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Value creation through API ecosystem

Case: KONE

ABSTRACT:

Digitalization and technological disruption have become prominent drivers of change in multiple industries around the world. New business models enable companies both to benefit from the possibilities enabled by digitalization and technological disruption, and to defend their existing core business against market disruptions. In a fast-paced digital world, it is exceedingly important to innovate faster. These developments have led to new business principles where value is created in networks between multiple companies rather than alone by a single actor.

This thesis asks how such value creation happens specifically in the scope of a traditional industry going through change enabled by digitalization. The research focuses on ecosystems enabled by application programming interfaces (APIs) acting as boundary resources between different companies. It explores how value is created in such an ecosystem and how that value can be monetized to generate new revenue streams for the companies in question.

This research is a qualitative study and was done by conducting semi-structured interviews to explore the views towards the case study company's API ecosystem both from the perspective of the company's own employees and company external representatives from the ecosystem. The interviews were analysed with qualitative content analysis to identify thematic categories emerging from the similarities and differences in perspectives raised by the interviewees.

This thesis finds that value creation is a very multifaceted topic. Value creation through API ecosystem is a trade-off encompassing multiple elements where openness and flexibility are key in enabling modular services that can serve different types of customer segments with an offering fitting for their unique needs. Furthermore, five different models of monetization were identified, however, it is recommended that there is no single correct model, but rather the monetization model depends on the maturity of the company itself and the market where it operates.

Based on the study, it becomes clear that companies need to learn and adapt when they approach new business models. The importance of APIs and ecosystems require companies to think beyond their own value creation process and consider a thematic, stepwise approach towards new markets and business opportunities.

KEY WORDS: digitalization, technological disruption, innovation, business model, API, ecosystem, digital platform, value creation

TIIVISTELMÄ:

Digitalisaatiosta ja teknologisesta murroksesta on tullut vahvoja muutoksen ajureita useilla toimialoilla ympäri maailmaa. Uudet liiketoimintamallit mahdollistavat sen, että yritykset voivat hyötyä digitalisaation ja teknologisen murroksen tuomista uusista mahdollisuuksista, sekä myös puolustaa olemassa olevaa ydinliiketoimintaansa. Nopealiikkeisessä digitalisoituvassa maailmassa on erityisen tärkeää pystyä innovoimaan nopeasti. Nämä kehitykset ovat johtaneet uusiin liiketoimintaperiaatteisiin, joissa arvonluonti ei enää tapahdu yhden yrityksen toimesta, vaan arvo luodaan verkostoissa.

Tämä opinnäytetyö kysyy, miten edellä kuvattu arvonluonti tapahtuu erityisesti digitaalisen muutoksen läpikäyvän perinteisen yrityksen näkökulmasta. Tutkimus keskittyy digitaalisiin ekosysteemeihin, joissa resursseja jaetaan ohjelmointirajapintojen (application programming interface, API) kautta eri ekosysteemitoimijoiden välillä. Se tutkii, miten arvonluonti tapahtuu tällaisissa ekosysteemeissä ja miten arvo voidaan muuntaa rahaksi, luoden uusia liikevaihtovirtoja kyseisille yrityksille.

Tutkimus on luonteeltaan laadullinen haastattelututkimus. Se toteutettiin hyödyntäen semi-strukturoituja haastatteluja tutustuen näkemyksiin tapausyrityksen API ekosysteemistä niin yrityksen omien työntekijöiden kuin myös ekosysteemin muiden toimijoiden edustamien henkilöiden näkökulmista. Haastattelut analysoitiin perustuen laadulliseen sisällönanalyysiin ja sen pohjalta löytyneisiin temaattisiin kategorioihin pohjautuen haastateltavien perspektiivien samankaltaisuuksiin ja erilaisuuksiin.

Tämä opinnäytetyö osoittaa, että arvonluonti on hyvin monisäikeinen aihealue. Arvonluonti API ekosysteemin kautta on valinta sisältäen monia elementtejä, joista avoimuus ja joustavuus ovat avainasemassa mahdollistaen modulaariset palvelut, jotka voivat palvella erilaisia asiakassegmenttejä ja heidän ainutlaatuisia tarpeitaan. Lisäksi tunnistetaan viisi eri arvoon pohjautuvaa hinnoittelun mallia. Suositus kuitenkin on, että ei ole olemassa yhtä oikeaa mallia, vaan sopiva malli perustuu kyseessä olevan yrityksen sekä sen kohdemarkkinan digitaaliseen kypsyyteen.

Perustuen tutkimukseen, johtopäätös on, että yritysten täytyy oppia ja mukautua lähestyessään uusia liiketoimintamalleja. APIen sekä ekosysteemien tärkeys vaatii yrityksiä miettimään arvonluontiaan yrityksen omien prosessien ulkopuolelta ja harkitsemaan temaattista, askelittaista lähestymistapaa uusia markkinoita ja liiketoimintamahdollisuuksia kohti.

AVAINSANAT: digitalisaatio, teknologinen murros, innovaatio, liiketoimintamalli, API, ekosysteemi, digitaalinen alusta, arvonluonti

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Acronyms

API	Application Programming Interface
B2B	Business to business
B2C	Business to consumer
B2D	Business to developer
EUR	Euro
GDPR	General data protection regulation
IoT	Internet of things
SDL	Service-dominant-logic
SME	Small and medium-sized enterprise

1 Introduction

This section introduces the research. The background of the research is explained, and the research questions are presented. The research scope is defined and finally the structure of the thesis is summarized.

1.1 Background, motivation, and research context

The megatrend of digitalization is changing industries faster than ever before. Companies are able to utilize technology to change how products and services are created, marketed, sold, and delivered to the customers. This allows companies to develop new business models and disrupt existing industries, where the established market leaders are often focusing on optimizing their existing business and processes. Market dynamics are changing faster as barriers of entry are removed by technology and substitutions for existing products and services are created with the help of technology.

In this rapidly changing digitalizing world, it is paramount that companies innovate faster in order to stay competitive. The developments described in the preceding paragraph have led to new methods of value creation, where customer value is no longer created by one actor alone, but rather by multiple companies co-creating the value consisting of multiple products and services. These business networks and business ecosystems are a way for companies to collaborate and compete in new ways. In order to build these value chains consisting of the offering from multiple companies, resource sharing and interfacing are crucial. Application programming interfaces (APIs) have become a prominent part of modern business models enabling both the technical as well as the business interface between these actors in the ecosystems.

This thesis explores this phenomenon of value creation through API-enabled ecosystems. The API ecosystem and its impact on digitalization and new business models is

considered. In order to discuss and understand digitalisation in a holistic manner, API ecosystems and the role they play cannot be overlooked.

1.2   Research Questions

The overarching problem addressed in this thesis is how to create value through API ecosystem and how to monetize this value. To address these problem areas, two research questions will be explored:

The first problem area is the way in which the different stakeholders conceptualize value creation through the case API ecosystem, elucidating similarities or differences in approaches.

Thus, the first research question is:

   RO1: How do different stakeholders see value creation through API ecosystem?

The second problem area is the question of how the value is turned into monetary business benefits. Value can be created by offering ready solutions as they are or through enabling customization and modification of the solutions offered through different methods. Monetization is therefore a choice embedded in the offering strategy and something to be considered in depth. The differences and similarities in the opinions of the different stakeholders are considered.

Thus, the second research question is:

   RO2: How do different stakeholders see the process of turning value from the API ecosystem into money?

The goal of these research questions is to formulate recommendations on how to create value through API ecosystem and on how to monetize value in the context of the case study company and industry.

1.3   Research Scope

The case analysed in this thesis is KONE Oyj (later: KONE) and their approach to API ecosystem and digitalization. The scope of the thesis is therefore KONE and their digital transformation and business. However, the research findings are generalized as far as possible to allow findings to be used in other industries and concerning other companies as well.

KONE is an internationally established industry player founded in Finland in 1910. The company is going through a heavy digitalization transformation. Throughout its over 110-year long history, KONE has always functioned in the same market, providing elevators, escalators, and automatic building doors, along with solutions for maintenance and modernization of these equipment. (KONE, 2021) KONE's core function is described as *"add[ing] value to buildings throughout their life cycle"* (KONE, 2021). KONE had a revenue of EUR 9,9 billion in 2020 and over 60 000 employees in over 60 countries, making it one of the largest and most global companies in Finland (KONE, 2021). The company defines itself as *"a global leader in the elevator and escalator industry, and our job is to make the world's cities better and more sustainable places to live"* (KONE, 2021). As can be seen from the statement, the company wants to define a clear purpose which is beyond manufacturing equipment. This is also reflected in the company's official mission statement: *"Our mission is to improve the flow of urban life"* (KONE, 2021). KONE's strategy is based on megatrends, out of which three are seen as important to KONE, *Urbanization, Sustainability and Technology.* Digitalization is seen clearly in the highlighted opportunities for growth section of that strategy, where the company identifies connectivity and adaptability as well as products and services to create value to their customers in new ways (KONE, 2021). They also make a statement about

"becoming the preferred partner for smart and sustainable city development" (KONE, 2021).

In 2019 KONE published their new product portfolio called KONE DX Class elevators, bringing connectivity and digitalization to every elevator product (KONE DX, 2021). This was a big step towards the strategic goals described earlier and shows the clear focus in digitalization. The scope of this research is around this change going on in the corporation. While the company is clearly not a start-up, the orientation to change and breaking down old practices and assumptions in a traditional established company like KONE makes it an interesting target for research.

1.4   Structure of the Thesis

The thesis will proceed as follows. Section two identifies research around the topic of value and value creation, starting from the definition of value and different tools available for value creation. Section three explores the core concepts needed to define what an API ecosystem is. This is done by focusing on research into topics of ecosystems, digital platforms, APIs and monetization of digital services. The definition of KONE API ecosystem is introduced at the end of the section three. Chapter four introduces the method used in this study from research approach to data collection and analysis. Chapter five collects and discusses the results of the analysis, splitting them into themes that can be used as a link to the theories considered as well as recommendations to the company. Finally, section six is bringing together the conclusions and recommendations for both the company and research alike in a concise manner.

2 Exploring the Concept of Value

This chapter explores the concept of value. It begins from the definition of value and how it has been approached in literature, proceeding to discuss how value can be created in a network of businesses instead of by one party alone. Then different components of value are considered by introducing four separate tools for structuring value. A framework is then synthesized based on these tools and a process of value creation proposed.

2.1 Defining Value

Value can mean either what a customer perceives and receives, or it can stand for what the customer can deliver (Woodall, 2003, p.3). The latter is related to customer lifetime value and for the purpose of this study we concentrate on the *customer perceived value*. Kotler and Keller define customer perceived value as "the difference between customer's evaluation of all the benefits and all the costs of an offering and the perceived alternatives" (Kotler & Keller, 2012, p.5). In principle value is therefore always dependent on the individual's evaluation, perception and eventually the costs they see associated to it. This makes the study of perceived value a difficult concept and an interdisciplinary area involving psychology, sociology, economic and business concepts (Boksberger & Melsen, 2011; Kotler & Keller, 2012). In the scope of this study there is not a need to delve much deeper into the other disciplines but concentrate on business side and what these value perceptions mean for strategic management. Therefore, the definition offered by Kotler and Keller (2012) can be used as a basis when considering the structure of value and value creation. Value is then created and delivered to customers as products and services that consist of a combination of functional and emotional benefits or reduction of various types of costs perceived by the customer (Kotler & Keller, 2012).

2.2 Value Creation in Business Networks

Megatrends like digitalization are changing our world, the different markets and competition more rapidly than ever. These trends make it faster and easier to create new products and services that disrupt industries and change the competitive conditions very rapidly. This requires the companies providing services and products to continuously update the value they create and is a challenge faced by multiple companies in different industries. (Jarillo, 1988; Prahalad & Ramaswamy, 2004, Vargo et al., 2008).

Companies need to adjust their strategy and utilize resources beyond what their own company alone can have in order to remain competitive (Dyer & Singh, 1998; Jacobides, 2019). Value is therefore more and more often no longer created by one party alone, but it is *co-created* by multiple service providers and even customers together (Lacoste, 2014; Pekkarinen & Ulkuniemi, 2008; Prahalad & Ramaswamy, 2004; Vargo et al., 2008). This kind of collaborative value creation and innovation happens between different companies that form a business network (Ford et al., 2011; Håkansson & Ford, 2002; Jarillo, 1998; Lacoste, 2014). Such a business network is any network of companies that work together to accomplish certain shared objectives (Ford et al., 2011). It is widely recognized and studied that business networking has become a way to keep up with changes in environments, markets, product, and service offering and relationship management (Allee, 2009; Ford et al., 2011; Håkansson & Ford, 2002; Jarillo, 1998; Kohtamäki & Rajala, 2016; Lacoste, 2014; Moore 1996; Söderman 2014). A single company is then becoming more like a node in a network, where its strategic focus is on how to connect with other organizations in the network (Håkansson & Ford, 2002; Kohtamäki & Rajala, 2016; Ritter et al., 2014) in order to create value that matches the needs of its customers. Organisations also *co-evolve* through their interactions in this value creating network (Moore, 1996). Therefore, it is crucial to also consider value creation as a networking activity and how these networks affect the value creation and perception process.

In business value networks a group of mutually complementary companies are said to offer "a complete value proposition" (Clarysse et al., 2014, p.1164), indicating how different resources, competences and potentially different solutions need to be combined in order to fulfil the customer need (Håkansson & Ford, 2002; Möller 2006; Prahalad & Ramaswamy, 2004). Networks can form over time as a result of common activities, or they can be purposeful networks like organizations creating value interactions towards a certain activity or planned outcome (Allee, 2009). In such strategic networks different organizations turn both tangible and intangible assets into offerings to fulfil different functions, which can complement each other (Allee, 2009; Jarillo, 1998; Möller, 2006). This kind of value-creating network can be defined as "any purposeful group of people or organizations creating social and economic good through complex dynamic exchanges of tangible and intangible value" (Allee, 2009, p.429). External facing value networks include the organization, its suppliers, strategic partners, investors, and customers (Allee, 2009). These different actors can produce complementary offering or service, creating value by generating a new benefit or reducing a sacrifice as a module in a bigger offering created by the network. On the other hand, service-dominant-logic (SDL) states that "Actors cannot deliver value but can participate in the creation and offering of value propositions" (Vargo & Lusch, 2016, p.8).

In this manner the value network creates a better chance of fulfilling the changing customer needs and also further adaptability and flexibility to address these needs (Kohtamäki & Rajala, 2016); Prahalad & Ramaswamy, 2004). Value networks refer therefore bring together multiple companies, where the value proposition is offered by a group of actors which are mutually complementary (Clarysse et al., 2014). No one actor is therefore delivering value as stated by Vargo & Lusch (2016) but contribute to the process where the value creation happens together by the different parties including customers, suppliers, partners, and other actors in the network (Kohtamäki & Rajala, 2016; Vargo & Lusch, 2016). Even though this is stated differently in other studies (Allee, 2009; Clarysse et al., 2014), the intent is the same in the way that the value grows by different parties interacting and complementing each other. In chapter 3, digital

platforms and API ecosystem are introduced as a specific implementation of a business network and this value creation process is discussed in more detail.

2.3 Components of Value

Value perception is not constant. It varies throughout the process and customer journey. It can be split to four stages from before the decision to buy, value perceived at the time of purchase to value perceived after the purchase and finally after using the product or service (Woodall 2003, p.12). The value perceived through these different stages is comprised of several elements. Everyone sees value from their own perspective, or in other words "Value is always uniquely and phenomenologically determined by the beneficiary" (Vargo & Lusch, 2016, p.7). Defining value is an intricate process that relies on many moving parts, thus being reflective of the multidisciplinary nature of the value concept itself. A variety of tools exist for defining what value means through splitting it to different components. Below four different approaches and tools will be introduced.

2.3.1 Benefits and Sacrifices Trade-off

Woodall (2003) defines customer perceived value as a trade-off between benefit and sacrifice. Value can therefore appear as presence of benefit or reduction of sacrifice (Kotler & Keller, 2012; Woodall, 2003). Benefits can be simple features of a product, but especially in a service business and digitalization a benefit can also for example come from usage of digital services supporting company strategy or enhancing the brand of the company as a modern one (Moilanen et al., 2019). Sacrifices can also be split to monetary and non-monetary sacrifices. Often it is easier to evaluate the direct monetary sacrifices but forget for example the non-monetary sacrifices related to lost time when using a poorly designed digital service (Moilanen et al., 2019). Benefits can be considered to consist of attributes and outcomes. For example, one can consider quality from multiple viewpoints through attributes such as product quality, technical quality,

functional quality or performance quality just to name a few (Woodall, 2003). These can be directly or indirectly related to benefit outcomes such as financial benefits or convenience or operational benefits (Woodall, 2003). A product that has good perceived quality can lead to financial benefits for the user utilizing it as part of something bigger. Performance quality can lead to operational benefits and greater convenience when there is no need to "pay" for the loss of performance in terms of operational delay or waiting times. Such payments could be considered non-monetary, but they can also have directly measurable cost impact when for example operation relates to yield of a rendered service. (Woodall, 2003) Common benefits and sacrifices in perceived customer value have been explored in depth by Woodall (2003) as shown in Table 1 below, showing the complexity of the topic at hand like the different angles discussed here. Woodall's (2003) table can be considered a tool when constructing the value of a product or service, to make sure different components as well as cause-and-effect paths are taken into consideration as illustrated by the examples earlier.

BENEFITS		SACRIFICES
Attributes	Outcomes	
Perceived quality	Functional benefits	Price
Product quality	Utility	Market price
Quality	Use function	Monetary costs
Service quality	Aesthetic function	Financial
Technical quality	Operational benefits	Costs
Functional quality	Economy	Costs of use
Performance quality	Logistical benefits	Perceived costs
Service performance	Product benefits	Search costs
Service	Strategic benefits	Acquisition costs
Service support	Financial benefits	Opportunity costs
Special service aspects	Results for the customer	Delivery and installation costs
Additional services	Social benefits	Costs of repair
Core solution	Security	Training and maintenance costs
Customisation	Convenience	Non-monetary costs
Reliability	Enjoyment	Non-financial costs
Product characteristics	Appreciation from users	Relationship costs
Product attributes	Knowledge, humour	Psychological costs
Features	Self-expression	Time
Performance	Personal benefits	Human energy
	Association with social groups	Effort
	Affective arousal	

Table 1. Benefits and sacrifices in perceived customer value. (Woodall, 2003, p.14)

2.3.2 Value Proposition Canvas

Another very commonly used tool for defining value is the 'Value Proposition Canvas' introduced by Osterwalder and his team (2014). The Value Proposition Canvas consists of a customer profile and value map. The Customer (Segment) Profile breaks the customer down into its jobs, pains, and gains. The Value (Proposition) Map breaks the value proposition into products and services, pain relievers, and gain creators. (Osterwalder et al., 2014) The canvas is shown in figure 1.
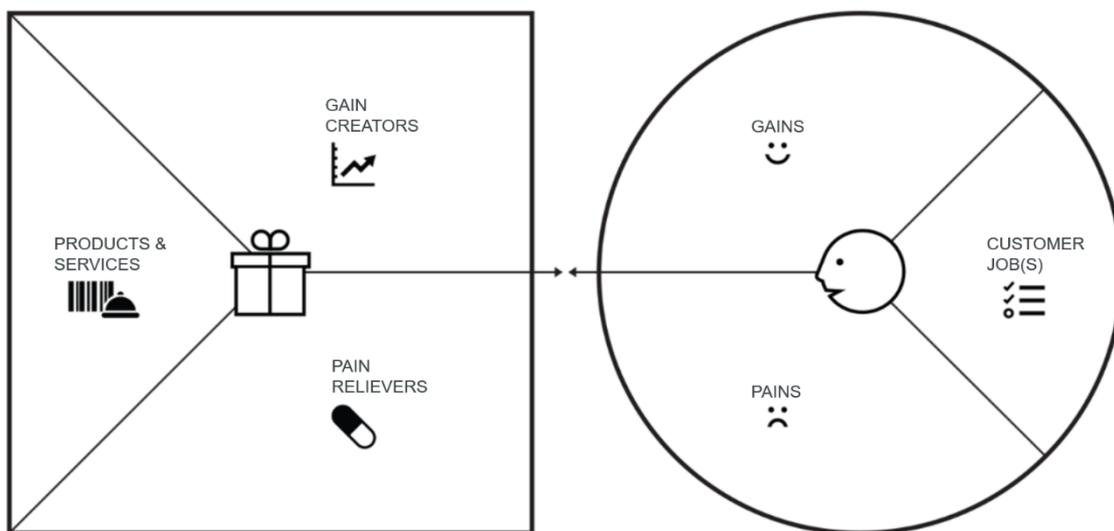
Figure 1. The Value Proposition Canvas. (adapted from Osterwalder et al., 2014, p.8)

This canvas is usually used in defining a product or service to address a customer job to be fulfilled. The design of such a product or service is based on the gains and pains perceived by the customer group and the correspondent gain creators and pain relievers. (Osterwalder et al., 2014) These can then fulfil different value definitions and consider both benefits and sacrifices as in Woodall's (2003) model.

2.3.3   Value Pyramid

Almquist and others (2016, 2018) studied value elements both in the context of consumer perceived value in business-to-consumer (B2C) market and later in the context of business counterpart perceived value in business-to-business (B2B) market.

Studying the B2C context, Almquist and others (2016) proposed that the customers weigh the product or services value against the asking price. This is directly linked to Woodall's (2003) framework and the original definition of value by Kotler and Keller (2012). In their study Almquist and his colleagues (2016) mapped 30 different elements of value split to four different categories: functional, emotional, life changing, and social impact. Study based on this pyramid view of value elements showed that the companies that performed well on multiple elements also had more loyal customers than the other companies in the study (Almquist et al., 2016, p.50). Loyalty of customers is another interesting benefit that can be both measured by utilizing multiple attributes and outcomes. This thesis is focused on a case study of a B2B company. Even though buyers in organization are also human and have similar decision-making patterns as in B2C business, there are differences in value perception to be taken into account in this context.

Almquist and his colleagues (2018) defined another set of 40 value elements for B2B context and mapped them into five categories: table stakes, functional, ease of doing business, individual, and inspirational (Almquist et al., 2018). These 40 distinct B2B value elements are presented for customers as a pyramid with five levels. The most objective kinds of value elements are found at the base, and the higher a level is, the more subjective and personal the types of value it contains. (Almquist et al., 2018). In this context, *table stakes* value elements are the starting point, comprising of meeting the customer expectations, acceptable price, compliance with regulations and ethical standards. If the *table stakes* are not met, the rest of the value do not usually matter, and a deal is not made. The level of f*unctional value* means *economic* and *performance* elements from direct revenue and cost reduction to product *quality*, *scalability* and

innovation. If the customer sees the value corresponding to their needs this far, then they can extend their evaluation to third level called *ease of doing business value*. These elements are numerous and how they are perceived is very industry specific. They can be split to five categories *operational*, *strategic*, *productivity*, *access* and *relationship*, each comprising of multiple elements within. In the fourth level of the value pyramid is *individual value*. At the end of the day, the person purchasing a product, or a service is still an individual and they have more subjective value expectations as well from personal preferences to career related. At the top of the pyramid are *inspirational value* elements related to the subjective purpose perceived by the individual making the decision. If the value can be tied to their vision of the future or bring as aspect of social responsibility, it can have a high impact on the perceived benefits. The different levels are illustrated in figure 2. (Almquist et al., 2018)
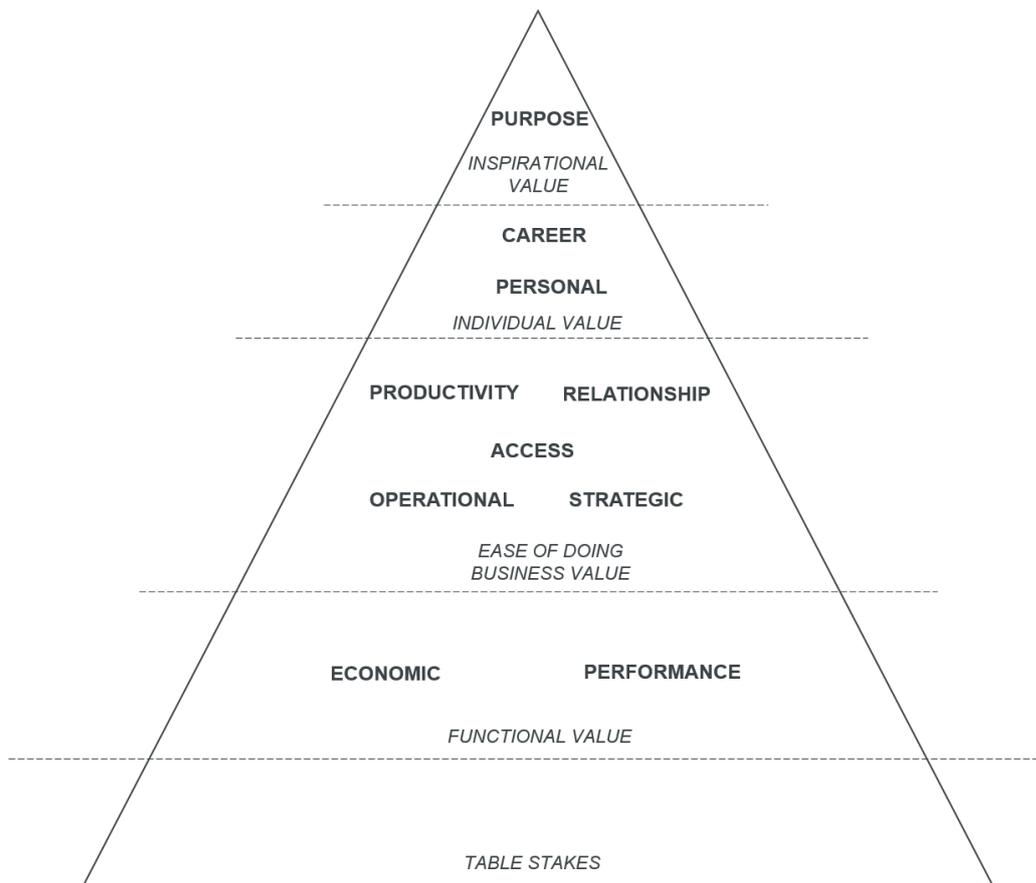

Figure 2. The B2B elements of the Value Pyramid. (adapted from Almquist et al., 2018, p.4)

Value in B2B context has not been researched in as much detail as B2C, but there is literature available indicating how the perceived value also changes differently in B2B context (Almquist et al., 2018; Flint & Woodruff, 2002). The changing customer value means that the value creation process should anticipate change over time and not assume constant value creation (Flint & Woodruff, 2002). This leads to the finding that companies should consider how to constantly evolve their value proposition to stay competitive. A company looking to increase their market share as a priority today might value scalability above all in the value pyramid, but once their own situation changes, they might see for example productivity as a much more important area of focus.

2.3.4   Modularity as a Value

As discussed earlier in this chapter, perceived value comprises of multitude of elements and varies based on the context and the customer (Almquist et al., 2016, 2018; Woodall, 2013). It was also discussed how value creation takes place in business networks and is co-created rather than created alone by one company (Dyer & Singh, 1998; Jarillo 1988; Kohtamäki & Rajala, 2016; Prahalad & Ramaswamy, 2004, Vargo et al., 2008) How then can a company be flexible enough to co-create further value for different needs and challenges with other parties? Service modularity is a key component in making this possible and utilizing a service platform approach to serve different customer needs (Pekkarinen & Ulkuniemi, 2008). How to fulfil the different benefits and sacrifices (Woodal, 2013), how to build pyramids of value (Almquist et al., 2018) and consider fulfilling the customer jobs (Osterwalder et al., 2014) are driven by modular services. Modular services, whether digital or not, consist of multiple service elements and interfaces between them. This linkage of service modules by an interface is illustrated in figure 3. A service that is designed to work together with other services to create further value proposition should take the interfacing of the services into account in the design process (Pekkarinen & Ulkuniemi, 2008). This can be considered equally relevant for services with physical attributes as well as fully non-physical services such as digital services.
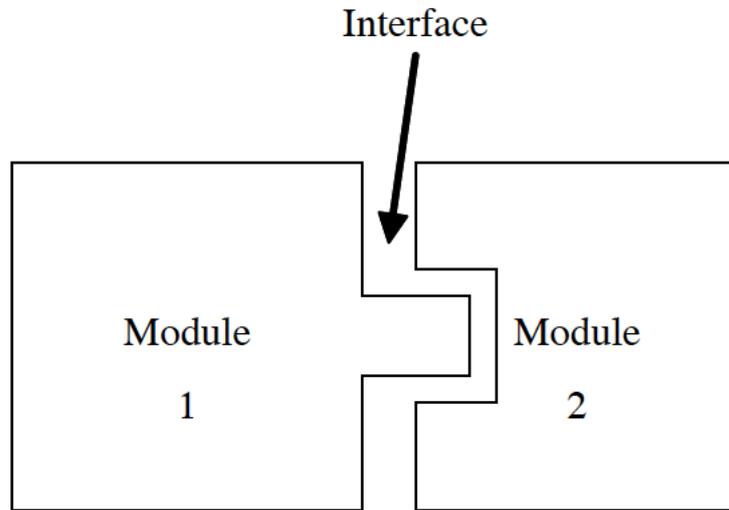
Figure 3. A modular service with two service elements and one interface. (Pekkarinen & Ulkuniemi, 2008, p.85)

By utilizing modularity an offering can be both flexible, and also offer possibility to be tailored to fit specific customer needs and fulfil more value propositions (Rahikka et al., 2011). It is shown in Rahikka's and others' (2011) study that the aspect of service modularity affects the earlier discussed value elements, both benefits and sacrifices. This model has many similarities in the benefits side to Woodalls (2003) and Almquists (2016) models and links can be made to Osterwalder's value proposition canvas as well. However, while service modularity approach can be viewed as an extension to the other value definition models described here, it does not take sacrifices made into account as well as Almquist (2018) and Osterwalder (2014). Costs are considered, but not other sacrifices needed for the chosen value creation approach. Even though this gap can be found in the modularity concept, it is of high importance to a digital service business and can be seen as a clear extension to the other models introduced. In this study, we can utilize the findings from the other studies to complement the service modularity theory and therefore offer a richer model and framework for value perception.

2.4   Synthesizing a Value Creation Framework

By combining the four value definition tools introduces in the preceding sections, an iterative and heuristic framework and process can be defined for value creation. The process starts with the simultaneous consideration of the benefits to be created for the target customer segment and their trade-offs compared to sacrifices the customer is expected to make on a high level based on Woodall's (2003) approach. These benefits and sacrifices can then be alleviated by following Osterwalder's (2014) Value Proposition Canvas approach by defining gain creators and pain relievers in more depth followed by defining the minimum viable product or service to address them. As a third step, one should consider how the value proposition fits on Almquist's (2018) value pyramid concept. Here, it should be considered whether there are lower layers being ignored, which would render the value proposition incomplete, or whether there are possible horizontal or higher value elements that should be added to complete value proposition to make it more attractive. Finally, as this approach can reveal a lot of gaps that one company or one service alone cannot fulfil (Håkansson & Ford, 2002; Prahalad & Ramaswamy, 2004), modularity of the service (Pekkarinen & Ulkuniemi, 2008) should be considered to allow easier extension to cover a wider range of value elements and co-creation of further solutions and services to address those values. Then the process can once again start from the beginning and consider especially the new sacrifices that were introduced and whether it is still viable to consider wider value proposition concept or perhaps rely on other services fulfilling the gaps. This proposed value proposition creation framework is illustrated in figure 4.
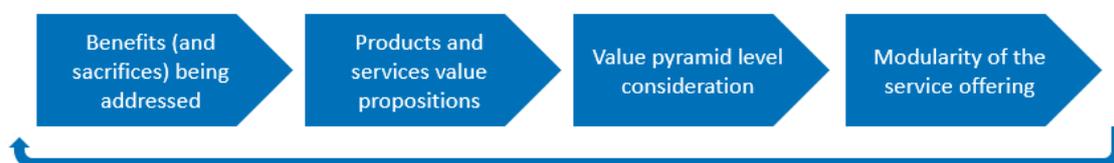
Figure 4. Value creation framework.

3 API Ecosystem

This section defines the second core concept of the study, an API ecosystem. To reach this definition, business ecosystems are introduced first, followed by digital platforms and the specific processes of value creation offered by them. Application programming interfaces are introduced along with basics into monetization of digital services to complete the definition of an API ecosystem and how it has been built for the case study company. The final chapter then introduces how this kind of API ecosystem has been defined in the case study company.

3.1 Ecosystem

Ecosystem concept comes from biology and was originally introduced by Moore in 1993. Moore (1993) compared business organizations and individuals to biological organism, which evolve over time. Ecosystems have sparked a lot of research and interest lately with an attempt to create classification and understanding of the various interactions (Adner, 2017; Han, 2017, Jacobides et al., 2018; Scholten & Scholten, 2012; Valkokari et al., 2015). One definition following Moore's original idea is "an economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world" (Valkokari et al., 2015). Another good definition is "ecosystem— the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize" (Adner, 2017, p.40). Ecosystems are continuously and dynamically evolving through interactions between the different parties and actors within. Business ecosystem is therefore a special kind of business network (Håkansson & Ford, 2002; Jarillo, 1998), which were introduced earlier in section 2.2. Both definitions of an ecosystem highlight the foundation and alignment needed in an ecosystem to enable further interaction and hence value creation as discussed in the context of business networks (Kohtamäki & Rajala, 2016; Ritter et al., 2014) generally in previous chapter as well.

However, due to the high interest in ecosystems in business research, there have been multiple different types of ecosystems introduced. Some studies draw lines between business ecosystems, innovation ecosystems, entrepreneurial ecosystems and knowledge ecosystems (Adner, 2017; Clarisse et al., 2014; Scaringela et al., 2018). Valkokari's (2015) popular split is between Business Ecosystem, Innovation Ecosystem and Knowledge Ecosystem as illustrated in figure 5.
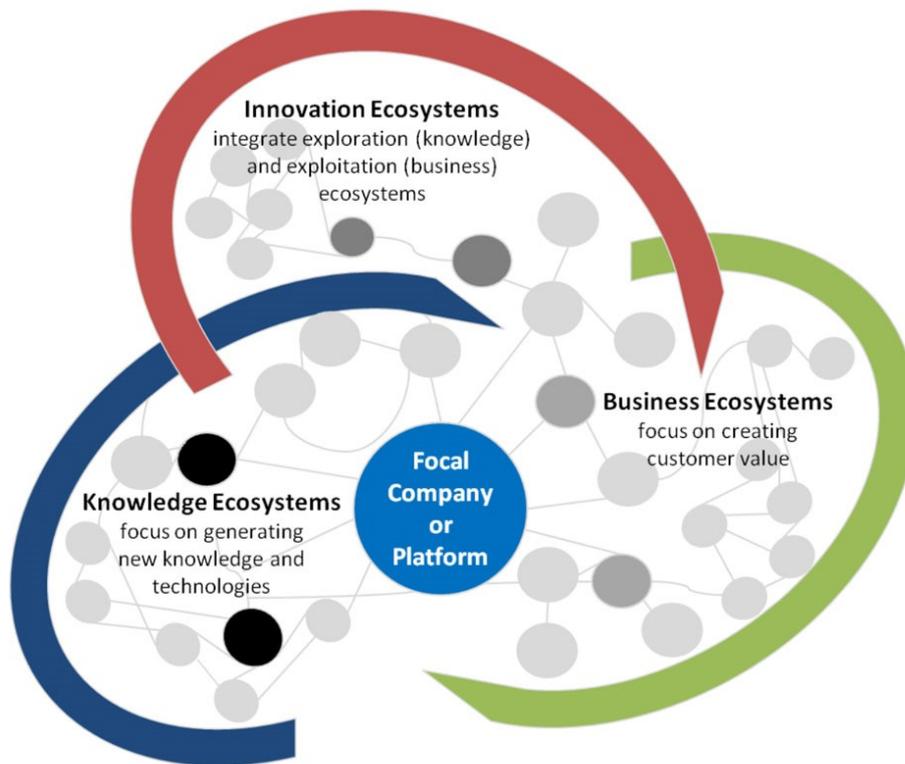
Figure 5. Three types of ecosystems. (Valkokari, 2015, p.20)

This thesis focuses on the intersection of the business- and innovation ecosystems. As evident from figure 5, ecosystems cannot be strictly separated in practice. However, for the analytical purpose of this thesis, the choice was made to concentrate on the innovation and business aspects, while fully acknowledging the importance of knowledge ecosystems (Valkokari, 2015) and entrepreneurial ecosystems (Adner, 2017; Clarisse et al., 2014; Scaringela et al., 2018) as well.

While ecosystems have sparked a lot of interest in research and many businesses tend to talk about their ecosystems, there are also those who argue that the term is over-used, and the meaning is getting blurry at best (Oh et al., 2016; Ritala et al., 2017; Tsujimoto et al., 2018). Innovation systems as an example have been studied for even longer and their tension towards each other seen as a driver for further innovation. In this sense the same topic is now researched under the innovation ecosystem umbrella and may be just a newer name for the same topic. (Oh et al., 2016) Even though Moore defined ecosystem based on biology, the definition is very different in different branches of research (Tsujimoto et al., 2018). Strategic networks, supply chain management and innovation system theories all seem to cover very similar approaches (Oh et al., 2017; Tsujimoto et al., 2018). Perhaps the differentiating characteristic of ecosystem research is the angle of co-evolution of the parties within the same ecosystem and how their interactions, evolution and actions affect the balance of that ecosystem differently than in other similar concepts (Ritala et al., 2017; Valkokari, 2015). Each actor in an ecosystem has their own goals and own activities bringing both positive and negative aspects to the ecosystem including competition (Tsujimoto et al., 2018). These aspects of interaction and evolution between different organizations could grant the right to use the word ecosystem and, in this thesis, we accept the slightly ambiguous definition and accept the definition of ecosystem as seen by Moore (1993), Scholten & Scholten (2012), Jacobides (2018), Adner (2017), Valkokari (2015) and others.

Value in an ecosystem is generated together for end-customers by integrating interdependent subsystems (Han et al., 2017). These different subsystems are pieces of a larger value creation process in both service and product businesses. Modularity in service and product business, as discussed earlier, is seen as a crucial enabler for ecosystem emergence, allowing distinct organizations to cooperate without much hierarchy (Jacobides et al., 2018; Rahikka et al., 2011). With the changing market and demands, corporations face more risks and costs which they can aim to counter by implementing open modular platform with an ecosystem around it providing further innovations (Scholten & Scholten, 2012). Therefore, instead of focusing on building

individual products and services to serve the value proposition demanded by the market, companies must focus on competition of digitally enabled ecosystems that span across industry boundaries and offer customizable product and service bundles (Jacobides et al., 2018; Rahikka et al., 2011).

Based on the definitions discussed above, the concept of an ecosystem is therefore fitting very well with the value creation framework introduced in the section 2.4 of this study. The framework offers a value creation process to widen the scope of benefits being offered to customers and enabling sacrifices being either lowered by specialized companies or at least spread between different interchangeable service elements. It also enables easier access for companies to multiple levels of a value pyramid by allowing different services being combined modularly to complement each other's value proposition. Each actor is bringing their own piece to the value creation process and co-evolving together with the rest of the ecosystem actors as Moore (1993) defined.

3.2   Digital Platform

Platform is a term used to describe a focal point in an ecosystem. It is the centre or hub around which a specific ecosystem can be created. Platform can refer to both business model and infrastructure, digital or physical (Choudary 2015, Hein et al., 2019; Parker et al., 2016). In this chapter the concept is studied further, and the unique value creation methodology offered by digital platforms is linked to the earlier theories introduced in this thesis.

3.2.1   The Concept of Platform

Platforms have existed in one form or another for a long time. Shopping malls are platforms for consumers and merchants; and newspapers for subscribers and advertisers (Van Alstyne et al., 2016, p.2). A newer form of platform business has emerged from

digital platforms (Choudary, 2015; Parker et al., 2016; Van Alstyne et al., 2016). Digital platforms have become very familiar for consumers in many industries through companies such as Spotify, Airbnb, Uber, Apple, Google, Facebook and many others. They are changing how value is created in an industry and often changing the logic of the industry altogether or even creating new ones completely (Parker at al. 2016).

Platforms can be considered as building blocks forming a foundation upon which other companies can build complementary offering in a modular fashion (Parker et al., 2016, Choudary, 2015). According to Van Alstyne and others (2016) as well as Parker and others (2016), a platform ecosystem then includes the platform owner and their own core offering including a governance model for the platform. The platform owner in this type of an interaction also handles the mediating and interfacing between different service modules, or they can have direct linkages. Scholten and Scholten (2012) define that a service ecosystem is formed from complementary products and the whole platform ecosystem enables the complete customizable solution which is offered to the consumers of the platform ecosystem. This is illustrated below in figure 6. With a platform approach like this, each customer can be offered a unique collection of services fulfilling their needs with the help of the platform. This is strongly linked to the value creation principles in business networks (Håkansson & Ford, 2002; Jarillo, 1998) as well as ecosystem value creation (Han et al., 2017; Jacobides et al., 2018; Rahikka et al., 2011). In the figure 6, a platform consumer C1 is offered a total ecosystem solution consisting of four different services illustrated by a blue line, while C2 is served by the green and C3 by the yellow highlighted service offering, respectively (Scholten and Scholten (2012). Digital platform is therefore bringing together the concepts of network value creation (Håkansson & Ford, 2002; Jarillo, 1998), service modularity (Pekkarinen & Ulkuniemi, 2008) and ecosystems (Moore 1996; Adner, 2017; Han, 2017, Jacobides et al., 2018).
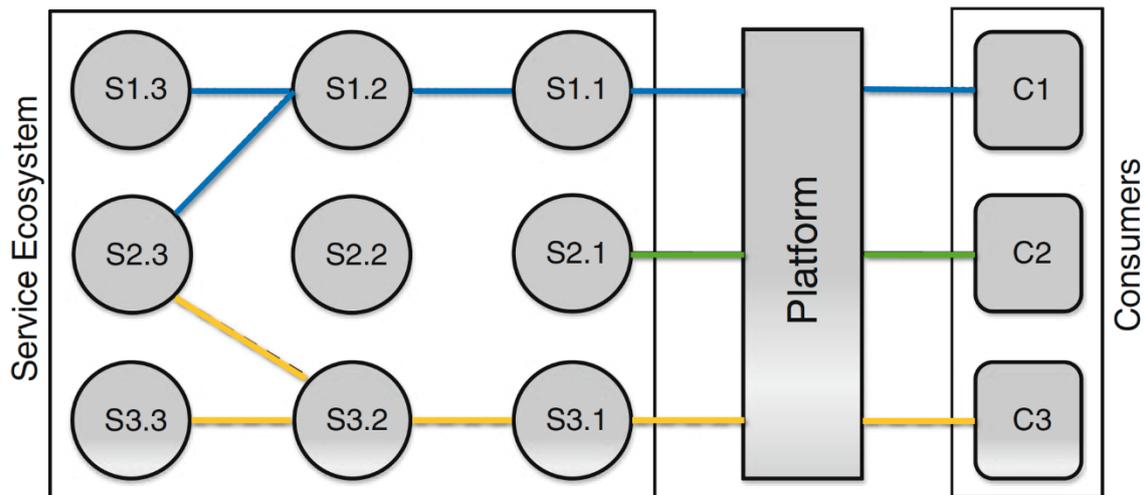
Figure 6. The principle setting of platform ecosystem. (adapted from Scholten & Scholten, 2012, p. 167)

Consumers of value can acquire products or services and get their needs fulfilled by the different service providers in the ecosystem through the platform (Han et al., 2017; Scholten & Scholten, 2012). The platform is hence a mediator of value enabling the combination of modular value elements and easy distribution to the consumers. The platform business model is therefore to be a provider of tools and channel to fulfil the value creation framework which was defined earlier in chapter 2.4.

3.2.2 Platform Value Creation

In platform business, value is created with customers, partners and end-users together often completely outside of the platform company itself (Parker et al., 2016; Van Alstyne et al., 2017). This links very strongly to ecosystems as summarized by Hein and others (2019): "Digital platforms utilize an ecosystem of autonomous agents to co-create value" (Hein et al., 2019, p. 87). Airbnb and Uber are great examples of how value creation logic in an industry can be changed by platform businesses. Already by 2014, Airbnb listed half a million properties and had served over 10 million guests without owning or operating any property itself (Parker et al., 2016, p. 2-3). It is a great and classic example of a B2C

platform company completely changing the value creation logic in hospitality industry. Similarly, Uber is changing taxi industry's value creation and is called the world's largest taxi company without owning any vehicles (Parker, 2016). These are but two examples that show how in platform businesses, value is created differently than before. What is common for these two examples is de-linking assets from value (Parker et al., 2016). A platform in this case enables an asset to be used by someone else than its owner and sometimes for a different use than what it was originally purchased for. This is another way how platforms disrupt existing markets, by re-defining the value creation process itself (Parker et a., 2016). This enables a change in consumer behaviour by enabling new ways to get the service they need. It is a disruption of business model even when the services themselves would have been accessible differently before as well.

Working in collaboration in a business network or ecosystem grants the organization access to new knowledge, enables shared risk taking and resources and joining complementary skills and capacities, which allow the companies to focus on their own core competencies (Romero & Molina, 2011). Earlier it was defined how value creation in networks is a joint effort (Håkansson & Ford, 2002; Jarillo, 1998). Prahalad and Ramaswamy (2004) popularized the term *co-creation* which is the activity of company and the customer creating value jointly, enabling the customer to co-construct the service experience in their own context. Related, Vargo and others (2008) introduced their service-dominant logic thinking defining how any goods are simply service delivery vehicles and knowledge and skills are the key to competitive advantage. Furthermore, they argued that there is no value until the offering is used and such offerings always need to be combined with other firms offering and market before it can deliver the value (Vargo et al., 2008). Individual firm's value creation, value proposition and services are only intermediary to the whole value co-creation- process, which combines the value from different sources and eventually forms the final benefits and sacrifices (Vargo et al., 2008). Value must be jointly created by both corporations and consumers as co-producers. Here is a clear link to earlier concepts of platform ecosystem value creation by Scholten & Scholten (2012) and service modularity by Rahikka and others (2011) and

Pekkarinen and others (2008). In a digital ecosystem the co-creation process can therefore include all the parties of the ecosystem, widening Prahalad's and others (2004) definition to include also complementary service providers, strategic business partners and the customers in collaboration with the platform owner or hub company. A digital platform ecosystem must then be able to attract and connect these different value providers. Value creation of the different participants in an ecosystem, both users and producers, form the core of the platform and its core interactions (Korhonen et al., 2017). Making sure the core interaction is encouraged and fostering is a key to co-creation activities in such a digital platform ecosystem.

Another characteristic of a digital platform business is the network effect, where users create value for other users (Van Alstyne et al., 2017) and therefore attract more users creating a beneficial cycle. There is direct network effect, where the value of the service is directly increasing when the number of users increases, or in other words the network grows. Indirect network effect is when the value depends on two or more groups such as producers, consumers, buyers and sellers. (Korhonen et al., 2017; Parker et al., 2016; Van Alstyne et al., 2017). When the co-creation of value happens between complementors or service providers and customer as well as the platform owner, this multi-sided network effect means that customers attract new service providers and the now extended ecosystem attracts more users. Same-sided network effect in addition means that customers attract more customers and service providers attract more service providers. (Rochet & Tirole, 2003) The growing value creating ecosystem is acting as a virtuous loop increasing the value creation possibilities and furthermore the flexibility, modularity, and attractiveness of the whole ecosystem (Rochet & Tirole, 2003). Network effect increases the value of the whole ecosystem as there is more exchange taking place with the increase in provided services and users. As there is more value created, there is also further demand for value consumption (Choudary et al., 2015). Network effect also creates stickiness of the service and ties users and producers both to the platform, making it less likely they leave the platform for another (Choudary et al., 2015). With this

effect a platform owner can reach market dominance and become hard to replace and compete with (Parker et al., 2016, Choudary et al., 2015).

Platforms bring together the value producers and consumers and provides the infrastructure for the business (Van Alstyne et al., 2016). Figure 7 depicts a general view of the players in a platform business. A good example can be given using Android mobile operating system as an example. Consumers are interested in applications running on a mobile device operated by Android operating system. In this example Google is the platform owner, owning the intellectual property rights of Android and deciding who can participate in this platform business and how. Sometimes the platform owner is also called the platform sponsor (Van Alstyne et al., 2017). Platform providers are the different mobile devices manufactured by many companies such as Samsung, Huawei, HMD Global and so forth. Producers are all companies and individual developers who are creating applications for the Android ecosystem and publishing them in the application store marketplace. The platform owner and provider make it possible for the producers to sell their products to the consumers, just like a shopping mall brings consumers in reach of multiple merchants. (Van Alstyne et al., 2017)
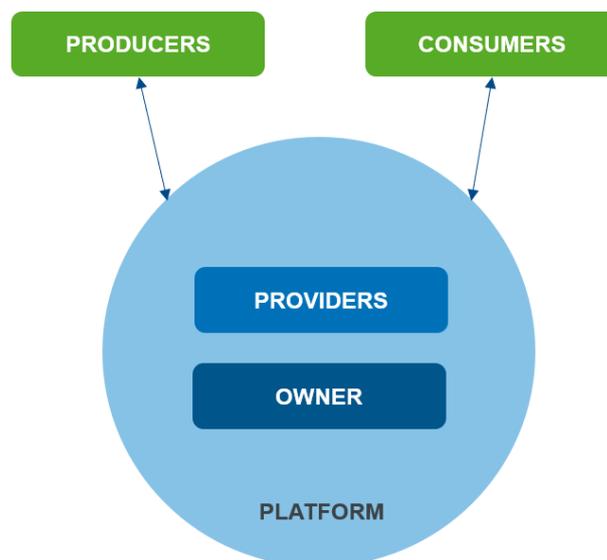
Figure 7. Players in a platform business. (adapted from Van Alstyne et al., 2017: 5)

As the platform owner can decide how the business is run on their platform and who can participate, they need to make crucial decisions about the openness of the platform. How much of the platform resources do they open and how they limit the different players in their platform is a question for the platform owner to decide. Too much openness can lead to value deteriorating effects such as poor-quality contributions, while too closed approach can reduce the number of producers and therefore consumers as well (Van Alstyne et al., 2017).

Value creation in a digital platform depends on the purpose and type of the platform. Many industrial B2B businesses build digital platforms for the purpose of improving their internal operations while others utilize them for the ecosystem and network effect to create further value for their customers as described earlier. One way to categorize platforms is to group them into transaction, innovation and hybrid platforms (Teece, 2017). Transaction platform is focusing on the exchange and transactions between different parties, utilizing the power of the network effect to attract further transactions as the platform matures. Amazon, Ebay and Alibaba are examples of a transaction platform. Innovation platforms primarily connect different companies together and enable them complementing each other's products and services to create further value. (Teece, 2017) Android and iOS ecosystems are good examples of innovation platforms enabling complementary value creation. Hybrid platforms combine the characteristics of the first two platform types and enable both types of value creation. (Teece, 2017). From the examples earlier it is clearly seen that the division between these platform types is often difficult at best and hybrid approach can be considered as the most scaling option. Some platforms are also named according to their purpose, such as social (digital) platforms and search (digital) platforms, however these can be viewed as a subset of the mentioned platform types (Teece, 2017). Eventually all digital platforms are enablers for a specific kind of ecosystem and set the rules and limits for the different actors participating in it.

3.3 Application Programming Interfaces (APIs)

API is the acronym for Application Programming Interface, and it is a set of tools, definitions, and protocols for integrating application software and services (Basole, 2016; Redhat, 2020). APIs are control points for digital products and services to communicate with other products and services without having to constantly build new connectivity infrastructure (Basole, 2016; Redhat, 2020). Digitalization, platform economy and APIs are changing many traditional business models (Benzell et al., 2017; Moilanen et al., 2019). API is in its simplest definition the digital interface between modular services as introduced in section 2.3.4 and figure 3. There are nearly 15000 distinct APIs available in the open internet and 7000 so-called 'mashups', which integrate two or more of such APIs together, showing how popular they have become (Basole et al., 2016).

There has been a lot of research into platform business, ecosystems, and digitalization (Benzell et al., 2017; Choudary et al., 2015; Libert et al., 2016; Parker et al., 2016; Van Alstyne et al., 2016) and while APIs are noted as important enablers in this new business field, their direct impact to value creation has been often overlooked. APIs are however not just part of platform economy, but they can open new business models on their own as well (Benzell et al., 2017; Iyer & Subramaniam, 2015; Moilanen et al., 2019) and create the foundation for digital ecosystems (Benzell et al., 2017). When a company wants to utilize external developers for further value creation, they build APIs (Parker et al., 2016). Another way to look at APIs is to consider them doors, through which a company can extend to new markets which were earlier out of reach (Iyer & Subramaniam, 2015).

Therefore, although API is a technical concept and requires technology, they should be considered business enablers. APIs are not just the concern for the technical people in an organization, but they concern multiple groups from executive to sales and to customer facing roles. This consideration of APIs as a business concept and their role as both a foundation for digital ecosystems as well as enabler for new business models and economic benefits can be called *API economy* (Heshmatisafa & Seppänen, 2020; Moilanen et al., 2019).

Earlier value creation was discussed in depth and a value creation framework was defined in chapter 2.4. APIs can play a big role in the value creation process and it can be a crucial part of customer's own value creation process. Earlier it was discussed how the value creating activities between the parties of an ecosystem form the core of the platform and core interactions (Korhonen et al., 2017). Now with further understanding of the value created by APIs it is clear how crucial the value they create is to these interactions. Well-designed APIs can boost a platform ecosystem in its co-creation activity and enhance the network effect further (Moilanen et al., 2019). APIs should therefore be seen as more than technical enablers and more as strategically significant business options like other value generating elements in a business (Iyer & Subramaniam, 2015; Benzell et al., 2017; Moilanen et al., 2019). This finding is one of the fundamental bases when a company considers value creation and strategy around an API-enabled ecosystem.

APIs enable exchange of value between actors and link them together, matching the concepts of the service-dominant logic (Vargo & Lusch, 2016) and modular service business (Pekkarinen & Ulkuniemi, 2008; Scholten & Scholten, 2012) introduced earlier. Their concepts are based on the possibility to combine different tasks and resources to co-create a full offering. API from a business perspective is a resource like any other and as such directly linked to a business model (Moilanen et al., 2019). Resources can be sold and purchased, and the key element is that resources are identifiable and available (Moilanen et al., 2019). API is doing exactly that, enabling easily identifiable resources, and making them available for the service-dominant-logic based business. Based on this overview of resources, it is clear to see that APIs can serve multitude of value creation methods and serve as resources for very different operations. For example, opening access to physical equipment and their operation to another service is a great example present in the case company as well. Also, for example legal and financial information can be opened to give an overview into them to serve better cooperation and co-creation between customers, partners, and the API producer. API owner decides and

controls which resources are opened through the APIs (Moilanen et al., 2019). This links to earlier introduced concept of digital platforms and platform owner (Van Alstyne et al., 2017). A platform owner is very often utilizing APIs to make the decision about the resources to be shared and therefore it is through APIs that they define the rules and restrictions of their platform ecosystem.

Some of these resources can be exposed as boundary resources. What is meant by boundary resource is a resource enabling linkage of different bodies in a software ecosystem (Dal et al., 2014; O'Reilly, 2007). Software ecosystems can be described as markets, where end-users and third-party developers exist in two sides of the market (Dal et al., 2014). In such an ecosystem, a large number of end-users attract more third-party developers and at the same time a large number of applications created by third parties attract more end-users (Dal et al., 2014; O'Reilly, 2007). This is called cross-side network effect and is one form of the network effect described earlier (Dal et al., 2014, Parker et al., 2016). The applications developed by the third-party developers utilise and are at the same constrained by boundary resources exposed by the ecosystem. This means that the parties exposing critical boundary resources to enable application creation can control and influence what happens in the ecosystem while at the same time taking advantage of the third-party development and applications' value creation process (Dal et al., 2014, Parker et al., 2016). Earlier it was discussed how an overly open platform approach can cause value deterioration (Van Alstyne et al., 2017). Boundary resources can be used as a means to control the openness and therefore also act as a quality guard for the ecosystem. This aspect is again highlighting how crucial APIs are when defining the business operations and limits within a digital ecosystem.

With the introduction of platform economy and API ecosystem basics, it is important to note the differences between these two. While APIs can and should be considered as a crucial element in a platform business, API ecosystem can be a wider concept. In platform economy the resources are not necessarily owned by the platform owner, but the platform is providing the marketplace where others are able to bring and interface

their own resources. From API ecosystem point of view, the crucial difference is that the API owner is controlling the resources that are exposed via their APIs (Moilanen et al., 2019). The difference may seem subtle, but it has a fundamental impact on what kind of business is enabled in the ecosystem and who can partake in it. A transaction-platform would not need to restrict what kind of resources are used and sold on the platform, while an API ecosystem can define very clearly which resources are part of that ecosystem and only those can be utilized for business.

3.4 Monetizing Value in API Ecosystem

When customer value is understood, monetization model can be defined to reflect the value creation process and the capturing of that value. Monetization is a term that can be used to describe the value capture part of a business model (Osterwalder et al., 2014). It is the process with which the customer perceived value is turned into transaction where money exchanges ownership. Monetization of digital services, platform and API ecosystem is a complex topic. The choice of a monetization model is usually between free, paid or indirect model (Heshmatisafa & Seppänen, 2020). While not all ecosystems aim for revenue, like the earlier introduced innovation or knowledge ecosystems (Valkokari, 2015), in this case the focus of business ecosystems is usually aiming for monetization. Companies want and need to be profitable. At the same time any charging of users can decrease the users in a platform and therefore damage the network effect and decrease the overall value of the platform (Parker et al., 2016; Van Alstyne et al., 2017). Companies need to find a balance between monetization, innovation and network effect on their digital platform and ecosystems. Pricing and monetization logic should be considered deciding factors in addition to boundary resources when it comes to decision on the different users within a digital ecosystem and their role in the business model. Wrong monetization model could become a hindrance to the growth of the ecosystem.

The basic choice how to price a service is to choose between one-time payment and a subscription model (Fruchter & Sigue, 2013). One-time payment is very simple, easy to describe, calculate and communicate. One-time payment can include a perpetual license to a software service, or it can also include a fixed term with certain end date (Fruchter & Sigue, 2013). In a subscription model, the customer pays a recurring fee for the service, until they choose to terminate the contract according to set terms. It is a balance between the cost of acquiring new customers for new one-time payments and the cost of customer relationship handling in a recurring service fee case.

Revenera (2020) conducted a survey into monetization models in software and IoT (internet of things) industry between April and June 2020. The survey was taken by 250 respondents in the industry and reveals interesting trends in monetization. The survey showed that 81% of software suppliers are using subscription models, and 37% using it as their dominant model. In the future, 53% of companies in the survey expect subscriptions models growing, compared to 48% who expect to see growth in usage-based models. Usage-based models are seen as a trend for the future, but at the same only 15% of the Revenera (2020) survey respondents were extensively using them today. Based on a study conducted by Heshmatisafa & Seppänen (2020), most companies do not even clearly determine a revenue model for their APIs. This clearly shows how new the topic of API economy and API monetization still is for most companies. When there is a monetization model used for APIs, the most common approach is a combination of free and premium, meaning paid, tiers (Heshmatisafa & Seppänen, 2020).

Based on the previous discussion of APIs as both enablers and limit definers in an ecosystem (Moilanen et al., 2019) and the impact price can have on growth of an ecosystem (Van Alstyne et al., 2017) the topic of pricing is seen as a critical choice for the business model as a whole. The role of APIs has been discussed in an innovation ecosystem, as part of transaction platforms and also as individual value-creating elements (Parker et al., 2016; RedHat, 2020; Van Alstyne et al., 2018). It has also been discussed how pricing can decrease the growth of an ecosystem by keeping away

complementors fearing costs (Van Alstyne et al., 2017). Choosing the most suitable monetization strategy is a very important factor when building a new API ecosystem and all of the models presented earlier should be considered from point of view of the different users of the ecosystem, businesses, consumers and developers while maintaining profitability for the business initiative.

3.5 KONE API Ecosystem

Value creation has been discussed in depth and from multiple perspectives in the preceding sections. There are clear elements to be recognised as value creation ingredients and these are different when it comes to B2C or B2B markets (Almquist et al., 2018). Value is a combination of benefits and sacrifices and consists of multiple layers (Woodall, 2003). Thus, value creation in service business requires modularity to enable bringing together different value creating elements to fulfil the service and the best way to achieve this is to utilize business networks to bring together different complementary value creating parties (Pekkarinen & Ulkuniemi, 2008; Håkansson & Ford, 2002; Möller 2006).

Earlier we have discussed business networks (Dyer & Singh, 1998; Håkansson & Ford, 2002; Jarillo, 1998) and ecosystems (Adner, 2017; Han, 2017, Jacobides et al., 2018; Scholten & Scholten, 2012; Valkokari et al., 2015) from multiple angles. Business ecosystem was recognized as one type of an ecosystem (Valkokari et al., 2015). Platform business is a business model creating a transaction and innovation ecosystem around a platform (Choudary et al., 2015; Parker et al., 2016; Van Alstyne et al., 2018). We have also defined APIs as key digital boundary resources in such a platform ecosystem (Moilanen et al., 2019). API ecosystem such as the one in our case study can therefore be considered as a special case of a business ecosystem and digital platform business. It considers value creation from the perspective of three customer groups: consumers (B2C), businesses (B2B) and developers (B2D). It is also not confined to one platform scope, but rather also tries to bridge several digital platform ecosystems together by

forming value chains not just between the players in one platform ecosystem, but several platform ecosystems together. Value creation is a complex process and has different meanings in B2C and B2B context as well as between service and product businesses. Modular digital services can be considered the ultimate value creation elements within this case API ecosystem, consisting of products and services built by different kinds of companies and individuals utilizing the resources of different platforms together with the APIs linking the boundary resources between them.

KONE's API ecosystem is built around their elevator equipment which are connected to KONE Digital Platform, called KONE DX Class elevators. The KONE Digital Platform is a cloud platform enabling sharing of resources through APIs as illustrated in figure 8. KONE is therefore utilising APIs to enable modularity and ecosystem thinking as also highlighted in their messaging. (KONE DX 2021)

"KONE DX Class enables customers to tailor and plug in additional software and services for elevators throughout the entire lifetime of a building. By using open application programming interfaces (APIs), KONE's approach makes it easy to manage and integrate different devices, apps and services with new and existing systems." (KONE DX, 2021)
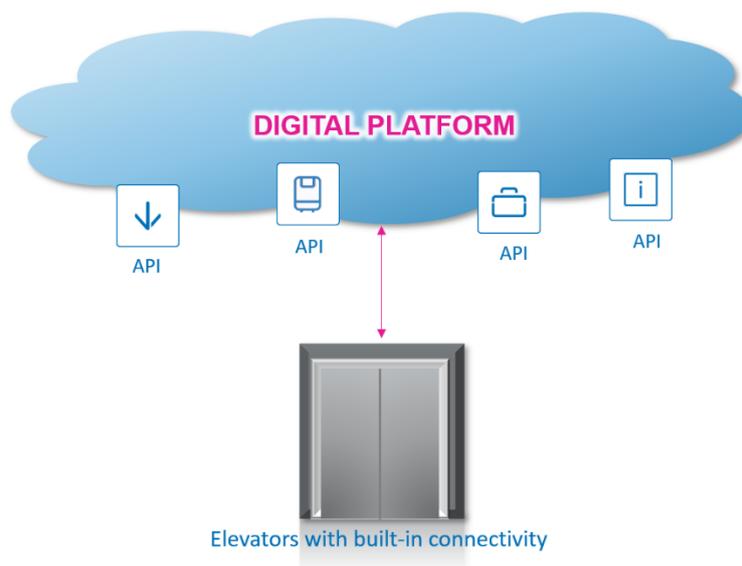

Figure 8. KONE Digital Platform and APIs. (adapted from: KONE DX, 2021)

KONE also sees this new approach as offering new ways to make business as well as making their product and service offering more holistic. This shift of business thinking is seen clearly in the company communication as well:

"With APIs, the KONE DX Class is transforming the elevator from a steel box on the end of a rope into a digital platform that becomes an integral and integrated part of a smart building." (KONE DX, 2021).

Through their digital platform and APIs KONE opens three kinds of options for digital services; KONE's own applications, applications elsewhere in the building and those brought by external third parties (KONE DX, 2021). This means that KONE is utilising an ecosystem approach for creating value in a wider manner than the company could alone. How they control this ecosystem is through the resources which they are sharing. These resources are access and control as well as data related to their elevators. Elevators can stay in a building for decades and KONE uses the power of the API ecosystem to also cater to future needs with adaptable and flexible service offering. (KONE DX, 2021)

KONE DX Class is a platform where KONE is the hub and has full control of the platform interaction through the design of their APIs. APIs also enable wider interaction than just around the single platform as was discussed earlier. This is also the case for KONE. KONE is also exploring further opportunities beyond their own DX Class Elevator platform. One example is KEKO ecosystem, which is an ecosystem for major players and small and medium enterprises (SMEs) to build a dynamic ecosystem around a smart building platform (KEKO, 2021). Smart buildings require many kinds of expertise, skills, resources and digital solutions. This particular smart building ecosystem brings together many Finnish companies like Nokia, KONE, YIT, Caverion, Halton, VTT and Netox with funding from Business Finland (KEKO, 2021) as illustrated in figure 9. This is a great example of value creation which goes beyond what any of these individual companies could do on their own.

Figure 9. KEKO smart building ecosystem. (KEKO, 2021)

By providing modular services and sharing resources through APIs these multiple companies can all reach more elements of value by combining their individual solutions and value creating processes. It can also be considered that each of these companies has their own ecosystem around their services and offering. As an example, YIT is working widely in construction area, interacting with multiple service providers, and Halton is working on Air Quality solutions that can be linked to other systems in the building (KEKO, 2021). This shows how their smaller ecosystems can contribute to other ecosystems to provide further value and together provide an ecosystem of ecosystems, like a wide smart building ecosystem in this example, as illustrated in figure 10. This also highlights the difference between a single platform business, where the company can draw very clear lines where they function and an API ecosystem where value creation can be looked at from a much wider perspective and where a company can partake in multiple different platform businesses and business models.
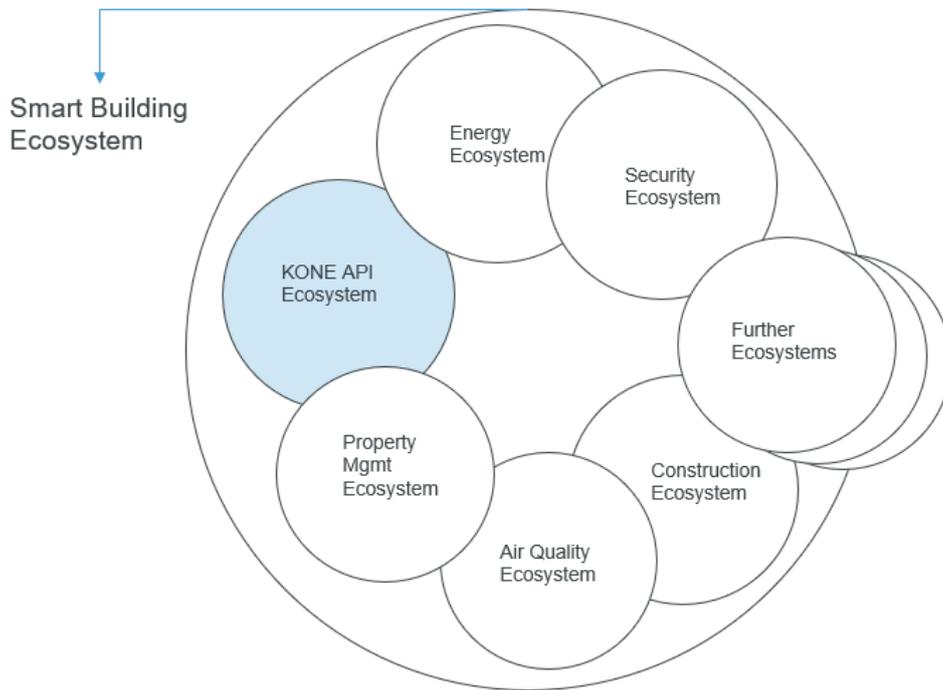
Figure 10. Illustration of a smart building ecosystem, an ecosystem of ecosystems.

The illustration highlights how different ecosystems can overlap, interact, and extend the value creation capabilities of one other. Smart building ecosystem is therefore a living definition based on the different actors present there. Assuming the ecosystem is an open one, other actors and ecosystems can join it and further widen the scope of the ecosystem of ecosystems and even extend beyond it for example by starting to generate value beyond a single building in a wider smart *city* ecosystem.

It is quite clear how KONE is utilizing ecosystem, platform, and APIs to create further value for their customers and enabling more collaboration and co-creation. However, monetization of this API ecosystem is a topic less explored in the public material. One of the purposes of this study is to explore the issue and options in monetization further to provide KONE with input for consideration when developing further monetization strategies.

4 Method

This chapter describes the method used in this study, introducing the research approach, interviews as the data collection method and coding-based content analysis approach. The chapter concludes by discussing the aspects of quality, reliability, and repeatability of the research.

4.1 Research Approach

This master's thesis is a qualitative research utilizing the case study approach. This approach was chosen to get a deep understanding of the research topic in one industry, from the point of view of one company. The aim is to form an understanding of how an API ecosystem is seen to create value in one industry from the perspective of one company freshly building such an offering and business opportunity. An alternative approach could have been to study API ecosystems taking a more general view or selecting multiple industries and companies. However, given the need to focus on practical implications, a case study is the most fitting approach to the research problem (Eriksson & Kovalainen, 2008; Yin, 2014). Consequently, the research focus is on collecting rich perceptions offered by individual people in different positions within the scope of this ecosystem. The emphasis is on rich interpretations and understandings, which makes a qualitative case study the most fitting approach to the research problem in question (Dul & Hak, 2008; Eriksson & Kovalainen, 2008; Yin, 2014).

The study follows Dul & Hak (2008) in understanding the research process as proceeding along a set of milestones. Research generally proceeds in a certain stepwise way and Dul & Hak (2008) have defined a very practical flow that can be used to describe the selection and decisions done for the whole method of the research topic. The topic of this study is a quite new concept around the value creation of digital platform- and API economies. The findings should be relevant for both academic research as well as the corporate perspective, and following Dul and Hak's (2008) approach, should thus be considered a

practice-oriented study as the aim is to understand the practical use of the concepts. Kohlbacher (2006), like Dul and Hak (2008), stresses that a case study is not a method as such, but a research strategy. Kohlbacher (2006) points out that choosing a case study is a choice on what to study, not how. A case study research is focusing on a study of a single event or otherwise limited topic based on an individual research target. A case study makes it possible to acquire a holistic view of a real-life event (Yin, 2014). A case study aims to study, describe, and explain the research topic by mainly concentrating on why and how questions (Yin, 2014). Case study is considered an especially fitting research strategy when the topic is broad and complex, when there is little theory available and when the context is very important (Dul & Hak, 2007). The topic at hand is fitting to this description very well and confirming the fit of the case study approach, utilizing qualitative interviews to emphasize rich interpretations over quantity (Eriksson & Kovalainen, 2008).

4.2 Data Collection

As the topic of API ecosystem is new for both the target company and even the industry as a whole, there is very little information and data available. Therefore, the most adequate way to collect data is through interviews of individuals. Semi-structured interviews allow for a deep discussion and for trust to be formed with the interviewee while also enabling rich interaction when discussing a broad topic like this (Dul & Hak, 2008; Kvale, 2007; Leech, 2002). Semi-structured interviews allow more freedom for the interviewees to express themselves and to select the topics that are most relevant from their point of view while still having a basic structure and themes decided upon beforehand (Kvale, 2007; Leech, 2002). Since the points of interest are especially value creation and monetization in an API ecosystem, a structure can be created for the interview around these topics while still leaving room for free discussion. While the interviewees all have some prior understanding of the topic, their individual interpretations are expected to vary. For this reason, it is good to first discuss the

definition with the interviewee before proceeding to the more detailed topics within the framework.

In this study the semi-structured interviews were split into three themes. These were firstly, *the definition of value in an API ecosystem*, secondly, *views into value creation today* and thirdly, *predictions about value creation in the future*. These three themes provided the basic structure for the interviews and questions were prepared for each theme to guide the interview. The prepared questions were used freely, depending on the interview situation and the interests and viewpoints of the interviewee. Quite often different questions were combined or were covered as part of a discussion without being formulated into a question specifically. The full list of themes and example questions can be seen in appendix 1. The interviews were then transcribed, interesting topics were identified, and material was coded according to the chosen categories, following the approach by Dul & Hak (2008).

4.2.1   Interviewees

The original plan was to interview customer purchasing and case company sales personnel to get a direct understanding of how the value and monetization discussions have been going in direct sales situations. However, as the study was conducted very early on after the launch of the company's API ecosystem, it became clear that the number of customers and even salespeople who had enough expert knowledge of the subject and were far enough in their understanding of the digital transformation to have discussed sales of the services, were very low. Consequently, the scope of interviewees was widened to also cover business development roles in addition to sales and purchasing. Additionally, the study was extended to include a completely new group of interviewees, API specialists from different industries, interacting in the wider ecosystem around the case company, in order to get a wider viewpoint also outside of the direct industry as a reference point.

Digital business and the offering here are very global. This made it very important to gather interviewees from different countries as well, not just from Finland. There was a great opportunity to cover six countries with the interviewees hailing from *Finland, Estonia, Italy, United Kingdom, Russia,* and *China*. All these countries have very competitive construction and facility management markets, making them great opportunities to learn about value creation through digital services in the scope of the case company. Still, the countries are very different in the way they work in this industry, as construction especially is very country-specific function. Total, there were 16 people interviewed, with exactly half of them representing the case study company and the other half representing customers and other ecosystem actors outside of the case company. The list of interviewees is shown below in table 2. Interviewees are presented as codes to preserve their anonymity. In the codes the group A stands for employees working in the case study company and the group B for people from external organizations.

Code	Job title	Code	Job title
A1	Sales Director	B1	Chief Development Officer
A2	Sales Coordinator	B2	Founding Partner
A3	Service Design Manager	B3	Senior Manager
A4	Sales Manager	B4	Project Manager
A5	Sales Director	B5	Head of Data & Analytics
A6	Product Line Manager	B6	Chief Executive Officer
A7	Area Director	B7	Manager
A8	Salesperson	B8	Design Manager

Table 2. Coded interviewee list.

4.2.2 Conducting the Interviews

Interviews were held in two languages: English and Finnish. Due to the target audience this meant that for roughly half of the interviewees the discussion was held with their

secondary language. Coding was done in English to standardize results. However, it was clear that for all participants it is very common to work in the English language in a global context. All quotes used in the thesis and given in a Finnish interview were translated by the author.

Another important topic as part of the interviewing process was building rapport with the interviewees. Rapport refers to how the researcher builds relationships with the interviewee before the actual interview as well as in the introductory part of the interview. According to Leech (2002), even the best-phrased interview questions can give uninformative answers if there is no rapport built between the interviewer and the interviewee (Leech, 2002, p.2). With roughly half of the interviewees there existed some past relationship and encounters between the interviewer and interviewee. In these cases, there were past interactions on which to build the bridge towards the study. With the other half, building the relationship and rapport began from the first contact made with them about the study. Based on literature (Leech, 2002) and past experience there was an understanding that building rapport is important and therefore careful attention was paid to explaining the interview topic and describing the case company's API ecosystem approach.

Leech (2002) suggests that it is important at the beginning of the actual interview to put the interviewees at ease, so they do not feel a threat of losing their face. The interviewees had very varying past expertise of the subject matter. The decision was made that in the beginning of each interview there would be no assumptions made about the interviewer having any previous knowledge of the subject and everything would be explained in detail. This also aided the interviewees to be less worried about stating the obvious or even basic comments and thus helped to get started with the discussions. Some research even recommends that the interviewer should "play dumb" to achieve this (Leech, 2002, p.2-5). In the interviews for the present study, interviewees were asked to ignore any assumptions about knowledge the interviewer could have

beforehand of the topic. Intent was to avoid assumptions and create an effect of reassurance and psychological safety.

The interviews were quite fluid, and discussions based on the past experience of the interviewees. Some of them had used these same technologies and ways of working frequently, and there was no need to spend much time explaining before moving on to the questions. Some also had off-work hobbies that helped them understand the topic better. It was noticed that the interviewees who were active on social media had clearly seen marketing communication about the topic shared by the case study company, also bridging the gap of the early knowledge of the topic and the need to explain in as much detail. Such marketing communication of course influences the opinion of the interviewee as well, but the interviewees were asked to share their personal views. A good example of the influence of social media was one of the expert interviewees who was generally an expert on the API ecosystem theme but did not have past knowledge of what the case company did around the topic. They had seen a video posted on LinkedIn and got the high-level description of the topic a week before the interview, making it therefore easier to describe the concept of an API ecosystem again when they had had time to process it for a few days already and probably come up with some ideas as well.

4.3   Data Analysis

As Kvale (2007) highlights, deciding the method of analysis after the interviews have been done and transcribed is far too late. Rather, he points out that the method of analysis should be built into the interviews and utilized when they are being carried out (Kvale, 2007, p.102). This principle was followed when designing this research as well. As the analysis was based on meaning, which is explained later in this chapter, follow-up questions were used to get the interviewees to further reflect on what they mean and try to convey with their message. Kvale's (2007) steps of analysis were adopted as described below.

The first step is defined as *subject describing* spontaneously what they experience and feel about a topic (Kvale, 2007, p.103). In the study, this was the first part of the interview, where the interviewee was allowed to describe how they perceive the KONE API ecosystem without leading them on or explaining further. As a concrete example they were asked about the core values they see in this kind of an ecosystem. Multiple interviewees wanted the interviewer to define core values and give examples to begin with. However, instead of providing a ready-made definition, the interviewees were asked to define it in their own words thus providing space for spontaneous descriptions. As a result of providing the space and time for reflection, interesting viewpoints emerged. The second step in analysis in Kvale's (2007) model is *subject themselves discovering* new relationships, still without interpretation by the interviewer (Kvale, 2007, p.103). This also emerged in the interviews for this study. The interviewees not only reflected on relationships between different parties of the ecosystem but also reflected on the ways in which these parties overlap and move from one group to another over time and maturity of the company in the ecosystem. The third step in the process is when the *interviewer during the interview condenses and interprets the meaning* of what the interviewee is describing and saying (Kvale, 2007, p.103). Here a very practical method used was to condense longer descriptions and messages of the interviewee and then ask whether the interpretation matched what the interviewee tried to say. Hence, one of the most common prompts during the interviews was: "did you mean that...". As a fourth step the interviewer *analyses* the interview alone afterwards using the recording and transcriptions created based on the interviews (Kvale, 2007, p.103). Kvale (2007) points out that certain automated tools can be utilized to go through the transcriptions. Instead of using automated tools, in this study the recordings were analysed further manually to concentrate on interpreting the answers and drawing conclusions from the material. Listening to the interviews after the actual live interview clearly brought more insights and helped draw more meaning as well. Kvale (2007) also defines possible steps five and six, which are *re-interview* and *action* taken by the interviewee based on new insights gained in the interviews. This fifth step was not utilized in this study, but there have been observations of some actions by the

interviewees, which seem to have been influenced by the interviews held even though there was no active search for such signs.

Kvale (2007) defines a practical approach towards analysis of meaning in an interview. He splits the modes of analysis in *coding, condensation*, and *interpretation* of meaning (Kvale, 2007, p.105-106). Coding means attaching a keyword or multiple keywords to a specific segment of the interview transcription to later identify certain parts or statements (Kvale, 2007, p.106). The approach further defines how coding can be used to group meanings in the text into categories to make it easy to count how many times a certain topic was introduced during an interview (Kvale, 2007, p.106). This practice was used to make it much easier to quickly go through an interview and cross-reference sections where the same topics or ideas were discussed multiple times. Handwritten notes were taken during the interviews, which were then transferred to computer during the same day to be able to record initial ideas and add notes for later use. This gave the researcher a solid first version of the condensed interview already, which was used as a basis when the interviews were listened through again later. Color-coding was also used in the category names to find them faster afterwards. Kvale (2007) also proposes to use a scale like 1 to 7 to express interviewees strength of an opinion (Kvale, 2007, p.106). In this study simple "+" or "-" -signs were used, sometimes doubled "++" or "—" to indicate strongest statements. Additionally, some interview segments were marked with exclamation marks to draw attention back to specific parts or to be referred again during later stages of the analysis.

In meaning condensation, longer statements by the interviewees are rephrased in a few words while keeping the main sense of the statement (Kvale, 2007, p.108). There are five steps in the meaning condensation described by Kvale (2007). As a first step the whole interview is read through to grasp the whole picture of it. Then the researcher is finding natural "*meaning units*" within the text. Thirdly the theme of these meaning units is restated as simply as possible by the researcher. The fourth step is what is called interrogating the meaning units for their purpose in the study. Finally, essential themes

of the interview are tied together into descriptive statements. (Kvale, 2007, p.107-108) This technique was used to interpret the coded interview transcripts a second time. In practice it was found that most of the meaning coding categories were already good enough units for finding similarities and differences between the interviews. With meaning condensation, it was possible to find better category-matches between other interviews where the original messages had been phrased differently and needed further condensing.

A table was made of the categories that came across in the meaning analysis of the interviews and all the interviewees were placed as rows in the table and categories as columns. Categories consisted of meaning units and meaning coding categories both. It was then easy to cross reference quickly and visually how many interviewees had discussed certain topic and how they grouped together.

According to Kohlbacher (2006) content analysis is the longest established method of text analysis in social studies. However, content analysis includes multiple different varieties of analysis based on categorization. Content analysis can be applied to any recorded communication, such as transcripts of interviews and discourses, protocols of observation, video tapes, written documents in general and so forth. Also so-called latent content can be used for the analysis. (Kohlbacher, 2006, p.15-16) In this study, as stated earlier, the analysis is based on the transcriptions of the interviews held by the researcher.

Kohlbacher (2006) has also attempted to simplify and describe the procedure of content analysis based on multiple studies. He splits the procedure to three steps; *summary, explication* and *structuring*. In summary, the researcher reduces the content and uses abstraction and generalization to make the text more manageable. Explication is clarifying, explaining and annotating the material. There the researcher does both a narrower and wider context analysis to be used further in analysing the whole. Finally, in structuring, the researcher filters out a structure from the content by splitting it to

units of analysis and coding those units. First units are identified and then processed and extracted. Coding can be based on a research agenda and categorization is then one of the most critical part of the analysis.

The principles described by Kohlbacher (2006) and Kvale (2007) are quite similar and reinforce each other well. The analysis methodology chosen in this study is validated by both.

4.4 Reliability, Validity, Quality and Ethics

Special consideration was given to validity, reliability, and generalizability of the study. These three aspects form a framework with which to consider a quality of a research (Eriksson & Kovalainen, 2008; Yin, 2014). In order to ensure validity, it is important to bring forth the pre-conceptions that could influence the results (Eriksson & Kovalainen, 2008). As described earlier, even though it was clear for most of the interviewees that the interviewer has a strong background and practical knowledge of the topic at hand, the interviewees were asked to ignore this. They were specifically asked to ignore any assumptions that the interviewer would know something already and rather explain things in as much detail as possible starting from the basics. This is important to avoid invalid assumptions from either side. Another important aspect is reliability. There can easily be mistakes made in deciphering an answer (Eriksson & Kovalainen, 2008). The reliability was improved by specifically always asking the interviewee to repeat an answer where needed and secondly repeating back the answer to confirm the correct interpretation. Rewording the answer with different phrases and confirming the points again with the interviewee makes sure both sides have the same understanding of what was stated and intended with an answer. The third aspect to consider is the generalizability of the study (Eriksson & Kovalainen, 2008). To achieve this all the results were simplified as part of the coding and categorization. Then the views of the different interviewees can reinforce each other, and the results can be considered as being more

general in nature. Of course, since this was a case study, it is important to consider how comparable the results are to other cases, companies, and industries.

The quality of the study should be considered from multiple angles. One aspect in addition to the considerations presented above regarding the general framework, is the aspect of interviewee selection (Eriksson & Kovalainen, 2008). In this study a total of sixteen interviews were conducted with interviewees from six different countries. In total, nineteen people were approached directly about an interview, meaning the rate of acceptance was quite high and there was no need to consider less optimal candidates. As the topic concerns a global business it is good to have several cultures and countries represented. Still, six countries out of the sixty countries where the company operates is quite low, leaving room for further studies in the future. However, the chosen countries represent the more advanced markets, which were considered most relevant for this type of study. As mentioned in earlier sections, the language of the interviews was in Finnish and English and the results therefore were partially translated and partially in the original language of the interview. It is noted, however, that each interviewee works in English mainly and secondly in Finnish in case of the Finnish interviewees. The language is not seen as a big influencer in the interviews. The job positions of the interviewees were ranging from a CEO to sales directors and business development managers to technical sales support. This gives a reasonably wide spread of organizational viewpoints while still restricted to people involved with the topic at hand. Each interviewee was treated equally by conducting the interviews online using Microsoft Teams, which was also preferred due to the COVID-19 situation at the time of the interviewing.

Ethics of this study were considered against the Finnish National Board on Research Integrity, TENK, guidelines on "the ethical principles of research with human participants and ethical review in the human sciences in Finland" (TENK, 2019). There are two parts to the consideration. Firstly, the basic ethical principles of the research. There an important factor is the handling of personal information and privacy protection as well

as the openness of the study. The handling of personal data has become extremely important due to the European Union's General Data Protection Regulation (GDPR) and companies have also learned to handle personal data very carefully because of it. (TENK, 2019) In this study, there was very limited personal data collected to begin with. However, the interviews were stored with the interviewees name attached to them during the study phase.

When the interviews had been coded and analysed, there was no longer any need to store the personal information alongside the data. Privacy should always be protected, and publication of names should be carefully considered. However, it is also important not to promise full anonymity if there is a possibility to guess the identity of the interviewee (TENK, 2019). In this study, the interviewees were asked for a permission to use their job titles, but not their names, and all of them agreed to this. Based on the industry and detailed job title, it is of course reasonably simple to narrow down the identity of an individual interviewee, but this was not a concern to any interviewees in this case. If any would have raised concerns about it, their title would not have been used in any form. Each interview was recorded using Microsoft Teams, as mentioned earlier, with the explicit permission of the interviewee. Another ethical consideration is the aspect of confidential information. It should be noted that the author was employed by the case study company during the research and writing of the thesis. All the information used in the thesis were based on publicly available data and sources. Company confidential information was not used in this study. Also, when interviewing case study company representatives, they were clearly instructed to only refer to publicly available information and any comments about potential future corporate strategy should only represent their personal views and not relate to any company confidential information. The data collected was also checked to make sure this was the case.

5   Analysis

This chapter presents the empirical results and synthesis based on the data collected from the interviews in the light of the theoretical *value creation framework* synthesized in section 2.4 and the concept of *API ecosystem* introduced in chapter 3. The chapter is therefore providing answers to the research questions *"R01: How do different stakeholders see value creation through API ecosystem?"* and *"R02: How do different stakeholders see the process of turning value from the API ecosystem into money?".*

Interviews covered a lot of ground due to complexity of the issue at hand. As a result of the thematic analysis and categorization strategy as introduced in the method chapter, six core themes emerged. These themes are *value elements, service modularity, monetization, challenges today, future overviews* and *API economy models*, as illustrated in figure 11. The first two, *value elements* and *service modularity* emerged as the core themes, supported by the remaining four. The six themes are opened up in the following subsections individually. The section closes with a synthesis of the analytical themes.
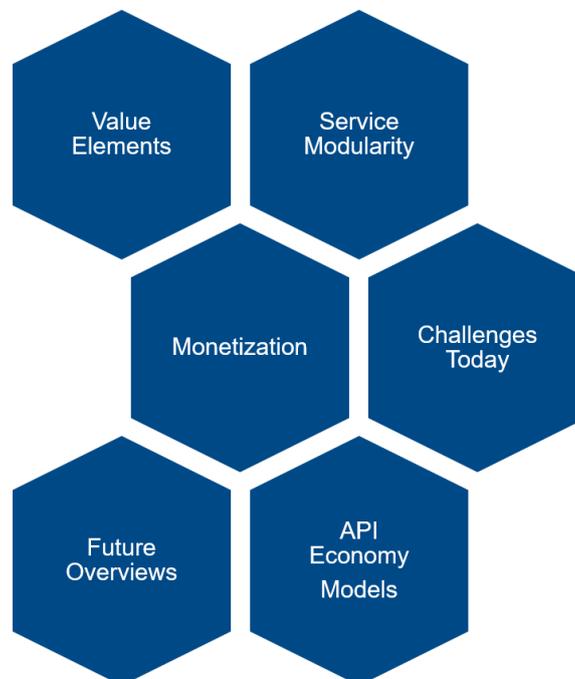

Figure 11. Six analytical themes of the analysis.

5.1 Value Elements

The first research question concerned value creation and as discussed in depth in earlier sections, value can consist of multiple different elements as well as gain creators and pain removers (Almquist et al., 2016, 2018; Osterwalder et al., 2014; Woodall, 2013). The purpose of the interviews in this regard was for the interviewees to voice their own definition of value in an ecosystem and the purpose of the analysis to find similarities and differences between their definitions. This theme is linked directly to the components of value described in chapter 2.3 and the value creation framework defined in chapter 2.4. Furthermore, the theme draws together the interviewees' opinions related to value creation in business networks, digital platforms and through APIs as introduced in chapters 2.2, 3.2 and 3.3. respectively. Linkage is made to the four aspects if the value creation framework starting from benefits and sacrifices (Woodall, 2013), value propositions of products and services (Osterwalder et al., 2014) and the value pyramid (Almquist et al., 2016) levels being considered.

One of the most prominent findings in the study was the high value assigned to *openness*. With the vast majority of the interviewees (14 out of 16) referring to the positive impact of openness creating value on its own, it is clearly seen that this approach to business is seen as a precondition of success in a new digitalizing industry. Choosing to approach an ecosystem of actors with open strategy has consequences to how the value is created and what kind of customer value creation process can be enabled. The decision for a company to publish APIs was seen as a step towards openness and value on its own as well (B1, A1, B3, B4, A3). Case study representatives also stated that the fact that the company chose to open APIs means a change in the company's' way of doing business (A1, A2, A3, A5). This would indicate a shift in strategic thinking was needed before this value element became important for the company and being offered to the customers. This was well reflected by comments such as "*Earlier we were a closed company, now we offer APIs*" (A2) and *"APIs are what will differentiate us. There are huge possibilities with APIs" (A3)*. The strategic choices being the deciding factor in value creation in a

wider network was well founded in the theory as well (Dyer & Singh, 1998; Jacobides, 2019; Jarillo, 1988).

Giving further weight to the importance of *openness*, some interviewees even expressed their opinion that a more closed approach is not only a worse business model but also causes negative feelings and pressure on the customer side. This was well reflected by the following two interviewee quotes:

"[Customer has a] feeling of anxiety if the system is closed" (B3)

"Customer felt like they were in jail with the closed solution" (A3)

Furthermore, many interviewees highlighted the importance of customer-orientation and customer-first attitude as enablers for value creation. Openness was again highlighted as the value that enables these customer-centric secondary values, enabling customers to prepare for the future, not being bound to a single solution and providing a lifetime value for the customer (A1, A2, A6, A8). In short, many of the comments could be summarized by one quote: *"APIs are flexible, with them customers can do more now"* (A8). Putting customer in the centre means that the customer can decide how they want to work and how their problem is solved. These link to *Relationship* and *Strategic* value elements in the value element pyramid as described in section 2.3.3. Eventually of course the different value elements are based on the performance elements such as innovation and scalability. Or as stated by one interviewee: *"More open approach enables richer innovation" (B6)*.

Openness can be considered to have a direct link to *Access* and *Operational* parts of the value elements pyramid introduced in section 2.3.3 and illustrated in figure 2 as well. As will be shown below, it also links strongly together the elements in the pyramid as well, highlighting the importance of openness. Access to different solutions and ways to

complete a value proposition can be achieved either by complementing other existing offerings, or by offering competing options as illustrated by the following quotes.

"If you have an open ecosystem where parties can compete with each other, that's a completely different thing than a closed system created by a certain actor" (B2)

"New alternative to a closed solutions is to open more APIs, or work with big partner companies" (A3)

"It is not mandatory to use one solution, offering multiple avenues is a value" (A5)

A third clearly shared opinion among interviewees were the values of compatibility, adaptability, and integration cost-efficiently, which can be all linked according to Almquist and others' (2018) value element pyramid in the *Productivity*, *Access*, *Operational* and *Economic* parts of the pyramid. The last of these, *Economic*, is on the lower level of the pyramid, bringing the value creation in an API ecosystem even closer to the mandatory pre-requisites level. APIs were considered to bring adaptability, agility and flexibility (B2, B4, B5, A3) and these thoughts were strengthened by comments such as *"The one [company] which is able to adapt, is the one that wins" (B2)*. One interviewee went as far as recognising the layered nature of value elements, stating that *"Value is created from building blocks. APIs enable lower costs, lower complexity and lower entry threshold." (B5),* combining these different value elements. Integration is a term used for combining different digital solutions and was brought up by multiple interviewees linking it to the *productivity* and *access* value elements with API as a means to achieve it (B2, A3, B5, A5). Figure 12 highlights these aspects from the value pyramid by Almquist and others (2018).
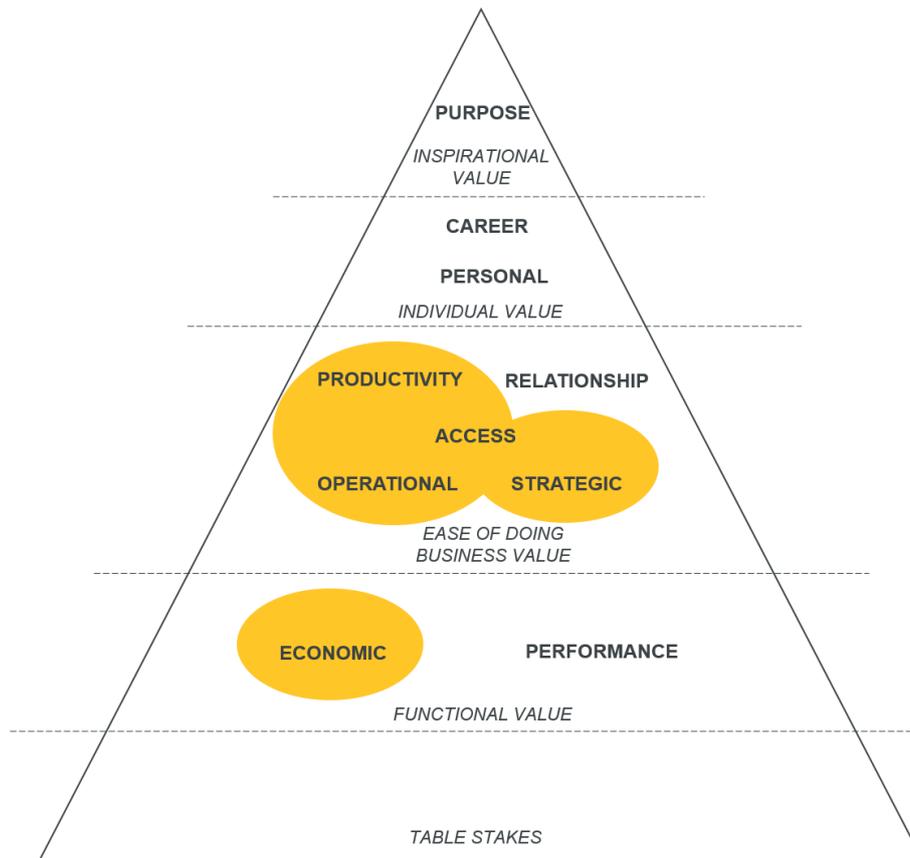
Figure 12. Highlighted parts of the Value Pyramid. (adapted from Almquist et al., 2018, p. 4)

A fourth aspect brought up by over half of the interviewees were data-based services. One interviewee stated that "*Data utilization becomes a value for the company on its own" (B2)*. Another one considered data and analytics to be a basis for a new offering and digital products on top of which APIs should be built to enable ecosystem co-creation and innovation (B5). Sharing data allows companies to open new business angles and business models beyond what they can offer on their own by approaching their data only internally (B3, B2, B1). The final solution offered to a customer is a combination of solutions, creating a value chain that delivers the value. In a fast-paced market such value chains are hard to build by one company alone and it is seen as a good strategy to extend the value chain beyond those offered directly and alone by one's own company (B1, A2). These opinions are clearly backed up by the research presented earlier (Allee, 2009; Håkansson & Ford, 2002; Jarillo, 1998; Kohtamäki & Rajala, 2016).

To summarize, the interviewees approached value elements by highlighting benefits, sacrifices as well as the related trade-offs. This connects well to the theoretical approaches presented in chapter 2.3.1. Furthermore, value propositions were also seen as a way to consider the customer value creation as presented in chapter 2.3.2. The value pyramid as such was not implicitly mentioned, but as described above, many of the value elements described in chapter 2.3.3 were brought up by the interviewees. Interviewees also recognized the hierarchical consideration of value, starting from more basic needs and proceeding further only if the basic needs and values were fulfilled. The top layers of Almquist and others' (2018) value pyramid are about individual value and inspirational value. These top layers were not brought up by the interviewees, instead, interviewees concentrated mainly on the lower pyramid levels as discussed earlier. Only visionary aspects of Almquist and others' (2018) pyramid layers were mentioned, but nothing about individual's value elements. This could be due to the point of view taken from business's perspective, or it could relate also to the still somewhat missing elements in relationship aspect of the pyramid. This concentration on the lower levels of value elements is not an issue, but rather seen as a prioritization done by the interviewees. Modularity of the value was strongly visible in the analysis, and the next theme is covering that in more detail. Finally, the most important value elements are then *openness, flexibility, access, productivity, strategic and economic* value elements. These are also shown in table 3.

Most important components of value	Openness	Flexibility	Access	Productivity	Strategic	Economic

Table 3. The most important components of value.

5.2   Service Modularity

The second theme emerging from the analysis of the interviews is the importance of service modularity and how it is perceived by the interviewees based on their expertise, history and perceptions. This theme is linked strongest to the theory of modularity as a value described in chapter 2.3.4. The theme also links to value creation in business networks, covered in chapter 2.2, and the theory about APIs and boundary resources discussed in chapter 3.3.

There is always a compromise between delivering ready, so-called turnkey solutions, and tailored solutions that match specific customer needs and requirements. While modularity is not explicitly mentioned in the research questions, each interviewee was asked about their views related to solutions they preferred to use as well as customization options. The topic of an API ecosystem and value creation through APIs led to a discussion about service modularity, which henceforth emerged as a core aspect of the study. Initial answers pointed to very diverged views regarding turnkey solutions and tailoring, however all interviewees agreed that the preference depends on the context and customer in question. Subsequently the ideas shared in the interviews are reflective of this thinking as will be shown in the analysis below.

Several interviewees commented on how from a sales perspective especially, ready-made turnkey solutions are easier to sell and easier to accept from the customer's perspective (A1, A2, A4, B2, B3, B4, B7). At the same time, there were strong opinions regarding how certain customers not only want, but demand flexibility and tailoring to match their needs (A2, A3, A5, A6, B2, B8). The viewpoint of this preference being dependent on the customer and context in question is illustrated well by A2 and B2 commenting in favour of both turnkey and tailored approaches. These opposing viewpoints emerged as interviewees did not only comment based on their own role and company but considered their answers from the point of view of both small and large companies, seeing clear differences in their needs and expected value perceptions. With further analysis, it can be seen that the opinions depended on the segment and needs

of the party that the interviewees were asked to reflect upon. More digitally advanced companies were expected to do tailoring on their own and also larger companies were seen to have more resources and willingness to tailor their own solutions further. This would indicate that the need to utilize resources from outside of the company themselves, as highlighted by Dyer and Singh (1998) and Pekkarinen & Ulkuniemi (2008) is also varying based on the capabilities and internal resources available for the company. Furthermore, interviewees identified a trend in which a digitalizing market may start from easy solutions and move forwards towards tailoring and modular solutions as it matures. This was considered to be the case for the markets where the case study company operates especially (A2, A6, A7, B2, B3, B5).

For small and less digitally advanced companies, this trend of changing perspective towards modularity was described as:

"They want to stand out from their competitors with a ready digital solution" (A2)

"Many do not want to think about how to build something new. A ready-made package is easier to sell and monetize" (B3)

"Small companies use ready services and big companies make their own" (A6)

Moving on to reflect on larger and more digitally ready companies, interviewees reflected related to modularity and tailoring showing the very different demands from different types of customers further:

"20/80 rule - 20% of customers demand the most, but also bring 80% of the money" (B2)

"In future we do not need packetized solutions, but a list of compatible partners which complement each other" (A1)

"Big developers want customized solutions with their own specs" (A2)

The interviewees also reflected on the interconnection between market evolution and changing needs, and the need to find a middle way between turnkey and tailored solutions. There were no clear guidelines to be found, but rather varying approach needed for different situations, as exemplified in the following quotes.

> *"Balance changes over time. Turnkey solutions in the beginning and later APIs and richer solutions" (B4)*

> *"Need to have ready components but in the future more customization" (B6)*

> *"Tailoring is expensive, but on the other hand innovation and co-creation are seen as a good thing" (B8)*

> *"Ready basic solution and tailoring offered on top of that. There needs to be flexibility." (A5)*

Based on the reflections by the interviewees, it can be concluded that the question of service modularity and how to structure the offering does not have a straightforward answer. The balance between ready turnkey solutions and purely modular services enabled by APIs are relevant to different customer audiences. According to the interviewees, their readiness for different types of solutions can be roughly split based on the maturity of the market, especially the competition level, and the digitalization readiness and capabilities of the customer. Following this assessment of their relationship, these two degrees of maturity can be used to draw a simplification of offering structure strategy and split it to four dimensions as illustrated in figure 13.
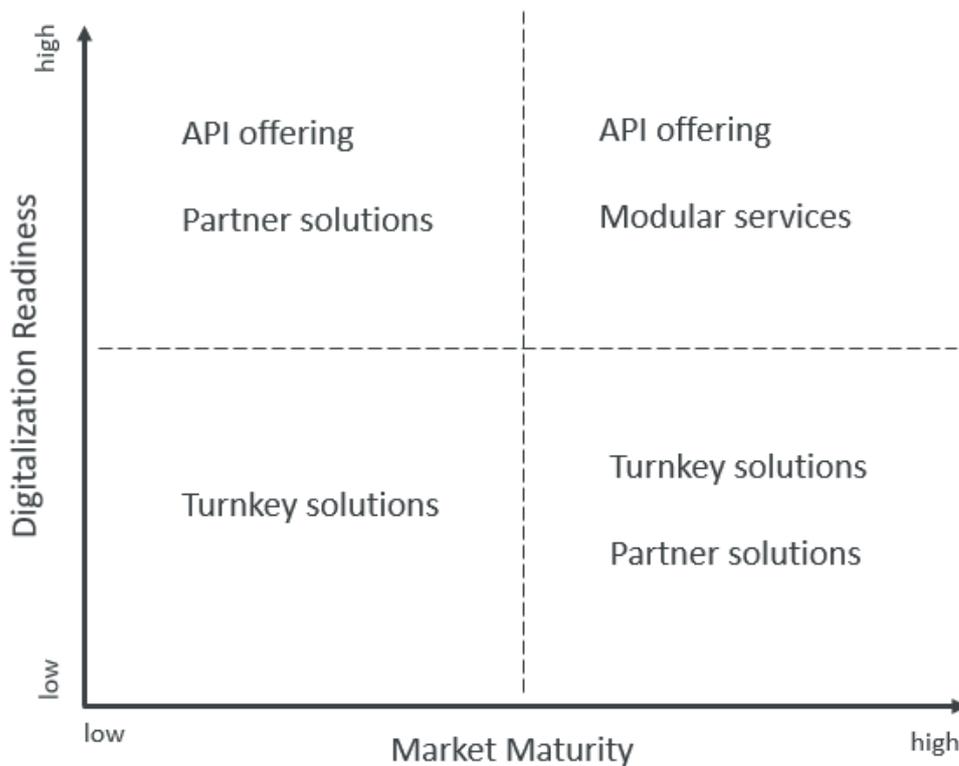
Figure 13. Offering strategy proposal based on market maturity and digitalization readiness.

As can be deduced from the analysis, modularity as a value, as described in chapter 2.3.4 was valued very strongly by the interviewees. However, the issue of how to build solutions that match a specific customer even with strong modular offering is not straightforward and is clearly an area that a company needs to consider very thoroughly when bringing an API ecosystem offering like the case company's API ecosystem to the market. Based on the analysis of value elements and service modularity, it can be concluded that the value creation framework defined in chapter 2.4 fits well to the value consideration aspects presented by the interviewees. Whether companies or individuals consider it as a framework or utilize the specific tools mentioned is secondary, but the topics themselves seem to be considered by most in one way or another. The main considerations about service modularity are illustrated in table 4.

Service modularity considerations	Turnkey solutions easy to sell	Tailored solutions for demanding customers	Segmentation	Market maturity

Table 4. Service modularity considerations.

5.3 Monetization

The third theme in the analysis centres on the topic of monetization. The linkage between value as perceived by the interviewees and their perspective on how value can be monetized is directly linked as described in depth in chapter 2.3 dealing with the components of value and chapter 3.4 dealing with monetization of digital solutions.

Monetization of digital solutions and APIs especially turned out to be a very interesting topic among the interviewees. A core finding here was a high-level consensus that (digital) services should be monetized through subscription pricing. This opinion was voiced by almost everyone (14 out of 16). However, when going further into the options and details within, the opinions started varying to a higher degree. The interviewees identified five different high level monetization schemes; free, freemium, subscription, usage-based and revenue sharing. These are illustrated in the figure 14. Free offering would mean that a digital service, or API, is offered free of charge completely and monetization happens with some other product or service completely. Freemium model is a monetization option where the service can be used for free until a certain point, such as usage level is reached. Subscription model refers to a model where the service is paid repeatedly, for example in monthly or annual payments. With subscription model there can be a defined level of use included in the price, or it can be without such a limit. Usage-based model is usually a specific subscription model, where the monthly payment varies based on the actual use of the service. In the case of APIs, the deciding measurement is commonly API calls or number of users (B1, B3, B4, B5). The fifth monetization model discussed was revenue sharing between different solution providers. In the case company API ecosystem this could mean that a service provider pays the

ecosystem orchestrator (KONE) a set share in percentages when delivering a customer solution which utilizes the resources from the API ecosystem. The revenue sharing option can also be considered an outcome-based model as revenue is only generated with an actual sale. Opinions voiced by the interviewees related to these models is discussed in the following chapter.

Free	Free of charge
Freemium	Free until a set level of use
Subscription	Fixed monthly/annual
Usage-based	Price based on usage
Revenue sharing / outcome based	Revenue shared with ecosystem partners
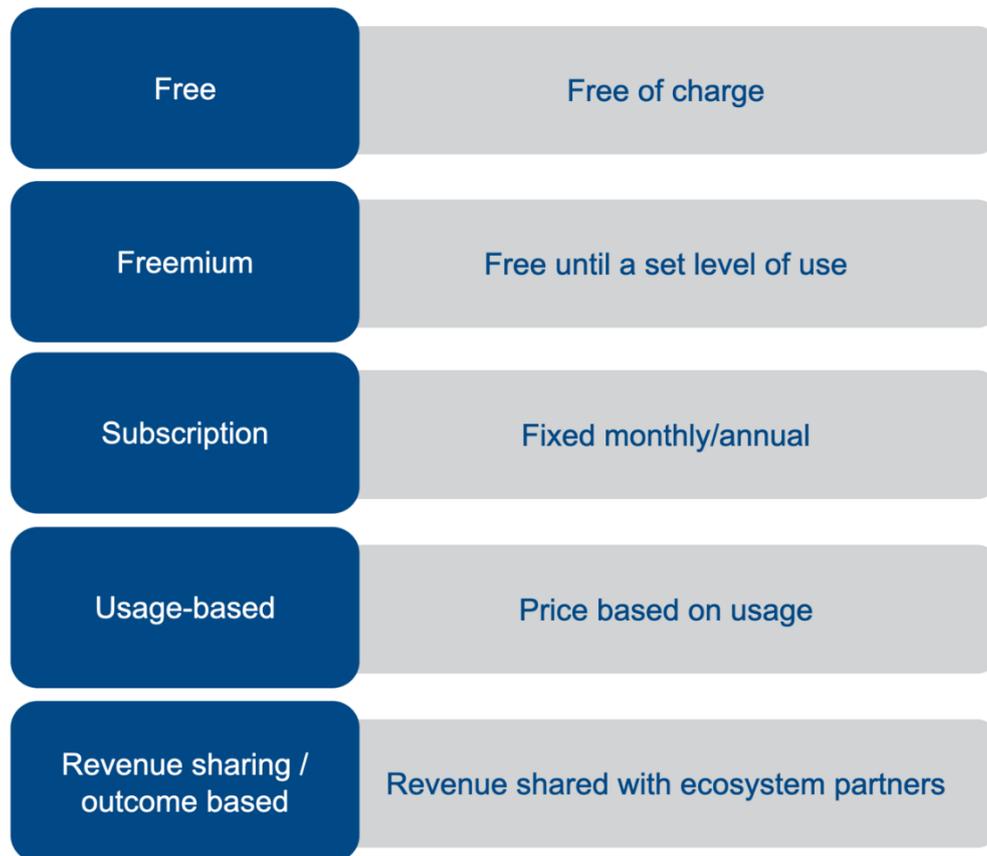
Figure 14. Different monetization models discussed.

Free digital services were brought up by many interviewees (9 out of 16). The logic for that choice is that free service can support the monetization of some other service or product. However, as the discussion was framed around how these services could be monetized, this option was mentioned by many, but discussion concentrated more on the alternatives. Over half of the interviewees from other companies brought up the concept of freemium model (B1, B2, B4, B5, B6). That is, a model where taking the service into use is free, but there is a potential paid tier later based on certain conditions.

This is different than not monetizing an offering, where a certain service does not have a price at all. Many felt that when starting a new business like this, freemium model is important to gain traction and market acceptance (B1, B2, B5, B6), making a new offering easier to approach from the customer's perspective. One interviewee used the example of a model where free parking is offered to cars, but additional services like cleaning and changing of tires are used to monetize the service (B5). This example highlights the split between different services offered and their impact to the monetization. Some also considered that API services should be considered silent enablers instead of directly monetized products and thus used as a basis for offering other services: *"Elevator services and APIs are like electricity - part of the service and enabling further services" (B6)*. However, in contrast to these views, not a single interviewee from the case study company brought up the freemium model approach. The reasons for this can be manyfold, ranging from company culture to set rules related to pricing and unfamiliarity with these kinds of pricing models. However, reflecting on these reasons falls outside of the scope of the present research.

The solutions offered in a business ecosystem are often created by multiple actors within the ecosystem, bringing forth also the question which parts of the modular service are priced, and which are not. The ecosystem in question has a digital platform and digital APIs. The interviewees reflected on the benefits of monetizing platform usage or monetizing API interfaces. However, none of them recommended monetizing both. As one interviewee succinctly summed up *"Either the platform has a cost, or the API has a cost, not both" (B1)*.

When discussing potential strategies for cases when pricing of APIs is possible, the interviewees distinguished between three most preferred possibilities. The first possibility was the freemium model, making it easy to approach given the low threshold of taking the service into use without initial payments. The second view among the interviewees was preference for a subscription model. Subscription and usage-based models were seen as the most promising monetization strategies, linking to the popular

monetization models described in chapter 3.4. There were strong opinions stated in favour of monetizing APIs through monthly subscription models such as *"For API a monthly fee is justified, I feel strongly that they are sellable" (A4)*, but the link to continuous value creation was also recognized as a condition for it: "*Monthly billing is possible when we also create continuous value [for the customer]" (A5)*. The third view focuses on what to base the monthly subscription fee on. In the case of monetizing APIs, interviewees stressed that pricing has to be moderate in order to avoid barrier to use and hence lowering the potential network effect gained (B1, B2, B5, B6). This trade-off between quick monetary benefit and growing user base and network effect is a difficult decision. One interviewee summarized this well by stating that "Moderate pricing, otherwise they (customers) do not dare to try… easy to make a decision whether to buy or not" (B3). Another big question is what to base these kinds of monthly fees on. On the other hand, some customers want to be able to predict and know in advance exactly what they will pay (A2, A8), but some would rather pay based on how much they use the service (B1, B5, B6). The latter especially leads to consideration of usage-based monetization models. They could be based on for example the number of users of service, the number of API calls, activity of the customer or other such principles for determining the usage level. The interviewees approached recommendations about possible usage-based pricing models from multiple perspectives as follows:

"Potential to be based on user amounts, with tiered prices" (A8)

"Value adding services need to have scaling [pricing] model. If there's little activity, the price is very low, but expensive for big users." (B5)

"Pricing is based on added value. If the value of an apartment increases a set amount, part of that increase can be given to platform as revenue" (B6)

"The one who benefits, pays in relation to the benefit received" (B7)

Based on these results it is possible to consider a recommended pricing strategy that evolves in stages based on the scale of business. Starting point is a freemium model, extended with a monthly subscription model after a certain milestone or scale is reached, but keeping the price moderate. Finally, a usage-based model that scales along with the customer's own business is taken into use, with the last option offering most scaling potential. This evolution of monetization models is illustrated in the figure 15.

Figure 15. Potential evolution of the pricing strategy.

The challenge in choosing a monetization strategy is that each choice is a trade-off and has downsides as well. Firstly, of course from the point of view of scaling versus revenue, but also from the point of view of customer behaviour that can be altered by the chosen model. Freemium model is a great model for gaining quick service adoption and remove barriers for new users and therefore benefit quickly from potential network effects as discussed earlier. However, freemium model introduces a new challenge in the form of conversion from free user to a paying user when the set conditions have been met (B5, B6). Freemium model also makes it difficult to estimate the customers willingness to pay for a new service, or at least slowdown that learning. Customer behaviour can change dramatically based on the chosen pricing. If a fee is too small, it can be difficult to increase it later even if the value proposition evolves. Also, monetization and subscriptions in general was seen by some to be linked to time and market maturity as illustrated by these two quotes: *"Monetizing APIs will be first difficult, then easier and then more difficult again" (B4)* and *"Monetization is a measurement of maturity" (B5)*. These mean that in a market new for these kinds of services, it can be difficult to find acceptance for the monetization strategy chosen, but once a suitable model is found it can become easier for others to accept as the actors become more accustomed to new ways of making business. Whereas usage-based models offer most scaling potential to

customers, the interviewees also pointed out the downsides of this approach. When the price of a service is based on a certain measurement, the customer can decide to optimize their own solution and usage to limit this measure. A good example was given by one interviewee: *"User-based pricing also leads to partial optimization when one wants to limit users, which leads to scalability challenge and also lowers the received value" (B8)*. It is therefore important to consider the downsides of a chosen monetization strategy and what that decision limits in addition to the positive effects. This is also linked to Woodall's (2003) theory of benefits and sacrifices trade-off discussed in chapter 2.3.1.

To summarize the theme of monetization, the link between perceived customer value and pricing was identified by the interviewees, linking it to the theoretical approach of monetization presented in chapter 3.4. The analysis of the interviews showed that monetization is a multifaceted topic, with different opinions and views existing. Subscription and usage-based pricing were clearly seen as the most fitting pricing models while perpetual and outcome-based were less popular. The points made about monetization strategy impacting scaling and adoption were excellent views not covered in the theory as clearly. This aspect of adoption vs monetization is a very important topic for any company to consider when starting with a new offering and changing market. The main considerations to be taken into account are highlighted in table 5.

Monetization recommendations	Freemium	Moderate pricing at first	Platform model	Subscription model	Usage-based model

Table 5. Monetization considerations.

5.4 Challenges Today

The fourth theme of the analysis is the tension between views towards value creation through API ecosystem against the challenges of today. This theme is related to the barriers that the interviewees saw as preventing the full value creation possibilities. Many interviewees raised points about aspects which make it challenging to do business

with an API ecosystem and which can become barriers in creating the value discussed earlier. The points made by the interviewees can be grouped to *challenges within the case company*, its personnel as well as existing capabilities, to *challenges for customers* and to *challenges for the market* itself where the company operates. It has been discussed earlier how digitalization and new business models are transforming industries and how the case company is attempting to adapt into new ways of doing business. The interviewees talked about company *culture* as well as *mindset* needing change towards this new way of working´. In addition, interviewees also mentioned *fear* and *change resistance* as clear obstacles to overcome before the company can fully embrace ecosystem solutions and consideration of wider modular services in their processes. The following three quotes highlight these aspects very accurately.

"Mindset and culture need to change to enable ecosystem and service thinking" (A3)

"Change resistance is fierce and it takes courage, but ecosystem helps with it" (A4)

"Salespeople are afraid of APIs, not comfortable in front of the customer" (A7)

A second set of similar concerns relate to the customers, who are also used to doing business in a certain way and are not always the first ones looking to change. Some interviewees talked clearly with certain customers specifically in mind while others considered the target industry as a whole and the markets ability to adapt to changing conditions brought by technological disruption. Sometimes it can be hard for a company to be seen as anything else than what it is used to being seen. This was clearly a concern for some interviewees from the case study company, stating that *"Market is not ready to see us as we see ourselves" (A3)* and *"They do not even consider how elevators would be related to the case or part of a solution" (A1)*. It is difficult to sell technically advanced digital solutions or talk about digital platforms, APIs and ecosystems if the customers see the company as a very different kind of supplier (A1, A3, A5). Correspondingly to the

identified need for change withing the case company, also customers have a need to change their mindset in order to work differently, as they will otherwise find it difficult to take digitally advanced projects further within their organization (A1, A8). The market where the case company operates was also seen as very fragmented and all types of smart technologies very new, making it difficult to build successful ecosystem projects (B3).

The theme of challenges today shows that many interviewees were familiar with the concepts of ecosystem, digital platform and APIs as introduced in the theoretical framework. All the interviewees were also briefed about the case study API ecosystem as described in chapter 3.5. The interviewees clearly identified potential, but also highlighted the need for learning both in the case company and in the market as a whole. Consequently, in order to enable future developments, focus is needed on addressing and overcoming these barriers related to mindset, culture and change resistance. The main barriers are shown in table 6.

Challenges today	Mindset & culture	Market readiness	Sales readiness

Table 6. Main challenges seen today.

5.5 Future Overviews

The previous analytical theme, *challenges today*, touched the barriers seen in today's situation or market. The fifth emerging theme is then based on the interviewees' views of the future and how the perception of value creation could, in their opinion, change in the future. These are interesting viewpoints drawing together some of the aspects about value elements and how they could be seen if some of the barriers of today were to be removed. This theme can therefore be considered either as a guideline towards the future or, alternatively, as an ideal state of things from the perspective of the interviewee in question.

Despite the challenges seen today from many perspectives, there were clear indications from the interviewee group of having a strong belief that the described new business models are increasing in the future (A2, A3, B2, B3, A5, A6, B6, B7, B8). Digitalization was a very well understood phenomenon to the interviewees, and many gave good examples of other digitalizing industries from mobile phones to automotive and finance. Many interviewees made very strong statements about growth and demand in this area, such as:

"Usage of API economy will increase in all the categories" (A4)

"Limitless creation and innovation through ecosystem" (A4)

"Business models will change in the future" (A6)

"Soon everyone will offer APIs" (B4)

"Devices in residential housing and offices move to software" (B8)

"[In the future] we do not need to build a picture of the added value, but customers will know how to demand for it themselves" (A4)

The last quote about customers demanding the added value generated by APIs and ecosystem approach is an interesting viewpoint, as it turns the table from the ecosystem provider needing to define and articulate the value created to the receiving party having a clear need and understanding of the value they seek. The value of data and sharing of data unique to a specific company was also highlighted as both a key trend and an important element to be considered even more carefully in future value creation (B1, B2, B7). Forerunners of digitalization in a certain industry, like the case example, can utilize

their position to define what can be called de-facto standards, shaping how other players in the market need to provide similar data and APIs (B1).

Others did not see the change happening very fast, instead assuming change to take possibly years, as highlighted by this comment: *"These technologies are still very new. Monetization will be similar in five years from now, no big changes expected" (A8).* However, development and smart technologies also have many viewpoints, meaning that what one sees as a big leap in a direction of smart buildings for example is not considered the same by others, making future predictions imbalanced (B7).

As also summarized in the previous analysis theme of challenges today, the potential of ecosystems, digital platforms, APIs and specifically the case study API ecosystem were seen by many interviewees in the theme of future overviews as well. As described earlier though, the opinions of the interviewees varied regarding the speed of the market evolution towards these new business models. The uncertainty of adoption makes it very challenging for any company to invest in new methods of doing business. Further segmentation of the market and customer-base could be seen as a step towards better understanding the possibilities offered by the market. Such segmentation and understanding of the varying customer needs can provide valuable input when deciding how to reach the potential fastest as seen by many of the responders. These main points are shown in table 7.

Future overviews	New business models	API economy	Ecosystems

Table 7. Future overviews summary.

5.6 API Economy Models

Earlier in section 3.3 APIs were identified as critical business enablers (Iyer & Subramaniam, 2015), foundation for digital ecosystems (Benzell et al., 2017) and

enablers for completely new business models (Iyer & Subramaniam, 2015; Moilanen et al., 2019). This business consideration of APIs can be called *API economy* (Moilanen et al., 2019) and the final analysis theme deals with these views about *API economy* and the *business models* surrounding it. These views consist of both statements about today as well as future, but what links them is the relation to the defined business model and theories about ecosystems, digital platforms and APIs as discussed in earlier chapters. Therefore, this theme links mainly to theory chapters 3.1, 3.2 and 3.3.

The phenomenon called network effect (Korhonen et al., 2017; Parker et al., 2016; Van Alstyne et al., 2017) was discussed in chapter 3.2. In short, direct network effect is realized when the service or product becomes more valuable based on how many users it has, and indirect network effect is the value gained from interaction of multiple groups on a platform such as service providers and buyers (Korhonen et al., 2017; Parker et al., 2016; Van Alstyne et al., 2017). The importance of network effect was something that was brought up by multiple interviewee external from the case company (B1, B2, B5, B6), but not directly referenced by any of the company employees. However, it should be noted that the value of openness, which was recognised by so many, is in the end the enabler for network effect as well, allowing different groups to interact. The aspect that was noted by case company representatives as well was that when the number of customers utilizing the ecosystem for their own business grows, this can lead to the growth of the company providing the ecosystem (A3, A5, A6). *"With APIs we can grow with the customer and be there to help them grow. This increases the received value"* *(A5).* This effect highlighted in the quote is also a type of network effect where the growth of one party makes the network more valuable to others. It should be noted that such a growth from the ecosystem orchestrator and customer side can also enable more growth and value for the third parties present in the ecosystem.

Other topics related to this theme are the new business model opportunities raised by the interviewees. As mentioned in chapter 3.5, the case company is already involved in multiple ecosystems and at least experimenting on new value creation methods because

of it. This leads to possibilities such as raised by B1: *"Platform to platform business is coming... companies haven't considered it yet" (B1)*. Platforms could provide value and sales directly to other platforms, but these kind of business models are still rare to see according to the interviewee.

The interviewees also commented that seeing software developers as a group of customers should be considered as a business enabler (B1, B2, B6). It was also considered that this aspect is very easily forgotten by companies as highlighted in the following quote: *"Corporations are led by marketing, sales and strategy - they forget the developer side" (B6)*. Traditionally, even digital platform value creation and especially business is geared towards platform consumers or sometimes the producer companies. However, a new form of business and value creation is aimed towards the software developers. Software developers in a digital platform are the ones who usually work for the producer company, or the platform consumer or platform orchestrator. Regardless of which party they represent, the software developers are a big part of the value creation process. Even if developers would not be the decision makers in a corporation making the final purchase, their importance as influencers was seen as a highly important factor to consider. (B1, B2, B4)

APIs, digital platforms, and ecosystems enable disruptive business models going far beyond what more traditional companies are used to doing. The potential for future disruption in the market empowered by even more disruptive usage of these business models was brought up by the interviewees with comments such as: *"Uber of elevators or Airbnb of elevators is a risk" (B6)*. This refers to the complete change of the competition in a given market, as described in chapter 3 related to both examples Uber and Airbnb. If a company is not prepared for potential disruptors, it will be hard to react in time if such a new disruptive business model emerges. Another aspect of future value creation and how it should be reflected in business models was the mention of a digital marketplace (B1, B2, A3, B4, B6). Here, marketplace could mean a place where to purchase ecosystem solutions fulfilling a certain value proposition, purchasing APIs or

purchasing data (B1, B2, A5, B6). Also, when there is a clear marketplace, the customers can request functionalities from the developers and the marketplace can work towards creating a positive cycle (B6), hence leading to an accelerated network effect as well.

The unique value creation possibilities offered by ecosystems, digital platforms and APIs, as described in chapter 3 as a whole, were seen by many. Different forms of network effect specifically were recognized by both case study company interviewees and external interviewees. What is very interesting are the more unique business model opportunities brought up mainly by the interviewees from outside of the company. There is clearly a chance to research the models of business-to-developer and platform-to-platform business and even business models not necessarily recognized yet. These main themes are summarized in table 8.

API economy models	Network effects	Platform-to-platform	Developer focus	Disruption

Table 8. Summary of the considerations related to API economy.

5.7   Synthesis of the Analytical Themes

As the previous sections show, the topics discussed in the interviews cover a variety of topics and considerations. The six themes which emerged from the interviews give a possibility to categorize considerations easier, supporting a company in deciding their focus areas and perhaps in prioritizing between focus areas. The table 3 is synthesizing the analytical themes and their key features. This synthesized table makes it easy to collect the main features of each theme and thus supports in translating these research findings into practice.

THEME	Value elements	Service modularity	Moneti-zation	Challenges today	Future overviews	API economy
Description	Most important components of value	Turnkey solutions or modular services	How to select pricing model	What stops us today	What happens in this area in the future	Special aspects about API ecosystem
Key features	Openness	Turnkey solutions easy to sell	Freemium	Mindset & culture	New business models	Network effects
	Flexibility	Tailored solutions for demanding customers	Moderate pricing at first	Market readiness	API economy	Platform-to-platform
	Access	Segmentation	Platform model	Sales readiness	Ecosystems	Developer-focus
	Productivity	Market maturity	Subscription model			Disruption
	Strategy		Usage-based pricing			
	Economic					

Table 9. Synthesis of the analytical categories.

It should be noted that the synthesized findings shown above can be used to form a plan that the case study company can follow to make their own action plan about the next development steps needed for API ecosystem. The table is not intended as a checklist covering each and every topic but serves as a tool to support creating a more holistic action plan.

6 Conclusions and Recommendations

This chapter concludes the thesis by drawing together the main points of the analysis and highlighting their relevance to academic theory. Based on the findings, the research questions are answered and discussed. Finally, practical recommendations for the case company and more generally for other companies facing similar situations are made and topics in need of further study are identified.

The present thesis asked two research questions:

R01: How do different stakeholders see value creation through API ecosystem?

R02: How do different stakeholders see the process of turning value from the API ecosystem into money?

As a result of the thematic analysis and categorization strategy as introduced in the method chapter, six core themes emerge in the analysis to answer these questions. These themes are *value elements, service modularity, monetization, challenges today, future overviews* and *API economy models*.

Value creation through API ecosystem

The first research question is answered mainly by the themes of *value elements* and *service modularity*, as these themes focus most clearly on exploring how the interviewees defined and perceived value creation. Additionally, the themes of *challenges today, future overviews* and *API economy models* contribute to answering the first research questions, as they deal with underlying topics related to API ecosystem and business value in general as well as how the value creation can change over time based on company and market maturity. In short, the value creation is a trade-off encompassing multiple elements where *openness* and *flexibility* are key in enabling

modular services that can serve different types of customer segments with an offering fitting for their unique needs. API ecosystem enables this creation of different solutions from *turnkey solutions* to fully *adaptable*, *API-powered* and *tailored* services.

To answer the first research question in more detail, the analysis shows that the interviewees approached the value elements by highlighting the trade-off between benefits and sacrifices as a core choice, linking strongly to the theoretical framework introduced in this thesis chapter 2. Value propositions as introduced by Osterwalder and others (2014) were seen as key statements that summarise the value and consist of different value elements (Almquist et al., 2018) with most emphasis given to *openness*, *flexibility*, *access*, and *productivity* as the main values in an API ecosystem offering. The link to the business priorities of a company comes from the value elements of *strategic* and *economic* values. Values related to individual people and inspirational elements present in the theory were not brought up by the interviewees, instead the interviewees concentrated on the lower hierarchical value elements as discussed in the analysis. Modular services as defined by Pekkarinen & Ulkuniemi (2008) and Scholten & Scholten (2012) were valued very strongly by the interviewees and they emerged as a theme of their own. In practice, matching a specific ecosystem offering to a customer is not a straightforward task and this is clearly an area that the case company and other companies with a similar approach need to consider very thoroughly. Based on the analytical themes of value elements and service modularity, it can be concluded that the value creation framework defined in chapter 2.4 fits well to the value consideration aspects presented by the interviewees.

One of the main findings of the study is hence that the tools used to evaluate value can vary, but the principles presented in the value creation framework in chapter 2.4 are a good ground for evaluating value. Chapter 5.2 introduced an offering strategy proposal covering the theme of service modularity. It is a two-by-two matrix based on market maturity and digitalization readiness, determining what modular offering is relevant for which type of a customer to fulfil the value proposition. This can support the case

company in their segmentation and solution development. It would be a very interesting topic for further research to study the applicability of this model to other industries and contexts.

Turning value from the API ecosystem into money

The second research question was answered mainly by the theme of *monetization* with the underlying themes of *challenges today*, *future overviews* and *API economy models* paving a view into how changing market conditions can alter the answer over time. API ecosystem offering options were split to *turnkey solutions, ready partner solutions*, *modular services* and *API offering* in the analysis. Each of these can have a different monetization strategy. Monetization was a very difficult and controversial topic as highlighted in the theory as well (Heshmatisafa & Seppänen, 2020; Fruchter & Sigue, 2013; Parker et al., 2016). The analysis identified five generic monetization strategies for API ecosystem and based on them a recommended pricing strategy could be drawn together. *One of the main results of the study is hence this recommended pricing strategy which evolves in stages based on the scale of the business.*

To answer the second research question in more detail, the analysis identified the link between perceived customer value and pricing strongly, linking it to the theoretical approach of monetization presented in chapter 3.4. The analysis identified five different high-level monetization schemes; *free*, *freemium*, *subscription*, *usage-based* and *revenue sharing*. As the focus of the research was on turning value into money the topic of indirect benefits from a free offering were not discussed in that much detail, with more emphasis given to the other alternatives. This study forms a recommended pricing strategy to address the adoption of these options. The strategy being proposed is dependent on the market maturity and consists of three steps that a company is recommended to take when bringing new API ecosystem offering to the market starting from a *freemium model* and advancing towards a *moderate monthly subscription* and eventually a *usage-based pricing*. The starting point is a freemium model enabling fastest

growth, extended with a monthly subscription model after a certain milestone or usage level is reached to start monetizing the value and finally evolving to a usage-based model that scales along with the customer's own business. The final option of usage-based model was seen to offer most scaling potential and therefore the ideal model once the market is willing to accept it. While these pricing options have been discussed in the earlier research (Heshmatisafa & Seppänen, 2020; Fruchter & Sigue, 2013), the proposed evolution between models is a much less researched topic.

The underlying themes of *challenges today, future overviews* and *API economy models* in general were relevant for both of the research questions. As discussed earlier, they underline the need to understand the maturity of the company creating the value as well as the market where the solutions providing the value are being sold. In the theme of *challenges today*, both sales readiness in the case company as well as the market readiness were seen as barriers for value creation and monetization both. Analysis highlighted the need for learning for both the case company and the customer companies present in the market. In order to enable future development and actualize the value creation, focus is needed on *mindset*, *company culture* and *change management*. How to address these barriers in more detail was not in the scope of this research. Once these barriers have been overcome, in the theme of *future overviews*, there is clearly potential recognized for value creation and monetization enabled by ecosystems, digital platforms, APIs, and the case company's own API ecosystem approach as well. The analysis identified further potential for new business models, API economy stretching to multiple ecosystems, and ecosystem-built solutions in general, following and even extending some of the concepts presented by Moilanen and others (2019) related to API economy. In the final analytical theme, *API economy models*, the analysis highlights especially the different forms of *network effects* as keys to success in scaling value creation as researched by Parker and others (2016) and Van Alstyne and others (2017). Especially interesting were the more unique business model opportunities brought up mainly by the interviewees from outside the case company. There is clearly a promising opportunity to study the models of *business-to-developer*

and *platform-to-platform* value creation and even business models not necessarily recognized yet. Finally, all of the six analytical themes were synthesised into a simplified table, which can function as a tool to bundle the main features of each theme and their link to the research questions. Synthesising the research findings into a compact format supports the translation of the research findings into practice.

Recommendations and further study topics

The findings and answers to the two research questions can be summarized *as a process framework that a company can follow when building their approach to a new API ecosystem enabled business*. The first step is choosing how the company evaluates value creation, based on different tools and approaches such as the *value creation framework* introduced in section 2.4. The second step is *choosing the value elements*, which are going to be addressed and prioritized from the customer's perspective. It is equally important to decide what kind of value elements not to consider as it is to decide the ones that are being prioritized. The third step is building *a modular offering strategy* based on this, to decide how the value is delivered to the customer. A good practical tool for this is the *modular offering strategy matrix* introduced in section 5.2. The fourth step is building the *monetization strategy* based on the chosen approach, following for example the models and strategy introduced in chapter 5.3. Finally, this process forms a business model, which should be evaluated against the barriers present in the company and the market. As the digitalization maturity of the company and the market changes over time, the chosen approach should also be updated accordingly. This need to continuously evaluate each element of company strategy against the changing market conditions is present in each individual tool proposed. This process framework is visualized in the figure 16.
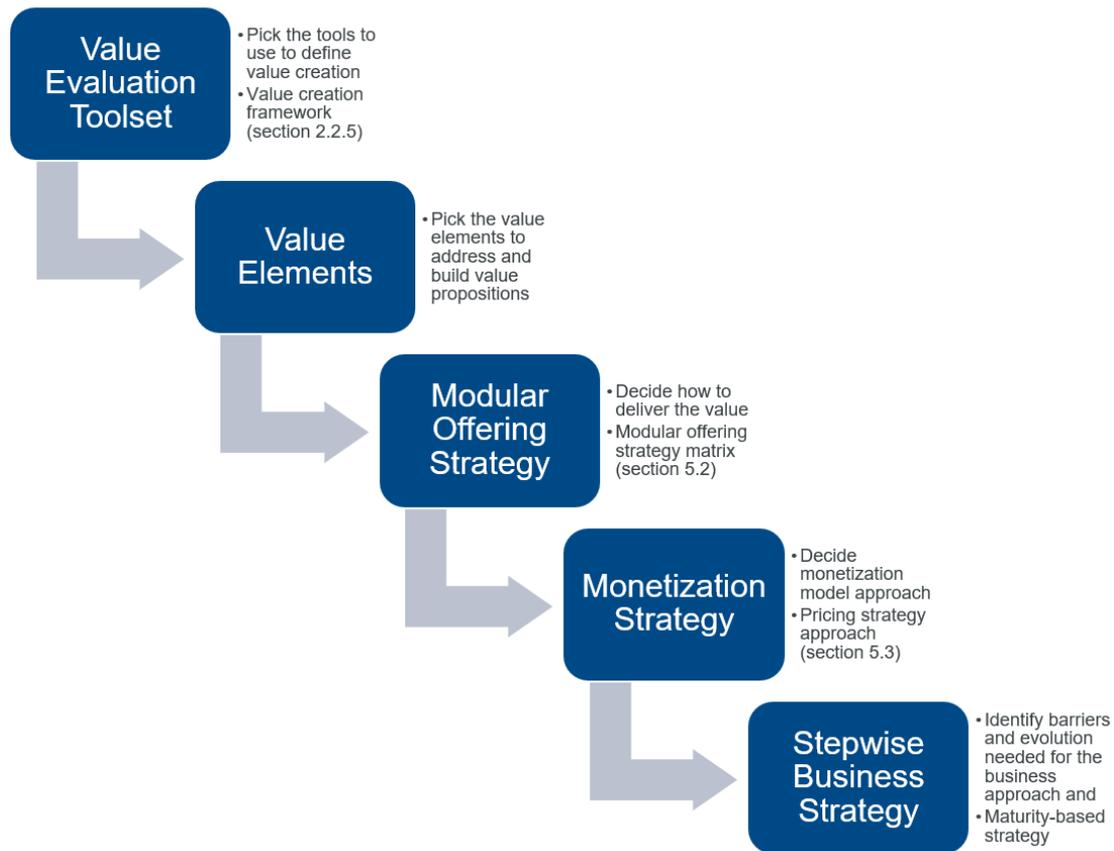
Figure 16. API ecosystem value creation process framework.

The above presented process and results form a useful practical approach for a company considering business opportunities based on APIs and ecosystems. It again highlights how APIs should be seen as much more than just technical enablers and rather as critical business tools.

The findings presented in this thesis take research further by linking together earlier studies in a concrete manner. The links between value creation in *business networks* (Ford et al., 2011; Håkansson & Ford, 2002; Jarillo, 1998), *ecosystems* (Adner, 2017; Han, 2017, Jacobides et al., 2018; Scholten & Scholten, 2012; Valkokari et al., 2015), *digital platforms* (Choudary, 2015; Parker et al., 2016; Van Alstyne et al., 2016) and *API economy* Benzell et al., 2017; Iyer & Subramaniam, 2015; Moilanen et al., 2019) were defined, and there would be room for further study to delve even deeper into the mechanisms

affecting how value creation differs in each business scenario and how companies decide their strategy and approach. There are a few topics that were scoped out from this study, which would provide an excellent ground for further research and study. The topic of individual value elements and relationship-level value elements present in the framework by Almquist and others (2018) were not visible in the results of this research. It would be an interesting study to find out if they were ignored due to scope or because they were not seen as value elements to begin with. Secondly, company culture, mindset and change management were seen as either great barriers or enablers for new business models encompassing API ecosystems. Studying the impact of these factors would be a rich ground for further findings both from academic and practical points of view. Finally, this research was based on a case study, and while the results were seen to be linkable to other industries, further study would be needed to evaluate the degree by which they can be generalized. Similar learnings can be expected to be highly relevant for multiple industries.

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Appendix

Appendix 1. Interview Themes and Questions

1.   VALUE DEFINITION

- What do you perceive as the core values in this API ecosystem

    o   Interviewee to make their own value definition

    o   Follow-up potential: ease of use, future-proof, compatibility

- Is this an interesting network for you? Would you like to be part of it? How would you like to be part of it?

- Case company employee: Where do you see monetization happening in this ecosystem

- External Interviewee: How would you expect to see money flow in this ecosystem

2.   SOLUTIONS USED / VALUE CREATION

- How do you see the balance between ready and customized solutions?

    o   What about monetization of the two?

- What would it take for your company to take part and start developing this ecosystem further?

- What is currently challenging that this ecosystem could solve

- Internal: What does it take for you customer to extend to their own custom solutions

    - what kind of support they would need from us?

3.   FUTURE DEVELOPMENT / VALUE CREATION IN THE FUTURE

- What is the potential for you to use the fill ecosystem in the future (all 3 kinds of solutions)

- What would you expect us to do next to develop this ecosystem?

- Case company employee: are customers willing to accept 3 approaches, or are they only interested in subset

    o   What do you think we should do to get them further?

- Where do you see most potential to monetize in the full ecosystem?

    o   Which models of monetization and pricing do you see most feasible?

- Do you see enough value to pay for the APIs themselves

Appendix 2. Interviewee coding

Interviewees are presented as codes to preserve their anonymity. In the codes the group A stands for employees working in the case study company and the group B for people from external organizations.

Code	Job title	Code	Job title
A1	Sales Director	B1	Chief Development Officer
A2	Sales Coordinator	B2	Founding Partner
A3	Service Design Manager	B3	Senior Manager
A4	Sales Manager	B4	Project Manager
A5	Sales Director	B5	Head of Data & Analytics
A6	Product Line Manager	B6	Chief Executive Officer
A7	Area Director	B7	Manager
A8	Salesperson	B8	Design Manager