and other employees at his previous firm even before the acquisition was official, especially remembering an invitation to a conference in Stockholm. He believes that actions such as these are vital to reduce the uncertainty that employees at acquired companies might feel (A, personal communication, May 13, 2022).

Vital capabilities in today's telecommunications equipment industry

A believes that the main complementary capability that will be vital for success in the telecommunications industry in the coming years is the ability to make partnerships with other companies. This is due to the fact that there will be such a large number of use cases which means that no single company will be able to provide all services alone. This will create possibilities for smaller niche companies which larger companies will need to create partnerships with. From D's experience there is often a mismatch between large and small companies that cooperate due to smaller companies being much more agile. As a result it will be vital for large companies to bridge this gap to be able to operate at the same speed as their partners in order to be successful (D, personal communication, May 13, 2022).

Thoughts about the current and future state of the industry

D currently considers the telecommunications industry to be increasingly characterized by strong commoditization. He explains how an ongoing chain reaction is taking place in the industry value chain, where profits are increasingly moving downstream towards various value-adding service companies such as Netflix. In practice, these firms leverage data provided by operators in a commodity-like way, and profit by charging end users with upfront premiums. The fierce competition and shrinking operator profits are a big issue for telecommunication companies who are stuck in a very little space. In attempting to survive, these firms try to offer more innovative services such as cloud solutions, but it has proved to be a difficult task. D claims that operators have been trying to find new ways to monetize for years, but investments in value added services have failed to attract customers due to established service providers' good recognition and firm grip of the market. He further believes that the observed value shift will continue to shape the industry and that telecommunication equipment

manufacturers, and operators in particular, likely should not expect a bright future ahead (D, personal communication, May 13, 2022).

“Operators cannot be like Netflix or WhatsApp. They have a different mindset and I don’t know how they can solve this.”

Core capabilities and high barriers to entry

D explains how the shrinking profits faced by operators are in turn also affecting the equipment manufacturers. “20 years ago, there were a multitude of equipment manufacturers, but due to consolidation only three or four of these players remain today.” D however believes that these companies will continue to exist as their know-how and core business is very expensive and difficult for competitors to replicate. As long as they do not successfully manage to adapt their business models and value propositions in a more or less untraditional way, they will however not be growing a lot going forward. D predicts that 5G will indeed bring new business opportunities to these firms, but that margins will continue to be under pressure and that major firms will likely experience declining shares of the total telecommunications market (D, personal communication, May 13, 2022).

E explains that the telecommunications industry is very niche. Most people working in research or with senior management are PhDs with extensive experience from working with wireless and radio technologies all their lives. He believes that the distinct research orientation helps to shape the company’s culture and is a prerequisite in the firm’s strategic pursuit of being a technology leader. The rapid development in the field of mobile communications generally results in a new mobile generation every decade and is considered to be one of the most fast moving technologies. E points out that there are indeed people behind these technological advancements whose expertise is deemed very essential in making this trajectory possible.

The fact that incumbent equipment firms possess such cumulative experience and R&D expertise makes it difficult for new entrants to establish themselves on the market. Thus, E doubts that the size and strength of big IT firms, such as Google and Microsoft, will be enough to establish a significant presence on the equipment market in the short term. E means that the hype surrounding 5G and its envisioned use cases has made many companies interested in pursuing the technology. What usually happens in such scenarios is that only a few players succeed and most struggle to survive. To illustrate this dynamic, E highlights the hype surrounding the iPhone, which led many technology companies, including Google, to invest in the smartphone space several years ago. In the end, Google’s smartphone Pixel only managed to attract limited interest and still remains a product

sold in small volumes. Instead, the phone constitutes a “good to have” channel for Google, who can leverage its application platform and sell the Android operating system to other smartphone vendors. In a similar way, E believes that Google’s 5G cloud vendor business constitutes something of a bet. If it grows, it grows, if not, the firm can still benefit from its presence in another promising channel in different ways (E, personal communication, April 23, 2022).

Necessary measures for sufficient adaptation

D believes that incumbent firms need to combine internal R&D efforts with external acquisitions to stay alive. He points out that the vivid acquisition activity currently taking place in different areas of the telecommunications industry will remain high, but also that major players are unlikely to shrink their R&D budgets. D furthermore highlights the importance of companies’ propensity and willingness to respond to trends. Otherwise, firms might risk ending up in a “Nokia scenario”, where market dominance is rapidly replaced with sheer tragedy. As in any market, participating firms must first and foremost generate new innovations to improve revenues and ultimately identify and develop profitable products and services. D also states that all industries reach a point where new entrants inevitably will appear. The telecommunications industry is no exception and one should thus be able to expect that incumbents will leverage M&A as a counterbalance to eliminate such potential threats in the near future (D, personal communication, May 13, 2022).

According to E, the company’s strengths have traditionally been within radio equipment, while IT has been kind of a weakness. For this reason, many of the firm’s acquisitions have taken place in IT-oriented product areas such as OSS (Operations Support Systems) and BSS (Business Support Systems) in the past two decades. Besides IT, the Company also looks to widen their portfolio. The firm's recent acquisition of a 5G antenna technology company is envisioned to supplement the radio system portfolio and highlights this ambition. Another area that has been given a lot of the Company’s attention lately is the enterprise segment, to which the two most recent acquisitions can be attributed. Through these acquisitions, the company has secured strategic capabilities and assets within the fields of enterprise wireless and edge solutions. Essentially, this involves small scale wireless equipment intended for industrial use, and an application platform providing extensive functionality for enterprises. Overall, E believes that the telecom industry has been performing pretty badly in terms of acquisition success. Specifically, he points at failed collaborations with other firms and hundreds of acquisitions which have resulted in practically nothing for the well-being of the company. E states that telecom companies probably have

much to learn from other industries in terms of identifying M&A targets and best practices during the post-acquisition phase.

E believes that facing O-RAN and open source is a big challenge for the Company. The company has long been an end-to-end solution provider, creating value by providing both hardware, software, and services through quality assured service level agreements. The view that performance, including e.g. high accessibility and reliability, is best achieved by ensuring that every component in a solution works together has thus been emphasized by the company for a long time. In the wake of open source standards in the IT sector, the decoupling of hardware and software also began to appear in the telecom sector through the deployment of IT applications and servers surrounding core networks. This digital software trend has come to completely dominate the industry during the later stages of 4G, and currently in the shift towards 5G. To transform from a traditional equipment provider to a modern technology company, E explains how the Company has invested heavily into Digital Services, the firm's main business area for solutions such as cloud based core networks. Lately, the boundaries between radio technology and IT have also begun to fade. In practice, RAN involves a lot of computing and the seemingly obvious benefits of server-based solutions and software-supported decomposable basebands constitute current technology trends. Since RAN accounts for more than half of the Company's existing revenue, the firm is however acting a bit more cautious in this field. E states that the company is well aware of the area and that it must be given priority in terms of investments. The Company is however committed to their conservative approach. In their latest RAN product release, only parts of the system have been opened up through decoupling and the Company still manages the key functionality considered most important (E, personal communication, April 23, 2022).

5. Analysis

In this chapter, the findings from the cases and the interviews will be analyzed in relation to each other and will be assessed in combination with the theories regarding technological change from Chapter 3. The findings from this analysis are then synthesized and summarized in a model which answers the research questions. In order to answer the research questions, the analysis is broken down into five parts stemming from a logical and chronological division of the factors previously identified: ‘What are strategic considerations for incumbent firms?’, ‘What type of company should be acquired?’, ‘Which specific company should be acquired?’, ‘How to manage the acquisition process?’, and ‘What to do after the acquisition?’.

5.1 What are the Strategic Considerations for Incumbent Firms?

Recognizing technological change and the trade-off between growth and control

The move from 4G to 5G has been described as an archetypal example of technological change where technological and business uncertainty remains high and the opportunities for future growth will require significant investment in new capabilities (Oughton et al., 2018; Carpenter & Lazonick, 2017). For incumbent firms, an alternative to internal innovation efforts and adaptation of existing capabilities is to acquire capabilities from external domains. Such efforts require recognition of the technological change and estimations of what capability configuration will maximize value for the firm in the post-change environment (Lavie, 2006). Industries characterized by high growth favors entrants seeking to build a new industry architecture, set up a new ecosystem, and establish open standards due to increased funding opportunities (Jacobides & MacDuffie, 2013).

While mobile network access is a critical building block in the telecommunications industry, industry values are recently appearing to slowly shift to the higher layers of the stack (Sharma, 2020). Here, the trade-off between growth or strategic control comes into play and incumbent firms need to evaluate whether encouraging growth in their own segment versus keeping the segment captive is strategically more advantageous. Particularly, firms in developed markets tend to undervalue growth potential and instead emphasize high returns by retreating to areas they find more profitable. The conservative approach and general uninterest towards e.g. O-RAN technology among established firms in the industry who collectively point at low market readiness can be asserted to highlight this phenomenon.

Through this misplaced investment focus, firms may relinquish strategic control and thus allow activities to be transferred to other parts of the value

chain (Jacobides & MacDuffie, 2013). In fact, short term financial measures indicating positive performance do reflect the past rather than the present. This leads firms to focus on where value was and not on where it could migrate to (Carpenter & Lazonick, 2017; Jacobides & MacDuffie, 2013). To maintain industry control, a firm's ability to encourage competition in vertically adjacent segments while restricting competition and mobility in its own segments is considered essential. In case mobility for a complementary asset cannot be enhanced up- or downstream in the value chain and in case the surrounding industry architecture is rapidly expanding, accessing the complementary asset and adjusting capabilities via vertical integration is favored (Jacobides et al., 2006).

Disruptive tendencies

Shifts in customer needs and subsequent shifts in products and services that can address these might as well lead to value migrating along the value chain or in the industry ecosystem (Jacobides & MacDuffie, 2013). In fact, one can argue that certain aspects of the dynamic currently shaping the emerging 5G value system shows disruptive tendencies. First of all, to meet consumer and industrial requirements, operators need to focus on both improved network reliability and capacity expansion. Given the weak revenue growth currently experienced, this is however challenging and the appetite for infrastructure investment is modest at best (Oughton et al., 2018). The need for new business models and improved usage of assets, involving spectrum, sites, and hardware that utilizes collaborations and software to increase capacity at lower cost have been highlighted by industry experts (Sharma, 2020). Meanwhile, the velocity of technological advancements may potentially overtake the speed at which operators are able to upgrade their infrastructure (Yeo & Jhunjhunwala, 2020). This can be considered a clear example of “performance overshooting” (Christensen, 2003). Industry executives would indeed prefer to point to higher revenues that scale more linearly with new infrastructure.

In theory, one can argue that the performance attributes currently valued by customers in the mainstream market will start to slowly diverge, especially as commercial private wireless and 5G enterprise applications - such as Industry 4.0 factories, autonomous driving cars, and robotic surgeries - become available in evolutionary stages (Fox et al., 2020). End users will increasingly consist of enterprises with very diverse needs, and 5G is expected to contribute to industry growth in a less linear and traditional way compared to previous generations (Banerjee et al., 2017). The carrier-led O-RAN initiative is aimed at disrupting the next generation (virtual) radio access network ecosystem by breaking vendor lock-in and embracing competition (Garcia-Saavedra & Costa-Pérez, 2021). In general, disruptive innovations tend to be ignored by incumbents who find them financially

unattractive compared to existing profit models while the most attractive customers will typically not use them since they are initially inferior to mainstream products (Christensen, 2006; Christensen et al., 2001). This behavior is reflected in the current scenario taking place in the industry where established equipment manufacturers seemingly avoid O-RAN for similar reasons and where telecommunications providers are unlikely to invest in networks without knowing if they would pay off (Ratnam, 2020). Over time, a disruptive innovation however improves more rapidly than the established technology with regard to mainstream performance attributes, which enables it to compete also in mainstream markets (Bower & Christensen, 1996). Here, ambidextrous processes and organizational structures allowing incumbents to seek and exploit business opportunities are considered imperative (Ansari & Krop, 2012).

Capability reconfiguration

As suggested by Jacobides et al. (2006), OEMs do have a defensible rationale for creating proprietary, vertical structures generating long-term strategic gains, which can be achieved by using standards. After all, technology standards do reside at the core of the industry and are required for worldwide mobile interoperability and interconnectivity (Gupta, 2015). Scholars Anderson and Tushman (1990) argue that the emergence of a standard or a dominant design is in fact a prerequisite to mass adoption and is directly linked to the diffusion of a new generation of technology. After a dominant design has been established following “the era of ferment”, the subsequent technological progress consists of numerous incremental innovations that are not targeted at challenging the industry standard with novel rival architectures. However, if the pace of innovation picks up speed, technical advancements can be expected to be more pronounced during the era of ferment where the market power of a dominant producer or market demand will ultimately decide which version of the new technology that emerges as the dominant design (Anderson & Tushman, 1990).

Considering the software-enabled digital technologies currently accelerating the development of 5G and subsequent innovations in future mobile generations, this view suggests that an established firm should allocate resources to technology development early on during the technology cycle and perhaps more than ever opt for capability substitution as its main reconfiguration mechanisms during this stage. This is contrary to what is normally considered best practice since incumbents can more easily conceptualize and acquire desirable value-maximizing capabilities when the level of uncertainty is lowered (Lavie, 2006). Industry standards are however not known in advance and whether or not mobile network technology standards will be open in the future, firms must be able to sufficiently combine technological capabilities with the ability to shape

interorganizational networks to influence the development of such standards (Anderson & Tushman, 1990).

Preparing for value chain transformation

Wireless innovations, including IoT and 5G, ultimately conspire to drive edge cloud services offered by an increasingly diverse ecosystem including telecom operators, data centers, OEMs, and cloud service providers (451 Research, 2022). Since absence of new market entrants can be considered an indicator of industrial stability (Bergek et al., 2013), this in itself signals that the industrial stability is loosening up. The edge cloud is considered highly strategic for operators to achieve required performance as they virtualize their RAN, core, and transport networks, which is reflected in recent industry network positioning procedures including alliances and M&A deals (Gabriel, 2021). As the ecosystem proliferates, time will tell if interoperability among different 5G applications or scalable capacity rather than the reliability currently offered by established OEMs will be considered more important by operators. Nevertheless, incumbent firms must be able to recognize when the end customer has changed or is changing and ensure to have the capabilities needed to transform their business models accordingly (Jacobides & MacDuffie, 2013). As new markets and sub-markets emerge, major value chain transformation can be expected and existing networks of relationships tend to undergo fundamental restructuring requiring incumbent firms to quickly decide on acquisition targets (Low & Johnston, 2009).

Reinforce or develop new network positions

By anticipating what impact an innovation will have on the surrounding network structure, incumbents can plan for what relational measures they should take to either reinforce existing or develop new network positions. Forecasting market acceptance and the pace of technological change however complicate investment decisions and firms generally resort to technology investments that allows continual and incremental improvement (Low & Johnston, 2009). Contrary to 4G which has been described as an incremental innovation with respect to previous technologies (3G and 2G), 5G is expected to introduce both incremental and radical changes respectively (Suryanegara, 2016). Increased speed and lower latency are both related to improvements of existing mobile network capabilities and can be considered incremental, while factors such as changes contributing to machine to machine interactions and the realization of the Internet of Things (IoT) may be defined as radical (Parcu & Innocenti, 2022).

The industry has for long been characterized by what can be considered competence-enhancing and sustaining innovations, reinforcing the competitive positions of incumbents. This constitutes a competitive advantage in itself, as highlighted in the interviews by E and D who point at

incumbent firms' extensive technological expertise and large investments that are difficult to match for new entrants. These high barriers to entry have seemingly made incumbent firms feel relatively secure about their dominant market position. Once such rigid industries begin to move, established firms who are only prepared for incremental and sustaining technologies and who remain steadfast in their set ways of approaching new technologies and in focusing on their areas of specialization however risk failure in the wake of disruptive and radical innovations (Christensen & Overdorf, 2000). Such competence-expanding innovations require incumbents to search for external partnerships and acquire new knowledge associated with several technological tracks, all in accordance with the principles of creative accumulation (Bergek et al., 2013). As suggested by Lavie (2006), incumbent firms solely relying on capability evolution as their main reconfiguration mechanism risk late response to technological change whereas capability substitution taking place shortly after the eruption of technological change involves high uncertainty and increases risk. At the same time, resorting to capability substitution at a later stage may mean that competitors have already gained substantial lead while acquisition options may be fewer and more expensive (Lavie, 2006). In general, companies should have a dynamic approach towards capability configuration mechanisms that are adapted to the degree of uncertainty of the technological change and in alignment with the technology cycle.

Altogether, associated key strategic imperatives incumbent firms should consider during periods of technological change, and to which M&A may contribute, involve:

1. Do the upcoming innovation have potential to destroy our current competencies or replace existing performance attributes?
2. Could we access strategically important complementary assets via vertical integration to restrict competition and mobility in our own segment?
3. What is the most valuable capability configuration in the post-change environment and how do we reconfigure our actual capabilities to achieve fit with the perceived value-maximizing capability configuration?
4. Can M&A be leveraged to reinforce our existing network position and / or venture to develop new network positions?

In summary, these questions constitute pillars which should be taken into account when the strategic significance of potential acquisition targets is investigated.

5.2 What Type of Company to Acquire?

The next question that needs to be answered is subsequently what type of company that should be acquired. This is the highest level question in this analysis, the most strategic, and arguably the most important. The cases, interviews, and theory all deal with this issue extensively, leading us to identify a number of critical success factors at this level.

5.2.1 Follow Strategic Aim

The first critical success factor is the strategic rationale behind the acquisition. By examining the chosen cases, it is clear that choosing acquisition targets that correspond to the acquirer's long-term strategy is vital to achieve long-term success in high-technology industries undergoing transformation. There is a clear contrast here to cases where the main rationale is rather adding scale or through the help of cost synergies improve short-term financial figures. Nokia's acquisition of Alcatel-Lucent is a clear example of where the focus on synergies became a hindrance to the company's vital innovation. The view that these cost savings are not only positive is further supported by the findings from the interviews with the M&A experts and their view that lay-offs are not desirable for tech companies today, as the competence is considered very valuable. This is contrasted by IBM's acquisition of Red Hat where one can clearly see how the acquisition has far-reaching implications on IBM's possibilities in a transforming market, while cost savings were not a focus.

Here one also has to remember that there are other motives than those of economic and strategic nature. This was pointed out in one of the interviews with the M&A experts, that one can not forget about both the personal and organizational motivations. These are difficult to uncover due to them often being hidden under the guise of economic motives. Even further it is possible that firms with such motives are not even aware of it themselves. As such, it is clear that when deciding to make acquisitions, the company has to have a rigid and systematic approach as this will help bring more clarity to decision makers.

5.2.2 In-house Capabilities

Another aspect that has to be considered when acquiring a company in high technology industries, especially when the acquisition is made with the primary goal of gaining a strategically important product, patent, or component, is the possibility of achieving similar results by using in-house capabilities. One argument in favor of trying to achieve as much as possible in-house is the fact that the acquisition prices of technology companies have been soaring according to one of the M&A experts we interviewed. This in combination with the resources and time needed to make the acquisition

successful means that it can often be cheaper to allocate resources to internal R&D efforts instead. With these high costs and risks in mind, why should companies make acquisitions? The answer is time. In high technology industries undergoing transformation, such as the telecommunications industry of today, firms can not afford to lag behind the competition. This is exemplified by Apple's acquisition of Beats, there is no doubt that Apple's in-house R&D capabilities would be able to successfully build an online music streaming service, but the company still spent billions of dollars on this acquisition due to the fact that they did not have time to wait while Spotify kept growing at a rapid pace. This shows a valuable lesson when it comes to the trade-off of acquisition versus in-house development, the question to be asked should not be: "*Can we afford this acquisition?*" but rather "*Can we afford to wait?*"

5.3 Which Specific Company Should be Acquired?

Once the type of company to target for acquisition has been decided on, it is time to move on to deciding which specific company to acquire.

5.3.1 Cultural Fit

The first consideration when choosing a company to acquire is the cultural fit with the organization. One clear aspect of this is the cultural discrepancy between large corporations and small tech start-ups. This was brought up during the interviews as a big obstacle to success. One of the M&A experts explained that those working at start-ups have chosen to do so because they prefer the freedom and lack of central planning. They have made an active choice to avoid working at a big multinational company such Microsoft or Ericsson for a reason. This commonly leads to resistance from the workforce when larger companies acquire small tech start-ups. This is of course a huge issue for acquiring firms, as there is such a high demand for talent. Furthermore so much of the value of the acquired company lies in the employees and their competencies. Losing these employees is a big risk and as such it is vital that the acquiring company targets companies that have a culture which is compatible. This was highlighted well by B's experience when a smaller technology company was acquired by the Company, as he stated that a majority of the software engineers left the company due to the fact that they had to follow the Company's processes which involved a lot of paperwork.

The importance of culture is disputed by other sources in our empirical research, one of the M&A experts stated that the cultural distance is somewhat overstated as a factor as it ignores the many other sources of discontent when companies merge. This in itself is not something that

makes culture irrelevant, it just means that it should not be the only consideration.

5.3.2 Relative Size

The relative size between the acquirer and the target company is another aspect that has to be considered. As shown in the theory section, a lot of research points to there being some 'size matches' that are less favorable than others, mainly mergers between equals and acquisitions of very small companies by very large companies. Interestingly enough, this view was not shared by the experts as from their experience, the relative size of the companies was not something considered important. With this in mind one can make the conclusion that size should not be an automatic disqualifying factor when it comes to choosing which company to acquire, but rather a guiding factor. For example, the fact that mergers between equals can lead to high degrees of conflict as both parties want to dominate, means that this is something to be extra aware of. As a result, it is important for the acquiring company to be aware of the risks that are associated with acquiring companies of different sizes and how well equipped they are to handle these issues. Experience in acquiring smaller firms may not spill-over when it comes to acquiring firms that are much closer in size. This relates to what was stated in theory regarding experience being a success factor, experience only carries over if there is a clear strategy being followed. One of the M&A experts suggested that the main positive effect stemming from experience is the fact that companies know what they do not know, and consequently what they need help with in the deal making process.

5.4 How to Manage the Acquisition Process?

Once a target has been selected, the next vital step in the process is to carry out the acquisition process. The acquisition process is here defined as the part of the M&A process starting from the target being chosen to the acquisition becoming carried out.

5.4.1 Information

The findings from the literature suggesting that information provided to the employees of the target company is seldom sufficient was echoed in the interviews. There is no way that employees will be having high morale and motivation if they are not given assurances about their and their colleagues' employment. As one expert put it, no matter how well you have communicated, there is always a need for more information. From this it is very clear that acquiring companies should strive towards more sufficient communication during the acquisition process. Information can also be transmitted indirectly as exemplified by D who recalls being invited to a

conference before the acquisition was official as something that gave him and his co-workers a positive impression.

5.4.2 People to Involve

Which people that should be involved in the process is something that came up both in our interviews with M&A experts and 5G industry experts. The M&A experts focused on the fact that the people making decisions and that are part of the deal making process will not be the same people that later try to implement the acquisition in practice, neither from an employee perspective or a technical standpoint. As a result, the outcome will be suboptimal. Managers from different parts of the company need to be involved, not just those directly involved with the deal or the strategic decision makers. This problem was approached from a different angle by the industry experts as they viewed the issue from the viewpoint of a start-up trying to be acquired and how they should approach the situation differently depending on who in the company they are dealing with. This of course means that there is an issue for the acquirer to deal with, as they have to be aware of the biases and incentives that are involved when different people in the organization have a say on deals. This has the implication that one must consider reasons, besides trying to achieve the company's strategy, that lie behind their opinion. It also has the implication that a diverse set of people should be involved in the acquisition process in order to lift as many perspectives as possible.

5.5 What To Do After the Acquisition?

When a deal has been made, there is still a lot of work to be done and many decisions to be made. All of the steps in the planning and buying process will be worthless unless the acquisition can be carried out correctly.

5.5.1 Degree of Integration

One major decision that has to be made during the post-acquisition phase is the degree of integration. The interviews with the M&A experts suggested that there has been a shift towards letting acquired tech firms retain their culture and not integrate them into large centralized organizations. One can consider this to be linked to points made earlier, such as the view that cost synergies should not be a main consideration, as well as the fact that tech companies are aware of the risk of losing the skilled employees of the acquired company. As a result, this means that when it comes to deciding on the degree of integration, the acquirer should have the cultural distance in mind. The larger the distance, the bigger the risk of integration. This then begs the question, how successfully can strategic goals, such as product development and complementing the product portfolio, be fulfilled without integration? IBM's acquisition of Red Hat and Cisco's acquisition of

AppDynamics show us that giving the acquired company autonomy is not a hindrance to such strategic goals. Many of the industry experts shared the view that the Company no longer forcefully integrates companies that they acquire as the risk of dissatisfaction among the employees is too high.

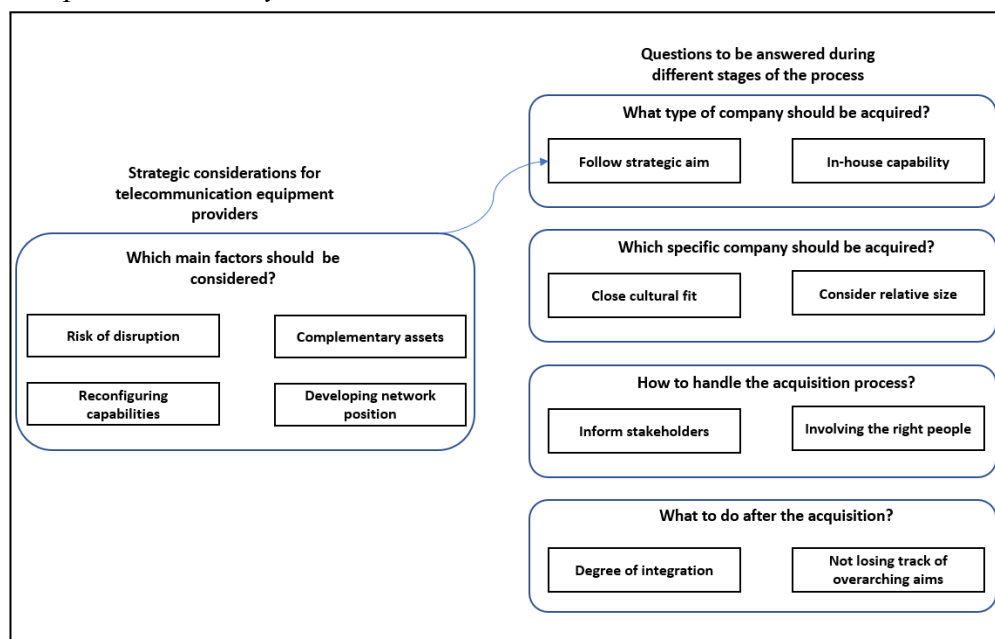
5.5.2 Not Losing Focus on What Matters

A strategically important acquisition is no doubt something that will be a process that requires a lot of time, resources, and planning. A lack in any of these aspects will be highly detrimental, but even with this in mind the acquisition cannot be the only thing on the mind of management. As stated in the theory chapter, companies need to avoid the risk of disregarding other important aspects. This is especially true in highly transformative industries as shown firstly by Nokia’s acquisition of Alcatel-Lucent, where so much time and energy was put on the acquisition and in making sure that it was financially viable. Simultaneously, the firm was falling behind with regard to technological development as this was not where the focus was at the time. The same issue was showcased in the case of HP’s acquisition of Compaq, where management put too much emphasis on the implementation and disregarded the long-term strategic impact.

5.6 Model

To summarize the findings, a model synthesizing the presented strategic and practical considerations and associated decisions will now be presented:

Figure 18
4-step M&A Advisory Model



In practice, the model includes the following levels and associated questions: The first level is associated with the question: “What type of company should be acquired?”. The first best practice is to ensure that the type of company is associated with the long-term strategy and not letting short-term financial results be the main decider. The strategic aim should correspond with the findings from the second research question, as presented in the next section. The second consideration is to ensure that the acquired company is in line with in-house capabilities. If a certain product or technology can be produced in-house, then the acquisition should be made with the deciding factor being that time is potentially of the essence due to the transformative nature of the industry. The second level answers the question: “Which specific company should be acquired?”. Here the two success factors are ensuring that the cultural distance between the companies is not too large, and being aware of the distinct challenges that acquiring firms of different sizes presents. The third level is “How to manage the acquisition process?”. At this level it is crucial to ensure that information is transmitted clearly throughout the process, especially to the employees of the target company. Here, it is also crucial to involve the correct people in the acquisition process in order to get a holistic view of both the potential and the challenges surrounding an acquisition. The final level is “What to do after the acquisition?”. At this level, a main aspect is the degree of integration, with the conclusion that unless the organizations and cultures are close to one another, the degree of integration should be low. This spills over into the other finding, that the implementation of the acquisition can not be prioritized in a manner which neglects other parts of the organization.

6. Discussion and Conclusion

This chapter includes a discussion of the methodology and results, potential weaknesses and room for improvement are identified. The chapter ends with a look at this master thesis' contributions, general outlook and areas for future research.

6.1 Summary of Findings

To summarize, this master thesis can be argued to have answered the research questions in the following ways. In pointing out what practices that are key to successful M&A dealmaking in high technology industries, a four step model highlighting critical success factors during each step respectively was constructed based on empirical evidence from past M&A cases in high technology industries along with expert interviews and additionally established findings from contemporary literature in the field. More specifically, the model itself emphasizes key steps in the M&A process and considers relevant impediments firms should regard as important when planning to realize potential productivity, market, and value gains across the value chain or in the wider industry ecosystem via M&A.

6.2 Discussion of Methodology and Results

In this section, the methodology as well as the results from the analysis are discussed. Reflections are made on the selection of methodology and the main stages of the research process are thoroughly assessed. The chapter is finalized with a critical analysis of the resulting model.

Literature review

The literature review was vital as it laid the foundation for the rest of the research process. This review was very challenging as two vast subjects needed to be understood and combined. The initial approach was to find as many articles and publications as possible in order to get a broad overview of the subjects. At this stage, the plan was to later narrow down the identified literature and only include theories and papers that directly relate to findings in the case studies and interviews, as this was seen as the most efficient and direct way to form a theoretical framework. We were able to narrow down the literature review in a straight-forward manner and make it as concise as possible, as the M&A-related theory and the fundamentals of this subject could be summarized efficiently. The relation to the empirical findings was furthermore simple to prove or disprove. The same can not be said about the industry-related literature, as this is a complex and rapidly changing field. The transforming nature of the industry also implies that the scope of the literature is broad and extensive. The complexity of the field

further requires a readily understandable overview in order to understand the nuances and trends. This resulted in a very long and extensive literature review that we deemed necessary in order to draw conclusions and parallels in the intersection of the two subjects studied.

Case studies

The case studies make up the empirical backbone of this master thesis as this is where the intersection between M&A and transforming industries and telecommunications equipment becomes apparent. The selection of cases was problematic as optimally, the cases should be as relevant as possible, meaning recent acquisitions made by telecommunications equipment manufacturers in the context of 5G. Unfortunately, the recency of such cases means that the results of these deals can not yet be analyzed. Instead, we used a combination of cases from transformative industries and from earlier generations of the telecommunications equipment industry in order to sufficiently replicate the current situation in the industry. One problem which was created due to the fact that the cases differed in size, industry, and recency was that the availability of sources and published materials varied greatly between the cases. This resulted in some cases, such as the HP-Compaq merger, being given more room than other cases. A weakness with the approach of first conducting the literature review is the fact that what the authors read during this stage may have had an influence on the cases ultimately chosen. A case which corresponds well and fits the description from a theoretical standpoint could yield an increased likelihood of being chosen, which is a case of confirmation bias. This could have been solved by being more aware of this risk.

Interviews

The interviews with the M&A experts had a strength in the fact that there was one expert from the academic world and one from the industry. This meant that both sides were represented and two distinct viewpoints were highlighted. A weakness is however the fact that there was only one expert from each field, interviewing a larger number of experts would increase the rigor of the findings stemming from these interviews. The industry experts were insightful in the state of the industry due to their many years of experience and extensive knowledge. The rapidly changing nature of the industry proved to be a problem though as some of the experts left the field in the last few years. The industry experts were able to give insights on M&A due to the fact that they had experienced working both for companies that had been acquired by the Company as well as working at the Company when other companies were acquired. This gave us valuable first-hand insights in how employees view and experience acquisitions in this industry, but also entailed the limitation that none of them were decision makers in these processes, meaning that strategic insights were limited. The fact that

all of the industry experts are current or past employees of the Company is also a weakness as a more nuanced view would have been achieved if employees of other companies were also interviewed.

Model

The model was created from the combined analysis of the interviews, cases and literature. The combination of these three separate parts created distinct insights that could be summarized in four levels. The model answers the two research questions in a clear manner, as the model handles them separately but also shows the linkage between the two. To evaluate the strength of our framework, it will now be assessed in relation to several model evaluation criteria, as presented by Gray (2020).

Comprehensiveness: The levels in the model are mutually exclusive as there is no overlap and completely exhaustive as it follows the important questions to answer from beginning to end in the M&A process.

Validation: The model is based on theory, cases, and interviews. The insights themselves are validated through the usage of a large number of sources and by triangulating the subject. The interplay of the different levels and factors in the model has not yet been tested and is a condition for this model to be successful.

Integration: A framework needs to be coherent and consistent. A weakness with this model is the large number of factors that interplay with each other. This means that there are problems with the integration of the model as it is not always clear how results in one factor will affect other parts of the model. This is a systematic problem with trying to create a model that explains a multi-faceted issue.

6.3 Contribution, Generalization of Findings, and Outlook

This master thesis has the aim of contributing to both the academic field and to companies in the industry. This master thesis applies known theory to high technology industries and the telecommunication sector in particular. Thus, this master thesis highlights certain sector specific challenges and considerations, and consequently brings relevant knowledge to industry decision makers interested in how M&A can contribute to technology strategy.

One can argue that the conceptual model presented in this master thesis can be applied to numerous industries characterized by technological change and pronounced industrial networks. As such, the model as a whole can be generalized to a certain extent. The structure of the model can also be

applied in other industries with M&A deals in different areas following the overarching logic that the model portrays. To academia, the model acts as a novel way to structure theories regarding M&A and technological innovation, and show the interplay between them. This master thesis also builds on existing theories as the cases and interviews both corroborate and challenge contemporary findings. Furthermore, the master thesis contributes to research on acquisition motives by highlighting relevant motives derived from contemporary literature in the field of technological discontinuities.

One interesting aspect to consider in future research that could potentially add additional value to the conceptual model presented in this master thesis would be a quantitative dimension. By incorporating such elements into each consecutive step of the model, M&A related decision making could be made in a more stringent manner, thus eliminating potential risks associated with solely relying on qualitative factors. This would also be a way to strengthen the currently weak integration of the model. A quantitative approach could further help make the interplay between different parts of the model clearer. Lastly, applying and verifying the framework on previous high technology M&A cases could affirm its practical implications and could thus be an additional area for future research.

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