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**Master's Thesis**

# Coopetition strategies of cybersecurity companies in Finnish markets

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## ABSTRACT


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Companies face challenges in today's business world because of fast-changing surroundings in business sector which changes development of technologies where knowledge-based resources play important part. For this, coopetition provides companies an opportunity to face these problems as it gives different opportunities for companies to utilize their different coopetition-based business models with certain benefits. This thesis aims to study what are the strategic reasons of the cybersecurity companies in Finland to do coopetition. The study is based on previously written theories about coopetition, its different aspects and knowledge-based advantage. The qualitative multiple-case study with cross-case analysis was conducted by interviewing company representatives from seven different case companies in Finnish cybersecurity sector.

The study shows that companies adopt coopetiton in their business as they use different types of business models in different modes of coopetition to gain different benefits from it in these modes. To make coopetition possible, companies decrease tensions of coopetition with formal and informal practices to protect their knowledge-based advantage as different tensions are present in various modes of coopetition. The study also points out that company's competitive advantage and specialization in the industry provides more opportunities to utilize coopetition with different business models. The results contribute to the current research of coopetition to understand what kind of opportunities coopetition gives to companies and how they can manage it in different modes of coopetition where competition-cooperation paradox is present.

**TIIVISTELMÄ**


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Yritykset kohtaavat haasteita tämän päivän liikemaailmassa nopeasti muuttuvien ympäristöjen takia mikä muuttaa teknologioiden kehittymistä nopeammaksi, joissa tietopohjaiset resurssit ovat tärkeässä roolissa. Toimialayhteistyö tarjoaa yrityksille mahdollisuuden kohdata nämä ongelmat, koska se antaa erilaisia mahdollisuuksia yrityksille hyödyntää niiden liiketoimintamalleja. Tämän pro-gradu -tutkielman tarkoituksena on selvittää, mitkä ovat kyberturvallisuusalan yritysten strategiset syyt tehdä toimialayhteistyötä Suomessa. Tutkimus pohjautuu aiempiin teorioihin toimialayhteistyöstä, sen näkökohdista sekä tietopohjaisesta edusta. Kvalitatiivinen moninkertainen case-tutkimus toteutettiin haastattelemalla edustajia seitsemästä eri case yrityksestä Suomen kyberturvallisuus sektorilta.

Tutkimus osoittaa, että yritykset hyödyntävät toimialayhteistyötä liiketoiminnassaan käyttäen eri tyyppisiä liiketoimintamalleja toimialayhteistyön eri tiloissa saadakseen näissä erilaisia hyötyjä. Jotta toimialayhteistyö on mahdollista, yritykset alentavat toimialayhteistyön tuomia jännitteitä erilaisilla käytännöillä suojellakseen omaa tietopohjaista etua, sillä erilaiset jännitteet ovat läsnä eri toimialayhteistyön tiloissa. Tutkimus osoittaa myös, että kilpailupohjainen etu ja erikoistuminen toimialalla tarjoaa enemmän mahdollisuuksia hyödyntää toimialayhteistyötä eri liiketoimintamalleilla. Tulokset edistävät nykyistä toimialayhteistyön tutkimusta ymmärtämään, että millaisia mahdollisuuksia toimialayhteistyö antaa yrityksille ja miten yritykset voivat hallita tätä ilmiötä sen eri tiloissa, joissa kilpailun ja yhteistyön paradoksi on aina olemassa.

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I have heard so many times that university is the best time of your life and I couldn't argee more when I think my own journey at LUT. The 7 years at university have passed faster than what I could have imagined, but these years are full of beautiful memories. I want to thank LUT for making these memories possible. I'm happy that I have met so many wonderful persons during my studies who I can call my friends. Especially I'm grateful for chances to study two times abroad in Athens and Lisbon.

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When reflecting on the day in 2013 when I started my journey in university and the present day, I can say that I'm not the same person that I used to be, but I mean this only in a positive way. During my time at LUT, I have learned important skills through lectures and case studies, but especially during my times working for Enklaavi as this organization has been important part for me to become who I am today. Still I can't thank enough my friends from LUT, Athens and Lisbon to teach me important values and skills in life as I'm grateful that I have got the privilege to learn from you guys. I strongly believe that I have all the things I need on the next phase of my life. It is always good to quote someone as all wise things are already said in the past, so I finish on the following words:

*"Diarrhea cannot be collected, and you cannot make marmalade from shit"*
*(Seppänen, 2016; Helokumpu, 2014)*

In Lappeenranta, 30.04.2020
Niko Seppänen

LIST OF ABBREVIATONS

| | |
|---|---|
| **CS** | Cybersecurity |
| **EU** | European Union |
| **FISC** | Finnish Information Security Cluster |
| **IPR** | Intellectual Property Rights |
| **MNE** | Multi National Enterprise |
| **SME** | Small and Medium-sized Enterprises |

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# 1 INTRODUCTION

Cyberattacks are causing problems across the world in many business sectors and different industries. The damages what cyberattacks do, have direct financial damages but also, they create reputation issues, the loss of business, opportunity costs, the loss of trust and to provide the services that company is offering (Nagurney & Shukla, 2017). Cyberattacks create in total the costs of almost $600 billion in the whole world according of the report of Center for Strategic and International Studies (CSIS) and McAfee (McAfee, 2018). Kshetri (2016, 1) points out that cyber-attacks are very critical threat of national security, but also these attacks are one of the biggest risks what companies and even individuals face today. There has been a huge growth in cyber-attacks and for this reason the emphasize in cyberspace is getting even bigger and this has created a huge hype around cyber-risks and investments in CS sector (Kshetri, 2016, 1-2).

In these days, making company's business to succeed, lots of efforts are needed. The world is changing constantly and the business environment itself too. Companies are no longer able to compete by their own because of the fast-changing surroundings in their business sector. One reason for the fast changes is the constant development of technology as it creates new types of industries and at the same time it modifies the existing technologies and sectors of businesses along it (Grant & Jordan, 2015, 194). This especially creates pressure and new approaches for the companies whose services or products need most recent technologies and updates as technological development moves on. Cybersecurity sector is not an exception in this as for example the short life-cycle of components which are used to create cybersecurity and knowledge that is required in CS services gets outdated really fast and for this reason companies need to acquire updated knowledge to maintain with the cybersecurity (Mahmood & Afzal, 2013).

This research focuses on the coopetition of Finnish cybersecurity companies. The goal of this study is to find out that what type of coopetition cybersecurity companies are doing in Finland. Interesting fact is to understand the reasons why cybersecurity companies are doing coopetition in this specific industry and what are the most

important reasons for it. Also, it is essential to find out the reasons why companies are possibly avoiding the coopetition or if there are ways how companies can do coopetition possible instead of avoiding it. In the end, the aim is to identify different types of forms in coopetition at cybersecurity sector and bring out the facts, how the knowledge-based advantage of the companies affects to coopetition and its different forms and what kind of benefits companies get from coopetition.

## 1.1 Background of the research

Coopetition which means that competitors are competing and cooperating with each other at the same time, is coming more and more important factor for companies to operate and to be successful in business world (Cygler & Sroka, 2017). According to Brandenburger & Nalebuff (1998, 36-39) coopetition is seen as a form of strategy where companies who are rivals, get benefits of collaboration and competition at the same time. Coopetition has gained for some time, a lot of attention in the business world as older research showed that over 50 percent of strategic alliances are formed among companies that are operating in the same industry or even with straight competitors (Harbison & Pekar, 1998).

So far coopetition has emerged in different types of contexts. First of all, coopetition has many examples from different industries. Gnyawali & Park (2011) observed a joint venture in R&D and production plants between Samsung Electronics and Sony Corporation as these companies were developing flat-screen LCD TV panels. In the airline industry Air France and Alitalia made a code-sharing alliance to lower resource capacity as companies were allowed to sell each others' seats so that companies were able to offer more fligts for their customers (Chiambaretto & Fernandez, 2016). In the platform industry, E-commerce giant Amazon.com has done coopetition with its competitiors as Amazon gave access to its different platforms (Ritala, Golnam & Wegmann, 2014). Example of coopetition in sharing and developing platforms has also occurred in car manufacturing industry (Gwynne, 2009). As earlier mentioned industries are more complex with their technology, coopetition has also emerged in not such high-tech field. In the wine industry, competitiors from New Zealand and Australia made a techonological collaboration to achieve global competitiveness

(Choi, Garcia & Friedrich, 2010). Other example from more non-high-tech field is the coopetition of Finnish forest industry in the aim for industry's long-term sustainability (Rusko, 2011).

When it comes to company's size, these earlier mentioned examples show that coopetition is really common for huge global companies as they are managing to stay in the markets (Gnyawali & Park, 2011; Chiambaretto & Fernandez, 2016; Ritala et al., 2014). Big global players like Apple, IBM and Motorola collaborated with each other to create new microprocessors and to fight against the market dominance of Intel and Microsoft (Vanhvaverbeke & Noorderhaven, 2001). Other examples between global multi national enterprises (MNEs) doing coopetition are Philips and Sony in their DVD manufacturing and development, Nokia's collaboration with its rivals like Ericsson and Fujitsu in China's telecommunication industry and cooperation between Siemens and Motorola to increase technological standards to block competitors entering Chinese markets (Luo, 2007).

Coopetition has not only though appeared between big global companies, but also among small and medium-sized enterprises (SMEs). Collaboration with competitors is important for SMEs as these companies face many challenges because of R&D costs, and technological development and in these kinds of situations, coopetition can help SMEs to compete against larger competitors (Gnyawali & Park, 2009). The one relevant example by Lindström & Polsa (2016) shows the coopetition of SMEs when small ICT firms made joint marketing campaigns together. Coopetition consisted of 25 SMEs creating a network which cooperated in marketing and sales and this way network was able to cover larger market area and gain more negotiation power with other partners, who were not part of the coopetitive network (Lindström & Polsa, 2016). Coopetition of SMEs is also observed by Kock, Nisuls & Söderqvist (2010) as researchers found out that the coopetition of 4 SMEs in trailers manufacturing gave international opportunities for case companies in different levels through collaboration.

Coopetition is said to be more important in high technology contexts as this area has few challenges like shorter product life cycles, huge investments in R&D, the importance of different technological standards and the convergence of multiple technologies (Gnyawali & Park, 2011). Also, coopetition is a booming abstract in high

technology sectors as it has been used in practice in this area especially, because of changing dynamics in this sector (Gnyawali & Park, 2009). Coopetition is also an important factor in innovation process in the industry sectors which have characteristics like knowledge-intensivity as they are dynamic and complex (Carayannis & Alexander, 1999).

## 1.2 Cybersecurity sector as a research context

Cybersecurity (CS) means the protection of different aspects like for example computers, applications, services, information and infrastructure with technologies, policies and practices (Kshetri, 2016, 3). Cybersecurity brings together wide collection of tools, instructions, guidelines, security safeguards and concepts, risk management and techonologies which are utilized to defend the cyber environment and companies (von Solms & van Niekerk, 2013). As CS has received lot of attention in recent years among practitioners and in politics, there is still not so much understanding what this term really means in general or what the common definition is, but most of the definitions are related to governmental institutions and in some level to industry and academic sector (Schatz, Bashroush & Wall, 2017). Also, one thing affecting for the growing attention of CS sector is according to Kshetri (2016, 1-2), the growth in cyber-attacks. The past cyber-attacks have occured in completely different industry sectors. In June 2017 Maersk Group was a victim of cyberattack which cost the company $250 to $300 million, when The Nyetea attack shut down Maersk Group operations across the world (Lopez, 2017). In healthcare sector, WannaCry attack infected fifty UK hospitals as these hospitals had system-wide lockouts, function loss in connected devices and delays in the patient care as attackers required ransoms to unlock systems (Mansfield-Devine, 2016). Also, in 2013 CS companies in The United States discovered that over thousand organizations from more than eighty-four countries were affected by group of hackers as this group was launching a cyberattack campaign where target companies were oil and gas companies as well energy investment companies (Kshetri, 2016, 9).

Global cybersecurity market is estimated to grow in 2023 to 248.26 billion U.S. dollars (Appendix 1). Different regulations are put on the act to answer ongoing attacks and

at the same time to wake companies to enhance their security status. In European Union (EU), the latest examples are General Data Protection Regulation (GDPR) which demands companies to take more measures to protect the data of their customers and employees (Corporate Counsel, 2018). Other regulation by EU is The Directive on security of network and information systems (NIS Directive) which focuses on member states as they are required to implement this regulation to their national legislation where this directive requires enhanced CS requirements for the companies in critical industry sectors (Corporate Counsel, 2018). Still the problem is that even though the actions to protect data and national security are created by different organizations, the huge part of the infrastructure in business sector is controlled by private companies and not public (Hiller & Russell, 2013). One other important fact is that private companies between different sectors are using different CS services from different CS companies. This situation creates a communication problem because different CS companies are using different technologies which are not possibly communicating with each other. For this reason, it has become important to improve information sharing among companies (Kshetri, 2016, 18).

When it comes to cooperation in cybersecurity sector, industry clusters have been one approach to develop this sector. CS companies in different countries have gathered together with certain purposes depending from the cluster. In Finland there is a cluster called Finnish Information Security Cluster (FISC) which consists about 70 small or medium-sized information and cybersecurity companies as this cluster aims to help these members in their national and international growth (FISC, 2018). FISC also cooperates with other national and international organisations (FISC, 2018). Other example from national cluster is The Hague Security Delta (HSD) which connects Dutch CS companies, governments and institutions to develop security sector and share knowledge (HSD, 2018).

Cooperation has also appeared in CS sector between different companies. CS giants Cisco Security and IBM Security started collaboration to improve product interaction, to integrate scattered services and to develop threat intelligence (Security Intelligence, 2018). Other example is the cooperation between Accenture, Microsoft and Avanade where especially Accenture and Microsoft operate in CS business. The collaboration brings together Accenture’s transformation expertise in cybersecurity field, Microsoft’s

unique services and platforms and Avanade's skills in Microsoft ecosystem to answer CS challenges (Microsoft News Center, 2017). One more example is the alliance between CyberArk and KPMG as the purpose of the alliance is to help customers in their attempt to minimize cyber attacks with KPMG's cyber security consulting and CyberArk's account security technology solutions (CyberArk, 2016).

## 1.3 Research gaps and objectives

Coopetition has been research topic in many different fields and business sectors with different backgrounds, operations and capabilities (Gnyawali & Park, 2011; Chiambaretto & Fernandez, 2016; Ritala et al., 2014; Gwynne, 2009; Choi et al., 2010; Rusko, 2011: Kock et al., 2010). Coopetition has brought many benefits to companies in these studies even when companies' sizes were different (Vanhvaverbeke & Noorderhaven, 2001; Luo, 2007; Ritala et al., 2014; Kock et al., 2010). Collaboration between competitors is said to be more common and important in high technology sectors because of changing dynamics, but also in innovation process in the industry sectors which have characteristics like knowledge-intensivity (Carayannis & Alexander, 1999; Gnyawali & Park, 2009).

Companies are tending to do coopetition so that this strategic approach offers them something that they could not achieve so easily by themselves. Coopetition is said to enhance market performance and so far, there have been found four market performance benefits what coopetition offers for companies. These benefits are resource efficiency, market growth and market development, creation of new markets and the last one is the creation of competitive dynamics. (Ritala, 2018, 320-323)

Even though coopetition research has observed many different business sectors, cybersecurity sector hasn't received attention so far. As mentioned earlier, CS sector is going through a lot of different situations as cyber attacks are getting more advanced and are creating more concern. New regulations are taking actions in different continents as big organizations and governments are trying to take actions to answer increasing cybercrime and the big industry players are joining together in attempt to create something new and to answer the problems which this sector have at the

moment. The purpose of this research is to understand the coopetitive actions in cybersecurity sector and what are the reasons behind the strategic decisions to cooperate with competitors. Especially research sheds light to Finnish cybersecurity market and coopetitive actions in this market area. The goal is to identify the main strategic reasons and actions which are affecting Finnish cybersecurity companies to start cooperation with their competitors. Also, those facts are included to research which are possibly preventing or slowing down the cooperation to happen between competitors.

## 1.4 Research questions

From the earlier chapters, coopetition can be seen as a potential form of action in cybersecurity sector. As cybersecurity is gaining more and more attention, this field needs further investigation to understand cooperative actions among competitors. Coopetition has been part of strategic actions in many different industries, but yet the cybersecurity sector hasn't been the objective of coopetitive research. Because of this, the main research question is introduced like this:

*"What are the strategic reasons of the cybersecurity companies in Finland to do coopetition?"*

To find answers on the main research question and objective of the research, more background research and understanding about the topic needs to be done. For this reason, there are going to be two sub questions which are going to provide explanations for the main question. With the first sub question, the goal is to find out, what are the different forms of coopetition between CS companies in this sector. The question refers to different business models what companies use in CS sector and tries to connect these business models to coopetition benefits what earlier studies have found. The first sub question is formed in the following way:

1. "*What kind of characteristics of coopetition in cybersecurity sector can be recognized in Finnish markets?"*

According to earlier studies, coopetition is connected to the sectors which have aspects of high technology and knowledge intensity and this is also the case in CS sector. With the second sub question the research tries to understand, how important knowledge-based resources are for companies in coopetition. This question seeks to understand that how important companies see their competitor's knowledge to start coopetition, but also how companies' own knowledge and resources affect on decision-making and how knowledge is possibly protected. The second sub question is following:

2. *"How are knowledge-based resources affecting to coopetition between cybersecurity companies?"*

The answers for these researchs questions are gathered through qualitative multi case study with semi structured interview questions. The data is collected from different representatives of Finnish cybersecurity companies.

## 1.5 Theoretical framework

This chapter shows the theoretical framework of this research. The purpose of the theoretical framework is to explain theoretical approaches of the study and how these approaches and subjects are observed in this research.

The theoretical framework, which can be seen from figure 1 below, shows the coopetition-based strategies as a concept and links these different strategies to the most important theories and concepts. These theories and concepts are observed in chapters two and three. The framework of the research starts from the left side where the companies' *backgrounds and specialization* in cybersecurity sector are observed as these aspects create a basis for the company's coopetitive approach. The *goals* of *coopetition-based business models* summarize four different goals in coopetition which have been identified in earlier studies. Coopetition-based business models also involve other important aspects which are connected to business models as all these aspects are discussed more detailed in chapter two.

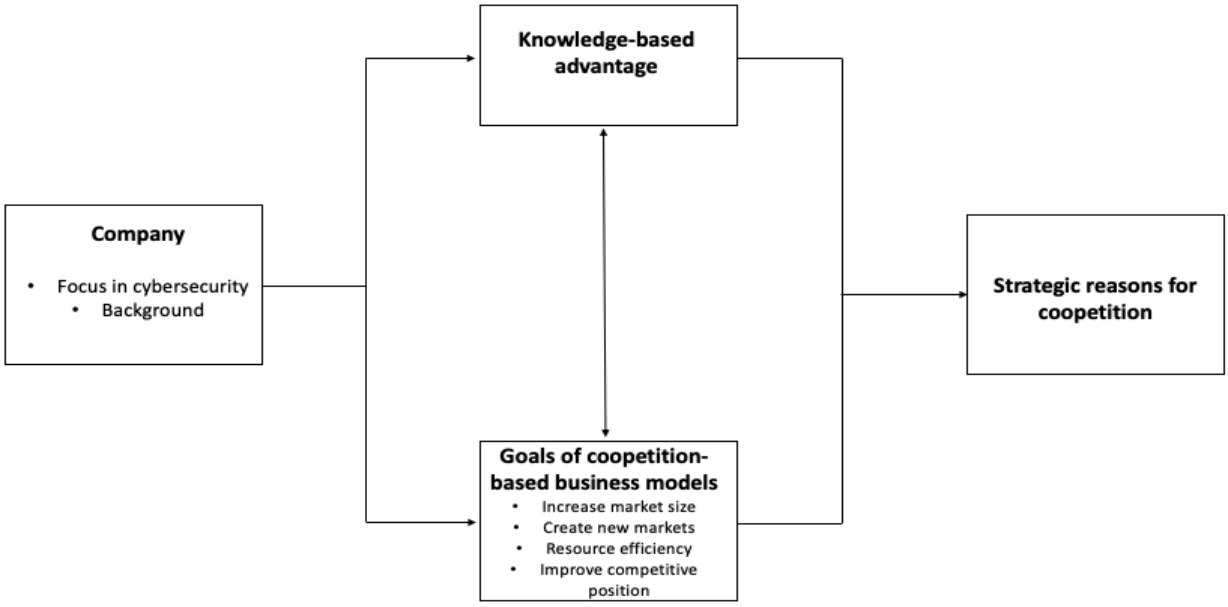


Figure 1. Theoretical framework of the thesis

The framework demonstrates how the *knowledge-based advantage* of the company affects to the different goals of *coopetition-based business models* when company is having a coopetitive approach and also how the goals of coopetition-based business model affects to knowledge-based advantage of the companies. In the right side of the frame the *strategic approaches* of the companies are concluded which is the outcome from the continuous interaction between knowledge-based advantage and goals of coopetition-based business models of the companies.

## 1.6 Delimitations

The research is specifically focusing on different types of coopetitive forms which are happening on the cybersecurity sector in Finland and also what kind of coopetitive actions companies would be willing to take with their competitors. For this reason, the study leaves out the deeper research of how the coopetition is formed between certain players in the market. Also, as the research data about coopetitive actions is gathered with semi structured interview questions from one representative of different cybersecurity companies, the view to coopetition is narrowed down to opinions and knowledge of specific persons from each case company.

Coopetition doesn't have strong scientific background in the field of cybersecurity among scholars, so it is assumed that earlier coopetition theory from earlier studies can be used in the coopetitive discussion in the cybersecurity field. Studies have focused on coopetition in the ICT industry and also in the business sectors which are knowledge intensive and operate with high technology (Leite, Pahlberg & Åberg, 2018; Daidj & Egert, 2018; Chevallier, Laarraf, Lacam, Miloudi & Salvetat, 2016). Earlier researches about different fields have similarities to CS industry, when it comes to knowledge intensity, so it is assumed that these studies can bring value to the field of CS with coopetitive perspective.

For this research the case companies are selected among all cybersecurity companies in Finland. This means that there are companies who are focusing only on cybersecurity actions and their product and service portfolio is completely based around this field. There are also companies who have other products and services apart from cybersecurity. This might change the coopetitive actions and opinions among interviewees and bring more scattered ideas about coopetition as the product and service portfolio are different among the companies. The study focuses only on the companies in Finnish markets so the coopetitive actions and ideas are only based on Finnish cybersecurity sector. The coopetitive actions can vary a lot between different nations and actions and interests can be completely different in other countries so generalisation of the findings isn't possibly valid to different market areas.

The study doesn't try to create deeper understanding about regulations and standards which are made for CS sector and neither it doesn't explain in small details how cybersecurity sector works, when companies create CS services and products to markets as strategic aspects are in the center of this research. First of all, this is done, because it is not the main point of the study to understand completely different operations connected to CS or neither the laws and standards of this field. Other problem is that for example even though EU has set standards for its member states about CS, these standards are not the same in the international level when compared to The United States. This is not the only problem as the policies vary across the globe, but the interests of different nations vary a lot as countries see CS in many different perspectives and can focus on special characteristics of CS. (Abolhassan, 2017, 17) Research doesn't take view on these regulations and standards though.

## 1.7 Structure of the study

This research consists of six parts. The first part is the theoretical part which purpose is to explain the meaning of coopetition as a concept and create understanding about it. This part explains different aspects of coopetition which need to be understood when strategic actions in coopetition are considered. In the second part, the research takes look to knowledge-based advantage and its theory. The focus is on the characteristics which need consideration and attention in the agenda of coopetition where knowledge-based advantage can play crucial part.

The third part of the study explains how empirical research of the study is done by using qualitative research method. The data is gathered by using semi-structured questions which are presented to representatives of different cybersecurity companies. The analysis is done by using multi-case study with cross case analysis where companies are compared with each other as the research tries to understand case companies' strategic approaches and what factors are affecting to these approaches. In fourth part of the study, every single company is analysed as study tries to find similar and dissimilar patterns that explain companies' coopetitive actions. In this part the results of gathered data are analysed, and the most important findings are provided.

In the fifth part, the results from the multi-case study with cross case analysis are analyzed and reflected to theory to create understanding about the current coopetition situation in cybersecurity markets in Finland. In this part, there is discussion about the results and theory as research tries to create generalized results and divide companies to certain categories, based on their coopetitive actions. In this part of the research, the goal is to answer on the sub research questions. After there are answers to sub questions, this chapter aims to answer on the main research question of the study by explaining, what are the strategic reasons of the cybersecurity companies in Finland to do coopetition. In the sixth and the last chapter, the implications of the research and the possible further research objectives are defined.

# 2 COOPETITION AND BUSINESS MODELS

In this part of the research, coopetition is explained in wider agenda. The meaning of coopetition and different aspects which are connected to it, are observed to create better understanding about this topic. First, the definition of coopetition is explained to give general understanding about it. After this, theories behind the coopetition are construed and also the paradox between competition and collaboration aspect is evaluated. In the end of this part, the research opens up about the business models and the benefits which are connected to coopetition-based business models which earlier studies have found.

## 2.1 Definition of coopetition

Coopetition which means coexisting cooperation and competition among companies, has been big interest for the field of research for two decades (Bengtsson & Kock, 2013). What this topic means is that coopetition is a relationship between horizontal actors where two or even more actors are in a continuous collaboration and competition with each other (Bengtsson & Kock, 2000). What this means according to Brandenburger & Nalebuff (1998, 37) is that company leaders should forget traditional competitive approach and cooperate with their competitors to create value. During recent years the focus of the research in coopetition has grown especially in different levels of coopetitive analyses which include the network level, inter-firm level and the intra-firm level (Dorn, Schweiger & Albers, 2016). Through the in-depth review in their research, Dorn et al. 2016 found five multilevel research areas in coopetition. These are environmental characteristics, actor characteristics, the nature of the relationship, governance and management and the output of the relationship (Dorn et al., 2016).

Many studies though have created the situation that there is not a unified definition for coopetition. The early definition for coopetition was seen as a dual relationship between companies (Bengtsson & Kock, 2014). This is also known as dyadic relationship which means the situation where two companies are cooperating in some activities, like for example in a strategic alliance, but at the same time they are competing in other activities (Bengtsson & Kock, 2000). But as the business sectors

have become more dynamic and more complicated systems, the definition needed update. Now coopetition is seen more as a relationship between two or more actors who are continuously part of the cooperative and competitive actions which are happening between these different sides (Bengtsson & Kock, 2014). This has been recognized in situations where companies have created multi-firm alliances which involve more than two companies as these types of alliances have emerged especially in technology-driven business sectors (Lavie, Lechner & Singh, 2007). Coopetition as a strategy can be seen as sort of interfirm strategy which brings competing firms to manage convergent interest and goals together which can align in some level, where this type of strategy's purpose is to create value by the means what this coopetitive advantage brings (Dagnino & Rocco, 2009). Research has highlighted coopetition as a strategy to create innovations in industries with high technology for some causes which are short life cycle of the product, convergence of technology and high costs in R&D (Gnyawali & Park, 2009).

For companies there are many reasons why they start to do cooperation with other firms. The same thing is with the coopetition as the motivations to start this act vary a lot. Though most of the reasons are explainable with resource-based view and game theory (Ritala, 2012). Here the game theory explains the fact that companies are cooperating so that they could increase the size of their business and later continue the competition and divide this larger business pie which was created from cooperation (Brandenburger & Nalebuff, 1998, 65). According to Ritala & Hurmelinna-Laukkanen (2009) competitors can create through collaboration new services or products and improve current ones and this way, create new markets or increase their current markets. This approach is useful in the situation where cooperating partners are able to increase the sum of the value together by collaborating and then capture this value individually instead of the situation where firms have decided to operate individually and just compete with each other (Ritala, 2012).

### 2.1.1 The resource-based view

The resource-based view points out that companies' competitive advantage comes from their resources and capabilities and firms perform strategies to utilize these

sources, but usually companies need other types of resources, so that they can implement their strategies in the efficient way (Schiavone & Simoni, 2011). Studies have shown that in competitive relationships, companies are giving more and more importance to knowledge and intangible assets (Martin-de Castro, López-Sáez & Delgado-Verde, 2011). To get access to these types of knowledge and assets which also work as complementary resources, companies need alliances to get access in some level to these inter-organisational resources of competitors (Schiavone & Simoni, 2011). It could be said that coopetition usually creates value for end customers and also for the companies who are involved as coopetition can for example enhance existing products and services or can create totally new ones (Walley, 2007).

The literature, in the perspective of resource-based view in alliances, shows that companies with same type of knowledge and resources are joining their forces to minimize the risks and costs in different business activities like in the development of new techonology and in standardization to get access to economies of scale as these kinds of actions happened in aircraft industry (Garrette, Castańer & Dussauge, 2009). Companies who are competing with each other are usually having similar resources and for this reason they are attractive partners when it comes to sharing risks and costs (Ritala, 2012). Also, sharing the similar knowledge and having a common vision about the markets could sometimes help competitors to get in cooperation according to resource-based persepective (Ritala & Hurmelinna-Laukkanen 2009).

### 2.1.2 Game theory

In the view of game theory, the ideal situation for coopetition is when there are more ways to allocate for the participants in coopetition, instead of operating alone (Brandenburger & Nalebuff, 1996). This can be explained with coordination games prisoner's dilemma and stag hunt (See Ritala & Hurmelinna-Laukkanen, 2009) where prisoner's dilemma suggests that individual company gets best value when operating alone as the payoff is better when company can develop everything by itself. Though the stag hunt game shows that instead of companies operate alone to get small amount of value, they should join forces to create bigger amount of value which leads

bigger payoff for all parties as this rationality could be connected to coopetition in innovations.

With coopetition, there are two important factors involved in companies' actions which are value creation and value capturing (Cairo, 2006). Value creation is an end sum of the value which is created through activities which are done together by different parties, where every single stakeholder of coopetition brings their own assets to create larger amount of value (Ritala & Hurmelinna-Laukkanen, 2009). This is connected to earlier mentioned stag hunt game which suggested that companies should join forces so that they can create more value instead of operating alone. Ritala & Hurmelinna-Laukkanen (2009) explain that value capture or appropriation is on the other hand the share, which every single company gets from together created value where the share can actually differ between firms in coopetition. Coopetition has different outcomes which are positive-, neutral- or negative-sum game where the result of the game depends on how the coopetition partners can enhance their capabilities during cooperation, but also the business environment affects to the outcome too (Ritala, 2009). Positive sum game approach is the best way to create more value and as a result from this, it possible to capture more value in the end of coopetition (Cairo, 2006). Though companies are not only thinking about value capturing, but they also care about how much there is total value created and relational inputs and outputs which companies have put to coopetition (Fernandez, Le Roy, & Gnyawali, 2014; Lavie, Haunschild & Khanna, 2012).

Coopetition is possible to see as a positive-sum game for all the attendees, when considering company's resource-based view and game theory. The reason to this is the fact that rivals have same type of logical thinking and poses pretty similar resources. These things lead to situation where absorptive capacity and creating value increase in specific abstract and also makes motivation and ability to combine capabilities and resources even higher (Gnyawali & Park, 2009; Dussauge, Garrette & Mitchell, 2000). Though coopetition can end up in the negative sum game where other party benefits more than other. For example, during coopetition other company might have risks to lose its core knowledge, gain less knowledge from competitor or capture less value from the coopetition as the competitor has received more (Ritala &

Hurmelinna-Laukkanen, 2009). This is connected to the knowledge-based advantage and knowledge sharing which are discussed later in the research.

## 2.2 Competition-Cooperation tensions

In coopetition, companies confront different tensions which have effects to the coopetition. These tensions come from the fact that companies are cooperating and competing at the same time (Tidström, 2014). In their research, Ritala & Hurmelinna-Laukkanen (2009) explain that tensions arise in value creation and value appropriation as the value creation is more like a collective strategy where companies pursue goals together, but in value appropriation the collective strategy turns to individual strategy where all companies compete individually from the created value. Though the fact is that all companies are not able to capture the value equally which is created in coopetition as bargaining power and resources in coopetition can affect to value capturing chances, but in coopetition partners can capture value from other companies or capture value from the markets with other possibilities (Lavie, 2006; Ritala & Tidstöm, 2014)

The relational strategy and firm-level strategy in coopetition creates tensions, because firms tend to have different expectations about the value which is created in coopetition. Companies' own firm-level strategies can be different already in the beginning of the coopetition, like what they want to achieve from it. This makes it hard to create common relational strategy for the value appropriation as companies' firm-level strategies are dynamic and change over time. Though in this situation as companies do coopetition to connect supplementary and complementary resources, the differentiation between companies eases tensions in some level which can be explained in collaboration and differentiation approach. (Ritala & Tidström, 2014)

Coopetition literature has found many tensions which are possible to appear in coopetition relationship as Tidström (2014) summarizes that these tensions are connected to aspects like *knowledge, opportunism, roles* and *power and dependence*. Role tensions are coming from the tensions which are connected to both cooperation and competition which in company level can be found when organization get tensions

from its own personal goals and the goals of cooperation (Tidström, 2014). This can be connected from the earlier mentioned fact between the differences of relational and firm level strategy. Tensions connected to roles are though easier to solve in the firm level (Bengtsson, Hinttu & Kock, 2003)

In the coopetition, knowledge also creates tensions as it is a source of companies' competitive advantage and for coopetition to be successful, companies' need to share knowledge with each other so that they can create value (Chin, Chan & Lam, 2008). So that the companies can achieve benefits from cooperation, they need to share their knowledge with each other to reach common goals (Raza-Ullah, Bengtsson & Kock, 2014). The problem comes because companies' need to protect their most important knowledge at the same time which is the source of their competitive advatange, so that they won't lose their competitive status against their competitor (Fernandez et al., 2014).

As companies are sharing their knowledge and resources during the coopetition, this may create another type of tension which is known as opportunism, where other firm's intention during the coopetition is to exploit interests of the other party during the coopetition (Osarenkhoe, 2010). This means for example that one competitor is looking for cooperation with motivation for long-term partnership while the other one could act in this situation more opportunistically and wants only benefits in short-term (Das & Teng, 2000). Opportunism can also appear in the situations where company starts cooperation with its competitor in order to expand company's business into the sector of competitor (Bengtsson & Kock, 1999).

Power imbalance or as it is also called asymmetries, can lead to the situation where the more powerful party in the relationship takes advantage of the weaker one (Jakobsen, 2020). For this to happen, it means that firm with more power should have better position in relation to several resources instead of one aspect than their counterpart (Pfeffer & Salancik, 2003). The mutual dependence can explain how companies handle tension as Jakobsen (2020) explains that companies form alliances with competitors in the situations to increase knowledge in industry which is done by cooperating in research or in R&D actions so that companies can confront the environmental regulations what the industry is facing. Tensions seem to arise from the

different aspects where the paradox between competition and cooperation explains these tensions. Though it is important to note that companies are not always choosing their fierce rivals, so the degree competition and cooperation can change depending the type of coopetition.

According to Chin et al., (2008), coopetition has different types which can be explained in terms of the degree of cooperation and competition as different types require different strategies in coopetition. The type of coopetition can be explained with figure 2 below which provides four different types, based on the level of cooperation and competition. *Monoplayer* is a company which doesn't have very much interaction with its competitors. *Contender* is a company which strives with its competitors from market share and market position and does cooperation with rivals in some occasions. *Partner* is a type of company which looks for synergies which are based on complementary resources of companies to create win-win situation. *Adapters* have high degree of competition and cooperation but are dependent from each other to reach certain goals. (Chin et al., 2008)

| Competition | Low Cooperation | High Cooperation |
|---|---|---|
| High | Contender (High competition, Low cooperation) Type 2 | Adapter (High competition, High cooperation) Type 4 |
| Low | Monoplayer (Low competition Low cooperation) Type 1 | Partner (Low competition, High cooperation) Type 3 |

Figure 2. The model of different modes of coopetition (Chin, Chan & Lam, 2008)

## 2.3 Business models in coopetition

Business model gives understanding, how the companies create and provide value to their customers and how companies turn the customer payments into the profits (Teece, 2010). Teece (2010) continues that business model is a platform which is between strategy and practice as it is depicting how value creation and capture mechanisms are in the utilization in the company. Business models are also seen as cognitive structures which make understanding in the theoretical point of view about the fact how to place boundaries for a company to create value and manage internal

structrues in the organization (Doz & Kosonen, 2010). According to Teece (2010), business model also explains, how the company is connected to external stakeholders and how company is able to manage its actions with these stakeholders so that it can create value to customers and partners. Strategy plays important part on the business model development as it has seen as independent factor when changing the business model (Yip, 2004). Also, network-oriented perspective is important aspect in the business model as creating networks and getting partners are important things which endorse the value creation and for this reason these should be a piece of company's business model (Nenonen & Storbacka, 2010).

Value creation and value capture are part of business models, but also part of coopetition, so this fact creates a connection between these two areas as coopetition's one purpose is to create even more value with partners and at the same time compete from this bigger value which was created through coopetition (Brandenburger & Nalebuff, 1998, 37). Companies have made different choices in company specific level and have taken certain road to follow, but on the other hand rivals have usually different positions, when it comes to changing their current business model (Ritala & Sainio, 2014). This differentiation is also important aspect in coopetition, when company tries to achieve firm-specific value appropriation (Ritala & Hurmelinna-Laukkanen, 2009). For companies to achieve this, business models offer lot of differentiation potential as this could also minimize risk which is connected to coopetition and create a situation where more value can be created to end customers and companies (Ritala & Sainio, 2014). Coopetition is though more usual to develop in the form of emergent strategies and not in the more sustainable way (Padula & Dagnino, 2007).

It is suggested that if company wants to get full benefits from the coopetition, there is need for sustainable business model to get access to full benefits. To implement coopetition strategy, companies should utilize coopetition-based business model in which possible rivals are positioned as partners. Business model like this helps to realize how coopetitive plans are following the purpose to create value for customers and how the company is able to capture this value and gain profits. Earlier studies have identified four different categories which are based to resource-based view and game theory. Coopetition-based business models give four different types of benefits

to companies which come from the basis of resource-based benefits. Beneftis can be divided from the basis of earlier studies into four different types which are (1) increasing the size of current markets, (2) creating new markets (3) efficiency in resource utilization, and (4) to improve company's competitive position. (Ritala et al., 2014) These benefits of coopetition-based business models are discussed in next chapters.

### 2.3.1 Increasing the size of current markets

One of the common motives to do coopetition is to make the current markets bigger as this motive is connected to incremental and radical innovations where cooperation with competitors is the way to improve current products and services or even create new ones in the market (Tether, 2002). According to Ritala (2009), in this type of coopetition, the goal is to create a positive-sum game. Companies which are taking this approach are operating in the same field and usually share common interest, so increasing the value created in markets can also create a situation where all attending parties can win (Ritala et al., 2014). It is possible to identify two rationalities in this type of motive. First of all, Bengtsson & Kock (2000) point out that competitors use probably different resources and capabilities during the coopetition, even though they are operating on the same sector and provide same type of offerings to same clients. Second rationality behind the motive to increase market size is because the companies poses sufficient amount of similar resources (Garrette et al., 2009).

One good example, where these both rationalities are in use, is the case of Sony and Samsung where these companies created through coopetition a joint technology development and manufacturing facilities which provided these companies a possibility to take leader position in the LCD TV markets. Meanwhile, companies shared technological know-how and marketing resources which are complementary resources. Still at the same time, Sony and Samsung shared costs and risks as they had joint facilities which were about combining resources which were supplementing each other. With this type of coopetition strategy, the markets of LCD TV grew worldwide, and these two companies were influencal actors in this sector. (Gnyawali & Park, 2011)

### 2.3.2 Creating new markets

Second motive for companies to adapt coopetition is when the aim is to create new markets. This creates possibilities for companies to create completely new value in the sector where they compete and gives new ways to value capturing for companies which are involved in coopetition (Ritala et al., 2014). There are four different reasons which explain this motivation. First, as competitors are practicing business in similar fields, they also have understanding about the field which can lead in to create radical innovations and find fresh areas to where companies could extend their service and product portfolio (Quintana-Garcia & Benavides-Velasco, 2004). Second reason is that in the sectors with high growth, it is impossible for a single company to capture all value in the market as these markets poses a huge amount of many different offerings from competitors who have all differentiated themselves with their firm-specific resources and these offerings provide a very broad base for customers to choose from (Ritala et al., 2014). This kind of situation has happened in the smart phone sector where many different phone manufacturers can offer their solutions to different customer segments even though competitors offer same solutions (Wang & Xie, 2011).

Third explanation for new market creation is connected to creation of new offerings where compatibility, interoperability and network externalities are important (Mione, 2009). In this situation, consistence is required between companies' offerings in the same industry, when new markets are going to be created as this allows competing companies to create added value to customers with interoperable approach and with improved offerings (Spiegel, 2005). The fourth explanation for creating new markets with competitors is risk and cost sharing as creation of new markets and innovations involves lots of costs and poses uncertainty so in this scenario cooperation with horizontal positioned firms and their supplementary resources help to ease such uncertainty (Gnyawali & Park, 2009). In the exploitation of supplement resources, where coopetitive actions have utilized network externalities and interoperability, the contemporary industries like ICT industry is a good example of this (Amit & Zott, 2001)

Earlier researches have found some evidence from coopetitive market creation. One example is the coopetition between Apple, IBM and Motorola where these companies

created an alliance to design the PowerPC and apart from this Apple and IBM planned to create open-system software platform and operating system even though they were close rivals in computer markets. This collaboration created possibility to new value creation and value capturing for both firms outside the current markets. (Vanhaverbeke & Noordehaven, 2001) Other example where interoperability and supplement resources have been used to create new market is in Finnish mobile TV as telecom actors and media companies who were competing with each other, developed together technologies and services to create new markets (Ritala, Hurmelinna-Laukkanen & Blomqvist, 2009). Ritala et al. (2009) though continue that in this coopetitive act, the problems started when the individual companies tried to capture value from this new market with their business models as companies' models were different from each other.

### 2.3.3 Efficiency in resource utilization

Coopetition can also rely completely on the reducing costs and assuring qualities as this type of coopetition focuses on the fact, where companies try to make their value creation and capturing of this created value even more competent which means producing more with resources, what company has now or using less resources to produce same output as before (Ritala et al., 2014). Companies might want to use less resources or use resources more efficiently, when it comes to handling the existing market share which they possess. This situation goes well with scale alliances as competing companies form these in their efforts to obtain benefits in efficiency and in sharing the costs with each other (Dussauge et al., 2000). As competing companies are having same activities with each other in the same position in value chain, this creates many opportunities for collaboration in resource utilization as this type of cooperation is about finding supplementary resources and capabilities (Ritala et al., 2014).

Resource utilization in the same position in the value chain has been used in brewing industry as Swedish breweries used their transportation methods together to collect empty beer bottles from the grocery stores as this type of action left area for companies to compete in other business functions which were near the clients

(Bengtsson & Kock, 2000). Bengtsson & Kock (2000) suggest that cooperation part is actually happening further away from customers in operations where scale advantages are providing more benefits when it comes to coopetition. The other example of resource efficiency is in the airline industry. In this sector, competitors integrated similar resources so that they can share risk and lower the overlap in resource utilization for similar tasks (Garrette et al., 2009).

### 2.3.4 Improving competitive position

In the ICT sector one common strategy is the competition between different rival networks as different actors are trying to increase their competitive position and coopetitive ecosystem to which they belong as the increasing amount of alliances and different types of network forms have moved the competitive actions more into situation where networks are competing against each other (Gueguen, 2009). Companies want to protect their market share which they have managed to capture in the past so according to this motive, coopetition is utilized to change competitive dynamics in the industry which means that competitors cooperate with each other to co-opt their rivals, to protect their competitive position and interest and support new technological trajectories (Möller & Rajala, 2007). Möller & Rajala (2007) continue that horizontal operators in the network and their role in it is strong, if they have certain aspects which help these operators in same network to obtain better position in competition. So, with the combination of resources that are having complementary or supplementary characteristics, competing companies in certain coopetition method or in the larger network of companies are able to enhance their position even more to answer competition which is coming from other operators in business sector (Ritala et al., 2014).

This type of motivation was happening in the coopetition where IBM, Apple and Motorola cooperated to make microprocessors which would change the ascendancy in this sector as it was controlled by ecosystem of Microsoft and Intel who had the dominance in this market (Vanhaverbeke & Noordehaven, 2001). Another example is in laser-disc technology sector where one party was Blu-Ray and the other was HD-DVD. In this network competition, Blu-Ray incorporation where the leading company

was Sony, got the dominance for this sector with better video attributes (Christ & Slowak, 2009). Finnish forest industries have also taken coopetitive actions in account as they wanted to improve their competitiveness. In his paper, Rusko (2011) explained how the forest industry in Finland used coopetition in industry's development phase to increase industry's competitive status against global market. The coopetition had a huge effect to the Finnish forest industry's competitiveness, but also on the sustainability of Finland's forest industry (Rusko, 2011).

So as discussed in recent chapters and to summarize, there are four different benefits for coopetition-based business models which attract companies to take collaborative actions with their competitors. These benefits make possible for companies to increase the size of the current markets, create new markets, have efficiency in resource utilization and to improve competitive position of the company. From table 1 it is possible to see the summary of these benefits with the main mechanisms which are explaining the reasons why companies are taking collaborative actions with their competitors.

Table 1. Benefits of coopetition-based business models and mechanisms (Ritala 2012).

| **Coopetition benefits** | **Main mechanisms** | **Case examples** | **Industries** |
|---|---|---|---|
| Increasing the size of the current markets | • Risk and cost sharing<br>• Interoperability and compatibility | Gnyawali & Park (2011) | • LCD-TV markets |
| Creating new markets | • Risk and cost sharing<br>• Interoperability and compatibility | Vanhaverbeke & Noordehaven (2001), Ritala et al. (2009) | • Microprocessor industry<br>• Finnish mobile TV industry |
| Efficiency in resource utilization | • Integrating supplementary resources<br>• Risk and cost sharing | Bengtsson & Kock (2000), Garrette et al. (2009) | • Swedish brewing industry<br>• Airline industry |
| Improving competitive position | • Improving competitiveness through coopetitive alliances<br>• Co-opting rival networks<br>• Support technological trajectories | Vanhaverbeke & Noordehaven (2001); Christ & Slowak (2009); Rusko (2011) | • Microprocessor industry<br>• Blu-ray industry<br>• Finnish forest industry |

# 3 KNOWLEDGE-BASED ADVANTAGE IN COOPETITION

For some time, knowledge has been a strategic resource and because of this, companies need to manage this resource in order to maintain their competitive performance. So, it is possible to expect that companies need to utilize their knowledge assets if they want to be successful in their business. For this reason, it necessary for companies to manage their knowledge as an important strategic aspect which provides them better position in the markets where they operate. (Bolisani & Bratianu, 2017) Cybersecurity is not exception in this. Operations which are needed to create effective CS services, require knowledge-intensive tasks and for this reason specialists with high knowledge about cybersecurity are in high demand to connect different components in the most efficient way (Ben-Asher & Gonzalez, 2015; Lee, Bagheri & Kao, 2015). As technology is evolving rapidly and because of the short life-cycle of components which are used to create cyber-security, knowledge that is required in CS services gets outdated really fast and for this reason companies need to acquire updated knowledge to maintain with the cybersecurity (Mahmood & Afzal, 2013).

It has been noticed that benefits of coopetition give competitive advantage for example in technological innovations and by increasing technological diversity, as coopetition has been seen important especially in knowledge-intensive sectors (Gnyawali & Park, 2009; Bouncken & Kraus, 2013). Bouncken & Kraus (2013) point out that technologies are getting more complex and R&D units face challenges in costs, resources, risks and in rising uncertainty as these kinds of aspects for single companies are hard to handle. This has created a situation that external knowledge, relationships with other companies and networking are important especially in technological innovations (Martin-de Castro et al., 2011). This creates a situation where coopetition is needed as companies possess certain specific skills. Techonologies are not the only reasons which require companies to do coopetition as for example in software industry, coopetition started from the specific needs of customer, where there was need for interoperability between companies or to share costs in R&D (Biondi & Giannoccolo, 2012). So basically, the coopetition can occur also, when there are complementary

resources and the requirement for it can come either from demand or supply side (Carayannis, Depeige & Sindakis, 2014).

Coopetitive tensions are coming in the risky situations when confidential information could be moving to other parties of coopetition or when technological knowledge is copied (Le Roy & Fernandez, 2015). According to Gnyawali & Park (2009), companies are combining strategic resources so that they can reach their goals. Here though it comes problematic as at the same time companies also need to protect their main competences if they want to stay as strong competitor. Knowledge sharing is boosting joint value creation, but on the other hand knowledge protection in coopetition is limiting value capturing at the firm-level (Tidström, 2014). Gast, Gundolf, Harms & Collado (2019) explain that balancing between sharing the knowledge and protecting it in coopetitive situation is easier when knowledge management in the interorganizational coopetition helps companies to provide common and project-oriented knowledge, when at the same time specific knowledge about companies and their customers is concealed. Usually this balance is achieved when companies use and combine formal and informal knowledge protection methods (Gast et al., 2019).

In the next chapters it is explained how companies share knowledge with each other, what happens when there is a knowledge leak and how companies are protecting their knowledge-based advantage. In these chapters, knowledge management is looked in the interorganizational perspective as functions in this view are focused on the fact how firms share their knowledge with each other and how they protect it for not getting in hands of competitor (Ritala, Olander, Michailova & Husted, 2015). This view supports and is more in line of this research and its goals.

## 3.1 Knowledge sharing

Cooperative relationship with competitor provides access to external knowledge and especially in coopetition, partners operate in the same industry and have similar knowledge, so because of this similarity, there is more knowledge to be shared with partners (Tether, 2002; Ritala & Hurmelinna-Laukkanen, 2009). As Bouncken & Kraus (2013) point out in their research, coopetition is important especially in knowledge-

intensive industries as it helps companies to procure external knowledge, R&D and technological aspects. So, sharing knowledge with competitor can improve the added total value, when companies can turn rare and barely accessible resources of their partner to new offerings and opportunities, but in the worst scenario it may threat company's unique and competitive knowledge and their position in the markets (Loebecke, van Fenema & Powell, 2016). According to Dyer & Singh (1998) there are four different sources for interorganizational competitive advantage between companies and these are relation-specific assets, routines in knowledge-sharing, complementary resources and capabilities and the last one is effective governance. In the concept of inter-firm knowledge sharing, it has been shown that firms are going to be part of multiple temporal or permanent agreements during cooperation (Marabelli & Newell, 2012).

Sharing knowledge can increase the total amount of value as companies can combine complementary and scarce resources from their partners to new types of business opportunities. There is though a possibility that knowledge sharing may have an effect on company's rare knowledge intensity and this way also on the competitive advantage of company. These facts could lead to potential conflict in the coopetitive situation. (Loebecke et al., 2016; Gnyawali & Park, 2011) The types of knowledge which are shared between partners are usually divided to explicit and tacit knowledge. Explicit knowledge is connected to tasks like specific engineering skills for software development or product manufacturing and tacit knowledge is linked to human assets which means the experience what certain employees for example poses (Loebecke et al., 2016).

Knowledge sharing has also two different charasteristics according to way how knowledge transfers happens between organizations. These are known as unilateral and bilateral knowledge. In the unilateral knowledge, knowledge sharing is working only in one way as this type knowledge sharing is more general in outsourcing where vendors receive information from their clients in order that vendor can provide service to their clients (Loebecke et al., 2016; Oshri, Kotlarsky & Gerbasi, 2015). Though in this situation it could be that vendors don't share their knowledge with the client (Loebecke et al., 2016). According to Loebecke et al. (2016) bilateral knowledge sharing is the situation where cooperation parties utilize the synergies of cooperation

like in case of complementary knowledge and knowledge creation as one example is the cooperation of R&D units of two different companies. In table 2, provided by Loebecke et al. (2016), bilateral and unilateral knowledge sharing are connected to the explicit and tacit knowledge and from table 2 it is possible to see four different types of knowledge sharing in inter-organizational context and knowledge sharing. Even though coopetitors are sharing knowledge with each other, Soekijad & Andriessen (2003) explain in their study that usually companies leave really firm-specific knowledge out from knowledge sharing, like company's goals, production processes or even company's clients, because these things are usually connected to companies' competitive advantage.

Table 2. Configurations of Inter-Organizational Knowledge Sharing (Loebecke et al. 2016)

| | **Unilateral knowledge sharing** | **Bilateral knowledge sharing** |
|---|---|---|
| **Tacit knowledge** | Outsourcing strategies: Client-supplier software specifications | Exchange of complementary market research information between competitors |
| **Explicit knowledge** | Client-supplier link in automotive industry | Collaboration of R&D units in semi-conductor industry |

## 3.2 Knowledge leaking

As the firms are sharing external knowledge with each other, they also come across with the fact of knowledge leaking, as a fear of losing certain critical business knowledge to competitor is blocking the possible collaboration with competitor and sharing knowledge with them (Ritala & Hurmelinna-Laukkanen, 2009). Knowledge leaking happens when important knowledge of the company like strategies, product-knowledge or critical client information moves to the unwanted parties (Ahmad, Bosua & Scheepers, 2014). There are two types of knowledge leaking. First one is accidental knowledge leaking where the employee of the company who is doing collaboration with the competitor, unwittingly provides important knowledge to competitor which was not supposed to get in hands of other external parties (Ritala et al., 2015). Ritala et al. (2015) continue that intentional knowledge leakeage on the other hand means the

situation where employee purposely gives business-critical knowledge of the company to competitor.

Knowledge leakeage can occur also from derived facts from knowledge which was gained from different sources, but also leakeage can be a result from bad information management practicalities or in the situation of employee turnover as people with important knowledge move to competing companies (Ahmad et al., 2014). Knowledge leaking can have negative aspects on companies as it can lead to revenue loss, production loss or increasing costs (Ahmad et al., 2014). As companies want to prevent the knowledge leaking, usually competitors choose to do cooperation in those kinds of activities which are further away from customer like in the operations of research and development instead of introducing new products or services (Bengtsson & Kock, 2000).

From the view of knowledge types, it has said that explicit knowledge is more harmful for leakages than tacit knowledge (Wu & Lin, 2013). The reason for this is that explicit knowledge is possible in most cases to get patented or protected by some other way as it can be documented (Ritala et al., 2015). Tacit knowledge on the other hand is really hard to depict and it is connected to certain person who poses it and from whom this knowledge is hard to separate (Wu & Lin, 2013). For this reason, tacit knowledge is useful in the environment where person's own experience is required (Ritala et al., 2015). Ritala et al. (2015) notify that it is very unlikely that the explicit knowledge is the important source for competitive advantage, but instead tacit knowledge is especially important in collaborations as both parties need to get access to this knowledge if they want to create further value to their cooperation.

## 3.3 Knowledge protection

The Resource-based view of the company sees knowledge as organizations intangible competitive resource which needs continuous development and protection in the same way as other competitive resources which companies have (Teece, 2009). In coopetition, coopetitors are in the situation where they need to manage knowledge flowing which includes the cooperative knowledge sharing with partner, but at the

same time they need to also handle knowledge protection so that the unwanted information will not end up to competitor (Gast et al., 2019). Gast et al. (2019) showed in their study that to reach balance in knowledge sharing and protecting it in coopetitive actions, knowledge management in interorganizational coopetitive circumstances helps different parties to share common knowledge which is most important for the projects where companies cooperate as it also helps to conceal core knowledge about company and its customers. This balance is achieved by companies when they connect formal and informal practices in knowledge protection (Gast et al., 2019).

As the competitive nature is part of coopetition, this creates a situation for opportunistic behaviour as this kind of action usually leads to behaviour which is unethical in the aspect of coopetition as the companies break rules of the market, because companies try to reach their goals as quickly as possible where low level of trust can separate the partners quickly, when goals are achieved (Cygler & Sroka, 2017). According to Chevallier et al. (2016) this opportunistic behaviour to acquire partner's knowledge is a risk in coopetition. Opportunistic behaviour creates even bigger problems when the power is not in balace between coopetitors as one party in the coopetition could use its better position in a way where the partner has to act so that it benefits only the company who has more power and this way creates more advatange to one firm (Bouncken & Kraus, 2013). Companies can also try to get more knowledge from their competitors in longer period of time than what they are ready to provide by themselves to their rivals (Bouncken, Gast, Kraus & Bogers, 2015).

There are two principles in managing coopetition which companies can implement separately or simultaneously for managing tensions which are associated to information in coopetition (Fernandez & Chiambaretto, 2016). First principle is separation which means the situation where management of competition and cooperation are separated from each other for a certain amount of time (Fernandez & Chiambaretto, 2016). Second principle is integration which supports individuals in the coopetition to surpass paradoxes (Chen, 2008). In their research, Fernandez, Le Roy & Gnyawali (2014) confirmed the importance of combining these two principles when managing coopetitive tensions. Coopetitors are usually adding protection practices as these helps to control the interaction in coopetition as these practices provide instructions about what company should and shouldn't share with the competitor

(Fernandez & Chiambaretto, 2016; Gast et al., 2019). These protection practices are divided to formal and informal practice which are important specially to increase performance in project management and to reduce the opportunism in coopetition (Gast et al., 2019; Bonner, Ruekert & Walker, 2002; Fernandez & Chiambaretto, 2016).

### 3.3.1 Formal practices

As competitors want to reduce risks in coopetition, formal practices are used to protect knowledge and set certain boundaries for knowledge-sharing during coopetition as these types of practices make needed knowledge sharing possible, but at the same time it reduces the risk of leaking critical information to competitor (Estrada, Faems & de Faria, 2016). These types of formal practices which protect knowledge and explain what knowledge will be shared, can be legal instruments or different types of structures or procedures (Gast et al., 2019). These formal control practices can set rules and penalties to the cooperation which are connected to the shared information in cooperation (Fernandez & Chiambaretto, 2016). Without the formal practices, cooperation partners have more incentives for trying to get knowledge from each other which was not part for the cooperation in the beginning (Jiang, Li, Gao, Bao & Jiang, 2013).

These formal legal instruments are usually contracts, which can have certain clauses about confidentiality, but these instruments can also be patents or copyrights (Salvetat, Géraudel & d'Armagnac 2013; Estrada et al., 2016). These kinds of instruments can also include intellectual property rights (IPR) which are connected to managing company secrets with technical and practical ways (Ritala & Hurmelinna-Laukkanen, 2013). Formal control practices can also be procedures or structures in the company which are supporting company's strategy (Poppo & Zenger, 2002). Also, according to Enberg (2012), coopetitive knowledge sharing with competitor can be even better, when setting clear statements about work, planning, processes and standardized forms are included as these activities concurrently enable and block knowledge sharing.

### 3.3.2 Informal practices

Formal practices are not able to protect important knowledge totally, because there can be unintended knowledge sharing behind formal practices, so for this reason informal practices are needed to complete formal practices (Ritala, 2009). Informal practices are usually connected to HRM practices or relational norms in coopetition (Gast et al., 2019). These practices help management in the situations, where they need to decide if certain information is shared with partner so that the short-term cooperative project will succeed, or should the company protect the information which could help them in long-term and because of these facts', management has to create routines and operations to sort information properly (Bouncken, 2011). In the case of relational norms, the most important practices are reputation and trust as these both practices could reduce the opportunistic behavior when the formal practices are imperfect (Fernandez and Chiambaretto, 2016; Carayannis, Alexander & Ioannidis, 2000). In their research, Ritala et al. (2009) found out that even though companies used formal practices in collaboration, also the need for informal practices and especially for trust was important to get more out of coopetition.

The second informal practice is connected to HRM practices. These types of practices are connected to employees and their limitations which could be that employees are granted with only limited access to company's core knowledge or handling employees' consciousness in the moments which require social actions (Loebbecke, Van Fenema & Powell, 1999). In addition to this, Gast et al. (2019) found out in their study that companies are not paying attention only on the limited admission to information or raising consciousness in social situations, but coopetitors also continuously restrict the interconnection and communication with the key employees and try to evade assemblies in the either of cooperating partners' offices. When coopetitors monitor and limit straight communication and avoid having meetings in their premises, coopetitors are able to prevent their competitors to have possibility to see how they are operating and working in their field and this way companies can protect their most important practices from copying (Gast et al., 2019). Fernandez & Chiambaretto (2016) raised the importance of project managers to manage information sharing in coopetitive projects as managers were decision makers and responsible to explain employees what information they can share in the right place and right time.

# 4 RESEARCH METHODS

In this part, the thesis presents the research methods. In the first chapter the research design and data collection methods are explained. After this comes the data analysis methods of the research. In the last part validity and reliability of the research will be explained to support chosen methods.

## 4.1 Research design

The empirical part of the study is done by using qualitative research method. Tuomi & Sarajärvi (2018) say that qualitative research is useful when it comes to describe event or phenomenon or when a particular activity needs understanding. So, in this research, the qualitative research method gives more specific information about the coopetition strategies of the Finnish cybersecurity companies. With the qualitative method it is possible to get deeper view into companies' coopetition strategies. This method also gives detailed knowledge about the practices, processes and behaviour of the companies' as qualitative research observes a phenomenon from the position of the insiders' who are working for companies under observation (Lapan, Quartaroli & Riemer, 2012). Lapan et al. (2012) say that this research type is analyzing contexts and creates descriptions and is not focusing to numbers. The empirical part of the study observes how CS companies in Finnish markets approach coopetition and what is the role of coopetition for these companies when operating at markets. So, because of the research topic, research questions and the goals of the study, the qualitative research method was selected.

Qualitative empirical research method, according to Yin (2011), has usually the following four steps in it. First one is to define something what to observe. As a second step, relevant data is collected. After data collection, it is analyzed, and the results of the data are decoded. The last step of the method is to provide conclusions which are based on the empirical findings. Case study is the most common method in qualitative research (Metsämuuronen, 2003, 171). Case study is an empirical research which explores certain phenomenon in-depth and in the context of real-life situations and this kind of study comes up when the limits between context and phenomenon are not

obvious (Yin, 2014, 30). The research in this study is fulfilled in the form of case study and it includes several companies who are operating in the Finnish CS markets.

Case studies are important when it comes to theory development or testing and to understand new phenomenon in different levels as for example Chiambaretto, Masse & Mirc (2019) used single case study to understand tension management in coopetition and Akpinar & Vincze (2016) used case study to test new framework and cover transformations in the type of coopetitive actions during the longer period of time. This study though observes multiple cases which give possibility to get more specific qualitative data in the broader context of the topic, when instead of concentrating on one single case study. According to Baxter & Jack (2008), a multiple case study gives the possibility to observe diverse cases and compare the similarities and dissimilarities between the cases and this way try to understand the situation. Because of this, the multiple case study method suits well for the situation of this research and its goals.

There are different methods to gather data in qualitative research as there are tools like in-depth interviews, observation or focus group discussion (Hennik, Hutter & Bailey 2011). This research was conducted by usage of in-depth interviews with open-ended questions which were done to representatives from different CS companies in Finnish markets. The goal was to contact companies which were offering cybersecurity products or services in their business, based on the information which was acquired from companies' webpages. This way it was also possible to get more diverse set of companies with different types of specialization to the research. Companies were either medium sized companies or large (global) companies operating in Finnish markets.

## 4.2 Data collection methods

The data for the empirical part of the thesis was collected with semi-structured interviews which were conducted in total to seven different case companies. To get a bigger and comprehensive understanding about the topic, the interviews included more aspects of the phenomenon. The interview questions were formed from the basis

of the theory of this research and the theoretical framework, so that it was possible to provide answers to research questions. In the empirical part, same topics are discussed as in the theoretical part, but in empirical section the focus is on the situation of cybersecurity companies.

The goal of the interviews was to get good understanding about the topic, so there were few standards in the selection of interviewees. Because of the research topic, the goal was to interview top or middle level managers of each company who have knowledge about their companies' cybersecurity business. The interviews provided in deeper details the operational level of the companies and how they operate in cybersecurity sector. The goal was to see, what kind of coopetition strategies companies in CS sector are using and what are the reasons and actions affecting behind these strategies.

To find the most relevant persons for interviews, different types of search methods were used to find the best options. First, best possible persons were searched with help of Linkedin and companies' webpages. When the possible person was found, contact was made either by email or phone call and the research topic was presented to contact person. The job titles of the contact persons were for example Chief Information Security Officer, Chief Security Officer, Head of Cybersecurity, Head of Technology etc. The search was not done with certain job title since the titles vary a lot between different companies as some companies might not have the same title as the other one. In some cases, the person who was contacted first wasn't the right person to answer the interview questions. If this happened, it was asked from the current contact person to provide the right person for the interview.

Every single interview of the study was done via phone, because most of the company representatives had really busy schedules due to their position in the company. This type of interview was also much easier to arrange. The seven interviews were conducted between timeline of March 2019 and January 2020. Interviewees were interviewed individually, and they were not provided opportunity to hear answers from the other interviews. Interviewees had a possibility to answer on interview questions either in English or Finnish. Only one interviewee wanted to do interview in English as rest were done in Finnish. The interview questions were provided to interviewees

beforehand to reduce time spent on the interview and also to receive more detailed answers from the persons that were interviewed. All interviewed persons of the case companies are presented below in the table 3 which provides the position of the interviewed person in the company, interview method and the duration on the interview.

Table 3. Representatives of the case companies

| **Case company** | **Position in company** | **Type of the interview** | **Length** |
|---|---|---|---|
| Company 1 | Chief Development Officer | Phone | 39 min |
| Company 2 | Head of Cybersecurity | Phone | 28 min |
| Company 3 | Head of Cybersecurity | Phone | 33 min |
| Company 4 | Head of Enterprise & Cybersecurity | Phone | 30 min |
| Company 5 | Director M&A, Corporate security | Phone | 30 min |
| Company 6 | Marketing Leader, Partner Ecosystem & Commercial | Phone | 32 min |
| Company 7 | Director, Strategy & Corporate development | Phone | 29 min |

The interview questions which were asked from the representatives are in appendix 2. The questions in interview were created from the basis of topic of the research, the research questions, theoretical framework and from the literature review. The questions of the interview were split into six different themes which were the following: company background and competitive advantage, coopetitive business models with benefits and challenges, competition-cooperation paradox, managing coopetition, value creation and value capturing and possible steps in the future. The topics of these different categories were presented in the theoretical part the research, but the last part of the interview questions tries to understand also what companies are willing to do and what is needed, so that the coopetition could be better between companies.

The interview questions were done by using a semi-structured interview method and all questions were open-ended. In this type of method, the persons who are being interviewed can answer to questions with their own experience and knowledge what they have about the topic instead of answering just with “yes” or “no”. This way interview gets more open discussion and it provides more in-depth understanding to the phenomenon, which the research is observing and even though the semi-structured method has predefined questions in the interview structure it still gives freedom to the interviewing process (Longhurst, 2010).

## 4.3 Data analysis methods

The data which is anaylyzed in the research is received from seven different companies which are operating in Finnish cybersecurity markets. The method which is used in this study is cross-case analysis which refers to research technique, which is really relevant if there are two or more cases to observe. Cross-case analysis can be done whether all case studies have been conducted by different persons or if cases have been designed to be in the same study. In either situation, this method sees all cases as a separate study and it looks findings from all these individual cases. To analyse all separate cases, creation of word tables is good option which show the data from all cases either with one or more categories. With this approach it possible to see if separate cases share similar profiles and can be considered as same of the general case. Though the case profiles can be different and seen as contrasting cases. Similarities and differences between cases give answers to original expectations and give connections to prior research. (Yin, 2014, 152-158)

As the theoretical part of the thesis and earlier researches provide the background for empirical part and analysis, the first allocation to different themes was done already in the interview phase as interview questions are divided to six different themes according to earlier research. Though the last theme’s purpose is to observe the possibilities what companies are looking from the coopetition in the future. The themes are the following:

1. Company background and competitive advantage
2. Coopetitive business models with benefits and challenges

3. Competition-cooperation paradox
4. Managing coopetition
5. Value creation and value capturing
6. Possible steps in the future

Data analysis process was divided to two different stages which followed the suggestions of Stake (2006) and Yin (2009) for cross-case analysis where first, each case was analyzed independently (i.e., within-case analysis) to understand each case company's actions in CS sector. Then these different cases were used to complete cross-case analysis to answer research questions. After the interviews were finished, all the data from seven different recorded interviews were transcribed into text forms, each case on separate document. When the transcribe process was done, each case was analyzed separately and the data from each interview was coded and observed to find connections to the six main themes and earlier literature as codes were attached to pieces of text in interview transcripts that were important for the study. Codes from each interview were constantly reflected to codes from the same interview. To support and understand main codes, quotations of every single case company were examined for statements which were able to connect to main codes based on coding.

After the cases were analyzed separarately and main codes were found from each case, all cases were combined to one excel sheet. Here the codes from interviews were compared against each other to find similarities, differences and duplications. From the first comparison between the cases' codes it was possible to categorize these codes into different themes which were present under every main theme. From these themes it was possible to create certain sub themes for the six main themes where case companies were categorized under certain sub theme depending on the similarity and differences which resulted from coding and categorizing among cases. The sub themes served as variables that were possible to compare between cases. These sub themes were added to cross-case tables which provided the background for cross-case analysis. From these tables, the single case analyses were analyzed again to find patterns between case companies to find similarities and differences among case companies. Every single main theme and sub themes under them were analyzed separately which is possible to see in the next chapter of the study.

## 4.4 Validity & Reliability

There are four tests which have been used to establish quality in empirical social research and these tests are also relevant in case studies as it is part of this bigger research agenda. The four different conditions which should be viewed in case study design are: 1) construct validity, 2) internal validity, 3) external validity, and 4) reliability. Construct validity identifies right operational measures for the concept which is studied in the research. Internal validity establishes the causality as it looks that certain conditions are leading to other conditions, but this applies only to explanatory and causal studies. External validity sets the area to domain which the findings of the research can be reflected. With reliability it should be possible to show that the operations which are done in the research can be done again like for example data collection. (Yin, 2014, 46)

In multiple case studies all cases must be selected carefully so that the case study will predict either similar results or contrasts results, but for anticipatable reasons. The reason for these types of replication processes should also show some theoretical interest and not just showing the similarities or dissimilarities of the cases. (Yin, 2014, 55-57) Case study approach is also selected because it is very applicalble on why- or how- research questions and when researching contemporary events where researcher is not having any behavioural control (Yin, 2014, 8-13).

For gaining reliability, there needs to be coherence, when certain variables are measured and when doing qualitative research, this is important especially in the information gathering process from people as it is highly suggested that these people have experience and knowledge from the research area (Lapan et al., 2012; Tuomi & Sarajärvi, 2018). In this research the reliability is improved as all interviewed persons have worked in their companies and in the cybersecurity sector for many years. Also, every single interviewee has lots of knowledge about their own company and about the whole cybersecurity sector. This way interviewed persons give very good picture about their companies' operations and practices in CS sector which brings value to the research. As companies were given possibility to be anonymous in this study, this can affect in positive way to behaviour of interviewees as they could provide more open answers to interview questions.

In this research, all interviews which are done with company representatives are recorded, because this makes reliability better for the different findings and for the analysis of these findings in the thesis. Though it is important to consider that persons who are interviewed could understand the interview questions and different themes in different ways, because every single interview is always unique and hard to repeat exactly as previous one. This can have an effect on the quality of interviewees responds and also to the outcomes of the interviews. Also, some interviewees have busier schedule than others so the time and interest in providing answers to interview questions could be affected by these different situations of every interviewee. This problem was reduced so that representatives of the case companies were allowed to choose the date and time which suited best for their own schedule, so that they could provide as good answers as possible.

According to Yin (2014, 46), validity is divided to internal, external and construct validity. Internal validity is contrasted to credibility which means the dependency that researcher has affected the change when it comes to dependent variable (Lapan et al., 2012). This is connected to fact that interviewees don't have same surroundings when answering to research questions. External validity on the other hand is connected on the transferability which means that outcomes of the research are possible to be generalized to other samples in the research population (Lapan et al., 2012). As seven companies are interviewed in the research and as they operate in the same sector, it provides some generalized results for the study in Finnish markets. Though it is notable that companies have different focus in CS sector, so the study doesn't provide the exact view for the phenomenon. Construct validity indicates to identifying right instruments which are connected to observed concept (Yin, 2014, 46-47). The data acquired from firms supports the validity of the study and shows the CS strategies of the firms.

# 5 RESULTS

In this part of the study, the results of the interviews are presented which were conducted for seven case companies. With empirical findings the goal is to recognize the coopetition strategies of Finnish CS companies and other aspects which have led companies to approach certain strategic aspects in coopetition. Empirical findings are divided to six different themes based on the interview questions in appendix 2. The first theme explores case companies' and interviewees' backgrounds and the competitive advantages of case companies' in CS sector. The second theme brings forth the reasons why companies cooperate in CS markets and what benefits and challenges coopetition involves. The third theme observes the competition-cooperation paradox and how much it affects on the decision to start cooperation and for how long these types of collaborations last.

Managing the coopetition and knowledge-based advantage is observed in fourth theme as this part tries to identify companies' methods and practices what they use when firms collaborate with competitors. In the fifth theme the value creation and appropriation of the companies are explored. In this part companies value creation before and after coopetition are analyzed and also how the created value is divided among the partners in coopetition. The last theme takes a look to the future and the goal is to recognize what kind of collaboration companies in CS sector would like to do with their competitors in the future and how coopetition could be taken further.

## 5.1 Company background and competitive advantage

All the seven case companies are operating in CS sector in one way or another as the focus to CS business is stronger with some case companies than others. Especially companies 1 and 7 focus their whole business to cybersecurity as company 1 provides CS services to enterprises and public sector and company 7 provides services and products to consumers and companies. Companies 3, 4, 5 and 6 on the other hand provide IT services in broad scale where CS services are just part of the whole company portfolio. Company 2 focuses more on CS consulting as its portfolio is based on management consulting in different business areas. All company representatives

had experience from cybersecurity sector and from different tasks from several years up to thirty years which makes their statements more reliable as they have understanding and knowledge about the industry. Also, as they were in high position in their company, they have understanding how their companies operate and do business in CS sector.

Companies' opinions about their competitive advantage in cybersecurity sector are differing a lot as interviewees mention aspects of company's employees, wide offering and external company analyses. Companies 1, 3, and 7 raise the expertise and knowledge what they have. Company 3 representative points out the fact that their business model offers access to their company knowledge worldwide.

*"Probably our business model where global and local aspects are connected so we can operate completely from Finland. Also, when thinking cybersecurity, we have resources and capabilities in Finland, but also globally." (Case company 3, 2019)*

The wide offering of services is competitive advantage for companies 2, 4 and 5 where companies 4 and 5 especially raise the fact of providing different IT services and knowedge in IT infrastructure where CS services are part of this whole portfolio. Company 2 on the other hand bases its competitive advantage on wide scale of service portfolio and on the analysis, which was done by external analytical companies.

*"Well different types of analytical firms have analyzed this globally and from their opinion we are the global market leader in this type of cybersecurity expertise service. From their opinion our competitive advantage when compared to competitors is the wide scale of our service portfolio." (Case company 2, 2019)*

Company 6 had connections to both earlier mentioned aspects as it based advantage on two facts. First advantage and its background are in external market research analysis which says that company 6 is top companies in their technological solutions in CS sector. Second advantage was on the service side as company's CS consulting team is one of the largest in Finland. When reflecting to companies' CS portfolios, companies 1 and 7 which are completely focused on cybersecurity brought up

expertise as advantage. Companies which are providing IT services in broad scale, only companies 4 and 5 see this broad scale of services as competitive advantage, as company 6 see their technological solutions and consulting services as advantage. Table 4 below summarizes the competitive advantages of the companies.

To get better understanding about the competitive advantage of the companies, questions 4 and 5 were supposed to make it more clear to what resources and knowledge the competitive advantage is based on and how the company is differentiated from other companies in CS sector. According to companies 1,3,6 and 7 their advantage was based on their people and expertise. Especially companies 1 and 7 said that the most important factor based on competitive advantage is the expertise of their employees where company 1 put a lot value to them.

*"Company doesn't see our people as resources but instead as the most valuable asset, so the competitive advantage is based on people." (Case company 1, 2019)*

In addition to the employee expertise, companies 1, 3 and 6 raise the volume of their employees who were working in the cybersecurity sector as an advantage too which gives them upper hand in resources. Table 4 shows that company 1 has over three hundred employees in CS sector, company 3 over hundred and company 6 expresses that their CS consulting team is one of the biggest. The employee expertise was taken further with companies 3, 6 and 7 as they also raised their technologies as part of their competitive advantage. Company 3 said that they have in total 8 cybersecurity centers worldwide and one of them is in Finland which gives them possibility to produce different services and solutions to CS sector. Apart from employee expertise and technologies, company 7 saw threat data, which they have, as an advantage too.

*"One of the most important factors is the expertise of our employees. Then there are also lot of technologies which we have researched and developed during the past years. Then one point which is really important in the CS sector is threat data and visibility." (Case company 7, 2020)*

Companies 4 and 5 expressed their experience from the industry and the knowledge what they have acquired during the time, when they have operated in the CS sector.

Company 4 also said that they benefit from the situation of understanding the whole IT infrastructure. Company 2 on the other hand said that their advatange is based on the fact that they have other types of consulting services than just services in cybersecurity markets and this gives them upper hand, when compared to companies who are specialized in CS services.

Case companies can be divided to two different cateogories when companies expressed how they differentiate from other enterprises in CS markets. Companies 1 and 7 are pure cybersecurity companies who are focusing only to this industry as all other companies have other functions to support cybersecurity business. Company 7 also noted that they are connecting products and services in wider scale and can provide solutions in bigger perspective. One thing though which was interesting in the case of company 7, the representative expressed that company is strongly channel based.

*"We are really strongly channel based from our commercial business model side both in company and consumer cybersecurity sector. I think that there are not that many companies in CS sector who are channel based. By this, I mean that our services and products are used in large base by other compaies. Firstly, we do business with and through our channel partners instead of that we would sell our products straight to end users. We represent that smaller part to whom channel, and partner networks are the primary sales channels." (Case company 7, 2020)*

Table 4 below shows that all other companies except 1 and 7 based their differentiation on the fact that they have broader IT services and wider service portfolio than companies which are just focused to cybersecurity business and these services support and are connected to their cybersecurity services in general. Case company 2 has little bit different approach as other companies, where company 2 focuses to strategy, consulting, taxation consulting etc. and not just to technological aspects. According to representative of company 2 it is good to know and consider how cybersecurity related aspects support and affect to company's strategy. Companies 3, 4, 5 and 6 could be seen more as a bigger conglomerate IT companies which are doing different types of IT operations and provide them as bigger package to customer. In these whole offerings, cybersecurity services and products are just small part of the

bigger picture. Case companies 3 and 4 representatives summarized the difference this way:

*"We can produce for example cybersecurity server room services or cybersecurity software production. Like something which connects these different IT sector elements with cybersecurity. Basically, we are able to pack different type of services to wider big picture than the pure cybersecurity players*." (Case company 3, 2019)

*"We are this type of conglomerate company, where cybersecurity is part of the whole product portfolio. For this reason, we are especially strong in the outsourcing situation where the customer wants to buy the whole service from the same place." (Case company 4, 2019)*

Table 4. Companies' backgrounds and competitive advantages

| | **1. What kind of business your company is doing?** | **2. What is the position of the interviewed person in the company and background in the cybersecurity field?** | **3. What is your company's competitive advantage in the cyber security field?** | **4. To what knowledge and resources is this advantage based on?** | **5. How do you differ from other companies in the cyber security field?** |
|---|---|---|---|---|---|
| **Company 1** | Cybersecurity services for enterprises & public sector. | Chief development officer with 13 years of experience. | Best employees. | Employees the most valuable asset. Volume advantage as 370 people working in CS sector. | Focused on cybersecurity. |
| **Company 2** | Management consulting in different areas. | Head of tech advisory and leader of cybersecurity unit with 20 years of experience. | Wide service portfolio and commercial benefits what company offers. | Has other consulting services to support cybersecurity consulting. | Understanding the whole business processes. |
| **Company 3** | IT services in broad scale where CS services are part of other services. | Head of Cybersecurity with 30 years of experience. | Business model that connects local and global resources. | 100 employees specialized in CS services and huge resources. | Broad IT services which are connected to CS services. |

| | | | | | |
|---|---|---|---|---|---|
| **Company 4** | IT services and outsourcing different projects. | Head of Enterprise & Cybersecurity with many years of manager experience. | Centralized IT services and knowledge in IT infrastructure. | Understanding IT infrastructure and company expertise. | Broad IT operations with CS being part of it. |
| **Company 5** | IT infrastructure services. | Director of security with over 20 years of experience. | Wide offering of IT services and not just CS. | Experience and knowledge. | Wider service portfolio than cybersecurity companies. |
| **Company 6** | Broad scale of IT services and technologies. | Responsible of ecosystem partnerships and operated several years in CS projects as partner manager. | Top company in tech solutions and one of largest CS consulting teams. | Technology based solutions and large CS consulting team gives resource advantage. | Other functions support CS services and knowledge available globally. |
| **Company 7** | Cybersecurity focused products and services to consumers and companies. | Director in strategy and corporate development with several years of experience in product development and consulting. | Wide expertise and diverse offering with strong reputation. | Expertise of employees, company's technologies and threat data. | Channel based business model and connecting products and services in wide scale. |

## 5.2 Coopetitive business models with benefits and challenges

There are different reasons why case companies are cooperating in cybersecurity sector with their competitors. Case companies have all different approaches for the cooperation with competitor, but there are also similarities. Based on the answers given by case companies, the reasons why cybersecurity companies cooperate with their competitors are connected to the following aspects: 1. Scale benefits, 2. Subcontracting, 3 Information sharing in threat situations, 4. Research and product development and 5. Commercial and project-based cooperation. In these aspects though resource efficiency is connected to all aspects, so it is explained next and after that five aspects are discussed to understand why companies adapt these types of strategic actions as a part of their business.

The most common reason for cybersecurity companies to do coopetition is resource efficiency as all seven case companies said that they are doing cooperation in this type of form where different resources and technologies are shared between companies. Companies said that they need expertise and resources of other companies to create solutions to customers. Company 1 representative summarized the reasons for cooperation.

*"To be able to scale, to be able to better serve large global customers. Most cybersecurity companies have a problem of recruiting enough skilled people and here cooperation is one way to solve this issue. Of course, if everybody has a lack of resources, cooperation doesn't help because there is not anybody who would have the availability." (Case company 1, 2019)*

Resource efficieny is connected to expertise, services, products and knowledge which is owned by other participant of the cooperation. Companies share these resources with each other so that companies would get the resources what they don't have. Companies 4 and 5 summarized well what is shared, based on resource efficiency and what kind of resources these are:

*"Usually we share expertise or products what we don't have." (Case company 4, 2019)*

*"In cooperation we share devices, softwares and consultants with competitors." (Case company 5, 2019)*

Depending on company's CS focus and portfolio, it is possible that companies cooperate in different areas with other companies. For example, case company 6 works in technology side with local CS consulting companies who are using case company's technologies in their services, but in company's own CS services it uses solutions from other cybersecurity companies too. Resource efficiency explains though that companies connect complementary and supplementary resources, so it explains the following aspects of coopetition.

### 5.2.1 Scale benefits

According to case companies, one reason to cooperate was to reach scale benefits with different resources. Company 7 obtains scale benefits with licensing. This means that company is doing technology and threat data licensing from other companies. According to company's representative it could be that companies license their competitors core technology or threat data, because of scale benefits as some companies in the CS sector have created this as a crucial part of their own business. Other interesting aspect in this area is to obtain scale benefits from regulators. Companies 1 and 3 say that they are doing cooperation with other companies to obtain scale benefits from parties who have power to regulate CS sector. Company 1 says that they are part of FISC where companies form a bigger mass and this way try to get their voice heard, when there are more companies behind a common cause. Representative says that one company can't go to Finnish parliament and say that legislation is wrong, but if the whole industry goes and says this, they will be better heard

### 5.2.2 Subcontracting

All case companies are involved in subcontracting in their cooperation activities. Some companies are in the integrator role where company gets different solutions and services from their subcontracting companies to complement company expertise and some companies on the other hand work also as a subcontractor. Earlier mentioned technology and threat data licensing is also connected to this when thinking that companies obtain certain expertise and resources from other companies and sell those forward. For example, companies 3, 4, 5 and 6 were IT integrators as they provide broad IT services to customers. So, these types of companies get complementary knowledge which they don't have from their subcontractors as company 4 representative explains:

*"You cannot do everything by yourself, so you need other company's expertise which we do. As we might not have all services, so we also sell other companies' solutions in our package." (Case company 4, 2019)*

This approach is kind of a retail sales/reseller solution where companies involve solutions of other companies to their own portfolio. Companies 1 and 7 which are CS focused companies are also using this approach as company 7 earlier mentioned licensing in technologies and threat data. Company 1 is also acting as a reseller for technology vendors. This type of cooperation is not that close as according to representative of company 7, this is more like commercial cooperation where one buys and another sells solution. This kind of approach can get deeper approach which is known as ecosystem partnership where companies have adopted certain role in the cooperation. This kind of approach was performed by companies 2 and 3 as company 2 explained the situation below and company 3 also provided the situation of Finnish markets:

*"For example, there are these vendors who produce softwares which have CS related dimensions. So, cooperation with these companies goes that other works as software coder or manufacturer and other as consultant. We do this kind of business and mainly cooperate with global CS software vendors who are not even straight competitors. These partners are called ecosystem partners. In this whole CS ecosystem every actor has different roles and tasks." (Case company 2, 2019)*

*"Companies are small in Finland, so they form ecosystems to create together bigger pictures." (Case company 3, 2019)*

### 5.2.3 Information sharing in threat situations

Sharing information in threat situation was one way how companies cooperate in the Finnish markets. One way to do this kind of cooperation was earlier mentioned threat data licensing which company 7 mentioned. Companies also share threat data and knowledge with each other as companies 3 and 7 are doing this type of cooperation. The more formal approach is through threat data licensing. According to company 7, there are also other types of informal threat data sharing between companies.

### 5.2.4 Research and product development

One action of coopetition what companies do is in the research and product development. Though the interesting thing in this collaboration mode was that only companies 1 and 7 says that they are doing this type of cooperation. According to company 7 representative, this type of cooperation brings together many different commercial and non-commercial parties especially when these projects are publicly financed as it is basically required by financing party like Business Finland. The reason for this is that it is important to get companies with different types of expertises involved, so that the project is useful. In these research projects though as different expertise is needed, some of the competitors are some way indirect competitors from each other. As this kind of situation is like a learning process too, in some level company 1 also does this as it noted that it does collaboration with the goal that partners can learn from each other. This view matches some way with the research and product development with other parties which company 7 does.

### 5.2.5 Commercial and project-based cooperation

The last type of coopetition which can be seen from the case companies is commercial or project-based cooperation. The interesting thing in this approach is the fact that usually this cooperation is required by customer. There can be contractual reasons which drive company to complement its resources with competitors' resources or then the customer or buyer is so big and significant that one company is not able to fulfil all demands which are required. As companies 3, 4, 5 and 6 are providing broad IT services, these companies have these types of actions as different expertises are required for different customers and different projects. Company 2 also says that it has some contracts in which some contractual patterns are hard to fulfil and for this reason it needs complementary resources from other companies. Companies 1 and 7 also noted that they cooperate because in some situations the client/customer is so big that it is impossible to fulfil all demands alone. According to company 7 the commercial cooperation follows from this situation:

*"This type of cooperation usually is in the situations where the buyer especially wants that there are more suppliers/vendors in the project and the buyer is so significant that all suppliers/vendors want to be involved in the project and cooperation." (Case company 7, 2020)*

### 5.2.6 Benefits and challeges of coopetitive business models

All case companies except company 5 say that one benefit which comes from coopetition is the ability to scale which refers to resource efficiency. This gives companies a possibility to operate wider and gain knowledge and resources from other parties which company doesn't poses in its own portfolio. According to company 4, the only benefit from coopetition is to get expertise which company doesn't have so that they can fulfil their customers projects. Company 3 mentioned that information exchange in threat situations is one benefit, but in these cases, there is always a 3rd party like authority who controls these situations. Other aspect which is related to ability to scale is the fact that companies can get access to bigger projects and reach more customers. Especially companies 3 and 6 say that they can reach more customers through coopetition and also get access to bigger projects which they couldn't be able to get without coopetition. Company 2 also said that cooperation with direct competitor gives financial benefits, when it is executed properly. Company 6 also mentions that these resource benefits also give financial benefits as company can increase its revenue.

*"One of the benefits is that through collaboration, company is able to get in the touch with bigger number of customers, when compared to situation when company would just use their own services. So basically, benefits come from the revenue size and how to make it larger. And of course, that through collaboration company can expand their own portfolio and service portfolio as company has more customers to offer their services."* (Case company 6, 2019)

Other aspect apart from resource benefits is that through coopetition, companies can serve their customers better. Especially companies 1, 2 and 3 say that coopetition

helps them answer customer demands. This is though connected to resource benefits as companies get the missing resources from other companies as customers' demands can be hard to fulfil alone or the project is just too big as company 3 says:

*"If one big organization needs one really big cybersecurity project, where you need tens or hundreds of people then basically this has to happen through networking and by cooperating since no one has enough people to do this kind of project in this country." (case company 3, 2019)*

Other benefit from cooperation with competitor is that company gains reliability when they work with bigger partners. Though company 5 only raises this benefit and here also their competitors are indirect and are more global companies with well-known brand which according to company 5 makes customers to trust company more.

Challenges in the coopetition differ in some ways as companies raise different problems which are happening in coopetition. Companies mention problems like maintaining competitive advantage, aligning the goals between companies and change in partner's status as partner company can turn from indirect competitor to direct one. Challenges in maintaining competitive advantage of company is problem according to companies 1,3 and 6. According to company 1 this problem goes both ways as they and their partners are reluctant of sharing company specific information as companies are afraid of losing their competitive advatange or intellectual property rights (IPR) as company 3 also says that companies want to keep their competitive advantage by themselves, but in the end, cooperation should focus on common good for both companies. One problem connected on the situation of losing competitive advantage is the information sharing. Company 6 says it is problematic that company won't share any specific information to competitor. Companies 1 and 3 also say that because of these challenges' communication is problematic with coopetition partners as it needs observation too. According to representative of company 3 and 7 information exchange can also be one-sided which brings up the second challenge which is differentiation in coopetition goals and benefits between companies.

Companies 1,2,3,4,5 and 7 say that goals in the coopetition can be a challenge as companies might have their own goals which are not in line with the goals of

cooperation. Company 7 says that usually in the beginning the goals are same but, in the end, companies tend forget these and pursue their own goals. This brings up another challenge which is connected to client ownership. As companies have their own interests sometimes about coopetitive partnership, companies feel that their client ownerships are threaten. Companies 3, 4, and 5 say that client ownership can be in danger when they cooperate with competitor. Representative of company 5 says that their partner passes the channel partner position and talks their client straight. Company 4 says that when thinking goals, their company's goal can be project-based for their client, but their competitive partner's goal is to slowly get in touch with company's client. Company 3 summarizes this situation in the following way:

*"There are many reasons why goals differ with competitors. One reason is based on customer ownership. For example, if we have strong foothold in certain customer organization then we want to maintain it and for that reason we don't want to bring there that type operator who is trying to increase their foothold in that company and try to gain better status in customer organization than our company has." (Case company 3, 2019)*

The last challenge which companies mention in coopetition is the situation where partner turns into straight competitor. Especially companies 3, 5, 6, and 7 raise this issue. This challenge can be connected also to the earlier mentioned situation in last chapter where cooperations partners try to get foothold in customer organization. Also, other aspect is the degree of competition as company 6 mentions it:

*"The biggest problem is that as most of collaborating companies are also competitors, it is hard to separate in which areas companies are cooperating and in which they are not." (Case company 6, 2019)*

This problem can also happen in the longer period of time as companies 5 and 7 mention that in the longer period of time, important cooperation partner can become a straight competitor which makes the coopetition aspect more challenging. Company 5 points out that there can always be a situation when partner decides to encounter customer by themselves without company's help and decides to end cooperation.

Company 7 gives a good example from their situation where an indirect partner has turned more to direct competitor:

*"Then one interesting thing which is happening more in commercial side and can bring challenges is that as we cooperate a lot with teleoperators and do commercial cooperation as they are important customers to us when they sell our products to end users. Though in recent five years teleoperators have invested a lot in growing their own commercial cybersecurity products and bringing them to markets. More and more we see that even though we want to do close commercial cooperation in one business area, we are straight competitors in other business area. For example, competing from same customers in cybersecurity consulting business area." (Case company 7)*

Case companies coopetitive business models are summarized in table 5 below which also provides the benefits and challenges what companies see in the coopetition.

Table 5. Coopetition aspects and their benefits and challenges

| | **6. Why and how companies in cybersecurity markets cooperate with each other?** | **7. What benefits and challenges are involved in collaborating with competitors?** |
|---|---|---|
| **Company 1** | Ability to scale, to serve large customers, resource efficiency, learning from others, subcontracting, FISC. | Benefits are able to scale and better serve customers. Challenges in IPR, what to share, communication and goals. |
| **Company 2** | Cooperating with software vendors which are ecosystem partners. | Benefits are financial benefits, ability to answer customer needs and sharing resources. |
| **Company 3** | Reach scale benefits with different resources, knowldege sharing in threat situations and obtain scale benefits from regulators. | Benefits are to get access to bigger projects, operate bigger scale and threat information exchange. Challenges to maintain competitive advantage, customer ownership and information exchange. |
| **Company 4** | Expertise of other companies' is needed. Retail sales of other companies' solutions | Benefits to get expertise that you don't have. Challenges in client ownership. |
| **Company 5** | Sharing resources like devices, software and consultants and reselling these resources. | Benefits in gaining reliability. Challenge when partner turns into straight competitor. |
| **Company 6** | Customer demands cannot be fulfilled alone. Offering own tech solutions in others CS services and | Benefit is that bigger number of customers is reached and own portfolio expanded. Challenges in the level of |

| | | |
|---|---|---|
| | using others' solutions in own services. | competition with cooperation partners and sharing specific information. |
| **Company 7** | Research and product development, technology and threat data licensing because of scale benefits, threat data sharing, commercial cooperation based on customer request. | Benefits are scale and resource benefits. Challenge is to see that all parties benefit and when cooperation partners turn straight competitors. |

## 5.3 Competition-Cooperation paradox

Coopetition can happen with companies who are not direct threat to company as companies might choose more indirect partner to certain operations. Companies also position themselves different when compared to other companies, so partner's threat can be different between different case companies. As some coopetition modes tend to be shorter than other ones so these aspects are observed next to find understanding to competition-cooperation paradox.

### 5.3.1 Degree of competition

All case companies noted that the competition aspect is affecting on the decision to start cooperation. Some companies are not looking for cooperation with direct competitors and try to avoid them. In some cases, the earlier mentioned fact that coopetition starts from client's need, affects to company's decision. Case companies 2, 4 and 5 say that they try to avoid collaboration with direct competitors as the cooperation is not that smooth with direct competitors. These types of collaboration partners are more like a last resort to these companies and collaborate only when pressure is coming from external party:

*"I recognize some cases where we might have made collaborative offering with competitor, but to these kinds of situations we go mostly reluctantly, and these cases are usually forced by our customer. So mostly this kind of situation starts from the customer or from some really huge big gig which also comes from customer." (Case company 5, 2019).*

One interesting thing is that as in the earlier mentioned part companies said that they don't want to let competitors close to their important clients as they are afraid to lose client to competitor. Company 3 says for example, that cooperation decision starts from client's needs and if they don't have all resources, they do cooperation. Also, company 4 says that importance of client is also connected to competition-cooperation paradox:

*"Competition relationship can affect to cooperation decision, but also if some customership is very sensitive like if some client relationship is really sensitive, we usually don't want to let competitor close to them, so this can effect on the decision to start cooperation." (Case company 4, 2019)*

Companies 1, 6 and 7 also say that competition affects on company's decision to start cooperation, but companies are not that much against direct competitors and cooperating with them. Company 6 says that trust is the most important thing and the fact that companies are able to share right resources and knowledge. According to company 1, any of their current cooperation partners are not big competitor when company compares partners to itself. Company 7 representative says that competition aspect is important to notice in the beginning and because of it, some cooperation methods are more rare than others. Though company 7 mentions one exception where the competition is high, but is not in the center:

*"One aspect where competition can be seen is that if we do some sort of research projects together. In these projects concentration is on those aspects where there is not that much direct competition even though commercially we would compete from the same customer." (Case company 7, 2020)*

All case companies agree with the fact that the resources and knowledge that other companies have, are also affecting on decision to start cooperation with competitor:

*"Yes of course. If we ran out of resources, then there is no other option than do cooperation." (Case company 4, 2019)*

*“That is pretty much the only reason why we would start cooperation.” (Case company 1, 2019)*

*“It is really essential, and I would say that especially in research projects and threat information sharing, the most essential thing for our company is that do we feel that other companies can provide knowledge, understanding or resources which we don’t have in our company*.” *(Case company 7, 2020)*

### 5.3.2 Threat of cooperation partners

Threat of cooperation partners gets different views from the companies. At the moment case companies don’t see their cooperation partners as a huge threat. Representatives of companies 1 and 6 say that partners are threat in some level as they have aspects of competitor in certain way, but still they are not straight competitors. For these two companies’ threat is coming from different sources as company 6 says that the biggest threat is that it loses customer contract to competitor. Company 1 on the other hand says that everybody with whom they cooperate are a threat in someway but in the end, company positions itself on higher perspective than its competitors as company’s goal is to be market leader.

Companies 3, 4, 5 and 7 don’t see their cooperation partners as a threat either but these companies base this on the fact that their partners are not matching the same position in the market because companies with whom the cooperation is happening, are smaller companies. Companies 3, 4 and 7 especially bring up that their companies are bigger and the cooperation partners in Finnish markets are not able to threat their market position. Company 4 also explains that it mostly does cooperation with smaller players:

*“We prefer cooperation with smaller operators who don’t offer same portfolio as we do. So basically, they are not direct competitors when compared to us. And then with bigger IT corporations we do limited cooperation like from single resource or expertise.” (Case company 4, 2019)*

Company 7 mentions an interesting point in the threat level in cooperation. According to company representative you cannot start cooperation if company sees other parties as a threat which means that it is important to find right environments where companies are not threat for each other. Though for company 7, the situation is that most companies are smaller and are not operating completely on the same sector as company is specialized in CS business as companies 3 and 4 offer broad IT services. Company 5 brings up that cooperations partners are threat if they operate in the same way but the fact at the moment is that cybersecurity markets are growing still so much that Finnish actors in this market have space to find growth and operate, so this decreseas the threat of cooperation partners with whom company 5 operates.

Company 2 also mentions that competitor is a considerable threat when the portfolio is completely same for both firms and company positions itself on the same level as its competitors. But as mentioned in earlier chapter, company is mostly doing the cooperation where it hires a subcontractor to its projects or has ecosystem partner and apart from this fact, company is usually the one who holds the customer contract. Representative also says that company has really randomly went in the situation where their competitor is having the customer contact.

### 5.3.3 Timeframe of coopetition

It is possible to find two different approaches in most cases when observing, how long partnerships companies are looking with the competitors. The first thing is that companies are looking long partnerships with competitors when the cooperation is connected for being ecosystem vendor, if company is selling forward competitor's solutions or licensing competitor's technologies. Last thing is strategic cooperation which is though connected to earlier mentioned reasons. So, in general companies are looking longer partnerships when competitor's solutions are part of company's own portfolio. Case companies 2, 3, 4, 5 and 7 have taken this approach.

Other approach is that companies are doing short term cooperation with competitors and this approach is connected to projects, cases and demands which are coming from customer. In these situations, companies basically fill the missing resources and

expertise with competitors' skills so that the earlier mentioned situations can be solved. Same case companies 2, 3, 4, 5 and 7 adapt also this approach. Company 1 also says that it has different partnerships with different scales as those vary from few months to few years, but company doesn't specify what kind cooperation it does in long and short term. Though company mentioned in earlier parts that it collaborates with technology vendors, acts as reseller and subcontracts services from other service providers in company's projects so it could be assumed that company 1 has same approaches as earlier mentioned companies:

*"Company naturally collaborates with technology vendors and the company acts as a reseller. Also, with other service providers like professional service providers company subcontracts their expertise and these companies are working as a subcontractors in our company's projects." (Case company 1, 2019)*

Only company 6 says that it is looking mostly long-term partnerships as its goal is that there would be no ending date with cooperation and that cooperation with competitor develops during the years. One reason which could explain this is that company mentioned earlier that it is offering technology-based solutions, so it can be that in this aspect company is acting more like ecosystem vendor. Though company said that there are shorter cooperations too. Company 7 also says on the other hand that it looks for mostly long-term partnerships because it takes time and effort to think, handle and start the partnership properly, so it is not worthwhile to seek it in short-term. Though there is a view which is quite interesting which representative says:

*"Of course there are exceptions like in threat information sharing the cooperation is based on personal long-term human relations and human relationships in general, when it could be that the information is shared randomly and really short cycles, but then in the background there is a relationship which has a history from many years back between actors." (Case company 7, 2020)*

Table 6 below summarizes the areas which were discussed in this part where the most important points are that competition affects on the cooperation decision as companies tend not to choose direct competitors though resources and knowledge have big deal on decision to start cooperation with competitor. Threat of the

cooperation partners was not either critical as all companies see themselves equal or even better positioned when compared to competitors. One interesting fact is that long partnerships are formed when competitors' solutions are connected to sales situation as this is connected to licensing, retail sales or ecosystem partnership. All other cooperation types seem to be short term as case and projects are obviously short-term, but also some customer-based cooperations are also short-term. Interesting fact in the threat information sharing is that even though it could happen in short term, the relationship in this cooperation is build for many years.

Table 6. Degree of competition, threat and partnership

| | **8. How does competition have an effect on the decision to start cooperation?** | **9. Do you see your cooperation partners as a threat to your company?** | **10. How long cooperative partnerships you are looking with your competitors?** |
|---|---|---|---|
| **Company 1** | It affects to decision to start cooperation in some level, but at the moment our partners aren't big competitors. | All with whom we collaborate are bit of competitor so not big threat. We want to be leader in CS sector. | There are short like few months and longer ones like 2-3 years. |
| **Company 2** | Affects as we try not to cooperate with direct competitors. | Threat especially when partner is direct competitor even though company positions itself on the same level with competitors. | With ecosystem partners long term cooperation and with Finnish competitors mostly project or contractual level from few months to few years. |
| **Company 3** | Affects of course, but in our case, decision starts from client's needs and our resources. | Not a threat as our partners can't threat our market position. | Changes case-by-case. Long strategic cooperation or project cooperation. |
| **Company 4** | Cooperation easier with indirect competitors. | Cooperate mostly with smaller operators who don't have same portfolio. Cooperation with bigger companies limited. | Retail sales type cooperation in long term. Other situations cooperation is case-by-case. |
| **Company 5** | Hard to create partnership with direct competitor so not looking for it. | Threat, but market is small so there is room to operate. | Global partners long-term, others depend from bids and customers. |
| **Company 6** | It is but most important thing is trust between companies. | In some level, especially if there is possibility to lose service contract to competitor. | Mostly long-term cooperation and developing these. |

| | | | |
|---|---|---|---|
| **Company 7** | It is important and needs attention especially in the beginning as some cooperation methods are more rare because of competition. | During the cooperation not a threat. Cannot start cooperation if you feel each other as threat. Not straight threat because of companies' sizes and sectors where they operate. | With licensing partners for many years. In other cases, usually shorter cooperation. |

## 5.4 Managing coopetition

During the cooperation with competitor, companies need to exchange information so that the cooperation succeeds as companies need some relevant resources or knowledge from each other. This means that companies need to manage information flow and observe other aspects so that right knowledge is moving between companies and wrong information is not getting to hands of competitor. Case companies have different ways to manage coopetition as four different types are mentioned by companies.

Companies that are doing cooperation are planning together in which areas they are cooperating and in which areas they are competing. This approach is mentioned by companies 1, 2, 3 and 6. Company 3 says that companies observe first possible parties with whom they cooperate and then negotiate about possibilities for cooperation. Companies measure together and by themselves is the partnership a threat to companies' businesses and does it strengthen companies' status towards clients. Also, there is pure business aspects that is the cooperation beneficial for all parties. If it is not, then collaboration collapses usually. According to company 6, companies usually know beforehand what the status of coopetition is:

*"As there are certain areas where companies compete or cooperate, they check in which customer segments or industries they cooperate and in which they compete. Basically, companies know beforehand what the scope in cooperation and competition is so that there are not coming surprises during the time when cooperation is going forward." (Case company 6, 2019)*

Representative of company 2 says that there are regular meetings with competitor about the cooperation when there is a mutual project or offering, but also mentions that this is not aways the case as there can be situations where competitor can individually do their own part from cooperation. This means that competitor agrees with customer about content, handles this part and delivers it to customer and then sends invoice to company 2 about their work.

Company 1 also mentions that they plan together with competitor about cooperation, but according to representative, this is mutually agreed in contracts which are connected to cooperation. Company 1 says that contracts define what is allowed in certain projects and what is not. Cooperation is project driven or research project driven, and these are explained in assignment contracts. Contracts are always very siloed or incapsulated in to one topic as company 1 isn't sharing everything with longer period of time. Companies 2, 3 and 4 are also using contracts when managing cooperation with competitor and according to representative of company 4 contracts have following characteristics:

*"There always needs to be contract in the background. Typical contracts are "NDA" which means controlled information exchange. Or then there is cooperation agreement where is written what is the meaning of cooperation, how long the cooperation is and what type of restrictions there are in cooperation. Typical restriction can be connected to recruiting and, in this case, it means that cooperative partners are not allowed to recruit other company's employees and offer job to them in the certain time period." (Case company 4, 2019)*

Companies 3 and 7 mention that cooperation management can be part of company's structure as there can be persons who are responsible of managing cooperation. Company 3 for example has business owner for each business area who have more power in cooperation decision making. Company 7 also mentions this as it has responsible persons for cooperation, for example, in research projects and other business processes. There can be also other structural approaches for coopetition management as company 6 mentions that their company separates teams from each other to block knowledge leaking:

*"Problematic is that company doesn't share any important and company specific information with competitor. Even on our side we need to separate and make distance between our own teams when there is a situation that at the same time we collaborate with competitor in one area and compete in other one. Company needs to make sure that important information is not getting to hands of competitor." (Case company 6, 2019)*

Company 5 doesn't mention any ways how they manage cooperation with competitor. According to company's person as the cooperation is mostly sales-based or ad-hoc, it is hard to recognize any good governance models which company is using.

All companies say that cooperation with competitor doesn't require any bigger changes in the organization when companies are planning cooperation. As companies have short and long-term cooperations, they have different approaches and arrangements. Companies 1, 6 and 7 say that cooperation doesn't require any changes to organizational structure as it serves different cooperation forms. Also, company 2 relates to this opinion as the representative says that in projects they have project organization and in longer term cooperation there is a person who is responsible about cooperation. This can be connected to earlier part where companies 3 and 7 pointed out that there are there are certain persons in their organizations, who are responsible about different cooperations forms.

Beside company 2, companies 1, 3 and 4 say that they have a project organization or project group which supports companies in cooperation. Basically, what this means for companies 1, 2, 3, 4, 6 and 7 is that companies have line organization and project organization where the project organization is having changes and line organization is more stable. Company 7 says if they do research project, company checks from their current organization which teams or persons are relevant for project and in some cases if there are experts from different departments, internal virtual teams are common for project. According to company 4 there is project organization if cooperation is connected to client's project and in this project, there is responsible person who takes care of project. In these projects company uses contracts and informs employees what information is allowed to share. Company 3 representative

summarizes the line and project organization well and explains the information and knowledge which moves in these different organization types:

*"I could say we have line organization and project organization which are constantly in our organization living and changing side by side, but project organizations are changing faster and more intense than line organizations. Here the difference is that as we have expertise centered services, consulting services, project deliveries and also continuous services like operation centers, so this cooperation and project organization changes are more connected to the expertise and consulting services." (Case company 3, 2019)*

Companies also have different types of governance models during the cooperation. Company 5 explains that one thing what they do during cooperation is that they form short governance model around customer though earlier was mentioned that company doesn't identify any effective governance models, but probably by this representative means that he can't recognize any long-term governance types as these short governance models are more connected to projects. As company 4 said earlier that there is project organization if cooperation is connected to client's project so cooperation management of company 5 is very similar. Separate governance functions are also possible in cooperation management as company 1 says that they have governance function which takes care of agreements which are in contracts.

The results how companies manage cooperation with competitor are summarized in table 7. In most cases companies explain that cooperation is planned together with competitor. For companies, the most important methods to manage cooperation are project organizations and groups which are operating in cooperation. Contracts set boundaries for cooperation and limit for example information exchange and knowledge leakage to competitor. Other methods are to separate teams from each other to stop knowledge leakage and usually there is a responsible person with certain authority to control cooperation.

Table 7. Managing cooperation with competitors

| | **11. How do you manage cooperation with competitors?** | **12. Are you doing any organizational changes when planning cooperation?** |
|---|---|---|
| **Company 1** | Managing by assignment contracts and planning together the cooperation. | No changes as project organization takes care of that. Also, there is governance function. |
| **Company 2** | With regular meetings, contracts and planning the project together. | For projects there is project organization, longer cooperation has responsible person. |
| **Company 3** | Business owner for each business area. Planning together how to operate and measure if it is beneficial. Contracts define methods to operate. | Typically project groups. We have line and project organization which live all the time. Clear model to handle partners and to cooperate. |
| **Company 4** | Contracts that control information sharing and define roles in cooperation. Recruiting restrictions. | Project groups, contracts which define project group's activities. |
| **Company 5** | Cooperation sales-based and ad-hoc so can't recognise good governance model. | Short governance model around customer relationship. |
| **Company 6** | Separate teams to block information leaks. Planning with competitor in which areas to cooperate. | Organizational structure serves cooperation forms. |
| **Company 7** | Internally part of business management. Internal persons to manage cooperation in research projects. In other aspects more like normal business management like who is coordinating what and with whom. | Depends from project. Checking which teams and persons are most relevant. In some cases, there can be internal project team as we have experts from different departments. |

## 5.5 Value creation and value capturing

Value creation in the coopetition is connected to resource efficiency which is the same with all case companies. Every single company says that they have certain resources which bring value to customer's CS operations. The fact is though that companies are not able to provide this value alone as they need sometimes expertise and knowledge from other companies. For companies 1, 2, 5, 6 and 7 the value creation before the cooperation with competitor is that companies have certain knowledge what they are providing to their customers and to different projects. Companies need sometimes complement resources and expertise from other companies so that their own value creation process can be done as representative of company 2 says. Reasons for this

are usually lack of people, expertise or certain knowledge which are part of resource efficiency and every situation and type of cooperation matters as company 7 summarizes the this:

*"In research projects we can benefit from partner's expertise in those areas in which we don't have that expertise. In threat information sharing for example we get that type of insights and threat information what we don't have from our side whereupon we can more overall serve and advise our customers and secure their actions. So, value created before depends from every situation and type of cooperation what we do at certain moment. But with cooperation it is possible to provide more value to customer when different solutions with coopetitors are brought together." (Case company 7, 2020)*

Case companies 3 and 4 have same approach to value creation as other case companies. These companies though are broad IT enterprises and act as an integrator where companies make sure that they provide the service to customer as company could outsource the whole IT system of customer. Company 4 summarizes this:

*"Well if we think that our strongest area is where we do full scale of solutions for clients and so that we can do this solution, we need different types of parts to build this whole solution, where some of those parts are our own and some could come from different types of partners who are in some level our competitors too." (Case company 4, 2019)*

As case companies need sometimes competitors and their complementary resources for value creation, so that they can provide end solutions to customers, the value capturing from created value through cooperation can be problematic when it is divided between companies. Representatives of case companies have different views for the value capturing process. The most common opinion among case companies is that the value is not always divided equally as other firm/s can benefit more than other ones. The reasons and how other companies benefit more than others are different. According to company 1, the holder of the customer contract is getting more value out from the cooperation as they are more meaningful to customer, even though the cooperation is fully resourced by partner. Company 2 sees this other way as

representative mentions that if they take Finnish partner to their foreign project, the partner benefits more as they might have less contacts in foreign countries. Company 5 says that it is hard to see who benefits more but mentions that company's partners margins are different than theirs.

Companies 4 and 6 see that the value capturing is connected to financial benefits as these are not dividing equally between cooperation partners. Company 6 says that goal is that both parties benefit but, in the end, other one usually captures more financial value. On the other hand, representative says that without doing cooperation with competitor, company wouldn't be able to get in contact with customers. This is connected to the fact what company 2 mentioned earlier about situation where company who doesn't have contacts benefits more in cooperation. According to company 4, everyone tries to maximize their profit and benefit from cooperation. These kinds of situations are possible to control with bidding or other actions to secure the value capturing more equally, if this is possible.

For case companies 3 and 7 the value capturing in cooperation goes according to activity and effort where the one, who is putting more effort to cooperation should get more out of it. Company 7 says that the goal is to divide value equally, but according to activity. Though there can be challenges as those who are most active can capture all the created value away with them or then it can be other way around as more passive companies bring some value to cooperation and in the end are able to get even bigger share out of it. Company 3 gives same type of answer about value capturing as representative says that bigger responsibility equals for bigger share:

*"As we are an operator who takes care of the whole delivery and is responsible for it and where a remarkable part of the whole delivery comes from 3rd party, but then again from the role of taking the full responsibility, we have to take little bit away from the partners. I would say responsibility, authority and value are shared in the same way." (Case company 3, 2019)*

Case companies' value creation and value capturing in coopetition are summarized in table 8. In all case companies the value creation in coopetition is to get complementary resources from competitors and this way make also own value creation possible. The

results show too that the value capturing process is not equal and other company benefits more than other, even though companies try to achieve equal value capturing.

Table 8. Value creation and capturing in coopetition

| | **13. What is the value created before and after coopetition?** | **14. How do you see the value is shared in cooperation?** |
|---|---|---|
| **Company 1** | For us it is about scalability like using resources we don't have. | Holder of the contract benefits more and gets more value. |
| **Company 2** | Usually it is about getting more resources and knowledge which help to provide more value. | Depends by case, but other gets more value than other. |
| **Company 3** | We are in the integrator role, so we make sure that value proposition to customer is met by bringing right solutions. | We start cooperation when we know we benefit enough from it. As we are integrator and taking full responsibility we have to take away a little from partners. |
| **Company 4** | We offer full scale solutions, so we need separate solutions to create it either those are own or competitors'. | Everyone tries to maximize profit. |
| **Company 5** | Provide ongoing services where promised value cannot be provided without cooperation. | Not easy to say as there is not any analytical facts to show it. |
| **Company 6** | For example, in SOC cases whole service can be given together with partners to customer. | Benefits are different for both parties and depends from case. |
| **Company 7** | With cooperation it is possible to provide more value to customer when different solutions with coopetitors are brought together. | Goal is that value is divided equally according to activity in cooperation. It can be though that most active parties capture all the value. |

## 5.6 Possible steps in the future

With the last two interview questions, the goal is to identify strategic approaches what companies are considering with their competitors and how the desired cooperation could be taken to next level. Opinions of the case companies divided to two different categories. Companies 2, 4, 6 and 7 see the that they should recognize more cooperation methods. Companies 1, 3 and 5 are more interested to share threat information in cooperation with competitor as companies see that this could serve mutual benefits. From table 9 it is possible to see preferred cooperation methods of the companies.

Companies 2, 4, 6 and 7 say that they would like to find more ways to do cooperation with their competitors or atleast companies' opinions are connected to this idea. Representative of company 6 says that company would like to find deeper and closer cooperation especially in company's technology portfolio as it is quite narrow in some cooperation methods. More wide scale should be found where company could use their techonology with their competitor. Companies 2 and 4 say that their firms should proactively look more cooperation methods and create bigger unities with partners which helps to create better value for their customers. View of company 7 for the cooperation on the other hand is that it would like to recognize more opportunities in Finnish markets as it operates more with foreign companies:

*"I think it is partially because in Finland we don't possibly recognize and see these cooperation opportunities. But on the other hand, even though there is quite big and diverse cybersecurity market in Finland, but from our viewpoint there is not though so many bigger actors. This is because that usually the most relevant knowledge and information what is needed in cooperation is located in some other countries than in Finland." (Case company 7, 2020)*

Other approach for new ways to do cooperation is that companies 1, 3 and 5 would like to do more information sharing in threat situations. Company 5 mentions sharing the information in threat and crisis situations in some sort of ecosystem where everyone provides their knowledge which is then shared with everyone. For company 1 the idea is the same as it would like to share technical data in threat situations so that it could better understand what is happening in society and get better situation awareness. Company 3 takes this approach little bit further as it highlights this threat information sharing in regulation and market creation in emergency-based cooperation. Representative of company 3 explains the situation in the following way:

*"The situation is that, if some sort cybersecurity problem is facing customer then usually in Finland there is more than one operator who is doing that IT infrastructure to customer and keeping it alive. So, this type of situation needs to work smoothly during the emergency situation and research process as it requires from companies to work over the organization borders and work together to solve the problems." (Case company 3, 2019)*

Companies 3 and 5 mention that threat information sharing is already happening in Finnish markets as this information is received from public authority and certain device manufacturers. At the moment this works in Finland quite well, but this type of cooperation should be taken deeper to help customers better.

The ways, how companies could achieve the earlier mentioned methods of cooperation, have quite similar answers for those who prefer threat information sharing, but for companies who want to recognize more cooperation methods the answers are different with every case company which can be seen from table 9. In the threat information sharing companies 3 and 5 say that there is a need for trustful neutral party who manages these problematic situations. Company 3 says that in Finland there is Traficom who has central role in this, but things need to be implemented to more everyday situations and expand the cooperation so that there is trustful neutral party to handle problems. Company 5 sees that alliances between companies are difficult and for this reason the cooperation in information sharing should be circled around national actor. Company 1 can't give any ideas for the fact how this type of cooperation could be taken further as company is doing lot different things successfully.

In the perspective of recognizing more cooperation methods, company 2 says that this can be achieved when company finds partners who complete its portfolio and where both actually benefit. The most potential targets are big global software companies and startup-based software companies. Company 6 sees that when there are more successful cases together with competitor, the cooperation can develop more as both benefit from it as company 4 gives attention to the fact that in order for cooperation to develop, it needs to be mutual and not one-sided. By this the representative means that company provides partner's solution to their client and would be able to provide their solutions to partner's client. Company 7 says that public sector in Finland works to find and recognize cooperation methods between companies. This could help company in its goal to recognize more partners in Finnish markets, but it also creates more competition, when smaller CS companies are getting stronger.

Some of the case companies mention difficulties which are connected to these desired cooperation methods. Companies 1 and 7 actually see that the one-sided benefit in

cooperation affects to their decision to cooperate, for example, in threat information sharing as they don't see that they could benefit from Finnish partners threat information that much. In the context of threat information sharing company 3 says that firms want to protect own interests as companies might worry about their market position or the possible knowledge leakage. Though it can also be that there is lack of trust between firms according to companies 2, 4 and 6.

Table 9. Possible coopetition in the future.

| | **15. What kind of cooperation you would want to do with your competitors?** | **16. How would the cooperation be taken to the next level with competitors?** |
|---|---|---|
| **Company 1** | Sharing more technical data like in threat intel and have better understanding what happens in our society. | Hard to give any ideas as at the moment our company is doing a lot and things are going well. |
| **Company 2** | Cooperation which brings more extra value to customer and which is equal for all cooperating parties. | Looking for partners who complete our portfolio like global software companies or startup based software companies. |
| **Company 3** | Sharing good practicalities and exchange of smooth information sharing in threat situations and other emergency-based cooperation. | Requires coordinative and neutral party. We have Traficom in Finland but implementing this to more everyday things and expanding cooperation to manage problematic situations. |
| **Company 4** | Proactively look more cooperation and build bigger unities by using offerings from different companies. | When there is mutuality and cooperation is not just one-way cooperation. Deeper trust needed too. |
| **Company 5** | Sharing information in threat and crisis situations. | Some sort of authority is needed in the middle to take things further. |
| **Company 6** | Closer and wider cooperation where we could use more our technology in cooperation. | More successful cases needed to realize benefits. |
| **Company 7** | Maybe we don't recognize and see cooperation opportunities, though there are not that many big actors. | Public sector side is pushing forward to find cooperation types between companies. This creates more bigger companies to Finland with whom we could cooperate, but also creates more competitors too. |

# 6 DISCUSSION: COOPETITION IN FINNISH CYBERSECURITY SECTOR

In this part of the thesis, a synthesis based on the cross-case analysis is presented and the results of the research are reflected to earlier researches and theories which were explained in the theoretical part. The goal in this part is to find similarities and dissimilarities between case companies, but also try to group case companies according to their answers. Here the interesting thing to see is that are those companies with similar acitivity having same coopetition activities or not and what reasons are affecting to these approaches. This part also provides answers to the sub-research questions which give understanding to the main research question. Research questions are presented in table 10 below. First, companies are put in groups according to their specification in CS sector and competitive advantage. After this, firms' knowledge-based advantage is observed as the goal is to understand how competition, competitors' knowledge and company's own knowledge affects to coopetition. Also, the fact how companies manage their knowledge-based advantage is explained. After this, case companies' coopetitive approaches are discussed and companies desired coopetition modes too which help to provide answer to main research question in the last part of this chapter which summarizes the research.

Table 10. The main research question and sub questions of the thesis

| | |
|---|---|
| **The main research question of the thesis** | *"What are the strategic reasons of the cybersecurity companies in Finland to do coopetition?"* |
| **Sub questions of the thesis** | • *"What kind of characteristics of coopetition in cybersecurity sector can be recognized in Finnish markets?"*<br>• "*How are knowledge-based resources affecting to coopetition between cybersecurity companies?"* |

## 6.1 Company's competitive advantage and approach to coopetition

**"*How are knowledge-based resources affecting to coopetition between cybersecurity companies?".***

Based on the results, case companies are possible to divide to three different groups where case companies 1 and 7 are pure CS companies, who are only operating in this sector and providing products and services. Other companies are operating partially in CS sector where especially companies 3, 4, 5 and 6 are bigger conglomerate IT companies where CS is just one part of the whole IT services. For company 2, the CS services are also just part of whole portfolio, but case company 2 is focused only on the consulting tasks in CS sector. Even though companies have different backgrounds in CS sector, still all case companies' competitive advantage is based to knowledge and resources what they have. Companies 1, 3, 6 and 7 say that their advantages are based in people and expertise, where case company 1 raises the volume of their employees and case company 7 puts effort on their technologies. Companies 3 and 6 as bigger conglomerate IT companies see that these both earlier mentioned advatanges are part of their competitive advantage too. Companies 2, 4 and 5 say that their wide service portfolio and more broad understanding is giving them competitive advantage from pure CS companies as this advantage is based on expertise and knowledge what companies have.

These advantages are highly connected to characteristics like knowledge-intensity which are appearing in high technology sector where changing dynamics are making coopetition more common (Carayannis & Alexander, 1999; Gnyawali & Park, 2009). So, when considering characteristics of CS sector in which Mahmood & Afzal (2013) say that components' short life-cycles and knowledge need continuous updating by companies, coopetition is one way to tackle these problems. All companies mention that resources and knowledge of their competitors are affecting to decision to start cooperation and all representatives say too that coopetition brings possibilities as it is impossible for single company to serve all customers or have all the resources and knowledge so other companies' expertise is needed too. Ritala (2012) mentions that

coopetition can be explained with resource-based view and game theory as these two aspects are well connected to responds of case companies. To get access to other firms' complementary knowledge and expertise, alliances are needed to get access to these resources of competitor as companies perform different strategies to utilize these sources so that they can implement these strategies in efficient way (Schiavone & Simoni, 2011).

Even though case companies have certain knowledge or high resource capacity as a competitive advantage, companies still need competitors in some way at cooperation, so that they can fulfil their own business operations. Companies say that when they are doing coopetition they gain benefits in resource effiency through scale benefits which is connected to get access on knowledge, resources, projects and reaching more customers. Coopetition also gives financial benefits to companies. These are connected to benefits that coopetition brings as Ritala et al. (2014) explained that coopetition can bring benefits in increasing current market size, creating new markets, gaining efficiency in resource utilization and improving competitive position. From these four benefits though, case companies find especially efficiency in resource utilization useful, but benefits like getting access to projects and reaching more customers are connected also to increasing the size of current markets and creating new markets. This is explained by the motives as sectors with high growth, single company can't capture all value as companies have differentiated themselves with certain resources and knowledge and competitors use probably different resources and capabilities during the coopetition, even though they are operating on the same sector (Ritala et al., 2014: Bengtsson & Kock, 2000).

Companies mention different challenges in coopetition. All companies except company 6 say that goals between firms can differ and are not in line with goals of cooperation as this happens especially in the end of cooperation. Ritala & Hurmelinna-Laukkanen (2009) say that tensions arise in coopetition when collective strategy of value creation turns into individual firm-level strategies in value capturing process which causes problems in coopetition among CS companies too. This problem appears in client ownership too as companies 3, 4 and 5 which are conglomerate IT companies say that this creates a threat in client ownership as competitor tries to gain better position among clients. Bengtsson & Kock (2000) say that cooperation is not

happening near customers, but instead in operations where scale advantages give benefits during coopetition. In CS sector this is still creating challenges for companies during coopetition especially in client ownership if cooperation partner is more direct competitor to company who has client ownership.

Another challenge is that partner with whom company is cooperating can turn from the indirect competitor to direct competitor as this is the situation for companies 3, 5, 6 and 7. From this it can be seen that company's differentiation and focus in CS sector doesn't matter as both pure and partially focused CS companies face the same problem. This challenge is connected to firm-level strategies as Ritala & Tidström (2014) explain that companies' firm-level strategies are dynamic and can change over time. This can happen in short period of time in the cases where competitor tries to contact client alone, instead of cooperating with former partner. Also, the change to direct competitor can happen in longer period of time, when important cooperation partner turns into straight competitor as partners are investing in their own CS products as this happened to companies 5 and 7. The last challenge in coopetition is maintaining the competitive advantage as this is problematic for both pure and partially focused CS companies as all companies mentioned this problem at some point during the interviews. Chin et al. (2008) say that knowledge is the source of company's competitive advantage and as companies need to share knowledge with each other to create value together, so it creates tensions between companies as this is the case among CS companies too. The challenges what companies face, can be connected to tensions which Tidström (2014) mentions and from these tensions especially knowledge, opportunism and roles in coopetition are more present in CS sector than power and dependence.

## 6.2 Knowledge-based advantage and management

**"*How are knowledge-based resources affecting to coopetition between cybersecurity companies?".***

All case companies mention that resources and knowledge of the competitor affect to decision to start cooperation with them, but on the other hand competition itself plays

part in the decision to start cooperation for all firms too. According to Bouncken & Kraus (2013) challenges in costs, risks, resources and in uncertainty are not easy to handle for single company so for this reason companies turn to their competitors' resources and knowledge as Martin-de Castro et al. (2011) say that external knowledge, networking and relationships with other companies are important for firms to succeed. Companies 1, 2, 5, 6 and 7 mention that they need certain knowledge and complementary resources from other companies so that the value creation is possible. For companies 3 and 4 situation is same, but these companies operate as integrator and make sure that they can provide services and solutions to their customers. Companies are split in two categories when it comes to cooperating with competitor. Companies 2, 4 and 5 to whom CS operations are one part of the whole business portfolio, prefer to cooperate with indirect competitors. Then on the other hand, companies 1 and 7 which are pure CS companies say that they can cooperate with direct competitors. Firms 3 and 6 though mention that for them cooperation happens with direct and indirect competitors.

One interesting thing to mention is that all case companies don't see their partners as a threat. For pure CS companies 1 and 7, the reason is that their position in the markets is better so companies' wide knowledge about business sector possibly explains this. For conglomerate IT companies like 3, 4 and 5, partners are indirect which decreases the threat of competition. The situation when cooperation partners threat rises for companies 2, 3, 4 and 5 is when external force like customer forces to cooperate with certain company which can be bigger threat to these companies. This is the same situation as Biondi & Giannoccolo (2012) explained that technologies are not only reason for coopetition as it can also start from the specific needs of customer as in their research, companies in software industry were doing coopetition as there was need for interoperability between companies or to share costs in R&D. As coopetition can sometimes be with more direct competitors and as companies want to protect their competitive advatange to stay strong in markets, Gast et al. (2019) say that balancing between knowledge sharing and protecting it is easier when knowledge management between partners helps them to provide general and project-based knowledge instead of information about company's specific knowledge and its customers.

Knowledge sharing can improve total added value when competitors cooperate, but it can also affect company's competitive knowledge and their position in the markets (Loebecke et al., 2016). Coopetitive tensions arise in the situations when important information is moving to coopetition partner or when certain knowledge is copied (Le Roy & Fernandez, 2015). For case companies, there were tensions especially connected to knowledge, opportunism and roles during coopetition. To achieve balance between knowledge sharing and tensions, companies are using formal and informal knowledge protection methods during coopetition (Gast et al. 2019). CS sector is no exception as all case companies are using these methods during the coopetition to protect their most important knowledge and resources so that they are able to create more value to the customers and markets, when they are doing coopetition.

Representatives mentioned many different practices for handling knowledge protection and preventing knowledge leakages. For case companies the most common formal practices to control knowledge sharing during coopetition is that companies have both line and project organization as all companies except company 5 mentioned this. Poppo & Zenger (2002) say that procedures and structures in the company are supporting company's strategy, so having two types of structures in company can support companies in long and short term coopetitions. Companies are also planning together how to fulfil coopetition so with this approach companies can reduce tensions in roles as companies have clear vision about each others' roles in coopetition. Contracts are common formal practices as with these practices it is possible to set boundaries to knowledge sharing and reduce knowledge leakeage (Estrada et al., 2016). So, it could be said that these practices help to reduce tension which are connected to company's knowledge. Case companies 1, 2, 3 and 4 are using contracts to set boundaries to information exchange, but contracts are also used to prevent competitor to recruit company's important employees. Ritala & Hurmelinna-Laukkanen (2013) explain that practices and managing company secrets with technical and practical ways are connected to contracts which is also the situation with certain case companies. Other way to handle information exchange are different governance models what companies 1, 4 and 5 use in short term cases as these situations are usually connected to short projects.

Ritala (2009) mentions that informal practices are important to complete formal practices in knowledge protection. Though when it comes to situation of the case companies, there are not that much informal practices what companies mention that are used in knowledge sharing and knowledge protection during coopetition. Companies 2, 3 and 7 say that they have responsible persons in short- and long-term cooperations who manage coopetition in general. Especially in projects, project managers are important to inform employees about information sharing practicalities (Fernandez & Chiambaretto, 2016). Companies 6 and 7 say that they prefer to keep cooperating teams separate from each other and not sending their employees to competitor's office which is the same approach what Gast et al. (2019) saw in their research as coopetitors were limiting the contact and communication between key employees and tried to avoid meetings at their premises. From these informal practices what case companies use, it is possible to see that those are connected to human resource management practices and not to relational norms like trust or reputation as companies seem to prefer set limitations to their employees and handle their awareness in social situations (Gast et al. 2019; Bouncken, 2011; Loebbecke et al., 1999).

Even though case companies have certain knowledge, expertise and resources as their competitive advantage, they still need competitors to operate in the markets. So here competitor's knowledge-based resources are affecting to coopetition as companies are using their complementary resources to create more value for the customers and markets in general which is explainable with resource-based view and game theory. Companies' own knowledge-based resources are affecting to coopetition too as companies want to protect their competitive advantage from knowledge leakage. This creates tensions which are connected to knowledge, opportunism and roles in coopetition. Case companies use mostly formal practices to manage these tensions and challenges as informal practices are not that common way to handle tensions in coopetition by many case companies.

One interesting thing is that conglomerate IT firms and consulting companies prefer to operate more with indirect competitors, but instead pure CS companies expressed that they don't mind operating with direct competitors too. So, on the other hand it can be that companies with narrow knowledge in CS sector try to decrease the tensions

and challenges of coopetition by cooperating with more indirect competitors who poses no bigger threat to company and to its competitive advantage. The situation though can change when the demand to cooperate with direct competitor comes from company's own client which pushes these partially specified CS companies to uncomfortable positions in coopetition as Soekijad and Andriessen (2003) note that companies prefer to leave their clients out of knowledge sharing as they can be counted as firms' competitive advantage.

## 6.3 Coopetition-based business models and strategies

***"What kind of characteristics of coopetition in cybersecurity sector can be recognized in Finnish markets?"***

Case companies are doing both long and short-term coopetition in the CS markets. All companies say that they have long partnerships with certain partners. With long-term partners the coopetition is focused to situations where companies act as resellers for certain services or products of their partner or case companies are providing these solutions themselves like technologies and threat data to their partners as vendors. So, companies are either subcontracting or act as a subcontractor. If the partnership is important for both companies in utilizing complementary resources, coopetition in this type of long-term cooperation mode is connected also to ecosystem partnership. All companies say that they are cooperating also in short-term as these cooperations are happening in projects and cases. These short-term projects can be so huge that for single company it is impossible to provide all the resources alone, but also the customer of certain company may demand that there needs to be other companies in the project which can lead to fact of facing more direct competitors.

In the figure 2 by Chin et al. (2008) it is explained that there are four different modes of coopetition. CS companies have characteristics which categorize them in two or even three modes, so companies are not acting just in one certain mode all the time but have different modes, depending on company's business model or what type of cooperation method is used. Among CS companies', only the monoplayer mode wasn't possible to link on companies' actions. The positioning wasn't done to this

mode, because all case companies' business models had characteristics which are connected to high level of cooperation, high level of competition or even both and these characteristics are not present in monoplayer mode (Figure 2). In partner mode companies tend to choose their coopetition partner so that they can cooperate for long period of time. This requires that partner is more indirect in coopetition operations and utilized resources complement each other in this mode to create win-win situation for partners. Contender mode is opposite from partner mode as companies are driven to this short-term mode because of external force and in this mode, resources and knowledge what companies use can be overlapping and create more competitive tensions. So basically, companies can cooperate in other mode where they are close partners but at the same time they might be included to project which creates tensions between them. Though in adapter mode tensions are lower because of mutual dependence and informal practices. The characteristics of different modes and business models which put companies to these certain modes are discussed next.

It is possible to see that all case companies are adapting the partner mode where companies keep high cooperation and low competition (Chin et al., 2008). In this mode case companies prefer to cooperate with indirect competitor, so that they can form longer partnerships. Conglomerate IT companies 3, 4, 5 and 6 operate here as a integrator as they receive solutions from their subcontractors to create more value to their customers. Company 2 actions are connected to subcontracting too as it cooperates with its ecosystem vendors who provide solutions to company 2. CS specialized companies 1 and 7 are doing resales for certain technologies too, but company 7 is also selling its own technologies and products in channel-based actions. As company 6 is providing its technologies and consulting services to its partners too, so basically companies can do subcontracting, act as subcontractor or do both of these, depending on their specifications. Chin et al. (2008) say that in this type of mode, companies look for synergies which are based on complementary resources of companies to create win-win situation, so this explains companies' approach based on their own expertise in partner mode. In this mode companies have implemented coopetition strategy and have coopetition-based business model in which possible rivals are positioned as partners (Ritala et al., 2014). This is achieved by combining resources and knowledge which doesn't create threat in partner mode even though companies might compete in other areas with other types of resources and knowledge.

Other mode of coopetition which all case companies have adopted is contender mode. Chin et al. (2008) say that companies in contender mode do cooperation with rivals in some occasions, so this mode is highly connected to situations, when case companies cooperate with their competitors in projects and cases where the requirement for cooperation is coming from some external force. This happens as company's client requires more expertise to project or then it can be that the project itself is so huge that one company can't fulfil it alone which leads to situation that it attracts more direct competitors to project. Subcontracting can be connected to this mode too, but also commercial and project-based actions are present in this approach. Basically, all case companies have same type of actions in this coopetition mode as what they have in partner mode, but in contender mode cooperation with competitor is shorter than in partner mode. In partner mode companies use complementary resources which lowers the competitive tensions in cooperation, but in contender mode companies might have to share those resources where companies see each other as competitors like in consulting services. So basically, it could be said that low cooperation is connected to short-term cooperation in contender mode and high cooperation is connected to long-term cooperation in partner mode.

One thing which is interesting is that only three case companies have actions which are connected to adapter mode where companies have high degree of competition and cooperation, but companies are dependent from each other to reach certain goals (Chin et al. 2008). This mode is part of companies' 1, 3 and 7 actions, so here we can see that companies which are specialized in CS business can also cooperate with more direct competitors in longer-term as they mentioned earlier. Here company 3 though is exception as it is conglomerate IT company. Actions, which companies are taking in this mode are gaining scale benefits from regulators, threat data sharing and research and product development. Companies 1 and 7 are doing research and product development, so wider and specified knowledge in CS sector can explain this as companies in high technology industry create joint ventures to share technological know-how as coopetition is the way to improve products and services or create new ones (Gnyawali & Park, 2011; Tether, 2002).

Ritala et al. (2014) say that similar activities among competitors create opportunities for collaboration in resource utilization as this is connected to second action which

companies 3 and 7 use. This is threat data sharing among competitors, but with difference that company 3 always has 3rd party who acts as coordinator. Company 7 on the other hand share threat information with its competitors where personal long-term relations play crucial part. Companies also operate together to fight against those parties who regulate CS sector as companies 1 and 3 have adopted this approach. Möller & Rajala (2007) say that companies do coopetition to change competitive dynamics in the industry and protect competitive position and in Finnish markets CS companies seem to cooperate together to gain scale benefits from parties who have power to regulate CS sector when in earlier researches, improving the competitive position has happened in the competition between networks. Figure 3 below summarizes the coopetition modes of case companies and connects business models which are used in different modes.

| | | |
|---|---|---|
| **High competition** | **Contender**<br>Companies: All<br>Business models: Subcontracting, Projects and commercial cases driven by customer/client | **Adapter**<br>Companies: 1, 3, 7<br>Business models: Scale benefits from regulators, Threat data sharing and Research and product development |
| **Low competition** | **Monoplayer** | **Partner**<br>Companies: All<br>Business models: Subcontracting, Technology and threat data licensing |
| | **Low cooperation** | **High cooperation** |

Figure 3. Coopetition modes of case companies and business models (Modified from Chin et al., 2008)

### 6.3.1 Benefits of coopetition in different business models

Teece (2010) says that business models explain how firms create and provide value to customers and that business model is platform between strategy and practice as it

depicts how value creation and capture mechanisms are used by company. Case companies say that they utilize complementary resources and knowledge of their competitors so that they can create value to customers as business model explains how company is connected to external stakeholders and how company manages its actions with stakeholders to create value to customers (Teece, 2010). According to case companies, value capturing process is not always divided equally between companies which Ritala and Sainio (2014) clarify with the fact that companies make different choices in firm specific level and often their rivals have different position in changing current business model. This means that with different modes of coopetition (figure 3), companies have different firm-specific approaches to coopetition even though the relational strategy is different where differentiation affects to this (Ritala & Hurmelinna-Laukkanen, 2009).

In partner mode, some companies are subcontracting certain resources and other companies act as vendors who provide different solutions to companies who seek complementary resources by subcontracting like conglomerate IT companies. Even though companies' relational strategy is resource utilization by utilizing scale benefits (Bengtsson & Kock, 2000), this seems to be situation for company who needs to provide certain solution to customer. Company who on the other hand acts as a vendor gets also benefit of increasing the size of current markets as companies use different resources and capabilities (Bengtsson & Kock, 2000). So, the vendor can benefit in some ways more than the company who was seeking to provide solutions to customer. Here it is noteworthy that financial benefits can be better to the company who is closer to customer as this type of coopetition happens further away from customer (Bengtsson & Kock, 2000). Companies also say that holder of the customer contract is usually in better position in coopetition and companies 3 and 4 also say that as they are responsible for the customer and provide the whole solution, they get bigger share from value capturing process.

In contender mode as the projects and cases start from client's need to utilize resources of many different operators or as the project can be so big that one single company can't fulfil it alone, efficiency in resource utilization is one benefit what companies receive as they combine their different resources to provide solutions to clients and bigger projects. In this mode client ownership can belong to one company,

so in this situation some companies can receive benefits in increasing the size of their markets and get financial benefits in shorter term. These benefits can fulfil also in longer term if the companies who were in the project can improve their position towards client.

For the companies who are acting as an adapter in CS sector, benefits are depending from the action what companies decide to take. In research and product development companies are increasing the size of the current markets as companies which are taking this approach are operating in the same field and usually share common interest, so increasing the value created in markets can also create a situation where all attending parties can win (Ritala et al., 2014). Also, companies are using different resources in this coopetition mode which was mentioned by representative of company 7 which is highly connected to the statement of Bengtsson and Kock (2000) that competitors use probably different resources and capabilities during the coopetition, even though they are operating on the same sector. Here cooperation with competitors is the way to improve current products and services or even create new ones in the market (Tether, 2002).

Obtaining the scale benefits from the regulators brings more companies together to reduce the power of authorities. Möller and Rajala (2007) say that companies want to protect their market share which they have captured in the past, so coopetition is utilized to change competitive dynamics in the industry as competitors cooperate to protect their competitive position. This action has happened mostly in situations where networks are competing (Gueguen, 2009). Though in Finnish CS sector companies are competing more against the regulators to make CS markets better for companies to operate. Companies also share threat information with each other to serve their customers better by providing supplementary resources which gives companies more information about the markets as firms tend to create new offerings when they can create added value to customers with improved offerings as compatibility, interoperability and network externalities are important in this (Spiegel, 2005: Mione, 2009).

### 6.3.2 Desired modes of coopetition and challenges in reaching them

Case companies expressed their interest to develop their coopetition modes as companies (2, 4, 6 & 7) either wanted to recognize more cooperation methods which benefit all parties or they (1, 3 & 5) wanted to have more information sharing among companies in threat situations. Problems which are connected to these coopetition strategies and reaching them can be linked to different tensions like knowledge and opportunism. Based on the complementary knowledge, expertise and resources what case companies say that they need during coopetition, companies' different business models are divided to different categories in table 11 below, which is modified from Loebecke et al., (2016). Companies (2,4 & 6) who want to find bigger and deeper cooperation methods are actually operating more in a way where information sharing is more unilateral when comparing table 11 and figure 3. Same thing is with companies (3 & 5) in threat information sharing as these companies' strategies are mostly based on unilateral knowledge sharing.

Allocation of different business models and knowledge sharing is based on the study of Loebecke et al. (2016) about unilateral and bilateral knowledge, but also on comments of case companies', depending on what kind of resources are shared. Subcontracting appears in both tacit and explicit knowledge, because this business model is based on the idea, that knowledge is delivered to other party of coopetition in the form of different products and services which makes this model more unilateral. Subcontracting and licensing appear in partner mode (figure 3), where especially companies' have different partners and the partnership is based on delivering and reselling technologies and services forward, like for example in the case of ecosystem vendors who aren't direct competitors, because of their complementary resources but who cooperate in longer term with companies.

Business models in adapter mode are located to bilateral knowledge sharing (Table 11; Figure 3) because these models are connected also to examples of Loebecke et al. (2016) about in what kind of situations knowledge sharing is fulfilled (table 2). Research and product development as business model requires information sharing between companies so that cooperation can be useful when again threat data sharing happens between employees of two competing firms where knowledge sharing is

based on trust and long-term relationships. Reaching scale benefits from regulators is based on the idea where company representatives of different companies are influencing together on the power of regulators as a bigger group who are connected to each other. In projects and commercial cases knowledge sharing is also bilateral, when companies plan the cooperation together, but this business model is based more on short-term cooperation and requires more planning and management as cooperative partners can be more direct competitors based on knowledge which companies poses as this makes coopetition harder in this situation.

As companies 2, 3, 4, 5 and 6 strategies and longer partnerships have focused more on unilateral knowledge sharing, these companies want to move coopetition to more bilateral knowledge sharing. Though there are certain tensions like knowledge and opportunism which can make it more difficult and companies mention problems like knowledge protection and needed trust which refer to tensions in knowledge and opportunism (Tidström, 2014). As these companies are acting as subcontractors or rellers of other companies' products and services, finding deeper partnerships can be hard as so far, cooperation has mostly been one-sided because characteristic of unilateral knowledge sharing in subcontracting or the coopetition has happened in short-term projects where tensions can grow as cooperation parties can be more direct competitors in contender mode. For these partially specialized CS companies, cooperation with pure CS companies seems not to be an option as companies 1 and 7 say that in threat data sharing, the benefits are more one-sided as these pure CS companies think that other companies in Finland can't provide knowledge to them in equal amount. Companies 3 and 5 said that in threat data sharing there needs to be 3rd party member to coordinate this type coopetition. In Finland Traficom has this responsibility, but this authority needs to take more actions and supervise this type of coopetition, so that the information sharing is equal among companies. Also, the trust is important aspect as company 7 says that long personal relationships are behind their threat information sharing cooperation with competitors.

Table 11. Knowledge sharing in different CS strategies (modified from Loebecke et al., 2016)

| | **Unilateral knowledge sharing** | **Bilateral knowledge sharing** |
|---|---|---|
| **Tacit knowledge** | *Companies' business models:*<br>• Subcontracting (1, 3, 4, 5, 6) | *Companies' business models*:<br>• Projects and commercial cases driven by customer/client (All)<br>• Scale benefits from regulators (1 & 3)<br>• Threat data sharing (3 & 7) |
| **Explicit knowledge** | *Companies' business models:*<br>• Subcontracting (1, 2, 3, 4, 5, 6)<br>• Technology and threat data licensing (7) | *Companies' business models:*<br>• Projects and commercial cases driven by customer/client (All)<br>• Research and product development (1 & 7), |

## 6.4 Summary of the research findings

Based on the research findings and answers which were received from the sub questions of the research, it is possible to provide findings on the main research question which was presented in table 10:

***"What are the strategic reasons of the cybersecurity companies in Finland to do coopetition?"***

Cybersecurity companies' coopetition and strategies in Finland are based on the resource-based view and game theory. As the resource-based view points out that companies' competitive advantage comes from their resources and capabilities and firms perform strategies to utilize these sources, but usually companies need other types of resources, so that they can implement their strategies in the efficient way (Schiavone & Simoni, 2011). Case companies have adopted different strategies in this sector based on their competitive advantage and resources, but companies are utilizing these resources in bigger scale as they act with other companies based on the game theory where the ideal situation for coopetition is when there are more ways

to allocate for the participants in coopetition instead of operating alone (Brandenburger & Nalebuff, 1996). Case companies have taken this approach in different modes of coopetition which is explainable with the fact that companies utilize their complementary and supplementary knowledge and resources in their different business models with each other.

Contender and partner mode which companies have adopted, share very similar activities and characteristics, but with the difference that in partner mode the coopetition is happening in longer period of time and in this mode, companies prefer to take partners whose portfolio and knowledge is not threatning company's own portfolio. Though as Padula & Dagnino (2007) say that coopetition is usually developing in the form of emergent strategies, contender mode is more like a short-term solution for companies where firms attend together to bigger projects and clients' cases which need a huge amount of resources and knowledge. In this mode, the tensions can affect more to coopetition as companies can be more direct competitors in these short-term cooperations. Companies who have specialized only to CS business, the closer cooperation with competitor doesn't seem to be that problematic as for those companies who are partially operating in CS sector. The background in cybersecurity sector possibly explains why pure CS companies have adopted adapter mode where they have different approaches for coopetition-based business models.

Different business models give certain benefits to companies who are doing coopetition as these benefits have also occurred in the earlier researches (Ritala et al. 2014). It could be said that companies who are subcontracting resources and solutions, receive only benefits in resource utilization where on the other hand subcontractors and suppliers receive benefits in resource utilization and these companies are also able to increase their current market size. This is happening in both, partner and contender mode. This fact can create tensions as supplier moves slowly closer to other company's customer or contacts client without partner, but as companies do coopetition to connect supplementary and complementary resources, the differentiation between companies eases tensions in some level which can be explained in collaboration and differentiation approach (Ritala & Tidström, 2014). So, as companies are not direct competitors in partner mode, the tensions are possibly not that high, when compared to contender mode where customer is kind of closer to

companies and where many companies provide their partial solutions to bigger project. Based on these facts, the tensions in adapter mode don't seem to be that high as in these two other modes. According to Jakobsen (2020) the mutual dependence can explain how companies handle tension as companies form alliances with competitors in the situations to increase knowledge in industry which is done by cooperating in research or in R&D actions, so that companies can confront the environmental regulations what the industry is facing. In adapter mode the business models and benefits are relying more on mutual good which support collective strategy, when thinking for example situation where companies try to obtain scale benefits from regulators as this helps all companies in Finnish CS sector. Also, in this mode the informal practices like trust are more important as long relationships with other operators ease the coopetition between direct competitors in threat data sharing for example.

In adapter mode the benefits of coopetition are based on the business models what companies are using in value creation process with competitor(s). Benefits are based on the relational strategy and business models to create common good to CS markets in Finland especially in reaching scale benefits from regulators or in research and product development. Actions in adapter mode seem more like acts which help CS companies in other operations in this sector. So, depending on the collective strategy in adapter mode, it can increase benefits in two other coopetition modes. Here the problem is how companies are able to capture value from common value creation process as bargaining power and resources in coopetition can affect to value capturing chances (Ritala & Tidström, 2014). Companies said that value capturing is not equal in coopetition and the views about how the value capturing goes, had many different opinions among companies. Here business models might explain how companies are able to capture the created value after coopetition as Ritala et al. (2009) also noticed that after coopetitive act, individual companies tried to capture value from market with their diverse set of business models as business models created differences in value capturing.

The summary of the research findings is presented in figure 4 below. Figure explains what modes of coopetition are used in CS sector and which case companies are utilizing these modes. In figure 4, the business models are also divided according to

how these appear in CS sector in different modes of coopetition. The benefits what different business models provide to companies are connected to the right business models according to results and earlier researches. Tensions and how companies are managing them during coopetition are also presented in the figure 4 as the formal practices are more common for companies to handle tensions especially in contender mode where on the other hand informal practices seem to be more important in adapter mode.

| | | |
|---|---|---|
| **High competition** | **Contender**<br>***Companie****s*: All<br>***Business models*****:** Subcontracting, Projects and commercial cases driven by customer/client<br>***Benefits:*** Resource utilization, Increasing size of the current markets<br>***Tensions:*** Knowledge, opportunism and roles<br>***KBA's management:*** Contracts, Project teams, Responsible person, Planning together, Organization structure | **Adapter**<br>***Companies:*** 1, 3, 7<br>***Business models***: Scale benefits from regulators, Threat data sharing, Research and product development<br>***Benefits:*** Increasing size of the current markets, Improving competitive position, Creating new markets<br>***Tensions:*** Knowledge and opportunism<br>***KBA's management:*** Contracts, Trust, Responsible person, Organization structure |
| **Low competition** | **Monoplayer** | **Partner**<br>***Companies***: All<br>***Business model:*** Subcontracting, Technology and threat data licensing<br>***Benefits:*** Resource utilization, Increasing size of the current markets<br>***Tensions:*** Knowledge and opportunism<br>***KBA's management:*** Contracts, Responsible person, Organization structure, planning together |
| | **Low cooperation** | **High cooperation** |

Figure 4. Summary of the research findings

# 7 IMPLICATIONS

In the last part of the thesis, the theoretical and practical implications of the thesis are explained. Theoretical implications give explanations what new this research has brought to theory as the managerial implications give supporting information to CS companies how they could utilize coopetition and what facts they need to consider when doing it. Future research directions are suggested too as there are many possibilities for new strategic research in cybersecurity sector.

## 7.1 Theoretical implications

As mentioned earlier in the thesis, earlier studies in coopetition strategies and benefits have focused on other industries to explain how coopetition appears in these sectors. There are no earlier studies how coopetition appears in cybersecurity sector and because of this, there is a research gap to understand the role of coopetition among different types of CS companies. Also, there are no researches of this phenomenon which focus on Finnish markets. Based on the results, it is possible to see that CS sector has similarities to other industries when it comes to earlier coopetition researches. First, collaboration between competitors is said to be more common and important in high technology sectors because of changing dynamics, but also in innovation process in the industry sectors which have characteristics like knowledge-intensity (Carayannis & Alexander, 1999; Gnyawali & Park, 2009). CS sector is no exception in this as it has the same characteristics as other sectors which have been under research. Also, the benefits what companies get from coopetition are present in CS sector as different benefits what have occured from earlier researches are possible to notice, but also different tensions are present which are creating challenges in coopetition (Ritala, 2018, 320-323; Tidström, 2014; Ritala & Tidström, 2014).

This study contributes to the literature areas of knowledge-based advantage and coopetition strategies. First, this study contributes to the literature of knowledge-based advantage by showing that companies utilize different resources and capabilities as companies manage these resources, so that they can maintain their competitive performance in the markets. Even though firms have certain specific knowledge which

gives them competitive advantage, they still need other companies' knowledge to operate in the CS markets. In order create value to customers, companies need different complementary resources which are based on explicit and tacit knowledge of the other companies in the CS sector. Companies share knowledge in unilateral or bilateral way which depends on the business models what companies use. These findings support notions about interorganization knowledge sharing, but also that with coopetition, companies can get external knowledge and technological aspects which provide better opportunities for companies in the markets (Loebecke et al. 2016; Bouncken & Kraus, 2013). In CS sector though knowledge-based advantage seems to give better opportunities to operate in the markets. Even though all companies based their competitive advantage to large resources, knowledge etc. it seems that those firms who are fully specialized to CS sector, have better operating possibilities in the sector than partially operating companies, because of their knowledge-based advantage as companies operate in CS sector with the capabilities what their knowledge-based advantage provides to them.

Second aspect what this study contributes are the tensions which are based on the decision to start coopetition and company's own knowledge-based advatange. As the CS sector is knowledge intensive, tensions arise around knowledge as companies are afraid to lose their knowledge-based advantage to their competitor during coopetition. Also, as companies see that firm-level and relational strategies can differ between companies, it creates tensions in opportunism and roles. The findings about tensions are highly related to earlier studies (Ritala & Tidström, 2014; Tidström, 2014). To prevent important knowledge leakage to competitor, companies are using formal and informal practices during knowledge sharing to lower the tensions in coopetition as this also supports the earlier studies (Gast et al. 2019; Ritala et al. 2009). Though the study also strengthens the idea that companies should pay more attention to informal practices in coopetition if they want to reach deeper coopetition methods and new business models as especially relational norms seemed to be important in this which is also noted in earlier studies (Fernandez & Chiambaretto, 2016; Ritala et al. 2009). Company's knowledge-based advantage also created tensions as those companies whose specification in CS sector was only partial, companies tried to lower the tensions by selecting more indirect competitors to certain coopetition methods as these companies were not a threat to company and its position towards client as

companies' differentiation made the coopetition more attractive which is based on game theory and resource-based view (Ritala & Tidström, 2014)

Third aspect to which this study contributes are the characteristics of coopetition when considering game theory and its affections in coopetition. Results of the study are having similarities to earlier studies as companies coopetitive actions are relying on the idea of game theory and resource-based view as companies cooperate with competitors to create more value and capture this value with different business models as companies utilize their different resources and capabilities (Brandenburger & Nalebuff, 1998, 65; Ritala, 2012; Schiavone & Simoni, 2011). The value capturing process from coopetition wasn't equal among companies, but still this study shows that coopetition brings more positive sum game results for companies instead of neutral or negative when it comes to value capturing process in coopetition. Coopetition provided different benefits which linked to earlier research from four different benefits what coopetition gives and the benefits what companies received were changing depending on the business models what companies were utilizing, but also the business environment is affecting to value capturing too. These findings are similar to earlier research in benefits of coopetition and when it comes to value capturing (Ritala et al. 2014; Teece, 2010; Ritala, 2009).

Fourth aspect how this thesis contributes new findings to earlier coopetition research is the fact that companies operate in different coopetition modes instead of adopting just one mode based on figure 3 which is adapted from Chin et al. (2008). This study shows that based on company's knowledge-based advantage and competitive advantage, company can utilize different business models in different modes of coopetition with its resources and capabilities where competitors complenentary and supplementary resources are part of coopetition, based on the idea of game theory and resource-based view. Study shows that companies use different business models in different modes to create and capture value and the equality in value capturing is based on companies' business models. Especially in partner and contender mode relational strategies and firm-level strategies have more difference as companies can receive different benefits from coopetition than their partner as this idea is based on the ecosystem partnership where different partial solutions create a full service or product from which companies capture value and different benefits, based on their

business model. Utilization of different business models and receiving different benefits from them is studied before which showed that companies receive certain benefits with business models in coopetition (Ritala et al. 2014; Gnyawali & Park, 2011).

Though this study shows that companies use different business models at the same time and can take different roles in coopetition, where in one mode of coopetition, companies can be important partners, because of their complementary resources. While this type of coopetition is happening, there can be other type of coopetition happening with different characteristics where the partnership is forgotten, and the characteristics of competition are bigger, even though companies are still doing cooperation. In these coopetitive situations, resources what companies use can be similar which create more tensions between partners. Though tensions seem to be lower especially in adapter mode of coopetition as coopetition types in this mode rely on informal practices like trust, but also on the mutual dependence between companies as companies are dependent on each other in this mode even though the degree of competition and cooperation are high. This links to earlier study as Jakobsen (2020) noted that mutual dependence can explain how companies handle tensions as companies form alliances to increase knowledge in industry through cooperation in R&D so that companies could face environmental regulations what the industry is facing.

As thesis observed coopetition strategies where companies' business models, benefits of coopetition and mode of coopetition are in continuous interaction, this thesis has brought also some new insights to coopetition strategies. Chin et al. (2008) say that different coopetition types are connected to different coopetition strategies and Ritala et al. (2014) on the other hand suggest that companies should utilize coopetition-based business models to gain certain benefits. This thesis shows that with certain business models, company can reach only certain benefits as partner and contender mode can only offer benefits in resource efficiency and increasing the size of the markets. If companies want to achieve more benefits through coopetition, they need to change their business models, so that they can reach adapter mode and gain new types of benefits as Teece (2010) says that business model is a platform which

is between strategy and practice as it is depicting how value creation and capture mechanisms are in the utilization in the company

## 7.2 Managerial implications

This thesis aims to study coopetition strategies of the cybersecurity companies in Finnish markets and reflect the existing theory to different strategic approaches and benefits what case companies have with coopetition. The thesis analyses how CS companies are utilizing coopetition in their actions, which can also be used by other companies who poses similar characteristics and activities as CS companies. Thesis also shows that coopetition is used in CS sector which can give support to those companies who are in doubt to take actions with competitors. Those companies who have same type of characteristics as CS companies can also get insights from the thesis, how coopetition can be used in different situations and what it requires to have successful coopetition.

For the business practitioners in CS sector who are responsible of their company's cooperation methods, this study provides possibilities and development areas in several implications. First, companies should consider what they are able to achieve with their current business models and strategies and how the development of these aspects would change the status of coopetition and get other benefits from it than what company is receiving now. As in Finnish CS sector, it seems that companies' business models and specialization in CS sector has an effect on the fact which kind of business models' companies are able to implement. Firms which have focused their business to this sector have adapted more business models than partially focused CS companies which is explainable with the wider knowledge and specification what these pure CS companies have when compared to other companies.

Second, companies should focus more on the firm-level strategies and relational strategies in coopetition as these two different aspects are present in all CS firms' actions in Finnish markets. There are different reasons why firms should pay attention to these. First of all, even though companies have found relational strategy which to follow with their partner, the fact is that companies' own firm-level strategies are more

dynamic and change over time. Companies should observe their partner's actions so that it is possible to avoid rising tensions if partner turns to more direct competitor for example with their investments in CS services. This can happen in certain CS operations like for example in companies' consulting services, but this still creates tensions, when partner firms' product and service portfolio have more direct competition as this could, in the worst-case, lead to the end of cooperation. Other reason why companies should focus on firm and relational strategies is connected to partnership. As CS sector and its companies utilize the complementary resources in coopetition, long-term partners and especially ecosystem partners are coming important for companies. If companies want to achieve deeper coopetition and achieve different benefits from it, long-term partners are important in this. Long-term relationships give possibilities to create new business models which provide opportunities for value creation and capturing, but to succeed in this, long-term partners are needed as tensions are higher in short-term coopetition. For these reasons, companies should follow the relational strategies and firm-level strategies to make sure that many years of partnership doesn't get complicated and end when it has more possibilities to develop more successful. Finnish CS sector is also having charatecteristics of ecosystem partnership, so this fact supports for long-term coopetition as competition is going to direction where ecosystems compete against each other.

Third aspect what CS companies should observe are the tensions and how to manage them in coopetition. For now, companies seem to rely more on formal practices during coopetition which are useful especially in certain modes of coopetition, when companies want to protect knowledge-based advantage and decrease tensions. Though companies should pay more attention to informal practices as these seem to be important when taking coopetition to the next level. Though informal practices like trust are achieved with long-term partnerships with competitors to reach new modes and business models, but other aspect in this is the earlier mentioend ecosystem partnership which seems to take place in Finnish CS sector. So, if companies are having important partners in CS sector, they should analyse partnerships according to goals what they want to achieve. Here companies should reflect the relational strategy of coopetition on their own firm-level strategy, but also try to predict competitor's firm-level strategy and directions where the partnership is going. Important for companies

is to find those kinds of companies with whom it is possible to operate in different modes of coopetition without tensions rising too high.

For CS companies the thesis gives supporting information and it shows how coopetition can be utilized by CS companies if it is not part of company's actions. It also shows what kind of coopetition possibilities there are in CS sector and what is required from company to add certain type of business model to its own actions. Thesis gives understanding to relational and firm-level strategies as managers of the CS companies can get insights about the facts how much business models affect to value creation and capturing and what kind of benefits certain business models actually provide. Also, as companies seek new ways to do coopetition, this thesis gives understanding what is required by CS companies to improve their coopetitive actions and what kind of practices are needed to reach new types of coopetition modes.

## 7.3 Future research directions

The thesis doesn't provide generalizable results about the phenomenon as there are only 7 case companies in the study. Also, the research is restricted only to Finnish markets, so the data represents small part of companies and is limited to opinions and actions in one certain market area. Based on these facts, there are interesting possibilities for future research to which this thesis can provide background information. There could be more interviews for bigger amount of companies to get more insights into this phenomenon. One interesting approach for future research is to conduct the research in other countries like Nordic countries or Europe and reflect the results from these studies on the results which were received in this thesis. This would give more generalized view about the coopetition in CS markets and also reflection between market areas and their common strategies. Case companies in this thesis are medium sized and large companies. In the future research, it would be interesting to see how much companies' coopetition strategies and business models differ based on the company size as the future research could compare bigger number of SMEs and large companies and provide similarities and dissimilarities between companies.

Other interesting aspects to study are the different modes of coopetition and coopetition benefits which occur in different modes. For example, future studies could observe only the adapter mode and business models appearing in it and provide deeper insights how the business models, value creation and capturing appear in the longer time frame. Also, partner mode where ecosystem partnerships appeared, is one interesting research area as research could observe how different ecosystems compete with each other and what kind of actions and roles members have in their own ecosystem to make it successful in CS sector.

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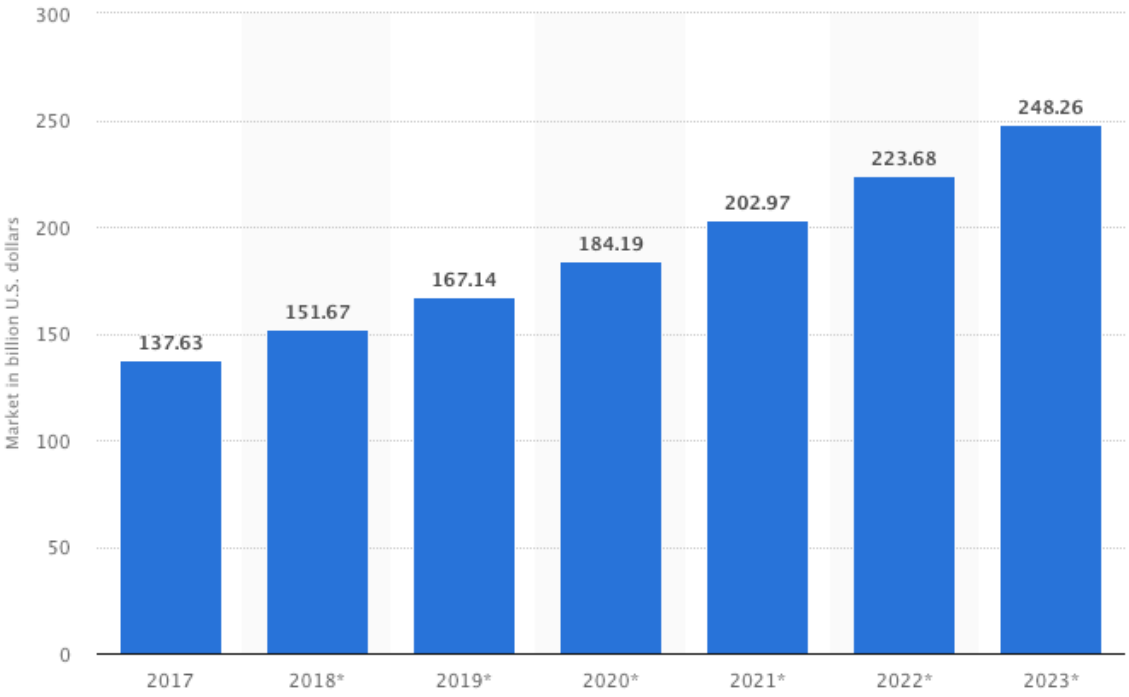
# APPENDICES

APPENDIX 1: Size of the cyber security market worldwide, from 2017 to 2023 (in billion U.S. dollars) (Statista 2018, https://www.statista.com/statistics/595182/worldwide-security-as-a-service-market-size/)




APPENDIX 2. Interview questions and structure

**Interviewee and company background**

1. What is your company's name and what kind of business your company is doing?
2. What is the position of the interviewed person in the company and background in the cyber security field?
3. What is your company's competitive advantage in the cyber security field?
4. To what is knowledge and resources in this advantage based on?
5. How do you differ from other companies in the cyber security field?

**Current status of coopetition**

6. Why and how companies in cyber security markets cooperate with each other?
7. What benefits and challenges are involved in collaborating with competitors?

**Competition-cooperation paradox**

8. How does competition have an effect on the decision to start cooperation?
9. Do you see your cooperation partners as a threat to your company?
10. How long cooperative partnerships you are looking with your competitors?

**Managing coopetition**

11. How do you manage cooperation with competitors?
12. Are you doing any organizational changes when planning cooperation?

**Value creation and value appropriation**

13. What is the value created before and after coopetition?
14. How do you see the value is shared in cooperation?

**Possible steps in the future**

15. What kind of cooperation you would want to do with your competitors?
16. How would the cooperation be taken to the next level with competitors?