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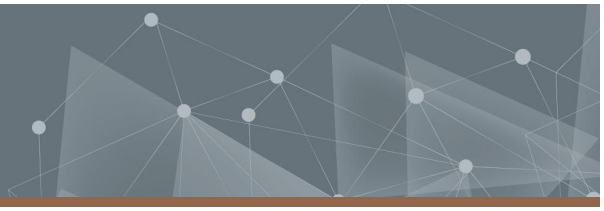

Making the Intangible more Manageable

A study of categorizations of intellectual asset and value creation in industrial born company undergoing digital transformation

Master's thesis in Entrepreneurship and Business Design

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Abstract

The rise of intellectual assets comes on the back of the knowledge economy and the increase in the amount of a company's market value that can be accredited to intangibles. The ongoing march of digitalization around the world further shifts the focus away from tangible assets and traditional industrial manufacturing companies are adopting more digital technologies. There is a lack of comprehension, a knowledge deficiency, and plenty of ambiguity associated with concepts such as intangibles, intellectual capital, intellectual assets, and intellectual property. This creates misunderstandings and increases communication difficulties.

This paper includes a multiple case study within the setting of an industrial company undergoing digital transformation. The aim has been to assess which intellectual assets contribute to value creation and how these assets can be divided into categories. Furthermore, in relation to the setting of digital transformation, the study aimed to investigate if it might have affected the categorization of intellectual assets. In addition, the study aimed to investigate how intellectual assets may contribute to value creation through control mechanisms to achieve sustainable competitive advantage.

Reviewed literature shows that theories that cover intellectual capital categorization stem from the 90s and they tend to converge into three main groups which divide Intellectual Capital into Human Capital, Structural Capital, and Relational Capital. All these concepts and categories are still ambiguous and sometimes contradictory. The findings in this study suggest that six main categories could be adopted, Knowledge Assets, Organizational Assets, Technology Assets, Data Assets, Brand Assets, and Relational Assets. Which forms the base of a proposal for an intellectual asset framework. Furthermore, the importance of knowledge as an asset was especially highlighted for industrial companies undergoing digital transformation. Digitalization also leads to an increase in what might be considered to be an intellectual asset, almost everything at least holds the potential to be an intellectual asset. Traditional industrial companies should highlight knowledge as an asset in itself as they strive to adopt more digital solutions. In order to control all potential assets and achieve sustainable competitive advantage there is a need to look beyond traditional Intellectual Property Rights to ensure protection.

Keywords: Knowledge, Intellectual Capital, Intellectual Assets, Intellectual Property, Intellectual Asset Management, Knowledge Assets, Technology Assets, Organizational Assets, Data Assets, Relational Assets, Brand Assets

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Finally, we would like to extend our love to our friends and family who have stood by us and supported us through this journey.

Julia Häll, Jennie Ljunggren, Gothenburg, June 2022

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List of Abbreviations

CiP Center for Intellectual Property

IAM Intellectual Asset Management

ICDT Industrial Company Undergoing Digital Transformation

IC Intellectual Capital

IA Intellectual Assets

IP Intellectual Property

IPR Intellectual Property Rights

R&D Research & Development

OECD Organisation for Economic Co-operation and Development

WIPO World Intellectual Property Organization

EU European Union

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1. Introduction

1.1 Background and Problem Statement

As tides of history ebbs and flows humans have a tendency to divide time into different paradigms when it comes to the arts, technological improvement or economical shifts. One view is that the current era is the information age and various industries are currently undergoing digital transformation. This relates back to Bell's (1999) use of the term post-industrial, in which the service sector generates more wealth than the manufacturing industry and knowledge in itself becomes more valuable. With this comes the rise of the importance of intangible resources. Bell's logic is closely related to what Drucker (1969, 1993) described as a knowledge economy. The knowledge economy highlights human capital, the power of knowledge and the knowledge worker (Drucker, 2007), who works with their heads to produce ideas.

In the 1990s, authors such as Edvinsson and Malone (1997), Sveiby (1997), Stewart (1997), Sullivan (1999) wrote various work on the importance of intellectual capital and how to categorize such capital. In a review of literature within the area, Choong (2008) found that there was an ambiguity on how the terms intellectual capital, intellectual asset, intangible resources etc. are defined and used.

We are living in a digital era where knowledge is generally considered one of the most critical resources within a company (Andreou et al., 2007). Some people defines it as the knowledge era (Sveiby, 1997). However, knowledge is not new for this era, it has always been a part of the business landscape, but takes different forms. In the business world, it is often recognized as a source of intellectual capital or intangible assets. With the societal changes, technological advancement, and increasing value of intangible assets industrial companies are pushed into digital transformation in order to maintain competitive advantages.

Industrial transformation is an international concept. According to the Oxford English Dictionary (2022) the term industry refers to manufacture and production. However, the definition of the term industry is changing (Long & Holmén, 2022). A common definition of industry is a set of manufacturing or service firms that compete or collaborate (Long & Holmén, 2022). Long and Holmén (2022) implies that there is a need for a broader definition due to organization's entrepreneurial activities and essential changes in technology, institutions and consummations habits. According to their theory an industry is a set of constantly changing firms that creates, deliver and captures value through interaction. The concept of *industrial transformation* should therefore be understood as, value creating changes in firms' activities related to for example innovation, competition and collaborations, but it also refers to relations

and interactions, such as networks (Long & Holmén, 2022).

Digital transformation refer to changes driven by digital technology, fundamental changes in technology, such as digital technology forces the industries to transform and adapt to the new technologies (Markowski, 2022). Markowski (2022) explains this by stating that new technology have transformation effects. A digital transformation require many small operational changes aiming to change the whole organization. An industrial company undergoing digital transformation could therefore be defined as a manufacturing company which currently is adopting to digital solutions, both as a part of their products and services as well as digital means of working.

Rudner (1966) states that one of the main values of classifications, and thus taxonomies, is their use as heuristical devices, which facilities understanding of complex systems. A common business taxonomy to categorize intellectual capital may bring value to a business as it potentially creates the base of a communication tool and enables unified understating. It may be used as a stepping stone to exploit and leverage intellectual capital.

In its Intangible Asset Market Value Study, OCEAN TOMO Intellectual Capital Equity found that intangible assets accounts for 90% of of the Standard and Poor's 500 (S&P500) market value in 2020 (Ocean Tomo, 2020). Traditionally this has been viewed as Intellectual Property such as patents, trademarks, copyright, and design rights (Ocean Tomo, 2020). However, as not all the value of intangible assets can be mapped back to the traditional view of intellectual property there is a question to what more lies within the those 90% of intangibles that makes up the market value.

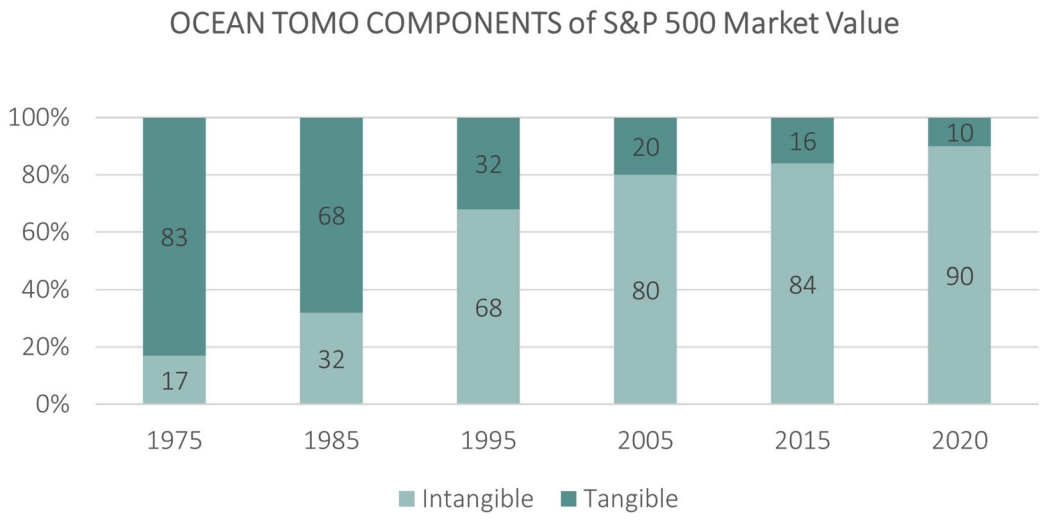

Figure 1.1: Adapted from OCEAN TOMO Intellectual Capital Equity's Intangible Asset Market Value Study (Ocean Tomo, 2020)

Although enterprises agree on the importance of intangible assets many companies

have difficulties to define, structure and manage them (Andreou et al., 2007). Being an industrial based company with years of focusing on product manufacturing will not make the task any easier as change of any kind tend to be meet with resistance. As intangible assets are crucial for the value creation of the business there is a need to find a taxonomy that will facilitate the identification and intellectual asset management. This will enable a better understanding of the true value of the company and identifying more competitive advantages. Therefore there is a need to create a taxonomy for the intangible assets in order to increase the value creation in the entity.

1.2 Prior Research

To position the scope of the this thesis a literature review was conducted. While mapping out existing research in the chosen field it became clear that there are a large number of academical papers within the field of intellectual capital and knowledge. Some papers also investigated and identified a relation between value creation and managing intellectual capital. The literature review showed that several authors within the field include a framework to structure intellectual assets and attempt to categorize intellectual capital. However, a generally accepted categorization has not been successfully implemented. Many of the reviewed literature which aims to categorize intellectual capital are based on financial point of view with a purpose to solve the accounting issues when it comes to intellectual capital.

When comparing the different authors some similarities was identified and showed that three fundamental categories were accepted and applied in most taxonomies, consisting of Human Capital, Structural Capital and Relational Capital. However, the literature review showed that only a few papers includes comparisons and analysis of the different suggested categorizations.

The Organisation for Economic Co-operation and Development (OECD) is an international organization consisting of 38 member countries. The purpose of the organization (Organisation for Economic Co-operation and Development, 2022) is to establish international standards and address social, economical and environmental challenges. According to OECD (2008) the "theoretical" definitions and taxonomies is not in line with the practical reality of a business. However, they found that there are three main categories that is most commonly used, which according to OECD is referred to as *Human Capital*, *Structural Capital* and *Relational Capital*. In addition, Andreou et al. (2007) based their research paper on a business strategic perspective aiming to define the business driver in relation to intangible assets. As a result of their research they identified knowledge assets and designed a framework linking the assets to work functions and activities of a company in relation to its strategy. The research resulted in a scheme for their case study LOKA which included *Market Capital*, *Human Capital*, *Decision Effectiveness*, *Organizational Capital (Technology and Process Capital)* and *Innovation and Customer Capital*. Another study resulted in a conceptual paper by Choong (2008), which defines and categorizes intellectual capital by analyzing characteristics of intellectual capital assets. As his paper is a

did a more extensive study of literature and theories within the context of reporting models and came to the conclusion that intellectual capital can be divided into three main categories *Human capital*, *Structural Capital* and Customer capital. However, Choong (2008) also identified a fourth category named *Intellectual Property Capital* to capture the R&D and commercialization of services and goods. Furthermore, Claver-Cortés et al. (2018) compared the work of different authors and came to the same conclusion, that the most widely accepted categorization consist of *Human Capital*, *Structural Capital* and *Relational Capital*. Their theoretical analysis also showed that different authors refer to different groups of assets when explaining the categories.

Ferenhof et al. (2015) conducted an extensive literature review of 83 articles within the field. Their study resulted in a meta intellectual capital model and came to the conclusion that intellectual capital consist of three fundamental dimensions: *Human Capital*, *Structural Capital* and *Relational Capital*. It also became clear for Ferenhof et al. from the literature review that different authors conceptualize and understand intellectual capital in different ways.

Due to the absence of work applied on industrial company undergoing digital transformation this thesis investigates categorization of intellectual capital in relation to such companies, seeking to provide a pilot framework as a tool to identify different intellectual assets within the company. Only a few authors have suggested sub-categories of the main three categories, thus this thesis aim to find suggestions of how to name and categorize a second level. A specific dimension is added by connecting the result of the theoretical study and the result of an empirical study to create an applicable framework in the context of digital transformation.

1.3 Research Purpose

The purpose of this thesis project is to help identify, structure, organize and control intellectual assets within an industrial company undergoing digital transformation. Which can be defined as a company that were created with an industrial background and are currently adopting digital solutions, both as a part of their products and services as well as digital means of working. Therefore, special consideration will be taken to digital transformation and how that affects categorization of intellectual assets.

1.4 Research Questions

A research question is clear, concise and can be answered (Allen, 2017). Thus, together with the research purpose and research strategy, it forms part of the backbone that is needed to complete the study. To answer the main research question, three sub-questions have been formulated to break down the main question. Together the sub-questions will each bring a small piece that is needed to solve the greater puzzle.

Main Research Question

Which intellectual assets are the most important to create value in industrial born companies undergoing digital transformation?

The main research question are built up by the results from all the sub-questions. Therefore it is intertwined with the methodology of the study as a whole. All theory are merged with data from interviews in order to paint a coherent picture.

Sub-Research Question 1

How can intellectual assets be categorized in an industrial born company undergoing digital transformation?

The first sub-research question aim to initially identify which types of intellectual asset can be found within the business and further on how these assets can be grouped and categorized in relation to digital transformation. The main theory connected to this are the literature related to knowledge, categorization of intellectual capital and the Center for Intellectual Property (CiP) Intellectual Asset Management (IAM) Framework. The data came from the semi-structured interviews connected to the two cases used in the study.

Sub-Research Question 2

How does digital transformation affect how intellectual assets are categorized?

The second sub-research question aim to establish if digital transformation have affected how intellectual assets are viewed and categorized. This question strongly relates to the background of the project and the definition of digital transformation. To answer to the question was found through the gathering and analysis of the interview subject's reflections of digitalization and its outcomes in relation to the gathered theory of intellectual capital categorization.

Sub-Research Question 3

What intellectual assets contribute to sustainable competitive advantage in an industrial company undergoing digital transformation?

In accordance with the definition of sustainable competitive advantage the third and final sub-research question aim to establish what control mechanism of intellectual assets needs to be highlighted in relation to digitalization. These are derived from laws and legislation related to IPR:s and connected to analysis models such as Resources Based View an Porter's Five Forces in order to extrapolate new potential control mechanism beyond traditional IPR:s.

1.5 Delimitation and Scope

One focus of this thesis is to conduct two case studies within an industrial company undergoing digital transformation. The chosen company strives to increase its digitalization efforts and the phrase *"industrial company undergoing digital transformation"* strives to emphasize that and frame the setting in which the thesis is conducted. The data collection will mainly derive from a narrative literature review and semi-structured interviews with relevant business professionals within the company. This thesis is in part connected to Franssons and Sadriu's (2021) master's thesis *"Data as an Intellectual Asset"* and therefore data as a category will not be explored further in the scope of this thesis.

Another part of the scope of this thesis is to identify which intellectual assets that drive value in an industrial born company undergoing digital transformation and clarify how these assets can be categorized into a business taxonomy. Due to the limited time scope, this thesis project will mainly be kept on a broad and general level when defining potential main categorization. Furthermore, the thesis will only suggest potential sub-categories to the defined theoretical main categories without further analysis of the components, or each potential control mechanism in terms of Intellectual Property Rights. When referring to value this thesis will be concerning value creation in relation to sustainable competitive advantage and not direct financial value or valuation in a traditional accounting definition.

2. Methodology

2.1 Research Strategy

The research strategy set the scene of the nature of the research and establishes the link to theory (E. Bell et al., 2019). One focus of this study was to create a deeper understanding of different frameworks that have been developed over time and adapt them to reflect digital transformation. Both a deductive and an inductive research strategy was deployed. The main research strategy used was a qualitative study, as it is commonly used in business research and relates well to the data gathering method of semi-structured interviews, which was the key research method in combination with the literature review of existing theory. A qualitative study was also preferred over at quantitative study as it was hard to nail down and quantify suitable variables to measure. Throughout the project, two separate cases within one company was used as the basis for finding interview subjects and gathering data. Thus, the research design use was a multiple case studies within one company.

2.1.1 Relationship Between Research and Theory

When conducting research in a business setting one hopes to contribute to theory, however small the contribution may be (E. Bell et al., 2019). One of the main goals of this study was to create a deeper understanding of the intellectual asset as a taxonomy in an industrial company undergoing digital transformation. To achieve this, a mix of deductive and inductive study was to be performed as part of the research strategy. In a deductive study, a hypothesis is formed based on what is known in relation to theoretical consideration within the domain (E. Bell et al., 2019). Thus this study is closely related to previous work that various authors have conducted in relation to categorization of intellectual capital and the study is mostly deductive in its nature. The opposite of a deductive study is an inductive, when data is gathered and theory is generated (E. Bell et al., 2019). Therefore, through the data collected during the interview phase a more inductive approach was adopted to step outside the predefined boundaries created by the use of theory and the literature analysis. The deductive and inductive approaches was be iterated to deepen the understanding and enable better data gathering. By basing the interview questions on theory deduction was used. To induce a new model the gathered data was used as an impute to adjust existing frameworks. Thus coming full circle with the mixed of deduction and induction.

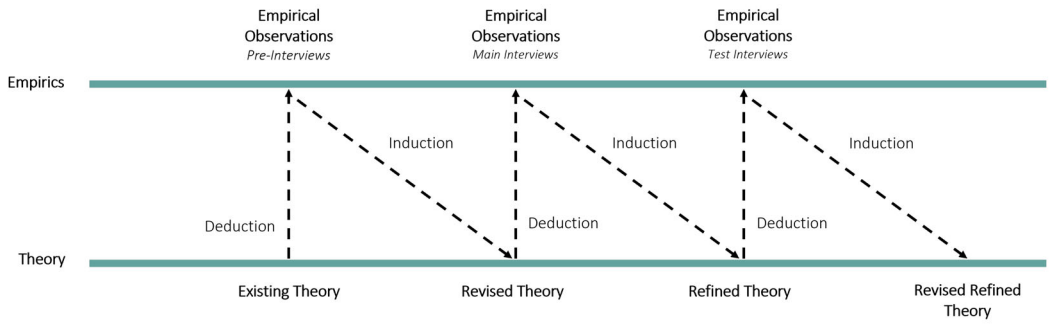

Figure 2.1: Methods of reasoning, adaptation of (Fransson & Sadriu, 2021)

2.1.2 Epistemology and Ontology

Ontology is concerned with the nature of reality while epistemology is the validation and the theory of knowledge (E. Bell et al., 2019). Resources as *Intellectual Assets* and *Intellectual Capital* as concepts are created phenomena which do not exist independently outside a constructed system, the phenomena under study was therefore resources as intangibles. These concepts could therefore be considered to be ontologically subjective and it was within that realm the main part of this study is performed. Since this study also touches knowledge directly, it could possibly have moved toward the direction of epistemologically subjective. However, since the aim was not to add new theory of knowledge or discuss what knowledge defined as the study remain in a objective setting, especially since knowledge is accredited to be a resource specified by the interview participants. All this relates to the postmodernism view of constructivism, phenomena are created through social interactions and are constantly altered (E. Bell et al., 2019). Postmodernism is a philosophical approach that questions if you can arrive at one single definitive version of reality. Findings in research are not right and wrong in an absolute sense, the results are possible interpretations and versions of reality (E. Bell et al., 2019).

2.2 Research Design

A case study facilities a methodological and in-depth analysis of a specific bounded system, using several sources of data to form a picture of how the system work. A multiple case study, also called collective case design, is when several connected cases are studied simultaneously to create a deeper understanding of the studied phenomena than one single case can provide (Mills et al., 2010). The issue is examined across cases, however, not in the same sense as in a comparative study when two or more contrasting cases are analyzed using the same method (E. Bell et al., 2019). The cases under study throughout this thesis were within an industrial company undergoing digital transformation with a dual focus on one platform project and one more traditional line of products. A product is an item offered for sale, which can be an item in itself or a service (Singer, 2020). In the case related to the product line it is deemed to be a more traditional product as it is a physical item sold for a fixed price.

Mayer (1997) defines a platform as common structures based on a set of subsystems and interfaces from which multiple products can be efficiently developed and produced. A platform has the combination of stable core elements with low-variety and low-reusability high-variety complementary elements which results in modularity (Thorén, 2022), which makes up the fundamental differences to the traditional line of products. The approach of a multiple case study were deemed appropriate, as it first of all fit well well into the boundaries set up naturally by conducting the study within one organization, and was chosen over a comparative method to facilitate a deep dive in to each case. A well grounded understanding of each case were prioritized over the ability generalize through comparison. This research design also connects well to the established research questions and scope which focus on one type of setting, industrial company undergoing digital transformation, which was the main boundary.

2.3 Research Method

2.3.1 Literature Review of Theories

To get an understanding of the different authors theories of how to categorize intellectual assets a literature review has been conducted. By comparing and analyzing the different theories this constituted a theoretical foundation to the study. The main focus of the literature review has been to gather academic papers and books which categorize intangible resources. To get different perspectives on the categorization the literature include authors with varied academic backgrounds, e.g. economic scholars and lawyers. In addition, literature that in various ways define intellectual capital and knowledge has been explored as well as literature related to competitive advantage. This has mainly been included under Chapter 3, Theoretical Framework. The literature review has been conducted as a narrative review, as this kind of review is coupled only with topics of interest, tends to be less focused and broader in scope, and goes well with the inductive part of the study (E. Bell et al., 2019). The starting point was to ask well-versed knowledgeable people about relevant articles and books. From those recommendations, other relevant works of literature were identified from said book's reference lists. In the process of gaining a foundational understanding of the topic and its challenges, there were a few author names that recurred in almost every book and article, which defined a set of core authors. Keywords related to the topics of interest were used as search terms in databases such as EBSCO to decrease the dependability upon the previous recommended literature. Hard copies of books were retrieved through the Chalmers University of Technology or the Gothenburg University Library. In addition to the reviewed academic literature, internal documentation was analyzed in relation to the cases under study.

2.3.2 Interviews

At the beginning of the project unstructured interviews were used to initiate contact with various potential interview subjects. These interviews were not used directly for data gathering, but rather as a navigation tool for the authors to get a sense of the

topic of interest. The main method of gathering primary data was the use of semi-structured interviews. As a finishing touch, a few test interviews were conducted as an additional iteration of the research strategy. Together with the reviewed literature and analysis of internal documentation the interviews form a triangulation of sources. The reviewed literature and internal documentation constitute secondary sources.

In order to structure the interviews, predetermined questions were prepared in line with theories and the findings of theories in the reviewed literature, see Appendix E. When utilizing grounded theory within a study, it is beneficial to use open-ended questions initially and then focus on more narrow and detailed questions (Charmaz, 2006). As the intensive interviews were aimed to be more conversational and include some room to open up for discussion, a semi-structured method was used (Charmaz, 2006). This enabled more flexibility for adjustments and follow-up questions depending on the individual's understanding and knowledge. All interviews were conducted digitally as video enabled meetings through Microsoft Teams.

2.3.3 Collecting Data and Data Analysis

The data was gathered through a combination of note taking during the interviews as well as recordings. The program used for recording the interviews automatically created a transcript of the interview which was used to assist in the data analysis but no direct manual transcripts were created. The main method used to analyze the data was the use of grounded theory, which can be seen as a way to generate theory out of data in an iterative process where the gathering of data and the analysis happen in parallel (E. Bell et al., 2019).

In contrast to other methods used to analyze empirical data grounded theory's working process entails that the collecting of data, coding, and analysis all happen at the same time. Grounded theory is often used when studying a certain phenomenon or process and developing or discovering a new theory (Charmaz, 2006). Since part of this thesis aims to develop a framework and tool to identify intellectual assets within an organization, mainly for an industrial company undergoing digital transformation, grounded theory was a natural fit. Before starting the data collection, initial research questions were determined. By stating the research questions, an initial idea was formed about the abstract phenomena the thesis aim to explore. The purpose and research question of the study was revisited during the whole process to see if these aligned, thus the coding and categorization were adjusted as this is an iterative process.

The research questions shape what data would be collected. The study used intense interviewing as a method to collect data from the industry. It is a commonly used method for qualitative research (Charmaz, 2006) and is therefore applied. Using in-depth interviews based in a semi-structured setting potentially generated more data than a structured interview or survey regarding the interviewee's experiences.

A qualitative study was conducted based on data mainly gathered through the

interviews. Therefore, it was crucial to make sure that the interview questions related back to the topics connected to the research questions and that the recruitment of what people to interview was considered. However, the method of grounded theory uses iterative recruiting of participants, called theoretical sampling (Charmaz, 2006). Starting with two names, one from each project, asking them for suggested names trying to build an understanding of the company and from there deciding who could be of interest to interview next based on the research questions. Each interview was recorded and transcribed including some initial analysis of the gathered data. As the data was collected and analyzed eventually themes and categories started to become visual.

Participants was selectively chosen to include different perspectives of what an intellectual asset framework could look like. By using an iterative selection process it facilitated a broader variation of the collected of data. When analyzing the information collected during the first few interviews it showed that there were perspectives that was not represented. Based on such analysis more participants were invited to participate in the study, adding more perspectives and variation of data. This method also encouraged comparison of participants different understanding based on different backgrounds.

The first step of processing and analyzing the information from the interviews is called open coding. According to grounded theory, it involves extracting important data by consolidating the data from each interview and breaking it down into smaller discrete units, giving them names, so called codes to tag them. The second step is called axial coding (Saunders et al., 2016), which involves connecting similar or related open codes and grouping them together to form categories (themes).

Another part of the grounded theory is the comparative method. This method involves constant comparisons (Charmaz, 2006) of data and interviews throughout the whole process. This facilitated findings of similarities as well as differences between the collected data and also contributed to the theoretical sampling and choice of participants for the interviews.

One of the last steps of the grounded theory is called selective coding. This involves the final categorization by defining the categories that capture the essence of the study. These core categories then became a part of the results.

2.4 Research Quality

When conducting qualitative business research it is important to assess the quality of the conducted research in terms of reliability and validity. In Bell et al. (2019) Lincoln and Guba's (1985) term *trustworthiness* is used to judge the quality of qualitative research. This includes, Credibility, Transferability, Dependability and Confirmability.

2.4.1 Credibility

The credibility of the study is related to how believable the findings are (E. Bell et al., 2019). In this study 14 interviews were conducted and 8 different sources of intellectual capital categorization/theories frameworks were investigated in-depth as well as 5 papers comparing and analyzing various theories. In addition, internal documentation was analyzed in order to establish a triangulation of sources and thus increase the credibility of the study (E. Bell et al., 2019). Most of the intellectual capital frameworks were developed during the 90s which could be seen as a credibility issue as one might question their relevance as of today. However, conducting interviews somewhat aimed to combat this. The interviews were carried out to following good practice, which is part of establishing credibility according to Bell et al. (2019). Several iterations of interviews were conducted, unstructured pre-interviews, semi-structured main interviews, and to close off the process, test interviews. The interview subjects represented different role descriptions within the company to generate multiple viewpoints, however, it is hard to capture a generalized view as the sample size was small in comparison to the total number of employees and the subjects were chosen specifically sought out by the researchers. However, with the use of in-depth interviews credibility might rise slightly as there is more time to dig into complex insights and issues.

2.4.2 Transferability

Transferability concerns if the research findings might be transferred to other contexts (E. Bell et al., 2019). This study was conducted inside on single firm, that was defined as an industrial company undergoing digital transformation. The results might therefore be harder to apply to other firms operating in a different setting. Also, this was a case study and a downside to this type of study is that it does not provide a result that can be generalized and it is hard to determine causal influence (E. Bell et al., 2019). The issue of generalization was partly amended as multiple cases were used, however, there was no direct critical comparison between the two. With that said, some of the results could be transferable but one should keep in mind the limitations brought on by the setting the study was conducted in.

2.4.3 Dependability

Dependability relates to if the research findings are likely to apply at other times, meaning that it is trustworthy in the sense that it can be reproduced (E. Bell et al., 2019). If similar theories and methods were to be used in a similar context as deployed in this study the findings should at the least correlate to some extent. However, Bell et al. (2019) also states that an audit process of the research can be used to establish dependability. This poses a problem as the raw data and data analysis of this study is confidential. Therefore, it is deemed to be difficult to duplicate the research results which lowers the overall dependability of the study.

2.4.4 Confirmability

Confirmability concerns if the researchers have allowed their personal views and values to affect the performed study, and if they have acted in good faith (E. Bell et al., 2019). The risk of bias when conducting research is ever present. In this study, the researchers recognize that they have been heavenly influenced by the chosen theoretical frameworks and the reviewed literature. A first step to counter bias is however to recognize the source and influence. And to combat this the semi-structured interviews were planned out to give the interview subject time for reflection before introducing the theoretical aspects. The influence of the personal values of the researchers is harder to identify and combat. However, Polanyi (2015) attests that personal views and experience have a significant effect on scientific discovery and in accordance with a postmodern view the result is neither right nor wrong in an absolute sense (E. Bell et al., 2019). Personal bias is thus a part of the findings and also depends on what glasses are chosen to view the world through.

3. Theoretical Framework

This chapter present the theoretical framework which the thesis is based on. As a starting point the thesis' interpretation and definition of the concept knowledge will be presented. Thereafter, different central business analysis models will be presented as they may work as tools for business in the value creation process of intellectual assets. Another theoretical framework which this thesis used to make intellectual assets more manageable is the Intellectual Asset Management framework. This is presented to introduce the setting of the thesis' focus: to capture and control (claim) intellectual assets, which is one of four processes according to the framework. This chapter also include a brief introduction of legal control mechanisms which can be useful in relation to the value creation of the assets.

3.1 Knowledge

Theories about knowledge and knowledge as a concept is ambiguous. It is difficult to enter into a discussion on how it could or should be defined as the concept is intertwined in numerous different scientific disciplines. For the purpose of this paper, knowledge is discussed in relation to the knowledge economy and resourced based view. According to these theoretical starting points, knowledge is considered the main source of all intellectual resources, therefore a detailed overview of the interpretation of the concept is presented in this section.

Peter Drucker (Drucker, 1969) used the term Knowledge Economy to describe a society where knowledge intense activities are the main driving force behind the production of goods and services and advancement in technology and science. The main factors in a global economy is no longer physical tangible resources, instead there has been a shift towards experience, expertise and intangible resources (Drucker, 1969). In this setting knowledge can be viewed as both a product and a tool (Drucker, 1969).

Lundvall and Johnson (1994) argue that we are in a knowledge economy in which knowledge is a key resource and learning is a key process. They have developed a framework to position knowledge and learning with a central role to analyze economic change. Knowledge has always been a key resources, as natural resources and human physical labor have limited how much can be produced and consumed. In contrast knowledge is not a scares resources (Lundvall & Johnson, 1994). As part of their framework (Lundvall & Johnson, 1994) suggest that knowledge relevant for economical analysis can be divided into four categories, know-what, know-why, know-who, and know-how.

- Know-what - The knowledge about facts, is close to information and can be broken down to bits

- Know-why - Knowledge about underlying principle and phenomenon in nature, in the human mind and in society. Basically, understanding the reason behind something or a course of action.

- Know-who - The knowledge about specific and selective social relations. It is to know who knows what and can do what. It can be further be broken down in two categories.

  - Know-when and Know-where - Knowledge about when and where to introduced innovations. In all, these refer to useful and concrete knowledge about the market which can give an economic advantage.

- Know-how - Knowledge in the form of skills. Specific knowledge on how to do something on a practical level.

The term tacit knowledge is connected with Michael Polanyi's original edition of *Personal Knowledge* (1958). Tacit knowledge is hard to articulate verbally. In a new edition, Polanyi (2015) states that all knowledge springs from tacit knowledge and that humans often know more than they can tell. Polanyi (2015) relates his work about knowledge to animal creativity but states that they can only possess tacit knowledge. It is the human ability to share knowledge verbally that enables the transmission of explicit knowledge.

Scholars working with intangibles naturally come to connect their work to knowledge, as that is the source of their subject matter. Sveiby (1997) refers to Michael Polanyi and states that knowledge can be described as a capacity to act. The process of knowing creates a person's capacity to act. Knowledge is considered tacit according to Sveiby (1997), meaning that it is hard to explain in words, but when made explicit through language it becomes static. However, it is not possible to express everything we know. A person always knows more than what is expressed in words (Sveiby, 1997).

Brooking (1996) in turn refers to three types of knowledge: tacit and explicit, and in addition, also uses the term implicit. *Tacit knowledge* is knowledge that is extremely hard to express in words. The second type of knowledge, *explicit knowledge* includes knowledge that is possible to write down. *Implicit knowledge* includes the practical application of explicit knowledge and can be found in operating processes, methods, culture of the company etc. This usually takes longer for new people to identify and learn.

Knowledge is not diminished when shared, instead it grows. Sveiby (1997) gives an example to clarify. If you share your knowledge with your project team, the team will gain knowledge while you maintain the same knowledge. In addition, sharing

knowledge could also result in new earned knowledge for you through discussions and questions throughout the process.

Furthermore, is the question of how knowledge relates to other definitions and forms of knowing. Ackoff (1989) proposed this relationship as a hierarchy. Stemming from wisdom moving down the ladder to understanding, knowledge, information, and data. This is been commonly visualized as a pyramid, see figure 3.1 with wisdom represented as the crown at the top. In Ackoff's (1989) version each step in the hierarchy is included in the one that falls below it. The top of the pyramid cannot exist without the support of the base.

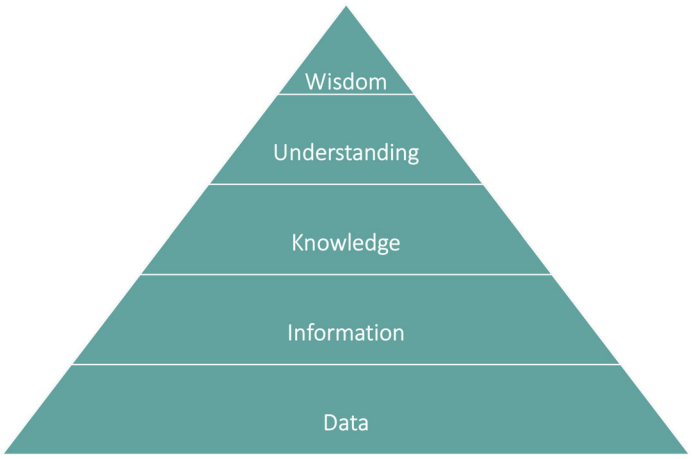

Figure 3.1: Adaptation of the hierarchy of wisdom (Ackoff, 1989)

Data may be represented stimuli and signals, conceived as signs or symbols (Zins, 2007). It is represented at the bottom and one main point with the use of a hierarchy is that data in itself is useless, context is needed to understand how data relates to the world around us and how it fits in (Ackoff, 1989). The difference between data and information is thus functional. *Information* lies within in descriptions. It is answers to questions that are initiated with either *who*, *what*, *where*, *when*, and *how many* (Ackoff, 1989). The definition of *knowledge* differs and is often elusive but in the context of the wisdom hierarchy it is defined by reference to information (Rowley & Hartley, 2008). Knowledge is also know-how about how a system works and makes it possible to transfer information into instructions. Through knowledge you can control a system and make it more efficient (Ackoff, 1989). According to (Zeleny, 2005) all knowledge is in some way tacit and to capture it is to make it into information. *Understanding* is explained as the ability to learn and adapt to errors in a systematic way, why the error occurred, and how to correct it (Ackoff, 1989). When experience is added to understanding *wisdom* is gained, it is a form of elevated understanding that aims to appreciate the why (Ackoff, 1989). However, according to Rowley and Hartley (Rowley & Hartley, 2008) wisdom is not in focus when the model is discussed.

3.2 Business Analysis Models and Value Creation

The concept of business models became a popular term to use in the 1990s (Richardson, 2008), even though it can be speculated that different models to conduct business is as old as trade in itself. However, since the 90s business models have become popular to use in business research (Zott, Amit, & Massa, 2011). Many frameworks have come out of the study of business strategies. Common models and frameworks are Porter's Five Forces, Porter's Generic Strategy, Hill and Jones Generic Building Blocks, the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, Barney's Value, Rarity, Imitability and Organization/Non-Substitutability (VIRO/N) to evaluate sustainable competitive advantage, and Porter's value chain framework to mention but a few (Richardson, 2008). These different business models can be divided into two major schools of thought. One of them is Industrial Organizational (IO) economics, e.g. Porter's Five Forces. Which is based on the assumption that a firms resources are homogeneous and mobile across industry (Barney, 1991) IO is based on the reasoning that a company's performance is set by the conduct and structure of the industry the company does business (Philipson & Oghazi, 2013). The other is Resource Based View (RBV), e.g. VIRO/N. Which in turn assumes that resources are heterogeneous and immobile across industries (Barney, 1991).

Business models are conceptual frameworks that facilitate a better understanding of one stream of business and not the entire firm as an entity. At the core lies three main concepts, value proposition, value creation and delivery, and value capturing (Richardson, 2008). The value proposition portrays the relevance and core value of the business, in other words, what value the business provides and to whom. The second part of the business model, value creation and delivery, further explains how to execute and deliver the value proposition to the targeted customers. The final part, value capturing, concerns the profitability of the proposition and value delivery. This can be viewed through revenue and economic models (Richardson, 2008).

3.2.1 Resourced Based View

Resourced based view (RBV) is a business model that look upon internal aspects in order to identify and exploit to achieve sustainable competitive advantage. Simple put, competitive advantage is the edge one company has over competitors. Barney (1991) define three concepts that are central to this perspective, firm resources, competitive advantage, and sustained competitive advantage.

Firm resources are stated to include all potential assets such as *capabilities, organizational processes, firm attributes, information, knowledge, etc."* (Barney, 1991). Not all of the firms resources are statically relevant, RBV intend to highlight which resources to use to achieve and maintain competitive advantage. Barney (1991) explains that a firm has competitive advantage when implementing value creation strategy not use by potential competitors. Sustained competitive advantage on the other hand is when the firm have a competitive advantage and the potential competitors cannot mimic and duplicate from the same strategy. Rather than time

passed the inability to duplicate the strategy is what truly makes it sustainable.

Barney (1991) also states that not all firms have the means necessary to obtain sustained competitive advantage. The resources that reside within the firms must have the following four characteristic;

- Valuable
- Rare
- Imperfectly imitable
- Non-Substitutable

Firstly, a resource is *valuable* if a strategy that improve efficiency and effectiveness can be implemented to exploit opportunities or neutralize threats in the environment of which the firm operates (Barney, 1991). Secondly, a resource that is *rare* is not possessed by a large number of firms (Barney, 1991). Thirdly, a resource that is *imperfectly inimitable* is unique or difficult to imitate (Barney, 1991). It might also be one or more of the following, contain unique historical conditions, be casually ambiguous, or socially complex. Finally, a resource that is *non-substitutable* has no equivalent valuable counterpart that is rare nor imperfectly inimitable. The resource cannot be easily substituted (Barney, 1991).

In summary, the basis of RBV is that for something to be a resource it must be valuable (Barney, 1991). The attributes rare, imperfectly imitable, and non-substitutable may be viewed as the control dimension. Thus, in relation to this study RVB and sustainable competitive advantage are used to build upon as seen from a value and control perspective.

3.2.2 Porter's Five Forces

The use of Porter's five forces is a wide spread model to determine the competitive intensity of an industry (Richardson, 2008). Porter's model (Barney, 1991) tend to focus on external factors and the collection of the five forces are meant to determine profit potential for an industry (Porter, 1979). The five forces are the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products or services, and the jockeying among current contestants according to Porter's (1979) original article. A market with perfect competition holds the worst prospect for profitability. However, if the overall sum of the forces on a market are weak there are potential for great performance (Porter, 1979).

Threat of new entrants is characterized as new capacity and resources brought into an industry as well as a desire to gain market shares. The potential gravity of new players entrance to the market can be related to the seven barriers to entry; Supply-side economies of scale, Demand-side benefits of scale, Customer switching

costs, Capital requirements, Incumbency advantages independent of size, Unequal access to distribution channels, and Restrictive government policy (Porter, 2008). Porter (1979) also notes that the conditions to enter are ever changing.

Threat of substitutes is if a product or service provide a similar solution by using different means for the same economic need than the one currently deployed in the industry. Substitutes are ever present, however, they can be hard to identify as they might represent a entirely different industry and thus easily overlooked (Porter, 2008). The threat is considered to be high by Porter (1979) if it offers a competitive price-performance trade-off compared to the current industry product or if the buyers cost of switching are low.

Bargaining power of buyers or customers, the market of outputs, and the opposite side of the suppliers can press down prices, demand higher quality or better service, and choose and pick between industry actors thus effecting the profitability (Porter, 2008). The power to negotiate is what gives the customers leverage towards industry actors. Such leverage could consist of, a few number of buyers who buy in bulk off a single vendor, the product or service is standardized or similar in character, low switching cost if buyers desire a new vendor, or if buyers start to produce the product further down the supply chain themselves (Porter, 2008). In addition a customer group is deemed to be cost sensitive if, the product procured from the industry represent a big portion of the overall budget, there are low profitability or low cash flow in a group of buyers, the quality of the buyers produced product or service is highly affected by the quality of the industry offer, or the industry's offer has little effect on the overall costs of the buyers (Porter, 2008). These characteristics generally apply to both consumers and business-to-business customers. This applies to intermediate customers, assemblers or distributors, as well. However, in addition they gain higher bargain power if they affect pricing for other buyers down the chain (Porter, 2008).

Bargaining power of suppliers, or the market of inputs, relates to the suppliers ability to adjust prices and quality of the goods and services that are provide for further refinement to the market. A supplier with great power can squeeze completely annihilate the profitability of an industry with price increases if the company in question cannot carry over the cost increase to its own pricing of their product or service (Porter, 1979). A supplier could be considered powerful if: it has a near monopoly status and is more concentrated than the industry it serves, the supplier caters to multiple industries, there are a high switching cost for the industry associated with changing suppliers, product or service are unique or differentiated, there are no substitute for what the supplier offer, and the supplier might move into the industry and become a direct competitor (Porter, 2008).

Competitive or industry rivalry among existing firms, called jockeying for position in Porter's (Porter, 1979) original publication, present itself in many forms. Pricing wars, new product introductions, marketing and advertising campaigns. High competition on a maker tend to put a cap on profitability (Porter, 2008). Factors that contribute

to a high degree of rivalry are, large numbers of competitors of similar power and size, slow industry growth rate, high exit barriers forces firms to stay active in the industry, the lack of uniqueness and low switching costs, high fixed cost for product or service, lack of knowledge about the other players within the industry, or overlarge egos and ambitions of the players or individuals (Porter, 1979). All five forces can be viewed in the illustration shown in figure 3.2.

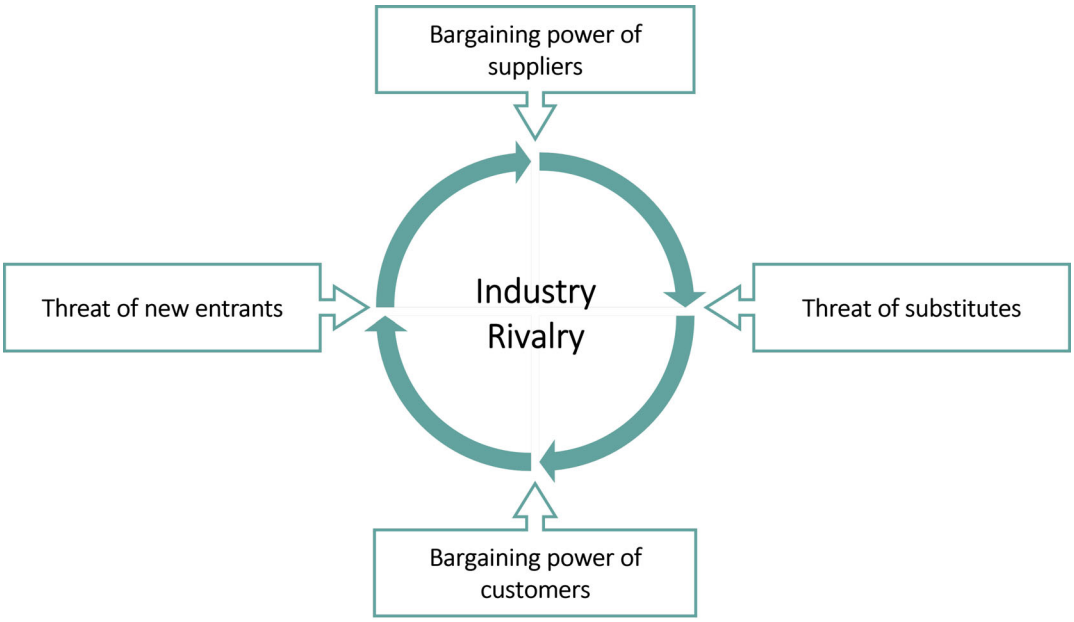

Figure 3.2: Adaptation of Porter's Five Forces (Porter, 2008)

Porter (2008), also include 4 factors, not forces. Industry growth rate, which highlights the importance of not blindly credit high industry growth rate as attractive. Technology and innovation, development in itself does not make an industry attractive. Government, not seen as a force, instead the industries attractiveness is better understood if each of the five forces is analyzed individually in terms of how governmental factors affect them. Complementary products and services, attractiveness increase when a combination leads to higher value than each offering individually.

3.3 Intellectual Asset Management Framework

The starting point for the Intellectual Asset Management (IAM) framework is taken from the Center for Intellectual Property's (CiP) development work in collaboration with industrial actors over several years. The IAM framework is a support system for four proactive processes in response to encountered challenges when working with intellectual asset management. At the core of the IAM framework is the aim to make intangibles more manageable and identifying processes to handle the transformation toward a knowledge-driven society, as well as evaluate how this impacts researchers and individuals working within innovative environments. In

his book *Research and Utilization* (2016) Petrusson explains and explores the IAM framework in relation to the academic environment. The four process of the IAM are stated as 1) claiming intellectual assets, 2) evaluating and positioning intellectual assets to an external environment, 3) making decisions about concrete utilization efforts, 4) organizing knowledge assets, intellectual property rights and contracts. These can be summarized as 1) Capture/Claim, 2) Position, 3) Utilize/Decide, 4) Organize as visualized in Figure 3.3.

Figure 3.3: Adapted of Petrusson's (2016) IAM illustration of Claim, Decide, Position, and Organize

One main part of this research study is the identification and categorization of intellectual assets. Thus the focus of this theory section is the Capture process of the IAM framework. The two forms of intellectual asset that the IAM framework mainly focus on are knowledge assets and intellectual property. In this context knowledge assets is an objectification of what might generate greater value proposition and intellectual property assets are used as the control dimension in terms of who can utilize the asset and under what conditions (Petrusson, 2016). In essence, the core is to identify which results create value and how these results can be objectified in such a manner that they can be controlled and transferred to other parties.

Figure 3.4: Process support for claiming knowledge assets, adapted from (Petrusson, 2016)

In the proposed support system a five step process for claiming intellectual assets

plays a central role, as seen in Figure 3.4. At the start of the process there is a could of knowledge that could be seen as unspecified, diffuse and scattered. The initial step is to identify which results and knowledge assets exists. To facilitate this, two approaches are used, 1) Identifying knowledge assets from the results based on what assets holds value now or has the potential to become valuable, 2) identifying knowledge assets through a system of definitions and categories. These categories are listed as Data, Database, Observation, Theoretical framework, Narrative, Solution, Visualization, Instruction, Software, and Creation (Petrusson, 2016), see figure 3.5. As a part of the identification process it is important to establish which individuals and parties are associated with the result. Who created it and who are the carries of the knowledge assets.

Category	Description
Data	Results as unstructured data
Database	Results as structured and searchable datasets
Observatio	Empiric results in the form of an analysis or conclusion
Theoretical framework	Results that form a general theory
Narrative	Results as a narrative
Solution	Results creating a solution to a engineering problem
Visualization	Results as a visual representation
Instruction	Results as a description on how to perform a task
Software	Results as code or algorithms
Creation	Artistic work

Figure 3.5: Categorizing research results as knowledge assets, adapted from (Petrusson, 2016)

The second step, claim research value, is to specify the value of the result and to describe the results scientific character. At this point there is a need to understand different research challenges, the building blocks of the research results and how they contribute to solve these known challenges. In addition there is a need to establish how the results have developed over time and in which knowledge asset each contribute to the result. This should be related to what other third parties has conducted within the area. Defining the value of the result is another important aspect of this step. To establish the uniqueness and significance of the result and how dependent ones own continued work is upon the result. And how valuable the result would be to establish future collaborations. In parallel a continuous evaluation of researchers claim to the results has to be conducted. Finally, the key here is the description of the knowledge asset, this is what will make the results manageable (Petrusson, 2016).

The middle and third step is to link the result to possible utilization options and use cases. How can the results be used and what benefits might be reaped. Two parts of this step is to describe potential areas of application of the result and specify the result's value if utilized. A number of questions should be posed to establish new value, positive and negative effects. When investigating utility value external

factors should be considered e.g., societal value, additional development needed for utilization, the need to transfer the knowledge asset to facilitate utilization and the degree of incorporation of the knowledge asset in order to utilize it. At this point stakeholders who have not been directly involved with creating the results but still might have a claim should be identified (Petrusson, 2016).

The fourth step is to claim control positions of the results, which can be done through three simultaneously conducted processes. Specifically, 1) establish and describe the possible control position, 2) the need and possible degree of control, and 3) who has claims to the result (Petrusson, 2016). When the first process is related to the academic environment the focus lies on control, based on intellectual property rights, confidentiality, relationships, technology and dependence on an individual. The second processes handles the investigation into the degree of control needed in relation to the importance of the results to succeed with the intended utilization, the risk of infringing on other's control rights, the potential strength and possibility to control the results through the control mechanism mentioned above, and degree of clarity of claims to rights of the result. The third process is an evaluation in order to identify who might have legal claims to the results in the form of who generated the result, who financed the project, partners, and potential transfer of ownership claims. As well as potential claims to licenses to the results (Petrusson, 2016).

The fifth and final step is to create a list of all intellectual assets. The information from the previous four steps put together in a comprehensive and accessible way. Intellectual assets are assessed and tagged with relevant metadata to further increase manageability. The list creates an overview of the results and clarifies the content of the results by providing a detailed description. The overview is created by linking each intellectual asset with a knowledge category and a description as an object. Furthermore it described in terms of scientific character, public benefit and control position. To relate the asset list to all the information gathered during the claiming process, each assets is tagged (Petrusson, 2016).

Examples include already existing links to IPRs, dependability to other background knowledge or project results, interoperability to other environments and infrastructure, as well as possible links to utilization options. The tags should also include connections to individuals. This could include creators, carriers, right holders and actors with utilization rights (Petrusson, 2016).

3.3.1 Intellectual Capital, Intellectual Assets and Intellectual Property

Nowadays, intellectual assets are one of the most important factors of a company's production (Corporate Affairs Division of the Directorate for Financial and Enterprise Affairs (DAF), 2006). As the term indicates the intellectual assets are non physical assets, thus the understanding of such assets is considered to be on a philosophical level. Choong (2008) and OECD (2008) states that there is no definition of the term that is commonly accepted. Terms as intellectual capital, intangibles and knowledge

capital all have the same problem.

With that said there are several definitions for Intellectual Capital. Edvinsson and Malone said (1997) *"Intellectual Capital is not an objective thing, but is a relationship issue and a debt item"*, Steward framed it as (1997) *"Intellectual Capital is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth – collective brainpower"* and Sullivan (1999) *"Intellectual Capital is knowledge that can be converted into profit"*

It is outside of the scope of this study to determine one universal and coherent description of Intellectual Capital and, however in order to battle some of the ambiguity around the term, one definition is described and used through out the study. Sullivan's (1999) lists the firm's ideas, inventions, technologies, general knowledge, computer programs, designs, data, skills, processes, creativity, and publications, and Intellectual Capital is the term used to encompass it all. Intellectual Capital is build up of two elements, human capital and intellectual assets. The employees is the main focus of Human Capital such as their knowledge, skills, abilities, and know-how. All employees have tacit knowledge that an organization wish to use and extract(Sullivan, 1999). The other major part is Intellectual Assets, which is Human Capital in a condensed written down or committed to other forms of media (Sullivan, 1999). It is the step from individuals to intellectual assets. It is now codified or a physical description of specific knowledge, which an organization may claim potential ownership of (Edvinsson & Sullivan, 1996). If an Intellectual Asset can be legally protected it is Intellectual Property (Sullivan, 1999). The relationship is illustrated in figure 3.6.

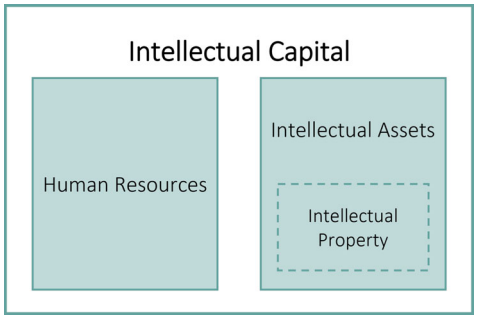

Figure 3.6: Adaptation of a model of Intellectual Capital (Sullivan, 1999)

3.4 Legal Control Mechanisms

Intellectual assets can be protected in different ways (World Intellectual Property Organization, 2022c). Intellectual property rights (IPR) refers to the legal protection of intellectual property. The legal system for intellectual property is different in each country. Due to the digitization, intellectual property is often commercialized and utilized on a global market (Levin, 2019). World Intellectual Property Organization (WIPO) (2022c) has therefore established minimum levels regarding definitions and

protection.

According to World Intellectual Property Organization (2022c), intellectual property rights is the legal protection of creations of the mind. Such creations refers to inventions, literary and artistic works, designs, symbols, brand names etc. The legal intellectual property protection often refers to patent, copyright, trademark and design rights (World Intellectual Property Organization, 2022c).

From a business perspective, the legal rights gives the right holder control over intellectual assets and enhance the competitive advantage (European Commission, 2022a).

3.4.1 Patent Right

Patents are the legal protection of any technical innovation which includes products or processes that offers a new methods or technical solutions (World Intellectual Property Organization, 2022a). According to the European Commission(2022b) there are three requirements. To begin with, the innovation must be *novel* meaning that it has to be new in relation to what is known and published at the date of the application. In addition to this, the innovation has to meet the requirement of *inventive step*, meaning that the product, process or solution can not be a result of what is obvious for a person skilled in the art. Furthermore, the innovation must be susceptible to *industrial application* meaning that the innovation should be reproducible in an industrial setting(European Commission, 2022b).

According to WIPO (World Intellectual Property Organization, 2022a), a patent right is a legal ownership of an exclusive right to prevent other actors from producing, using, selling or in other ways commercially exploiting the patented invention without the right holder's consent. Any physical person or legal person can send in an application for a patent. When the protection is granted it generally lasts for 20 years from the application date and when the patent expire (World Intellectual Property Organization, 2016b), the invention enters into the public domain and the legal rights ends.

3.4.2 Copyright

Copyright is a legal right granted to the creator of literary and artistic work. Which works are covered by the right is typically not expressed with a clear definition or in an exhaustive way, which leaves room for most artistic works to be included. The only requirement is that the work has to be creative and an original creation by the author(World Intellectual Property Organization, 2016a), meaning that it is unique and independent in relation to others work. Creative works that are covered can therefore be everything from books, poetry, paintings, music and films to computer programs, databases and technical drawings. However, an idea, procedures, mathematical concepts, methods of operation can not be protected by copyright.

The rights of copyright can be divided into two kinds. First of all, it is an exclusive

right to reproduce, copy and distribute the protected work without the right holder's consent. This is called the *economic right* (World Intellectual Property Organization, 2016a) which means that the right holder have a sole right to derive money from the artistic work. What differs copyright (World Intellectual Property Organization, 2016a) from other intellectual property rights is that it includes a certain right to protect the work from changes and distortion of the artistic work. This right is often referred to as *moral right*.

According to the Berne Convention (Berne Convention for the Protection of Literary and Artistic Works, 1886), copyright is obtained automatically from the moment the artistic work is created. The duration of copyright may vary depending on the country's legislation(World Intellectual Property Organization, 2016a), however the Berne Convention set out a general rule that the protection should last at least 50 years after the death of the creator.

3.4.3 Industrial design right

Design right is the legal protection of industrial designs (World Intellectual Property Organization, 2016b) which give the right holder an exclusive right to make, sell, import products which embody a copy of the protected design for commercial purposes. An industrial design is recognized due to its dual nature which includes both aesthetic and functional purpose. In order to obtain protection WIPO (2016b) states two main requirement. According to the first requirement, the design must have aesthetic appeal, referring to the intention to create a shape of appearance that is appealing to the customers. The second requirement state that the design have to be original, meaning that it should be new in relation to what is publicly disclosed the filing day. The right aim to protect the the creative elements that enables and contribute to success on the market(World Intellectual Property Organization, 2016b) and usually last for 10-25 years.

3.4.4 Trademark right

A trademark can be any sign or mark that identifies and distinguish your goods or services form others (European commission, 2022). According to the EU directive 2015/2436 the main purpose of trademark is to inform the customer about the origin and quality of a good or service, however trademarks today also serve an important communication channel between the companies and its consumers (Levin, 2019). The trademark right is an ownership of an exclusive right to use a specific mark and hinder others from using it, which in turn also protects the reputation and goodwill.

Trademark is the longest potential protection of all IPRs, which usually last for ten years, but unlike any other IPRs trademark registrations can be prolonged (European commission, 2022) as long as it meets the requirements of registrations and the fees are paid in time.

3.4.5 Trade Secret

Another IPR protection follows by the phenomena of trade secrets. According to WIPO (World Intellectual Property Organization, 2022b) trade secrets refers to a right to confidential information in relation to unfair competition. For information to be considered a trade secret it must meet a few criteria. To begin with, it should not generally be known or readily available, meaning that only a limited number of people carry the knowledge. In addition to this, the organization has taken reasonable measures to confiscate the information, meaning the owner of the information must have taken some kind of action to keep it as a secret. Furthermore, the information must have some commercial value, meaning that disclosure would cause harm to the organization.

There are several different types of trade secrets (World Intellectual Property Organization, 2022b). One of them is *technical information*, which refers to manufacturing processes, test data, designs and methods etc. directly related to the technical solution. Another type is *commercial information*, which refers to information regarding the commercialization strategy such as distribution, list of customers and suppliers as well as marketing strategies. Trade secrets also includes financial information, recipes, source codes and formulas.

Naturally, trade secrets can not be protected by registration. Instead the protection is based on preventive measures (World Intellectual Property Organization, 2022b) to keep the information a trade secret. One way to protect the information could be through *non-disclosure agreements* (NDA), which is an agreement between the company and the employees or business partners, preventing them from disclosure confidential information of the company. Another way of protecting trade secrets is through *non-compete agreement* (NCA), which is destined for the employees to prevent them from participating in competing businesses during and after the employment. It is also a good idea to introduce a system for cyber security and a organizational structure to control the accessibility of to the information.

3.5 Intellectual Capital Categorization

In Saint-Onge's (1996) framework divide intellectual capital into three elements and the emphasis is put on tacit and explicit knowledge held within each area. *Human Capital* is the individual ability to provide the customer with a solution. The tacit knowledge that resides here are are individual mindset, things such as assumptions, values, biases and beliefs (Saint-Onge, 1996). *Customer Capital* is *"the depth (penetration), width (coverage), attachment (loyalty) and profitability of costumers"* (Saint-Onge, 1996). The tacit knowledge within this element looks outside the organization at the customer's individual or collective mindset about how a product or service's value is perceived. *Structural Capital* is described as the organizations capability to meet the needs of the market (Saint-Onge, 1996). In terms of tacit knowledge this is the collective mindset of the company's employees, which in turn shape the culture of the organization as well as its norms and values.

The Structural Capital is in turn split into four categories, *Systems* how the company processes e.g. information and outputs its product/service, *Structure* which is the relationship between the employees in terms of responsibility and accountability, *Strategy* the main goals of the company and how it strive to reach them, and *Culture* the added up opinions, mindsets, values and norms of the individual employees (Saint-Onge, 1996).

Brooking (1996) states that '*intellectual capital*' is the term for the intangible assets that enable an organization to function. According to her, the intellectual capital can be divided into four categories: Market assets, Human-centered assets, Intellectual property assets and Infrastructure assets.

3.5

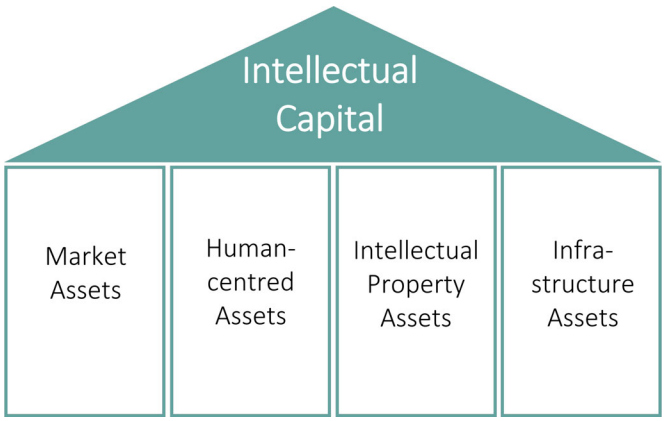

Figure 3.7: Adaptation of Intellectual Capital Categories Brooking (1996)

The first category is *Market assets* (Brooking, 1996). This type of assets are market-related assets that constitutes the potential of the company and are derived from the relationship with the organization's market and customers. Market-related assets includes brands, customer loyalty, distribution channels, business collaborations, franchise agreements, licensing agreements and other favorable contracts. Brooking (1996) divides the brands into three different types: 1) *Product brands* including brands of the product which main function is to distinguish the brand, 2) *Service brand* which typically inform the customer about the service and 3) *Corporate brand* which encompass brands that includes the company name.

The second category, named *Intellectual property assets* (Brooking, 1996), is usually recognized as intangible assets protected by law and refers to patent, copyright, trade marks, trade secrets, proprietary technology and know-how.

The third category of assets according to Brooking's (1996) theory is *Human-centered assets*. When assessing the value of the people Brooking (1996) suggest to use following sub-categorization: Education, Vocational qualifications, Work related knowledge, Occupational assessments and psychometrics, and lastly Work related

competencies. However, the taxonomy based on the individual will vary depending on the company and its interests.

With *education* Brooking (1996) refer to the formal education that a person acquire during school or other educational establishment from the age of four to the age of eighteen. This should not be confused with *Vocational qualifications* which is described (Brooking, 1996) as the practical qualifications based on what a person does at work which can prove a skill. Then there is *Work related knowledge*, which includes knowledge based on practical knowledge and understanding the work. When it comes to *Occupational assessments and Psychometrics* Brooking (1996) refers to objective assessment and psycimetric testing and personality fitting. These assessments are done by using test methods and is useful in order to define the potential of a person. Brooking (1996) also mentioned *Work related competencies*, which can be seen as the ability to something. It is a merged set of skills, creative profiles, personality attributes an vocational qualifications.

The fourth and last category is named *Infrastructure assets* (Brooking, 1996). These types of assets creates the structure of an organization and form the operational foundation of a company. Brooking (1996) divides the corporate infrastructure into six different components. One element to consider is the *Management philosophy* (Brooking, 1996), meaning that the people in leader positions way of thinking about the employees and the organization will effect the culture of a company. The second element to consider is the *corporate culture*(Brooking, 1996). The culture of a company reflect the management philosophy and can be seen as an asset by reinforcing accomplished goals. In order to implement the management philosophy there is a need to have a *Management process*, which is another element of the infrastructure assets(Brooking, 1996). The management process can include policies, quality control processes and feedback mechanisms.

In addition to this *Information technology systems* is also considered an important element since IT systems enable the implementation of several management processes (Brooking, 1996). A customer driven company is also reliable on their customer database, but whether it is an asset or not depends on how the data is used. For third millennium companies *Networking systems* (Brooking, 1996) are crucial elements. This refers to the ability to network, get access to customers, suppliers, external R&D companies etc. which are of high value for a company. What also is considered an important asset is the communication infrastructures.

Brooking (1996) mention *Financial relations* as the final element of the category of Infrastructure assets. With financial relations Brooking means investors, financial company communities, banks, angels etc.

Sveiby's (1997) introduces his theory by stating that companies generally have a difference between their book value and market value. He explains this difference as a result of the existence of intangible assets due to the challenge to book such assets. The concept of intangible assets is used by Sveiby (1997) as an umbrella term

of different assets. According to Sveiby (1997) humans are the true sources of all assets and structures, tangible as well as intangible. He continues his argument by explaining that humans creates '*intangible internal structures*' as result of the actions directed to the inside of the entity, while they create '*intangible external structures*' as a result of actions directed to outside the entity. Based on this understanding Sveiby (1997) divided the intangible assets into three main types.

The first type of intangible assets Sveiby (1997) decided to name *employee competence* and states that the concept of employee competence encompasses the human's capacity to take actions that creates assets. He continue his argumentation by declaring that without people there would not be an organization and illustrate the people as the "machinery" behind a knowledge based organization. However, he also points out that there are theories with an opposite opinion meaning that employee competence should not be considered an intangible assets due to the fact that a competence can not be owned by any other person or legal person than the individual possessing the competence.

The second group of intangible assets according to Sveiby (1997) is the *internal structure* which includes patents, concepts, models, computer and administrative systems, as well as the culture and spirit of the organization. As mentioned above the internal structures are created by the employees however, in difference with employee competence internal structures are owned by the organization.

The third and last group of intangible assets of this theory is the *external structure*. This includes the relationships the organization creates with customers and suppliers, but it also comprises brand assets such as brand names, trademarks and the reputation of the organization.

Stewart (1997) states that there are three places to look for intellectual capital in a company, in its people, its structure, and its customers. These are called Human Capital, Structural Capital, and Customer Capital and relates back to both Hubert Sanit-Onge's and Leif Edvinsson's taxonomies. Stewart (1997) on to explain that once you start thinking in categories it is possible to ask questions in terms of tacit and explicit knowledge. Stewart (1997) states that *Human Capital* is the source of innovation and renewal. It is the knowledge inside the heads of the employees, of which has relevance for the organization. Human capital can grow in two ways, either the company uses more of its employees knowledge or when knowledge that is useful for the organization share among employees. Between Human Capital and Structural Capital the distinction is how the knowledge is managed. *Structural Capital* is the knowledge retained within the organization, It belongs to the company as a whole and can be reproduced, shared and transferred. It could include technologies, inventions, publications, and business processes. *Customer Capital* is represented by the value of the company's relationship to the parties the company conducts business. Stewart (1997) goes on to suggest that this could be extended to relationships with suppliers and mover towards Relationship Capital. Stewart (1997) argues that it is within this category that intellectual capital turns into money, its born from the relationship

with costumers. However, intellectual capital is not created in isolation within each category but from the interplay between them. In addition he also states that that in order to define and manage intellectual capital you need to know what you want to do with them.

Roos and Roos (1997) developed a framework to categorize intellectual capital and intellectual performance. The authors found that there are three main categories of intellectual capital, *human capital*, *organizational capital* and *customer and relationship capital*. Furthermore, they identified four sub categories which each can be divided into smaller groups (Roos & Roos, 1997). The first sub category was named *knowledge capital* including skill capital, motivation capital and task capital. The second sub category was named *business process capital* which includes flow of information, flow of products and services, cash flow, co-operation forms and strategic processes. The third sub category named *Business renewal* includes specialization, production processes, new concepts, sales and marketing and new co-operation forms. The fourth and last subcategory was named *customer relationship capital* and included supplier relationship capital, network partner relationship capital and investor relationship capital.

The focus on Edvinsson and Malone (1997) are closely related to financial value and Intellectual Capital reporting. They explore and explains how to measure the gap between a company's balance sheet and its book value, the hidden value. It is stated that the hidden value takes on three basic forms, Human Capital, Structural Capital, and Costumer Capital. *Human Capital* includes individual capabilities, the knowledge, skill, and experience of the company's employees (Edvinsson & Malone, 1997). However, it is not described as only the sum of previous measurements. Human Capital also need to encapsul the dynamic changes in the competitive environment that an intelligent organization operates within. Skills need to be upgraded and new ones needs to be added. *Structural Capital* is described as the infrastructure that supports Human Capital. It includes organizational capacity to transfer and capture intellectual assets (Edvinsson & Malone, 1997). This could be IT systems, company images, databases, organizational concepts, and internal documentation. Edvinsson and Malone also includes some traditional IPR:s here, such as, patents, trademarks, and copyright. They have suggested that Structural Capital in turn can be divided into *Organizational Capital* the systems, tools, operational philosophy that delivers knowledge through the organization, *Innovation Capital* the use of protected commercial rights, intellectual property and talent to create continuous innovation, and *Process Capital* work processes, technique, standards and employee programs that enables efficient manufacturing or turn around of a service. The last category, *Customer Capital* is simply described as the relationship between a company and its customers (Edvinsson & Malone, 1997). In Edvinsson and Malone's model it is placed under Structural Capital, however, they suggest that there is a shift in the literature towards separating Customer Capital to its own individual category. The also challenge this view and suggest that only time will tell if this is significant enough to merit its own section or if it is a fad to appease investors, employees and other stakeholders. Edvinsson and Malone (1997) illustrate the relationship between

the different types of capital as seen in figure 3.8.

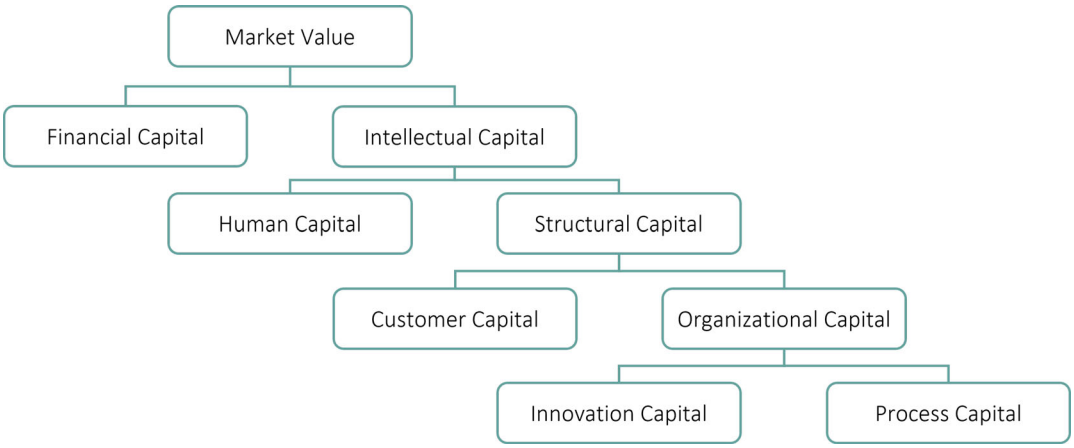

Figure 3.8: Adaptation Intellectual Capital Categories (Edvinsson & Malone, 1997)

Guthrie and Petty (2000) states that the classification by Sveiby is one of the most popular frameworks when learning about intellectual capital. In their empirical study they therefore chose to use Sveiby's categorization. In their literature review (2000), Guthrie and Petty show a modified version of Sveiby's intellectual asset framework.

According to this modified framework (Petty & Guthrie, 2000) the first category they named *Internal: organizational (structural) capital* which is divided into two groups: 1) Intellectual property, which refers to patents, copyrights and trademarks and 2) Infrastructure assets, which refers to Brookings framework and includes management philosophy, corporate culture, management processes, information systems, networking systems and financial relations. The second category named *External: customer (relational) capital* (Petty & Guthrie, 2000) and includes brands, customers, customer loyalty, company names, distribution channels, business collaborations, licensing agreements, favorable contracts, franchising agreements. The third category named *Employee competence: human capital* (Petty & Guthrie, 2000) refers to know-how, education, vocational qualification, work-related knowledge, work-related competencies, entrepreneurial spirit, innovativeness, proactive and reactive abilities as well as changeability.

Wendin and Hayes (2021) released an article detailing how intellectual asset mapping can potentially drive value for knowledge companies, such as Spotify. As part of this they have developed an intellectual asset mapping framework. The starting point lies with the individuals, the employees of the knowledge company, which is defined as the Human Capital. This could been knowledge and experience, which needs to be translated into clearly defined intellectual assets and assigned to the company. Once the potential intellectual assets have been understood they can be controlled as intellectual property and registered as intellectual property rights. The five main categories in the framework are, Tech Assets, Data Assets, Brand Assets, Relational

Assets, Structural Assets.

Tech Asset are described as key knowledge and technology critical for services, features and products. This includes technical solutions, algorithms, machine-learning models, know-how, secret or confidential information, and research results (Wendin & Hayes, 2021). Data Assets are data and information the company gathers through its operation, e.g. raw data, metadata, data sets, data catalogues and data-derived insights and predictions (Wendin & Hayes, 2021). Brand Assets relates to things the company can be identified through, such as marks and symbols, such as distinctive marks, descriptive concepts, unique design and aesthetic features, and original content (Wendin & Hayes, 2021). Relational Assets encompass assets that are dependent on external relationships, some examples includes customer relationships and lists or databases of these, partner relationships and alliances, contracts, such as licenses and agreements, distribution channels and third-party content (Wendin & Hayes, 2021). Finally, Structural Assets are things that shapes the company's way of operating, they are listed as internal organizational structures, systems, policies, procedures, business plans and strategies (Wendin & Hayes, 2021). This logic are related to the CiP IAM way of thinking, using these categories as a framework of intellectual asset to capturing, managing, protecting and leveraging companies intangibles, with the starting point of capturing assets.

4. Findings

4.1 Interview Findings

In this section the findings from the semi-structured interviews will be presented through the use of grounded theory.

4.1.1 Identifying themes

The main themes that emerged as a result of the interviews were related to Knowledge, Organizational, Brand, Relational, and Technology. Themes concerning digitalization effects on industrial born companies and value proposition were additional groups that were gathered from the interview data. See Appendix C for an illustration of the interview data through grounded theory analysis. This is one possible interpretation of the interview data. It is not entirely conclusive and is one representation and analysis of multiple possible truths.

Knowledge

When going through and coding all the interview data one of the major themes that emerged was connected to knowledge. These responses were promoted by the interviewees when questioned about what would be lost if members of the organization were to leave, effective immediately. The codes that build up this theme were either directly expressed as knowledge, or information that is not written down or kept inside one person's mind. Another major part of the knowledge theme was expressed as any knowledge gathered over time. This was expressed as experience, competence, historical knowledge, legacy, and heritage. Others expressed the importance of experience gathered during the development process of a product and how different part of the organization holds and contribute to that knowledge. In addition, the knowledge and insights about why something was done in a certain way were stressed, not only how to do something.

Organizational

Another theme that emerge when going through the coding and searching for similarities were asset related to the organization. As this study concerns a large international industrial company undergoing digital transformation one reoccurring topic was the structure of the organization. The findings focus on the that the organization as such is global, international, and decentralized. Highlighted here is that company is divided into divisions that operate somewhat independently and a core team structure, which are both assets when it comes to building up the

operational model of the company. Further, the findings group processes together. Specifically processes for research and development of technical solutions as well as innovation processes. Other processes included working methods for strategic planning and for working together across teams and divisions. A separate group that emerged was all things related to knowledge sharing, which in itself can be viewed as a process but reoccurred multiple times and was therefore highlighted separately. Adjacent to processes different types of more straightforward routines directly implemented in the work process were highlighted as well.

Business Strategies in the form of different business models stood out as an asset in its own merit as the firm can leverage different strategies to maximize the utilization and potential capitalization of other assets. Featured in the results related to strategies were aspects focused on the use of licensing, and subscription based models as a source of reoccurring revenue and to create lock-in effects on the market. Internally the use of the company's resources and existing business models were mentioned as a strategic aspect in itself when working to create new opportunities. Also included under organization are things that build up the culture of the company, such as the contribution of talented individuals within the company, relationships between employees, and how the leaders of the organization act.

Technology

As an industrial company undergoing digital transformation a theme that became central were all asset related to technology. The industrial aspect was represented through a focus on hardware solutions, there was a strong focus on purely mechanical solutions and physical components that build up the product. As well as the focus to ensure the quality of the material used to produce the product. Digitalization has brought forward digital solutions, software solutions, and platforms as assets. Digital solutions that enable digital and remote control, which in turn enables access management both physically and through cloud and app solutions. This kind of digital solutions would not be possible without the use of software in various ways, code, algorithms, design of software structure, and the use of User Experience (UX) design. Platforms that are built up of different modular solutions, with multiple layers and that enable global access. To bridge the hardware solution and the software solutions the importance of assets that facilities that rose up as an aspect of technology assets from the analysis of the interview data. Interoperability aspect that facilitates the use of collaboration, interfaces, Application Programming Interface (API), and ecosystems. Connectivity that enables communication through radio technology and other digital connections. In relation to this, assets that facilities technical functions were brought up, to ensure safe solutions, user friendly, energy saving and storage, dealing with signal strengths. A minor group that also stood out was the increased use of biometric technology, fingerprint sensors, and face ID.

Brand

The theme brand ended up being one of the groups that emerged distinctly as clear examples of what could be included were identified and coded. Trademarks especially

as logos, names, slogans, colors, symbols, and icons were given as concrete brand items in multiple interviews. In addition, the structure of the brand was brought up as key aspect. In this particular company, the structure was heavily reliant on one master brand with multiple different brands either being used independently or in connection to the master brand. Other less concrete examples that could constitute potential assets were both brand awareness and brand associations. Awareness e.g. in the form of the recognition and the repetition of the brand. Associations with the brand in itself and its products that such as safety and reliability that makes the customer choose these items and the design of the product and how that reflects on the brand. Other brand related items that came up and had a wider scope were the, how brand related to digital aspects such as domain names, e-commerce, social media, digital identity, digital contacts, and data in relation to brand.

Relational

A theme that was different from brand yet closely coupled was relationships. There is a relationship aspect to brand elements but not all relations are associated with the brand. Therefore, throughout the data analysis relationships emerged as an asset that is wider than brand yet adjacent. The major group that built up relationships as a asset throughout the interviews were the customers. However, customers were built up of multiple different groups in themself, there were buyers, end customers, end users, retail stores, reseller of the product, sales personal, Original Equipment Manufacturers (OEM), and customers that install and assemble the products. Collaborations with third-parties through joining alliances or dependencies of providers of infrastructure services or products also held a key role to build up the relationship aspect as a whole. In addition, all these could possibly be put into a value chain that encompasses the supply chain components such as suppliers, distributors, retailers, and the complex relationship with competitors. The final key component were grouped as customer understanding, the interview subjects brought up things such as customer insights, reviews, experience, information about the customer, and the customer's experience of the product.

4.1.2 Digital Transformation

The data analysis also converged to cover digitalization effects that an industrial born company undergoing digital transformation has been affected by. From the interviews it was gathered that digitalization was seen as a natural next step for an industrial company moving forward, all solutions are becoming more digital. In a digital setting, everything could possibly be considered an asset and there are new business opportunities that could be explored. The shift from a traditional product company towards a service company, and from purely mechanical to digital, were also brought forward as an effect of increased digitalization. Some interview subjects were concerned that there is a risk of getting drawn into technology hypes and potentially draining resources, e.g. the artificial intelligence wave. However, in contrast, some interviews brought up that change tend to be coupled with resistance in general, which could be seen within through the struggle to adapt to new digital ways of working and a tendency to get comfortable in old ways. Another major

part was connected to how to manage products and services in a digital world. The importance of calming control over certain crucial parts balances with giving open access to accessories to foster open innovation, e.g how to handle integration with smartphones. Also how to handle brand aspect as the brand representation has long moved past only to represent the physical product and transcended into a more complex and overarching concept.

5. Analysis

5.1 Categorization in Relation to Theories

A key finding of this analysis was that there was no generally accepted categorization of intellectual capital. Most people find it difficult to understand and define the conceptual meaning of intellectual capital and intellectual assets. In addition, Choong (2008) and OECD (Organisation for Economic Co-operation and Development, 2008) both mentioned that there was no globally accepted definition of neither *intellectual capital* nor *intellectual assets*. One way to increase people's understanding and guide them to identify intellectual assets themselves would be to create a framework or scheme that categorizes potential intellectual assets.

The theoretical analysis of the categorization indicates that three fundamental classifications should be included in the categorization of intellectual capital. In all literature, the authors conclude that the intangible assets include assets related to humans, assets related to the structure of the organization, and assets related to the relations. However, a finding when comparing the different works was that the names of the categories change depending on who the author were, they also differ in their ways of conceptualizing the categories and how they should be structured and only a minor number discuss the relations between the different categories. These findings are coherent with the conclusions Ferenhof et al. (2015) provided in their literature review.

The first category wat to some extent always referred to as human capital, which often is associated with the knowledge, skill, competence, and abilities of the individual. The second category was related to the internal assets within the organization. This category differs to some extent between different authors, but one similarity was that this category often aims to capture the organization's internal activities that make it a successful business. There were mainly two different names for the category, some named it organizational capital while others named it structural capital or internal structure. It usually refers to the processes, infrastructure, concepts, culture, etc., some also include intellectual property rights. Edvinsson and Malone (1997) had a slightly different approach. They created a scheme including different levels of the categories and stated that Structural Capital refers to the organizational infrastructure while Organizational Capital refers to the internal systems, the processes, and standards within a company. Meaning that Structural Capital was a broader concept representing one of the main categories which in turn included a more specified concept, Organizational Capital.

The third main category, often referred to as Customer Capital, varies the most and there is a trend that indicates that the term relational capital with time will be more commonly used. This category aims to capture the relational link between the organization and its customers, partners, collaborators, and other stakeholders and focus on the external result (Sveiby, 1997) of an organization's actions. By naming this category customer capital it may exclude other types of external relations of an organization. Naming it Market Assets as Brooking (1996) does mainly put focus on the brand that connects the company to its customer, however, it may also include a relation to the competitors as well as to the whole value chain.

Sveiby (1997) was the first to provide a categorization of intellectual capital without an accounting approach. As his categorization of intellectual capital included employee competence, internal and external. There was a trace of his categories in all of the other authors' works, however, most used a renamed version including *Human Assets*, *Structural Asset* and *Customer Assets*.

Brooking (1996) used the same three main categories, but added *intellectual asset* as a category and changed the name of the second category to *organizational assets*. Edvinsson and Malone (1997) also accepted the three categories, but their intellectual capital scheme looked differs. In their version, there were only two main categories, Human Capital and Structural Capital, while Customer Capital, together with Organizational Capital, was included as a sub-category to Structural Capital. Another difference is that Edvinsson and Malone divided the second sub-category into two groups and named them Innovation Capital and Process Capital, which could be seen as an adaptation to the increasing importance of intellectual property of a company. Both structural and organizational are wide terms, which make it applicable to several different types of organizations and assets, however, a wide concept can also aggravate the application to associate and identify specific assets.

Years later Wendin and Hayes (2021) developed a new version in relation to their digital born company stating that *Technology Assets*, *Data Assets* and *Brand Assets* should be their own categories.

Comparing the different categorizations it became clear that the explanations of the concepts slightly varied depending on who the author was, see figure 5.1 extended version Appendix B. One reason for these variations may depend on the background of the authors, mainly legal and financial, and their different understandings and perspectives of intellectual assets. Furthermore, it may also depend on societal aspects. New technology has contributed to new types of assets and a new understanding of the value of intellectual assets. Which created a new market where the product and services itself no longer are the main source of success. As the world transforms and adapts to digital development the understanding of non-tangible assets such as knowledge, brand, relations, etc. became fundamental to take into consideration to maintain a sustainable competitive advantage. The fact that a product is the best of its kind on the market does not automatically mean that customers choose that product, instead, they might choose another brand just because of the value a brand

carries, such as the relation between the company and its customer. Therefore the comprehension of the different concepts within the area of intellectual capital and intellectual assets may change over time.

	Human Capital	Structural Capital	Relational Capital
Hubert Saint-Onge (1996)	Human Capital	Structural Capital	Customer Capital
Annie Brooking (1996)	Human-centered Assets	Infrastructure Assets	Market Assets
Karl Erik Sveiby (1997)	Employee Competence	Internal Structure	External Structure
Thomas Stewart (1997)	Human Capital	Structural Capital	Customer Capital
Göran Roos Johan Roos (1997)	Human Capital	Organizational Capital	Customer and Relationship Capital
Leif Edvinsson Michael S. Malone (1997)	Human Capital	Structural Capital	Customer Capital
Richard Petty James Guthrie (2000)	Employee Competence: Human Capital	Internal: Organizational (Structural) Capital	External: Customer (Relational) Capital
Per Wendin Ellenor Hayes (2021)	Human Capital	Structural Assets	Relational Assets

Figure 5.1: Intellectual Capital Categories from literature

These societal changes, different perspectives, and understandings make it a challenge to define concepts of intellectual assets and intellectual asset categorize in a way that generally will be accepted. Digitalization has contributed to a new perspective of what intellectual assets are, and broadens the understanding of different types of assets and their relation to value creation. This might be a reason why the concepts and terms that have been used to name the fundamental categories are very broad and could be interpreted to include most types of intellectual assets.

Based on the interviews, assets related to knowledge and assets related to the brand were often highlighted as particularly important. As a result of the analysis of the collected data, the number of different assets related to brand aspects could even be categorized and create a sub-category to the suggested Brand Asset category. Data is another great example. Due to digitalization, there are new ways to collect, store and manage data. In combination with new more extensive uses of data, it is now considered one of the most important intellectual assets of a company (2021). Therefore data became its own category which in itself constitutes sub-categories (2021).

The original scholars of different categorizations rarely defined sub-categorizations and the few who did differ quite a lot from each other. Which sub-categories would be relevant may also vary depending on what type of organization it will be applied to and which perspective and purpose the categorization aim to have. Wendin and Hayes (2021) and Petrusson (2016) attempted to define more precise and narrow categories, and based on the research and interviews there are some patterns that

could take the form of sub-categories. However, the more precise and narrow a specific asset was the more individualized the grouping of assets would be. What constitutes an asset in one organization may not exist in another kind of organization. To some extent, there might be different types of sub-categories for different types of companies, depending on which assets were the most important.

The theoretical study and literature review provided three main categories to build a framework. However, the fact that the definitions of these categories on a theoretical level differ depending on the author indicates the difficulties of understanding the concepts. Adding sub-categorizations could facilitate the individual's understanding and guide their way of thinking. When analyzing the different authors' work and identifying similarities in their ways of describing the main categories six sub-categories took form and resulted in a first attempt to implement a secondary level of categories, see figure 5.2.

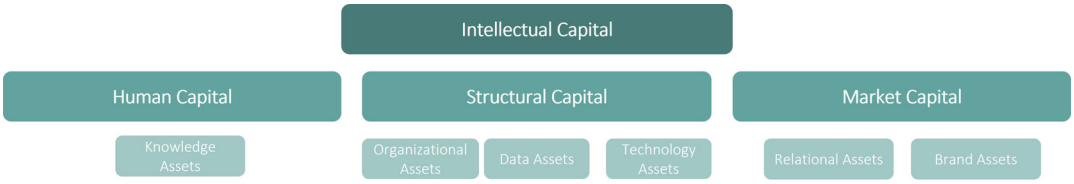

Figure 5.2: Intellectual Capital Categories: Merging theory and findings

In conclusion, Intellectual Capital was the most commonly used term to describe the overall concept. Human Capital and Structural Capital were mainly used to name two of the main categories. Human Capital was often referred to as knowledge, which naturally became one sub-category. Structural Capital, on the other hand, differed more between the reviewed works, nevertheless, most authors refer to the infrastructure, systems, and processes of a company. Inspired by Edvinsson and Malone (1997) Structural Capital was chosen as the name of the main categories including *Organizational Assets*, *Technology Assets* and *Data Assets*.

The third main category was often referred to as Customer Capital or Relational Capital. The first mainly focused on the customer relationship while the second term open up a broader scope. Several authors described this category to include assets outside the scope of the term customers such as suppliers, brands, investor relations, and relations with other parties. Therefore it would be more reasonable to use Relational Capital as it is a broader name that can include all types of assets related to external relations.

5.2 Merging Theory and Interview Findings

When introducing the first draft of the theoretical framework during the interviews it became clear that the three main categories are generally too open and diffuse to capture the participants' thoughts and give concrete examples of their own. Even the suggested sub-categories were too vague, however, this could also depend on the participant's background knowledge. There had to be a balance between open categories that can include everything and more narrow concepts that were easier to understand, which may not be the same in other companies or projects. Based on the interviews and the literature review it became clear that the theoretical three main categories are not enough. Generally, they do not provide enough information or guidance for people in the company to contribute with their own specific examples of intellectual assets. Based on the interviews and theories the categorization was revised and a few new categories were added with suggestions of what they should include.

The awareness of the importance of knowledge in a company appears to be quite high according to the interviews. Most participants were aware of the value knowledge could have in a company which was followed by many interesting thoughts and discussions. During the interviews questions regarding knowledge transfer and definitions of different types of knowledge was raised. In relation to the theoretical definitions of knowledge, there are several researchers who are working on conceptualizing knowledge and knowledge assets. Despite the fact that knowledge is a very abstract concept it was highlighted as a fundamental asset both in theory and in the empirical study, and therefore it was natural to include this as one of the categories in the framework. However, the concept of knowledge was discussed in relation to specific knowledge, such as technology knowledge or technology skills. As the framework is based on a knowledge driven perspective where all actions and results of a company are originally derived from the human, knowledge is the foundation of all assets which also can be found in all categories.

To separate the different levels of knowledge and guide the user to identify tacit knowledge, the final framework suggests that Knowledge Assets mainly include tacit knowledge, that is knowledge that was inside the individual's head and cannot easily be transferred or written down. This type of knowledge assets was strongly connected to the individual. I. In relation to the theoretical main categories, it would be a part of Human Capital. Specific knowledge in the form of explicit knowledge, which easily can be transferred or written down and potentially owned by the organization, should be categorized depending on what knowledge it was. For example, technology knowledge would be categorized as a technology asset, while the experienced skill would be categorized as a knowledge asset.

In addition, the literature stated that assets related to the structure of the organization constitute the operational foundation of a company, which indicates its essential role. Therefore, a second category of the framework was created aiming to capture the internal structures of the organization. When asking questions addressing Structural

Capital related to the organization the interview subject generally requested further explanations of what it meant and should include. The term structural assets were considered too broad, however, by introducing infrastructure, processes, and culture as examples it became easier for the participants to understand the concept and give examples of their own. A suggested name will therefore be *Organizational Assets* , referring to infrastructures, processes, culture, etc.

By mentioning the term technical components, many participants contributed with examples of Technology Assets without hesitations during the interviews and when showing the first draft of the framework they often pointed out this type of assets as easy to understand. According to several authors, Technology Assets are included in the main theoretical category *Structural Capital*, however, based on the interviews discussing Technical Assets separately from Organizational Assets enabled the participants to focus on technical solutions. Without further theoretical research on this concept, it became a part of the categorizations of the framework.

However, the participants often referred to products when exemplifying Technology Assets, which mainly is understood as tangible assets. To capture the foundational intangible assets of the technology there was a need for some further explanations to deconstruct the product and define its functions, methods, and data that builds up the product.

The third theoretical main category changed name several times during the process, challenging the balance between easy to understand and broad enough to include important assets gained from external activities. When comparing the different frameworks presented in the theories brand and different relationships was mentioned as a part of this category.

An early analysis of the data collected from the interviews in relation to the theory indicated that customers represent a crucial group of assets. However, throughout the process, it became clear that the theory produced by scholars and participants also exemplified other types of relationships. To capture this, it was discussed whether assets related to brand and assets related to other relationships should be divided into two groups of assets.

In theory, the term brand and brand assets are very ambiguous concepts as they mostly relate to or depends on other assets, such as the product or service a company offers. However, many participants mentioned different assets related to trademark and the company's brand, highlighting its relevance and expressed that the term Brand Assets is easy to understand on such a level that it is possible to think of their own examples and relate to brand assets they have. Based on the scope of this research the empirical study was supported by a few theoretical frameworks, Brand Assets became a separate category in the framework.

Besides customers, assets related to relations were a little harder for the participants to refer to. Mainly they got really focused on customers and how such relations

creates value. Although the Relational Assets often appeared to be a confusing term at first, further explanation and a few examples guided them to capture other relations and discuss their importance. A few mentioned different levels of customers in a different parts of the value chain, while partner relationships and investors were not considered brought up to the same extent in the discussion. According to the empirical study, this category was the hardest to understand and associate with concrete assets within the company.

To capture assets related to brand and other relations, the names Relational Assets and Brand Assets were most natural when referring to these two groups of assets. However, it then created confusion when naming the main category Relational Capital. The absence of a more precise term for relationships without only including customer relationships resulted in searching for the different name options for the main category. Based on Sveiby's theory (1997) it was discussed to add the term *external* to the name. Although it contributed to some guidance for the participants, without further explanation it was considered to cause more confusion than guidance. Instead, the term external was used when describing or explaining the concept and what the Relational Asset category could include. As a result, the term *Market Capital* was used for the theoretical main category which in turn was divided into two categories, *Relational Assets* and *Brand Assets*. Relational Assets often appeared to be a confusing term at first, a few examples guided subjects to give examples and discuss their importance.

The importance of controlling intellectual assets has been discussed in large number of literature as well as among the participants. Generally, all participants easily associated the identification of intellectual assets with intellectual property and intellectual property rights. Intellectual property is often at such an abstract level that the concept *property* in this context mainly refers to the certificate or document which proves ownership. As it is a legal concept there is a need for the public to accept the social construction built up around intellectual property and intellectual property rights in order to have a functioning intellectual property system. A strategy to guide the users of the framework to think outside the scope of intellectual property assets the suggested framework does not include a separate category for that type of assets. Instead, it is categorized depending on what type of intellectual property it is protecting, for example, a patent for a specific technical method is categorized as a Technology Asset, while a trademark registration is categorized as a Brand Asset.

One option to further guide the users is to separate intellectual property rights and other control mechanisms. It is then suggested to include control as a specific group of assets to identify in each sub-category. If these type of assets refers to intellectual property rights, including trade secrets, the name *Intellectual Property Rights* is preferable. Other control mechanisms which may not be considered an asset themselves, but work as a tool to maintain or create value for other assets will add another dimension to the framework. These control mechanisms should be applied to each category and based on Porter's five it may include for example market control mechanisms, such as first to market strategies.

Another way to capture control is to include all control mechanisms as a separate dimension, including intellectual property rights and external control mechanisms. Keeping control separate from identifying assets in the other categories, but implement identifying potential control mechanisms as a part of the innovative work process.

A third way to include control in the framework could be to add it as a specific section within the category Organizational Assets. This would show the connection between control and organizational processes related to management. For example, controlling knowledge includes human resources management and processes for on-boarding, controlling access and use could include managing systems and processes for sharing while controlling innovations may include processes for IPR.

During the interviews, there were a few assets that were not easily categorized due to the fact that they could be included in more than one category or not at all. Documentations and general certificates were two examples that were mentioned. One interpretation could be that documentation and archives could be considered data.

5.2.1 The Intellectual Asset Framework

Part of the research result of this study has led up to an Intellectual Asset Framework. To simplify the understanding of the framework the three main theoretical categories were removed. The suggested framework, see figure 5.3, therefore consists of six categories and a control dimension that can be applied to the different categories. This study mainly concerns the following 5 categories, Knowledge Assets, Organizational Assets, Technology Assets, Brand Assets and Relational Assets. Data assets are included as the work has partly been connected to the Data Asset Framework developed by Fransson and Sadriu (2021).

Knowledge Assets

Assets which a person holds in the head. The essence of experiences which cannot easily be transferred. Assets that which cannot easily be written down in full.

Organizational Assets

Assets inside the company that assist with its operation and makes it tick. Assets that helps people in their everyday work.

Technology Assets

Asset that makes the companies technical solution such as products, services, platforms, networks etc, work.

Brand Assets

Assets that generates the value of a brand (brand equity) and helps the organization be more attractive on the market.

Relational Assets

Assets that constitutes and enables the potential of a company on the market, derived from its relationships and interactions.

Data Assets

Assets in the form of information that enables value creation in a firm, either as it is or through processed and/or analytical activities. (Fransson & Sadriu, 2021).

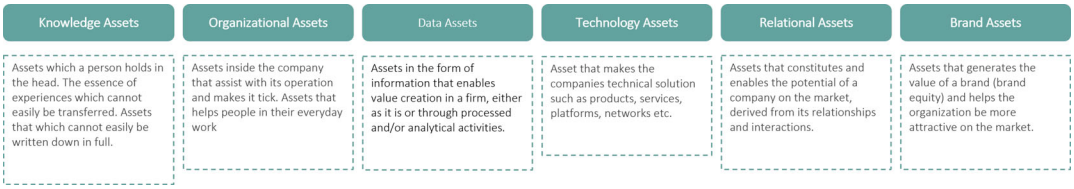

Figure 5.3: Intellectual Asset Framework

5.3 Digitalization and Digital Transformation

Every action of a corporation was connected to the ultimate goal, to make runt a profit. In order to make money, a company must sell something on the market. To sell things on the market a company needs customers, and to get customers the company must provide something more attractive than other players on the market. A company can become more attractive on the market through marketing (Levin, 2019) and by having a competitive advantage (Petrusson, 2004). The common goal within the whole organization connects the different categories and assets, why several assets run across the different categories. The interview participant's answers related to digitalization indicated that the whole organization changes as a result of the digital transformation. Organizational assets such as working processes, business strategies, and management influence the decision of what products, brands, and relations to invest in. Starting from a technology asset point of view, new technology could influence the choice of business strategies and which brand assets worth investing in. The interplay between the categories implies that fundamental technology changes would have an impact on the whole company. Thus, when industrial companies adapt to a digitalized world by implementing digital solutions in their products as well as their internal work structures this will influence assets in all categories.

Society is slowly shifting from a perspective where the object itself is seen as the only value carrier. According to this understanding, the value derives from the goods and the output of someone's achievement. In ancient Rome and Greece, it was mainly goods that had any value on the market and therefore needed protection (Levin, 2019). However, as new technology was developed and the understanding of intellectual assets and property was an accepted social construction the goods themselves were no longer the only subject of protection. The organizational control must include intellectual property (Petrusson, 2004). Therefore, the digitalization

and new technology also contributed to a new perspective of what is valuable for a company and new control mechanisms in relation to the importance of intangible assets. In addition, it raises awareness of the value and importance of intellectual assets that can not be protected by traditional intellectual property rights.

The study showed that industrial companies, as manufacturers or producers of goods, naturally focus on physical assets and how to manage and control them on the market. However, due to digitalization, companies must shift focus to include intangible assets and understand the source of tangible assets. This will most likely lead to a change in their organizational structure to focus more on human management and understanding the value of the employees as well as defining the key persons.

Digital solutions are often associated with effectiveness and simplicity. As stated in the interviews there is an increased demand for digital solutions and digital products among the customers. Digital based products were deemed more attractive than pure mechanical products creating a shift in the market and thus the company's product offerings. To maintain a competitive advantage there is a need for industrial born companies to adjust and adapt their products to include digital solutions or create connectivity with digital solutions. For industrial companies, this will most likely lead to new technology assets.

According to some interview participants, digitalization also created new business opportunities and new ways to make money. Customers demand digital solutions, easy access as well as quick and easy fixes, which opened up for more service driven business strategies. Thus, industrial companies might need to open up for new business opportunities and reconsider their current business strategies as well as their value offering to include services related to the goods. A new way of thinking of how to make money based on subscriptions and reoccurring revenues also changes which organizational assets will be highlighted as important by the participants. However, a critical factor that came up during the interviews was that to create reoccurring revenue there will also be a reoccurring cost. In order to have a service of some kind up and running cost associated with maintenance and support will be ever present. This relates to the aspect of not being drawn into hypes too easily, neither technology hypes nor strategic ones.

When transforming and adapting to the ongoing digitalization there was also a need to adapt to a sharing culture, where knowledge and other intellectual assets should be shared to increase efficiency. The study showed that new technology enables new ways to communicate, share and store information to facilitate a sharing culture. Digitalization forces industrial companies to implement digital solutions to improve internal efficiency. Adapting to digital organizational assets, such as digital working processes, digital documentation, and digital archives, will result in possibilities to work remotely and between different work groups as well as improve access to documentation and archives. Digital archives and storage for data and documents can more easily open up accessibility within the whole company as well as limit specific documents or data to specific individuals. It also enables easy ways of sharing limited

data with other parties for a limited time. For example, streamlined innovation processes throughout the company and adaptation of agile working methods require a higher level of communication and a more digital way of working. The bigger and more decentralized a company is, the bigger effect of digital communication and sharing culture would be.

Furthermore, implementing digital solutions internally often requires that the old structures and tools must be adapted to coexist with the new solution, which may be a challenge. Certain structures and processes may not be compatible with digital solutions. Changing the way of working and communicating within a company will also change its culture. These type of changes takes time and a lot of effort which may distract the focus on the main business, and there might also be resistance against digital changes on an individual level which slow down the process.

In general, digital transformation includes changes on an organizational level and existing organizational assets of an industrial company may be adapted and/or changed in relation to implementations of digital organizational solutions. Such changes in organizational structures within a company may also relate to changes in other assets.

Due to new technologies, there are new ways to reach out to customers and market a product or service. Customers are constantly exposed to an extreme volumes of information and commercials (Levin, 2019). Every second of a customer's attention is valuable which requires something special to catch their attention and thus the importance of a distinctive brand and standing out from the crowed is more valuable than ever. Using digital brand strategies, including sound, motion, and logos or marketing through a certain scent, hologram, big screens, etc. (Levin, 2019) to capture the attention of a customer's all senses were rather rare only a few decades ago. These new ways of marketing or branding to capture customers and business partners lead to new brand strategies which will affect the view of important brand assets. In conclusion, the digital transformation lead to a broader understanding of the brand concept outside IPRs while the societal digitalization increased its value. As a result, interview participants highlighted brand as particularly important assets, which lead to the creation of a new category, Brand Assets.

As a result, digital transformation changes the whole organization. A change among one type of assets will often result in changes in other assets and the old organizational structures may need to change and adapt to digital solutions and digital product offerings.

5.4 Value Creation and Control Mechanism

Every asset could have the potential to create value for the company. This can be related to Barney's (1991) criteria to obtain sustainable competitive advantage. Resources should be, valuable, rare, imperfectly imitable, and non-substitutable. One way to interpret and view the matter would be to consider the control mechanism as

a means to ensure that an asset is rare, imperfectly imitable, and non-substitutable. Thus, sustainable competitive advantage is connected to the value and control dimensions of the asset.

The control of intellectual assets has traditionally been strongly connected to intellectual property rights and the focus has been to ensure protection under the scope of these rights. In addition, different strategies of how to leverage and utilize IP has been a key focus when it comes to the management of IP. Mostly everything has in one way or another been connected to IPR:s, strategies, utilization options, and monetization plans. Each category of the suggested Intellectual Asset Framework will therefore encompass IP that can be connected to traditional IPR:s such as patents, copyright, industrial designs, and trademarks. Petrusson (2004) names traditional IPR:s as right based property and views them as one building block to claim innovations.

As IPR:s are legal control mechanisms the application of IPR:s are stated in law and legal praxis why it is rather similar within all types of companies. However, the strategies behind the protection, where to protect and the choice of control mechanism may differ depending on business models. In the context of a company with an industrial background patents are perhaps one of the most widely used IPR:s, in particular, to control the technology. However, as technology can be deconstructed into different components, industrial design rights may also be applied to protect the aesthetic and functional purposes of a product. According to legal definitions, software, user interface, the visual design, and computer source codes as well as copyright of databases may be applicable as long as the asset fulfills the requirement of originality. When it comes to brand, the control looks a little different. In relation to, IPR:s trademarks are protected through trademark rights or design rights. Generally, trademarks have been used to protect figures and word marks. This area has also been affected by the shift brought on by increased use of digital media. All trademarks do not longer need to be graphically represented, thus opening up the potential to trademark other things such as holograms, smells, and sounds. Another way to digitally protect brand assets, such as names would be to register domain names. In all, there are new more digital ways better suited to protect the digital aspect of brand assets.

However, when the focus shift from only looking at IP towards a broader definition of what an intellectual asset could be, there is a need to look beyond traditional IPR:s and toward other control mechanisms. Barney's (1991) definition of sustainable competitive advantage is closely related to the internal perspective of resource based view. In contrast, Porter's five forces take on more of an external view. The different forces can be related to different market effects which can then in turn be viewed as an extended control mechanisms of intellectual assets if achieved. Control of the market and the asset in itself through phenomena such as network effects, lock-in effects, first mover advantage, and the economy of scope and scale. This view also goes well with Petrusson's (2004) view of control based building blocks. In addition to right based property, secrecy, contract based property, technical control, and

market power are listed. Especially market power can be related to effects derived from reasoning associated with Porter's five forces.

Trade secrets can be applied to all types of assets which are valuable by keeping it as a secret within a company. The value of knowledge and information is especially sensitive to being publicly exposed, however, disclosure of internal processes and strategies that are curtail for the operation of the company may also have a fatal impact on the success of a company. During the R&D process, it is important to keep results and data as well as the technology a secret and out of the public domain in order to apply for a patent. A noteworthy observation here is that there are several difficulties when managing trade secrets. Keeping information as secrets within a company with many employees, limiting access, and complying with all legal conditions is hard. There is always a risk that employees share information with other people that should not have access to explicit trade secrets. In such cases, it might be beneficial to make use of different internal classifications in terms of confidentiality. This kind of classification is not covered under the same type of legal protection as trade secrets, but the firm could potentially obtain some protection as it should be clearly stated that the information is confidential and thus informing employees of the status of the information.

Likewise, contractual agreements can be applied to several categories, knowledge and relationship assets for example. Traditional employee agreements state how work produced by the employee is governed and owned in relation to the company. Contracts might be drawn up between all types of customers, partners, or anyone the company deals with. In addition, when it comes to relationships, it is important to not forget direct personal contact.

In relation to knowledge assets, both trade secrets and contractual agreements are important control mechanisms. The last few decades have provided the world with fundamental technological changes such as computers and the internet, and technology continues to advance at a rapid pace. The internet provides global access to almost limitless information, why knowledge is shared in a new way and certain explicit knowledge is considered general knowledge. Information which is not easily accessible could therefore be more valuable.

In relation to a knowledge economy perspective, it is of high importance to control knowledge as the source of all assets. Some knowledge can be explained in words and written down and thereby are easier to be owned and controlled by an organization. Tacit, or quiet, knowledge is challenging to control on an organizational level. It is not always possible to explain or write down all knowledge to its full extent, the use of knowledge is based on the combination of experiences and skills that have been built up throughout a lifetime. Instead of trying to manage knowledge as knowledge data by forcing explanations of things that may not be possible to explain, the focus should be on managing the source of such data, the humans. When managing humans the organizational managing structure is of high importance. In addition to traditional contracts and labor law, a firm might use other incentive structures to

keep their employees and focus on building a company culture that makes people want to stay with the company.

Knowledge transfer was highlighted during the interviews. This can be related to the importance of both a structured onboarding and offboarding program within the company, as well as continuous knowledge transfer to enable and foster a climate of lifelong learning throughout the organization. This can be hard due to several factors, employees might see this as an administrative task that takes away time and focus from what they view as their main task. Or there might be friction and competition between different departments with a non-sharing culture throughout the organization.

Due to digitalization, there are new ways to control, transfer, and store knowledge information, the explicit knowledge. As the knowledge is to some extent written down and stored in the cloud or other digital archives there are digital limitation solutions to control its access. However, there are also new technological ways to go around such digital limitation walls, which usually is called hacking, why cyber security tools also could be considered important control mechanisms for companies today.

Through different types of market effects, it might be possible to gain another dimension of control. These control dimension is perhaps not the direct legal ownership of the asset, or the right to exclude others. However, the position gained on the market can be used as a means to assert market dominance. One such effect might be made possible by the industrial company's increase in the degree of digitalization in their products, the network effect. The value of the product increase with the number of users that are connected through the use of the products (Lin & Camara, 2020). If the product also shifts to provide a service that is reoccurring and connected to other service offerings there is a possibility to strive for and take advantage of lock-in effects (Eurich & Burtscher, 2014). Make the user dependent on the technology or service and increase the difficulty to switch. If any of these can be achieved, a firm might get an indirect stronger control over assets such as technology or relationships with customers and vendors. Brand assets might also be strengthened as recognition of the brands could potentially increase.

A market effect that is potentially available for all players in the market is the economy of scale. Prices can be cut due to the large scale of the operation. Traditionally industrial companies have reaped the benefits of this effect as mass production at a large scale has been a core strength (Macher & Boerner, 2006). But digitalization and an increased degree of individualization have brought on the demand for specialized solutions. To amend this companies could increased the amount of complementary goods and services produce in tandem with the original product, benefiting from the effects of the economy of scope and thus reducing costs (Macher & Boerner, 2006). Both these effects are well known and utilized by big industrial players as ways to control cost. An interesting side effect would be to leverage them to create a greater control of intellectual assets, especially technology assets.

Then there is always the risk for traditional players to be outmaneuvered by distributive technology from smaller new fast moving firms that are playing at benefiting from first mover advantage. But there is a half-truth to the first mover advantaged and the effect is a bit exaggerated (Suarez & Lanzolla, 2005). By observing the market change and coming in as close reliable second mover larger industrial firms have the opportunity to capture market shares and leverage their status as already established in related markets.

As seen in Figure 5.4, are some non exhaustive examples listed how different control mechanisms, both tradition IPR:s and non traditional, could be connected to the proposed intellectual asset framework.

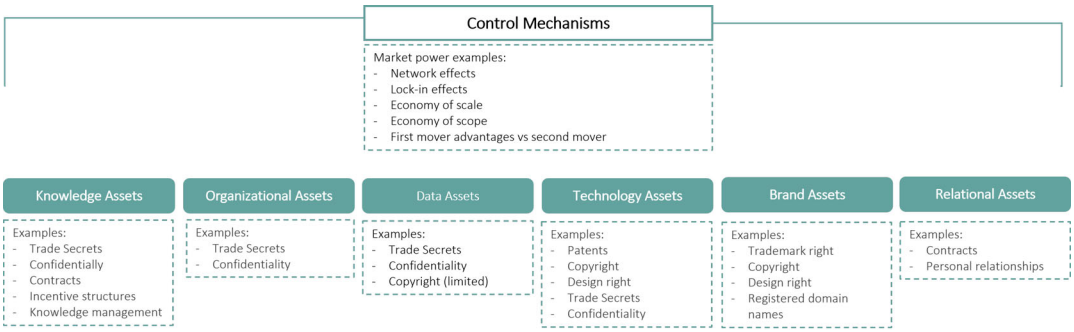

Figure 5.4: Examples of Control Mechanisms Intellectual Asset Framework

If overlapped, these different control mechanisms could increase the control of competitive advantage of all different kinds of assets. Companies may intertwine strategies concerning the protection of intellectual assets with market strategies, R&D development, mergers and acquisitions strategies, and employee loyalty schemes.

6. Conclusion

Sub RQ1: How can intellectual assets be categorized in an industrial company undergoing digital transformation?

In the existing knowledge economy, intellectual assets have become a main resource of value creation, however, this research study found that these types of assets are still abstract and ambiguous to most people. One thing among many that have emerged from the interviews is that several business professionals have an understanding of what may constitute an intellectual asset but lack the knowledge to independently identify and express said asset. Using a framework providing a categorization tool may help them to identify and express different intellectual assets, however, it may still be hard to understand what the categories mean and what should be included. To some extent, practice and implementation may not correspond exactly to the theory.

It would not be reasonable that a whole organization must learn all the theories behind the framework to be able to use it. On the other hand, the theoretical study showed that different theories do not completely agree with each other. In this study, it was also shown that there probably always will be a cross-over between different categories, and perhaps there is no specific way to clearly define each category. The suggested approach is to continue to use classifications instead and accept that there will always be ambiguity and cross-over. What is most important is that the user of the framework is consistent and understand the categories in the same way within the organization in order for the framework to be useful.

This study has shown that it is possible to define some similarities among the assets and identified six groups of assets that generally are considered important for value creation in an industrial company undergoing digital transformation. Based on these six types of intellectual assets, this study provides a suggestion for an intellectual capital categorization model including the following categories: Knowledge Assets, Organizational Assets, Technology Assets, Data Assets, Brand Assets, and Relational Assets.

Sub RQ2: How does digital transformation affect how intellectual assets are categorized?

This study also found that the biggest effect of digitalization and digital transformation of a company is the view of intellectual assets. It increases the awareness of different intellectual assets and changes the priority of which assets are seen as most important. Going from a product focused perspective to the intellectual assets behind

the products and physical things. The advanced knowledge and understanding of intellectual assets contribute to the creativity of identifying more assets that could be of value to a company.

Another result of this research study is that a digital transformation changes the whole organization. One perspective could be to see the digital solutions as specific digital assets and create a separate category. However, this study showed that digital solutions are a natural development of existing assets and rather considered an additional dimension that changes the perspective of existing assets and their value. Therefore, due to digitalization new assets are identified in each category such as digital technical solutions (Technical Assets), digital organizational processes (Organizational Assets), multimedia marks (Brand Assets), etc. With that said, the digital transformation highlights some types of assets to such an extent that they become their own category, for example, brand assets, and knowledge assets.

Sub RQ3: How can intellectual assets contribute to sustainable competitive advantage in an industrial company undergoing digital transformation?

In a conclusion, drawn from the analysis, there is a need to look elsewhere than traditional IPR:s and leverage other control mechanisms to establish sustainable competitive advantage from intellectual assets to build a well rounded base of protection in a digital setting. By levering other phenomena such as network effects, lock-in effects, first mover advantage, economy of scale, and scope intellectual assets may be controlled in new ways and thus holds greater potential for value creation. Contract and secrecy based control are additional tools available to further ensure strong overall protection. Digitalization has both increased the opportunity and the complexity to protect assets through multiple sources, both in combination with and beyond traditional IPR:s, for example, control mechanisms based on digital technology.

Main RQ: Which intellectual assets are the most important for value creation in an industrial company undergoing digital transformation?

Overall, in a world that adopts more digital solutions, everything holds the potential to be an intellectual asset. As a result of the research study, it became clear that with the rise of knowledge in connection to the digital world, knowledge in itself is an asset and that must be preserved. The importance and focus on knowledge is nothing new or revolutionary. However, industrial companies undergoing digital transformation need to highlight knowledge as one of the main contributing factors to value creation. Also, explicit knowledge, needs to be considered in connection to all intellectual assets. The time to only chase patent quotas and number of filings are being left in the rear view mirror.

6.1 Contribution of Research

The literature within the area of categorization of intellectual capital is extensively aiming to create a general framework. This study differs by mainly focusing on a company undergoing digital transformation and therefore provides a new perspective. In addition, digitalization effects of an industrial company in relation to its view on intellectual assets and how they could be categorized, which has not been studied in this context.

6.2 Further Research

This study is only one of few which investigates sub-categories of the three theoretical main categories, therefore it is suggested to further research within this subject. As the study was conducted in one company it may be interesting to investigate the applicability of the suggested Intellectual Asset Framework in other cases and other industrial companies undergoing digital transformation. In relation to digitalization and digital transformation, the effects could be investigated more thoroughly. It would also be valuable to further investigate the application of the framework in other types of companies and different business contexts.

As this was a qualitative study with limited participants it would be beneficial to conduct a quantitative study to identify more valuable assets and other categories. Another area for further research could be to investigate and develop valuable sub-categories in relation to the suggested categories.

The main focus of this research was to investigate which types of intellectual assets exist in an industrial company, while the value of the assets was not questioned or examined thoroughly. Therefore, a suggestion for further research could be to investigate how different types of assets create value and why some intellectual assets are considered more valuable than others. In relation to digitalization, it could also be interesting to explore its effect on the value of different intellectual assets.

The thesis only introduces control mechanisms in relation to categorization based on existing theories. Therefore, it would also be valuable to conduct an empirical study to further investigate how companies apply the control mechanisms in relation to their intellectual asset management.

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A. Literature Analysis

Title	Author	Year	Summary	Categorization (Relevant for the study)	Definitions and concepts
Personal Knowledge: Toward a Post-Critical Philosophy	Michael Polanyi	1958 (2015)	Personal Knowledge is classic work in the field of knowledge theory. It challenges rigid empiricism and makes a point that personal experience and how knowledge is shared highly effects scientific research results. Tacit knowledge, personal knowledge and explicit knowledge are curtail concepts explained and explored in this work.		Tacit Knowledge Explicit Knowledge
From Data to Wisdom: Presidential Address to ISGS, June 1988	Russell Ackoff	1989	In a presidential address Ackoff highlighted to topic of wisdom and data instead of the more classic presidential address which aim convey advice or wisdom in its. Ackoff present the dependency between wisdom and data and how they are order into a hierarchy. Ackoff address the question of system that in the future will generate wisdom and what such a system should consist of.		Wisdom Knowledge Understanding Infromation Data
How Competitive Forces Shape Strategy	Michael E. Porter	1979	First published in Harvard Bussiness Review Porter's Five Forces has become a widely used model to analyze the competitive environment in which an industry operates. It focusses on external forces that create rivalry on the market and determine the potential profitability. The forces are the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products or services, and the jockeying among current contestants.		Porter's Five Forces
Firm Resources and Sustained Competitive Advantage	Jay Barney	1991	The article explores the connection between firms' resources and sustained competitive advantage. A model of four empirical indicators of how to generate competitive advantage is presented and applied.	(Criteria for competitive advantage) Valuable Rare Imperfectly imitable Substitutability	Competitive advantage
The Learning Economy	Bengt-Åke Lundvall Björn Johnson	1994	The paper develops a framework to position learning and knowledge in a central role to analysis economic change. The authors argue that we are in a learning economy and that knowledge is a key resource and learning is a key process. They also argue that such an economy is a mix of a planned and market economy.	(Categorization of economic knowledge) Know-what Know-why Know-who Know-how	Knowledge
Tacit knowledge the key to the strategic alignment of intellectual capital	Hubert Saint-Onge	1996	The article includes a definition of intellectual capital, explores the role of explicit and tacit knowledge in terms of three categories of intellectual capital and how to encourage value creation within each category in relation to business strategy.	Human Capital Customer Capital Structural Capital	Intellectual Capital Tacit and explicit knowledge
Intellectual Capital	Annie Brooking	1996	The author explains the importance of intangible assets in a knowledge-based service-oriented economy and contributes with tools to identify, document and manage intangible assets.	Market Assets Human-centered Assets Intellectual property Assets Infrastructure Assets	
Developing a Model for Managing Intellectual Capital	Edvinsson Leif Sullivan Patrick	1996	The aricle provides an overview of intellectual capital and how it relates to the knowledge firm. Diffrent components of IC are identified, defined, and discussed.	Human Capital Structural Capital Business Assets	Intellectual Capital
The New Organizational Wealth: Managing & Measuring Knowledge-Based Assets	Karl Erik Sveiby	1997	This book provides the reader with a toolbox for managing knowledge based organizations and business including how to design a business strategy with a focus on knowledge and intangible assets. Chapter 1 describes the intangible assets as a concept. Furthermore can a discussion regarding the terms *knowledge* and *information* be found in chapter 3-4.	Employee competence Internal structure External structure	Intangible assets Knowledge Information

Intellectual Capital: The New Wealth of Organization	Thomas Stewart	1997	The book mainly touches on the subject of strategical and practical issues of identifying, capturing, and using knowledge to improve a company's competitive advantage. The traditional view is that capital had financial or physical characteristics. The author instead focuses on intangible assets as intellectual capital.	Human Capital Structural Capital Customer Capital	The Knowledge Economy The Knowledge Company The Knowledge Worker
Measuring your Company's Intellectual Performance	Göran Roos Johan Roos	1997	The article aim to devekop an intellectual capital model as a tool for company. They use empirical studies for four purposes including to define which categories of intellectual capital that are valuable for managers, and provides a matrix to capture the growth of important intellectual capital in a company.	Human capital (knowledge capital: skill-, motivation- and task capital) Organizational capital (Business process capital & Business renewal and development capital) Customer and relationship capital (customer relationship- supplier relationship-, network partner relationship- investor relationship capital)	
Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower	Leif Edvinsson Michael S. Malone	1997	The book explores and explains ways to measure intellectual capital, which according to the author is the gap between the balance sheet and the market value of the company. They present how to compare IC value and efficiency between different organizations.	**Human Capital** **Structural Capital** - Organizational Capital **Customer Capital** - Innovation Capital - Process Capital	
Profiting from intellectual capital	Patrick H. Sullivan	1999	The article concerns what Intellectual Capital (IC) is, how it can be utilized, how value can be extracted and the risk if managed poorly. The author includes a model and definition of intellectual capital.	Intellectual capital divided into two categories: - Human capital - Intellectual assets (Within IA lies Intellectual Property) Structural Capital is complimentary to Intellectual Capital: - The traditional "hard" assets of the firm (financial assets, buildings, machinery etc.)	Intellectual Capital
Managing Intellectual Capital	David J. Teece	2000	The book is an in-depth study of how companies utilize their innovation, protect their intellectual capital in relation to keeping competitive advantage. The author provides frameworks of organization structures to support innovation. Does not categorize intellectual assets.		Knowledge Competence
Intellectual capital literature review : Measurement, reporting and management	Richard Petty James Guthrie	2000	The paper is in part a literature review focusing on identifying the most significant work on intellectual capital and how it has developed. It also explores future questions in need of investigation. It discusses the work of authors such as Sveiby, Kaplan and Norton, and Edvinsson and Malone.	Internal: organizational (structural) capital External: customer (relational) capital Employee competence: human capital	Knowledge Management

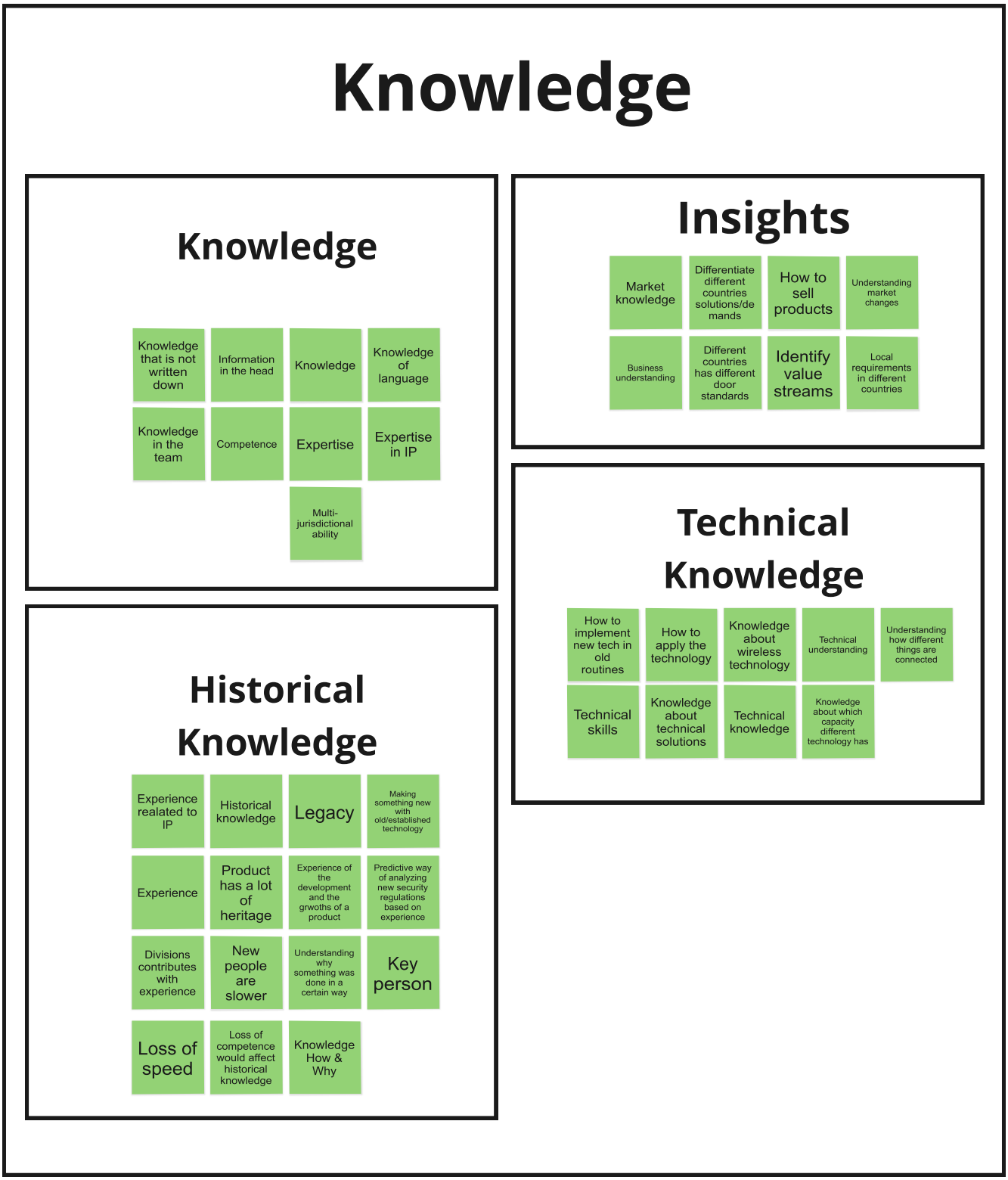
Intellectual Assets and Value Creation: Implications of Corporate Reporting	Corporate Affairs Division of the Directorate for Financial and Enterprise Affairs (DAF)	2006	There is no globally accepted definition and classification of intellectual assets. The European Commission suggest three main categories which appear to be most accepted in intellectual capital guidelines. **Human capital** is defined as the knowledge, skills and know-how that employees "take with them when they leave at night". Examples are, innovation capacity, creativity, know-how, previous experience, teamwork capacity, employee flexibility, tolerance for ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training, and education. **Relational capital** concerns the resources arising from the external relationships of the firm with customers, suppliers and R&D partners. It comprises that part of human capital and structural capital involved with the company's relations with such stakeholders. Examples are image, customer loyalty, customer satisfaction, links with suppliers, commercial power and negotiating capacity with financial entities. **Structural capital** refers to the knowledge that stays with the firm "after the staff leaves at night". It comprises organizational routines, procedures, systems, cultures and databases. Examples are organisational flexibility, a documentation service, the existence of a knowledge center, the general use of information technologies and organizational learning capacities.	Human capital Relational capital Structural capital	Intellectual assets
A Framework of Intangible Valuation Areas and Antecedents	Andreas N. Andreou, Annie Green and Michael Stankosky	2007	The paper provides an unexhaustive list of operational knowledge assets (LOKA) comprised into 31 categories and grouped into 7 value generating activities. It aims to improve the understanding of the knowledge assets that managers need to leverage. Furthermore, the paper discuss value driver in relation to intangible assets.	Market Capital Human Capital Decision Effectiveness Organizational Capital Innovation & Customer Capital	
Intellectual Capital: definitions categorization and reporting models.	Kwee Keon Choong	2008	The purpose of the paper is to examine what items that are treated as IC (IA) and how these expenditures contribute to value creation of firms. The author adopts a staggered approach in developing a formal framework in identifying, defining, categorizing, measuring and reporting IC. Information about what is Intellectual capital/ assets Brooking 1997identifies IC as "market assets", "human-centered assets", "intellectual property assets", and "infrastructure assets". Table of different categorizations and authors.	**Sveiby** (1997) - 1) employee 2) internal structure 3) external structure. **Brooking** (1997) - Sveiby + 4) intellectual property assets **Edvinsson & Malone**(1997), Bontis (1998), Sullvian (1998) - 1) human capital 2) organizational capital 3) customer capital **Roos & Roos** (1997) - Human capital and structural capital **Stewart** (1998): renamed sveiby's 1) Human capital 2) structural capital 3) customer capital **Sullivan** (2000): also adopted the three categories of IC proposed by Sveiby, but indicates that by undertaking various processes, these IC will lead to intellectual assets. **Petty & Guthrie** (2000): 1) Human capital 2) organizational (structural) capital. Mouritsen et al (2002) and Pablos (2003): uses Sveibys categories. Pablos renamed "customer capital" as "relational capital". Lev (2001): 1) innovation (discovery/knowledge), 2) human resources 3) organizational practices (capital)	Intellectual capital Intangible assets

Intellectual capital dimensions: state of the art in 2014	Helio Aisenberg Ferenhof Susanne Durst Mariana Zaniboni Bialeck Paulo Mauricio Selig	2015	This literature review provides a list of IC frameworks. A study of 83 articles from 2004-2014 to create a table of how different authors classify IC. Writing about different levels and dimensions in each category. "The findings suggest that IC is best approached through the dimensions human capital, structural capital, relational capital and social capital. Additionally, the findings provide information on how different authors understand and conceptualize IC dimensions".	Customers Structural Human Innovation Business Organizational Process Relational	
Research and Utalization	Ulf Petrusson	2016	The book's main topic revolves around how universities can facilitate the utilization of research results in collaboration with commercial actors to a higher degree. Part 3 of the book goes into detail on how to use the Intellectual Management Framework (IAM), developed together with the Center for Intellectual Property, in academic environments. A key part of the framework is the focus on Claiming (Capturing), Positioning, Deciding (Utilizing), and Organizing intellectual assets.	Knowledge assets categorization: Data Database Observation Theoretical framework Technical solution Visualization Instruction Software Narrative Creation	Intellectual assets
Intellectual capital management: An approach to organizational practices in Ecuador	Enrique Claver-Cortés, Patrocinio Zaragoza-Sáez[1], Mayiya González-Illescas	2018	**Human Capital** refers to an employee's skills, to the experience, knowledge, know-how, values, and attitudes of individuals. Most important intangible asset in an organization according to Kalkan et.al, 2014. HC is a key element when achieving organizational improvements (Schultsz, 1993). **Structural Capital** refers to internal process, infrastructure, information systems, culture, routines and procedures for human capital to be productive (Ross & Ross, 1997). **Relational Capita**l refers to relationships that the company maintains with the external environment, customers, strategic partners providers, distributors, investors, public bodies, stakeholders (Todericiu & Stănit, 2015)	Human capital Structural capital Relational capital	
How Spotify's intellectual asset mapping framework can drive value for knowledge companies	Per Wendin Ellenor Hayes	2021	The article describes a framework for mapping intellectual assets into 5 main categories and dives them into sub-categories. Further the authors discuss potential IPR for each sub categories and how the categorization could potentially drive value for companies.	Technology Assets Data Assets Brand Assets Relational Assets Structural Assets	From the cloud of knowledge to assets Human Capital -> Intellectual Assets -> Intellectual Property

B. Categorization Comparison

	Human capital	Structural capital	Relational capital				
Hubert Saint-Onge (1996)	**Human Capital** The individual ability to provide the customer with a solution.	**Structural Capital** Organizations capability to meet the needs of the market	**Customer Capital** Refering to "the depth (penetration), width (coverage), attachment (loyalty) and profitability of costumers".				
Annie Brooking (1996)	**Human-centered Assets** Education, Vocational qualifications, Work related knowledge, Occupational assessments and psychometrics, and lastly Work related competencies.	**Infrastructure Assets** Assets that creates the structure of an organization and form the foundation of the operation of the company.	**Market Assets** Includes brands, customer loyalty, distribution channels, business collaborations, franchise agreements, licensing agreements and other favorable contracts.	**Intellectual Property Assets** Including patent, copyright, trade marks, trade secrets, proprietary technology and know-how.			
Karl Erik Sveiby (1997)	**Employee Competence** Refering to the human's capacity to take actions that creates assets	**Internal Structure** Includes patents, concepts, models, computer and administrative systems, as well as the culture and spirit of the organization.	**External Structure** Refering to the result of actions directed to outside the entity. Including relationships with customers and suppliers, brand assets such as brand names, trademarks and the reputation of the organization.				
Thomas Stewart (1997)	**Human Capital** The source of innovation and renewal. The knowlegde carried in the employees head.	**Structural Capital** The knowledge retained within the organization that is owned by the organization. Example: technologies, inventions, publications, and business processes.	**Customer Capital** Refering to the value created from business reallionship with other parties.				
Göran Roos Johan Roos (1997)	**Human Capital** Sub-category: *Knowledge capital* refering to skill capital, motivation capital and task capital.	**Organizational Capital** Sub-category 1) *Business process capital* including information flow, flow of products and services, cash flow, co-operation forms and strategic processes. Sub-category 2) *Bsiness renewal* including specialization, production processes, new concepts, sales and marketing and new co-operation forms.	**Customer and Relationship Capital** Sub-category: *customer relationship capital* including supplier relationship capital, network partner relationship capital and investor relationship capital.				
Leif Edvinsson Michael S. Malone (1997)	**Human Capital** Includes individual capabilities, the knowledge, skill, and experience of the company's employees	**Structural Capital (SC)** Refered to as the infrastructure that supports Human Capital. It includes organizational capacity to transfer and capture intellectual assets	**Customer Capital** SC sub-category 1) refering to the relationship between a company and its customers. (suggesting it should be a separate category)	**Organizational Capital** SC sub-category 2) including systems, tools, operational philosophy that delivers knowledge through the organization. Divided into two groups. 2a) *Innovation Capital,* refering to IP and talent to create innovations. 2b) *Process Capital,* refering to work processes, technique, standards and employee programs enabling manufacturing.	*Innovational Capital* SC sub category 2) refering to the use of protected commercial rights, intellectual property and talent to create continuous innovation.	Process Capital SC sub category 2) referring to to work processes, technique, standards and employee programs enabling manufacturing.	
Richard Petty James Guthrie (2000)	**Employee Competence: Human Capital** Refering to know-how, education, vocational qualification, work-related knowledge, work-related competencies, entrepreneurial spirit, innovativeness, proactive and reactive abilities as well as changeability.	**Internal: Organizational (structural) Capital** Sub-category 1) IP including patent, copyright and trademarks Sub-category 2) Infrastructure assets including management, culture, processes, information systems, network systems and financial relations.	**External: Customer (relational) Capital** Including brands, customers, customer loyalty, company names, distribution channels, business collaborations, licensing agreements, favorable contracts, franchising agreements.				
Per Wendin Ellenor Hayes (2021)	**Human Capital** Refering to knowledge and experience,	**Structural Assets** Assets that shapes the company's way of operating. Refers to internal organizational structures, systems, policies, procedures, business plans and strategies.	**Relational Assets** Refers to customer relationships and lists or databases of these, partner relationships and alliances, contracts, such as licenses and agreements, distribution channels and third-party content.	**Technology Assets** Includes technical solutions, algorithms, machine learning models, know-how, secret or confidential information, and research results.	**Data Assets** Includesdata and information the company gathers through its operation, e.g. raw data, metadata, data sets, data catalogues and data-derived insights and predictions.	**Brand Assets** Relates to things the company can be identified through, such as marks and symbols, such as distinctive marks, descriptive concepts, unique design and aesthetic features, and original content (Wendin & Hayes, 2021). Relational Assets encompass assets that are dependent on	

C. Data Analysis Grounded Theory



Organizational

Organizational Structure

- Teams
- Local teams --> Comply with local requirements
- Cross functional team
- Core Teams
- Organization structure
- Matrix organization
- Decentralized
- Less Bureaucracy
- Divisions
- Global structure
- Complex local /global company structure
- Global development
- Different ways to solve problems (within company)

Processes

- R&D
- Process
- Working methods
- Strategic Planning
- R&D Structures
- Innovation process
- Working together
- Work across divisions & teams
- Technical development
- Consolidated production
- Communication between divisions
- Sharing Tech IP inhouse
- SAFE Scaled agile
- Innovation gateways
- Agile way of working
- Communication process
- Global process --> adapt to local regulations
- Flexible
- Processes for receiving feedback and take critique -> Use it to become better
- Lack of routines and processes within AA

Strategy

- Licensing
- Subscription business
- Reoccurring revenue from partnerships
- Leverage internal resources
- Brand licensing
- Brand profiteering
- Business models
- Lock-in effect
- The lack of outsourcing (within certain areas)

Knowledge Sharing

- How to keep knowledge
- Information exchange
- Knowledge transfer
- Knowledge sharing

Routines

- Routines
- Implementation of tech
- Protection of IP assets
- IP awareness

Governance

- Governance
- Management
- Project management
- Control
- Policy
- Directive
- Guidelines

Culture

- Culture
- Company Culture
- Culture & management must coexist
- Internal relationship
- People
- Talented people
- Retaining and developing talent
- People behind the product
- Leadership
- Trust (in leaders)
- What makes a good leaders? A good manager?
- Inter employee relationship

Brand

Brand Structure

- Brand
- House of brand
- Umberella brand
- Master brand
- Multiple different brands within firm

Awareness

- World wide customers
- Awareness
- Reputation
- Recognizable
- Goodwill

Digital Brand Aspects

- Domain name
- E-commerce accounts
- Contacts
- Digital Identity
- Data in relation to brand
- Coherent social media picture

Trademark

- Trademark
- Logo
- Slogan
- Names
- Color combination
- Symbols & icons

Associations

- Brand associations
- Robust
- Designs
- Product - fun brand
- Customers choose product
- Reliable
- Safety
- Installation experience
- Trust in brand
- Company is a traditional brand
- Design mark
- Visual design of the products
- Products connected to the brand
- Product - more modern and fast moving brand
- History of the brand

Technology

Interoperability

- Interface
- API
- Firmware
- Integration level
- Ecosystem
- App integration

Hardware solutions

- Product portfolio
- Hardware design
- Hardware
- Camera
- Physical components
- Light diodes
- Wireless components
- RFID
- Batteries
- Non-electrical
- Non-electrical
- Mechanical solutions
- Mechanical access to product

Platform

- Electronics
- Electronic platform
- More electrom agnetical products
- Wireless system
- Wireless
- Platform
- Modular platform
- Technology platform
- Modular solution
- Platform for products
- Digital platform
- Global platform
- Multiple layered platform
- MBS Modular building system
- Us of other (existing) solutions
- Tech modules
- Platform => next natural step in the development cycle
- Move towards one solution
- Platform for the division
- 1. Wireless 2. Lowe power 3. Read multiple kinds of access solutions
- Modules
- Reusable

Digital solutions

- Digital control
- Using the phone as access point
- Digital access to product
- Cloud solutions
- Digital solutions
- Remote control
- Using the cloud
- Cloud
- Verification through an app
- Limitation of access
- Digital control of the product
- Cloud components
- Physical access through digital access points
- Managing access control
- Limitation of access

Material

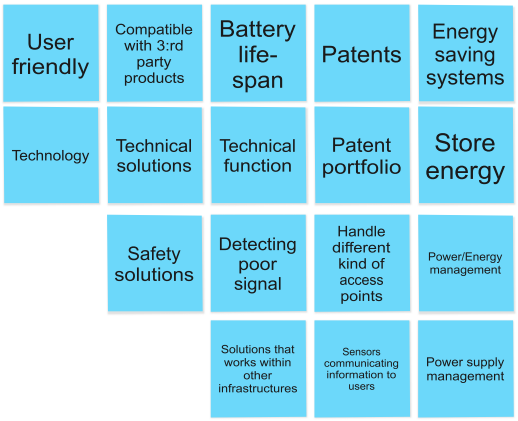
- Metal
- Raw material
- Material bland
- Value in the quality of the product
- Best material best technology
- Durable

Connectivity

- Hardware and software work as a unit
- Connectivity
- Product communicate with the hub
- Interaction between customer and product
- Connectivity to smart phone
- Digital connection
- Radio technology

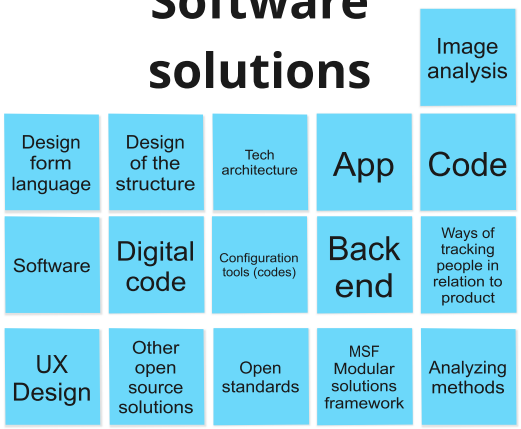
Technology

Technical Functions



Biometric Technology

Software solutions



Relationships

Collaborations/ Third parties

- Alliances (group discussion)
- 3:rd party software
- Product owners
- The need of wifi
- Amazon (Cloud AWS)
- REACT
- Big partners
- Need of a smartphone

Value chain

- Supply chain
- Suppliers
- OEM
- Resellers
- Installer
- Distributors
- Buyers
- End customers
- Relationship with Competitiors

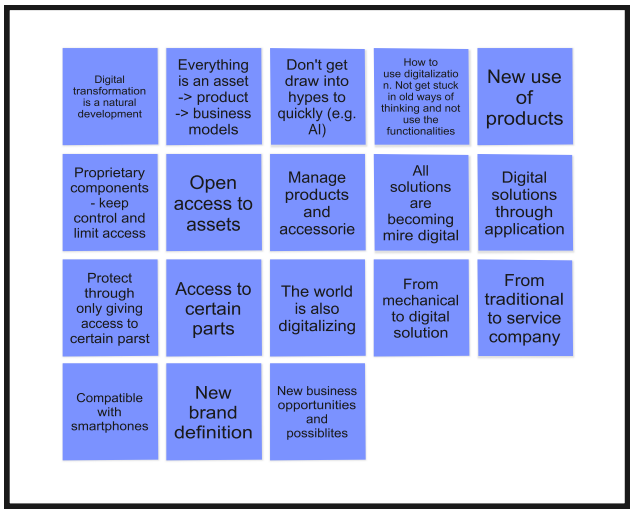
Customers

- Customer
- Installators
- Resellers
- Buyers
- Landlord
- Customer network
- Installation operator
- Reseller of products
- End customer
- Authorities
- Company Division (internal customer)
- Assemblers
- Retail stores
- User of the products
- Deliver company
- OEM
- Professionals user of product
- Sale persons
- Product have both end users and end customers
- Office/Building owners
- Distributors
- Product owner
- Telecomm unications companies
- Hospitals

Customer understanding

- End customer - who is it
- Voice of the customer toolbox
- Customer interviews
- Customer dialog
- Customer feedback
- Customer insights
- Information
- Information from customers
- Customer preferences/pain points - Why
- Customer experience
- Insights --> business opportunities
- Information - how the produces is use the used
- Customer experience, insights, information
- Understanding the customer
- Location information of the customer
- Customer reviews
- Database
- How to capture customer demand
- Capture customer expectations, preferences, painpoints
- informaiton about the customer
- Information about number of products in use

Digitalization effects



D. List of interviewees

Number of Interview	Business Title	Project	Unstructured	Semi-structured	Test
1	VP & Head of Strategic initiatives and innovation acceleration	A (Platform)	2022-02-07	2022-03-09	2022-04-20
2	Platform Manager	A (Platform)		2022-03-09	
3	Business Development Director	B (Product)	2022-02-09	2022-03-15	2022-04-20
4	Global Head of TM/Brand IP	B (Product)	2022-02-09	2022-03-15	
5	Product Line Manager	B (Product)		2022-03-15	
6	Operations Manager	A (Platform)		2022-03-18	
7	TM IP Counsel	B (Product)	2022-02-09	2022-03-22	
8	System Architect	A (Platform)		2022-03-24	
9	Marketing Coordinator	B (Product)		2022-03-25	
10	Hardware Architect	A (Platform)		2022-04-07	
11	Brand Protection Specialist	No project	2022-02-09		
12	VP & Head of Pre- Product innovation & IPR	No project	2022-02-10		
13	VP & Head of M&A	General			2022-04-21
14	Global Digital Innovation manager	General			2022-04-21
15	Senior IP Manager	General			2022-05-05

E. Interview Guide

Draft interview template

Introduction

We are currently conducting research for our master thesis at Chalmers University of Technology in Gothenburg within Intellectual Capital Management. The master's program focuses on innovation processes and creating business strategies based on Intellectual Assets to maintain the competitive advantage in a digitalized society.

Description and purpose of the project

The purpose of this project is to identify which intellectual assets are the most important to create value in an industrial company undergoing digital transformation and how they can be categorized. This project is conducted in collaboration with (Company) and there will be one internal delivery and one external public delivery.

Clarify how the data will be used

The data gathered during the interview is part of a qualitative study at Chalmers. The thesis will be published but no confidential information will be included.

Request permission to record the interview

We would like to ask your permission to record this interview for our own personal reflection. The recording will not be shared, nor will any direct quotes be used. It will be deleted upon the termination of this project in June. Is this alright with you?

Interview guide

Research Questions (As a reference)

Main RQ:

Which intellectual assets are the most important for value creation in an industrial company undergoing digital transformation?

- Sub RQ1: How can intellectual assets be categorized in an industrial company undergoing digital transformation?
- Sub RQ2: How does digital transformation affect how intellectual assets are categorized?
- Sub RQ3: What intellectual asset contribute to sustainable competitive advantage in an industrial company undergoing digital transformation?

Questions - Case

Background

1. What is your role within [PROJECT]?
2. Could you, in short describe the product and/or service?

General about Intellectual Assets

3. What does [PROJECT] have that [COMPANY] does not want other entities to have?
4. What is it that creates value in the [PROJECT]?
    a. What is it that makes the product and/or service unique?
5. Which components are essential for the function of the product and/or service?
6. In relation to your team members what are key success factors?
    a. If they left [COMPANY] what would be lost?
7. What different structures within the [COMPANY] enables value creation within the [PROJECTS]?
8. What external relations contributes to the value creation of [PROJECTS]?

Digital transformation

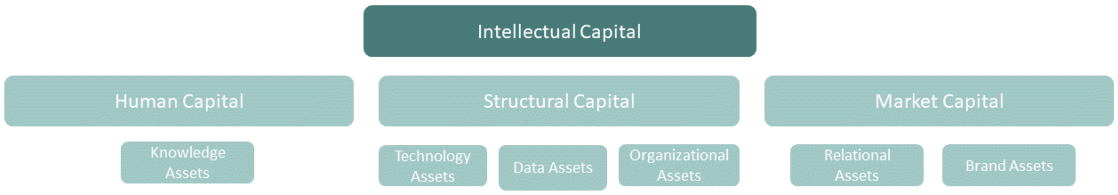
In relation to this project (Company) has been defined as an industrial company undergoing digital transformation.

9. What value does digital transformation bring to [COMPANY]?
10. Has digital transformation affected the value proposition of [PROJECT] and [COMPANY] as a whole?

Preliminary overview of the framework

As a main part of our project, we will create a framework that will work as a tool for [COMPANY] to structure and organize the intellectual assets. The intellectual assets can be divided into three main categories: Human Capital, Structural Capital, and Market Capital. Our **task** is to identify the sub-categories of each main category. We have created a draft of how to categorize the intangible assets within an organization.

11. In relation to this model do you have any examples of potential assets from the [PROJECTS] that we have not yet discussed?



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