LAPPEENRANTA-LAHTI UNIVERSITY OF TECHNOLOGY LUT
School of Engineering Science
Degree Programme in Industrial Engineering and Management

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UTILIZATION OF SERVICE DESIGN CONCEPTS IN INDUSTRIAL MANUFACTURING COMPANIES

Master's Thesis

Examiners: Associate Professor Lea Hannola
                    Professor Ville Ojanen

ABSTRACT

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The digitized world is creating more and more opportunities for companies to achieve growth. It also brings certain requirements to the table if a company wants to be successful in the future markets. The direction businesses are going towards is considering more customer experience, product and service lifecycle, and sustainability. Industrial manufacturing companies are usually the ones following two steps behind. It is often hard to start implementing such a big change in a company that has traditionally only focused on producing a product and not taking the final customer experience into consideration at all. With this one-way of doing business, customer needs and sustainability issues get left behind. This way of doing business is an old way that will not help the company in the future. The goal of this thesis is to find out whether industrial manufacturing companies do service design and use the possibilities of Internet of Things for it, or if they do have it even on their radar. This thesis also aims to find out what kind of needs and goals these companies have for finding out whether servitization would benefit them.

The first part of the thesis is built by comprehensively approaching the subject from a theoretical point of view. The literature review presented in this thesis gives a solid ground for the topics and analyzing the results of the empirical section, the second part of the thesis in order to provide encompassing information. This thesis uses an online survey questionnaire as a research method. A link to the survey was sent to employees of different industrial manufacturing companies globally. A total of 18 survey responses were received anonymously.

The results gathered from the obtained data in the empirical part show that industrial manufacturing companies have certain needs which could be fulfilled by using service design and Internet of Things. Results also clearly show that service design implementation is not at a good level due to a lack of knowledge about this topic and its benefits. This thesis provided a solution for industrial manufacturing companies to achieve their business goals in a sustainable and profitable way. By implementing service design and using Internet of Things platforms, these companies could benefit in the longer run.

TIIVISTELMÄ

Erilaiset digitaaliset alustat luovat yrityksille valtavasti kasvumahdollisuuksia. Markkinoilla on kova kilpailu, joten tiettyjen vaatimusten on täytyttävä, mikäli yritys tähtää menestymiseen. Asiakaskokemukseen panostaminen, tuotteiden sekä palvelujen elinkaaresta huolehtiminen ja kestävyys ovat kaikki keskeisessä roolissa. Teolliset valmistavat yritykset ovat aina vähän jäljessä muista yrityksistä, kun puhutaan muutoksista. Usein on vaikea aloittaa tällaisen suuren muutoksen toteuttaminen yrityksessä, joka on perinteisesti keskittynyt vain tuotteen tuottamiseen eikä niinkään lopullisen asiakkaan tarpeiden huomioimiseen. Tämä yksisuuntainen liiketoiminta ei niinkään ota asiakastarpeita tai kestävää kehitystä huomioon. Tämä vanha perinteinen toimintamalli on jätettävä taakse. Tämän diplomityön tavoitteena on selvittää, käyttävätkö nämä yritykset palvelumuotoilua sekä Internet of Things -alustoja. Diplomityössä selviää myös minkälaisia tarpeita ja tavoitteita näillä yrityksillä on, joita voisi tyydyttää palvelullistamisen avulla.

Diplomityön ensimmäinen osa on kirjallisuuskatsaus, joka auttaa lukijaa ymmärtämään aihetta kokonaisvaltaisesti. Tässä diplomityössä esitetty kirjallisuuskatsaus antaa vankan pohjan empirian, työn toisen osan, tulosten analysoimiseksi. Työssä käytetään online-kyselylomaketta tutkimusmenetelmänä. Linkki kyselyyn lähetettiin eri teollisuusyritysten työntekijöille maailmanlaajuisesti. Yhteensä 18 vastausta saatiin nimettömästi.

Empiirisestä osiosta saaduista tuloksista selviää, että teollisilla valmistavilla yrityksillä on tietynlaisia tarpeita, joita voitaisiin tyydyttää hyödyntämällä palvelullistamista ja Internet of Things -alustoja. Tulokset osoittavat myös selvästi, että palvelumuotoilun toteutus ei ole hyvällä tasolla näissä yrityksissä, koska tästä aiheesta ja sen eduista ei tiedetä tarpeeksi. Tämä diplomityö tarjoaa ratkaisun näille yrityksille liiketoimintatavoitteiden saavuttamiseksi kestävällä ja kannattavalla tavalla. Keskittymällä enemmän palveluiden tarjoamiseen tuotteiden tuottamisen sijaan, nämä yritykset hyötyisivät pidemmällä aikavälillä.

ACKNOWLEDGEMENTS

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1 INTRODUCTION

In this chapter, information concerning the reasons why this research is made is provided. First, the background of the thesis will be defined. After this, the chapter aims to discuss the research objectives and scope. Methodology on how the thesis with its empirical part is built will be discussed and the data used in the research will be explained. This chapter will go through the whole structure of the thesis.

1.1 Background

When considering how manufacturing companies do their production, you get to see a very common thing. Usually, all the effort is put into the production cycle with the aim of making it more efficient. At least this is how it was back in the days, and this is how it cannot be in the future if a company aims for growth and success. (Basen 2018) Information technology has made products complex in a way that they have become connective to different systems. These systems might combine hardware, microprocessors, softwares, sensors, data storages etc. which are also connective to many other things. New technologies, service design, different Internet of Things (IoT) platforms, etc. have changed this view of implementing business and have released a new competition era. Intelligent and connected products are transforming both the competition and the operations of companies. If a company wants to remain competitive, changes shall begin within the organization and its strategy. (Porter & Heppelmann 2014; Porter & Heppelmann 2015)

When focusing just on the production process, the customer's point of view gets left behind. Just producing efficiently is not a key to sustainable growth as said before. This is a so-called one-way of doing production. The world we are living in now, a world where everyone and everything is networking and connected is something every organization should take advantage of and change the way of doing things. Transparency needs to be gained to serve customers better by getting real-time knowledge on customer behavior and use cases. This can all be achieved with the use of digitalization platforms and re-thinking of business models. (Basen 2018)

Service design, which is radical client-oriented thinking, is still a rising star in different industries. It is client-oriented in a way that it considers the whole customer cycle. Both user experience (UX) and customer experience (CX) are as important. In figure 1 below the relationships between these terms are presented. User experience is specific to a product or a service. It refers to how the user experiences the product or service in question considering its navigation, usability, and interface design. Customer experience is a broader concept in a way that it considers the user or customer's experiences with all channels. Service design on the other hand is something that touches both the customer and the organization. Interactions across all channels and touchpoints are at the center point here. (Brightlabs 2019)
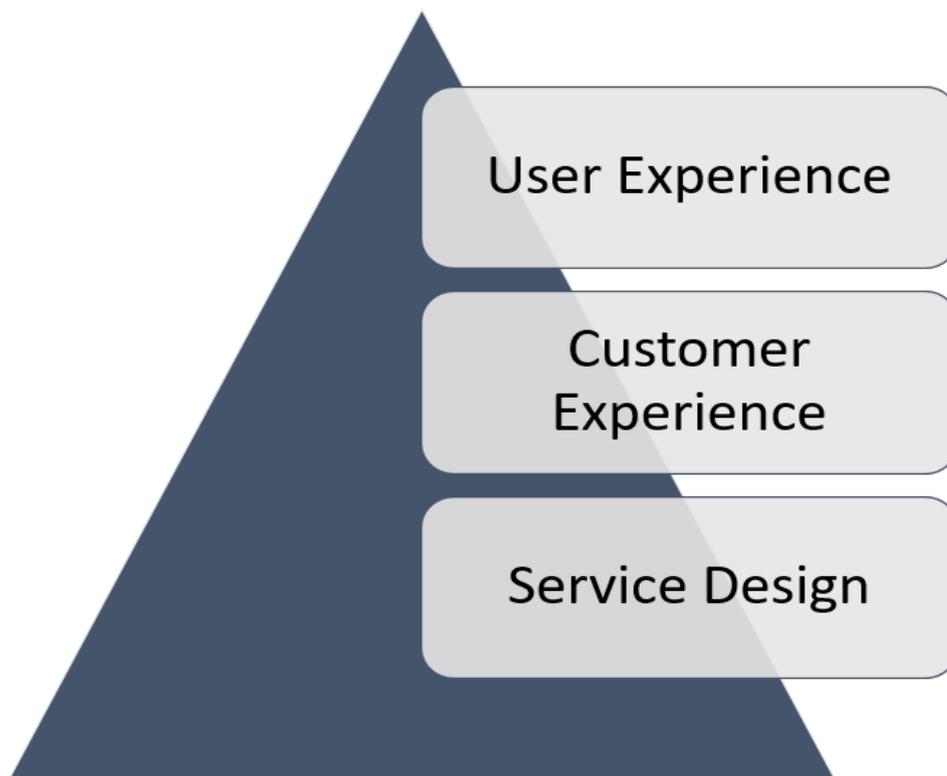
Figure 1. Relationship of service design, customer experience and user experience.

With service design methodologies, companies can promote the transition of servitization. Servitization is said to be the process of adding services to products (Kryvinska et al. 2014). Service design helps companies in overcoming the challenges organizational culture brings which are requirements for supporting the servitization transition (Andreassen et al. 2016). As

described by Kwon et al. (2021) service design methodology is something used to design the whole process the service requires. Here the point is to also maximize the value the customer experiences. This is something on which traditional manufacturing relies for promoting servitization. (Kwon et al. 2021) Servitization drivers can be divided into two categories, one meaning general environmental trends and the other referring to internal drivers of finance and strategy of the business (Kryvinska et al. 2014).

For the process of transforming from product to service to succeed, it requires specific enabling technologies such as cloud computing, data analytics, and above all Internet of Things (IoT) platforms. Connecting products and processes to the internet generates sensitive insights on customer behavior. The company can therefore use it in developing a deeper knowledge of its customers and their needs. (Kiel et al. 2017)

The Internet of Things being present there comes alongside with it a complex environment. For being able to take full advantage of what it has to offer it needs a new kind of thinking and holistic design. IoT is all about services instead of just products or devices. Service design is a holistic approach for creating value for a user and the design for the IoT solution should start with service design implementation. (Ojala 2017) In 2010 Sean Ellis came up with a term called growth hacking. Growth hacking is something which can be applied in new product innovation as well as in the continuous improvement of product. It also helps in growing an existing customer base to a bigger one. (Ellis & Brown 2017) With growth hacking, companies can experiment different ways of implementing servitization and at the same time acquiring customer loyalty and retaining them.

1.2 Research objectives and scope

This thesis is done on behalf of a corporation called BaseN. This thesis aims to analyze how industrial manufacturing companies can transform their business for achieving sustainable business growth. The key point is to find out how much industrial manufacturing companies use service design for Internet of Things development and innovation. While embracing a growth hacking mentality within the organization, industrial manufacturing companies could

possibly hack lots of new potential which might be unknown in the beginning. This way of thinking outside the box would give them an advantage in the market.

BaseN will be provided with updated knowledge on the needs of industrial manufacturing companies what comes to service design and IoT. By knowing the needs of the companies, BaseN can help in fulfilling them in order for the companies to achieve their both long- and short-term business goals. BaseN can be the partner in helping manufacturing companies discover the unknown potential they might have. Different barriers which will be discussed later in this thesis cause manufacturing companies to back off from implementing servitization. These companies themselves might not acknowledge the needs they have but rather focus on different ways for achieving their set goals.

BaseN is a software company focused on providing scalable and global Internet of Things platforms for customers. The company's focus on IoT platforms and digital twin creation of the products is massive, and indeed this is the message they want to deliver to their customers. Businesses of different industries are getting more and more IoT-oriented, but for industrial manufacturing companies to implement it they need to start working on service design in practice. With service design utilization comes the possibility to design the IoT solutions also in a holistic and benefitting way for the company.

This thesis work´s main objectives are to recognize the needs industrial manufacturing companies have for using service design and IoT. Besides this, the research aims to find out what kind of business goals industrial manufacturing companies do have. By identifying and knowing the needs of these companies both with their business transformation plans, it gives a great opportunity to start looking for appropriate solutions for minimizing the barriers and maximizing the benefits. Therefore, three research questions are formed and can be seen in Table 1.

Table 1. Research questions.

Q1	What are the needs industrial manufacturing companies have concerning service design and IoT (transforming from product to service)?
Q2	What is the business transformation plan status at industrial manufacturing companies?
Q3	How can BaseN improve its service design messaging to be utilized in their sales and marketing approach with the insights provided?

The first research question focuses on the evaluation of the needs of the customers. When defining the needs this research aims to prove the benefits service design and servitization would offer to them to satisfy the needs. The second research question aims to offer information on what industrial manufacturing companies want to achieve within the next five years. An overview of the business transformation goals will be created for knowing where they are standing and towards what they are going. The first two questions study the subject from a theoretical point and are compared with the empirical data gathered from the survey questionnaire. The third research question offers BaseN improvement suggestions on the service design messaging, and this is done by analyzing the findings in the first two research questions and the questionnaire results in general.

The output of this work is an analysis that is based on the collected data. It will analyze how industrial manufacturing companies should increase their knowledge of concepts related to service design and servitization to gain scalability, sustainability, and growth of their business. These companies need to really know that to stay competitive in the global market they need to start working on how to retain and keep their customers satisfied in the long term. A successful servitization transition is in the key role for achieving that.

The theoretical framework of the study can be seen in Figure 2. The figure below represents how both service design and growth hacking combined can be a key to a successful IoT development. IoT is at the center point in the theory due to its usability in servitization. With IoT comes lots of new information. This information can be about customer behavior, new trends, or innovation of the product which companies should use in product development and innovation of new services.

As said before, service design plays a huge role when designing an IoT solution (Ojala 2017). Growth hacking on the other hand can be applied in every situation and every goal set, so the concept can be seen as another direction of the study when wanting to implement servitization and use IoT platforms or it can also be a way to start experimenting with service design implementation within the organization to gain a successful IoT solution. The implementation of the growth hacking mindset at industrial manufacturing companies both with its correlation between service design is something that has not been studied that much before. This thesis aims to provide academic information for further research of this subject as well.
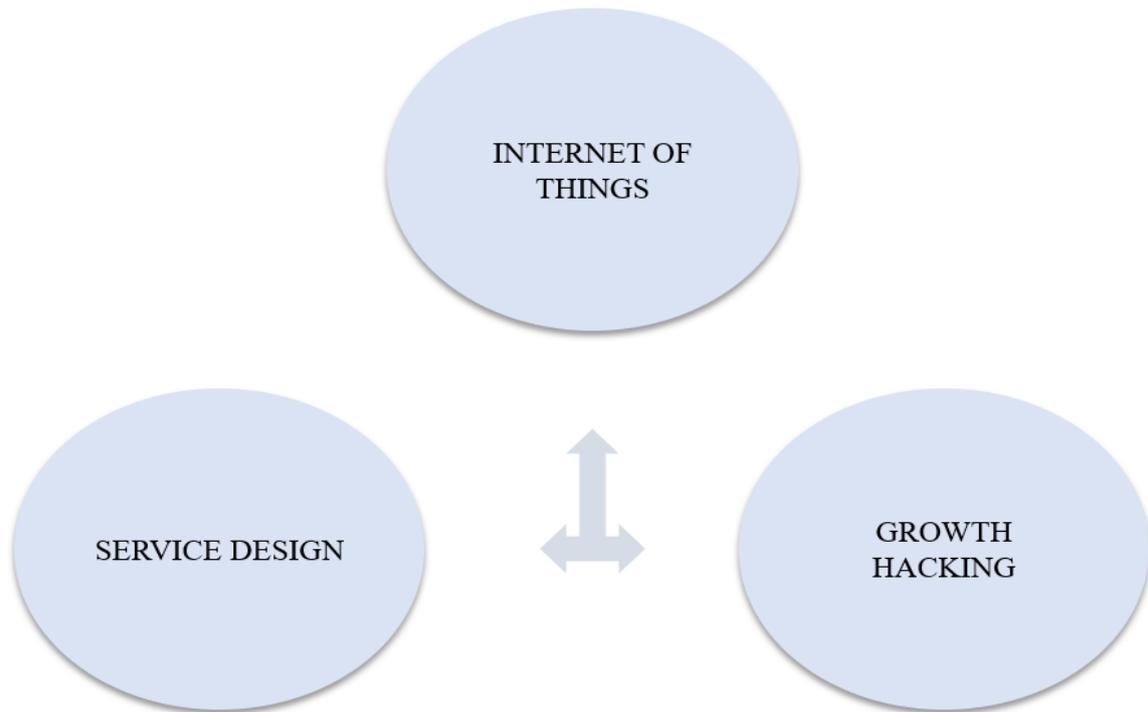
Figure 2. Theoretical framework.

1.3 Methodology and data

The methodology of this thesis is divided into two sections. The first section, literature review, does research on the outcomes of implementing servitization in industrial manufacturing companies and gives a solid understanding of what concepts related to service design mean. The benefits gained from transforming from product to service, using servitization and IoT platforms are the main issues concerning this topic. This thesis provides a comprehensive view of how industrial manufacturing companies could benefit from using servitization. The barriers caused by implementing servitization will also be discussed and ways to overcome these challenges will be provided.

The second section is the empirical part of the thesis. The main research method in this section is an online survey questionnaire, which is sent to 90 individuals from different industrial manufacturing companies who have either of the following terms in their job title and/or job description on LinkedIn: digitalization, smart factory, Internet of Things (IoT), business

development, CEO/manager/director. LinkedIn groups related to manufacturing were also channels for reaching ideal respondents for the questionnaire. These groups were Manufacturing UK, Electrical Manufacturing, Semiconductor Manufacturing, Electronics Manufacturing, and Supply Chain, Semiconductor Equipment Manufacturing. Besides this, Sales Navigator in LinkedIn was used to reach out to some more individuals working in different industrial manufacturing companies with the same titles as before. This part of the thesis will be discussed more in chapter 5, research design.

1.4   Structure of the thesis

This thesis is divided into eight main chapters. These chapters are presented in table 2 below. This table gathers information on inputs given for each chapter and provides information on the output obtained from every chapter specifically. On the left side of the table, inputs to the specific chapter are provided. In the center, each name of the chapter is presented and on the right side, the outputs of the chapters are described.

Table 2. Main chapters of the thesis and their inputs and outputs.

INPUT	CHAPTER	OUTPUT
Introducing the research problems, going through the main topics of the thesis	**Introduction**	Background, research objectives and scope, research methodology, and structure
Presenting the theory of the main concepts related to the thesis	**Definitions of terms used in the research**	Understanding thoroughly what each of the concepts means separately
Presenting the meaning of servitization process in manufacturing and listing the benefits and barriers of it	**Adding value with service design in manufacturing**	Comprehensive understanding of what servitization transition could offer to manufacturing and why it is important
Presenting growth hacking viewpoint in service design implementation	**Adding value to service design with growth hacking**	Understanding how service design benefits from adding growth hacking to it
Case company description and research approach and methodology	**Research design**	Understanding why BaseN was chosen as the commissioner and description of research data and methods
Going through the responses of the survey questionnaire	**Results**	Providing qualitative and quantitative information about the results
Discussing the results of the research	**Discussion**	Comparison of the results obtained to the learnings from literature review
Presenting main findings and solutions of the thesis	**Conclusions**	Answering the research questions and providing insight for future research

The first chapter is introduction, and it aims to provide the reader a good and clear understanding of the research topic and its process. The first chapter is followed by chapter two where the terms used in this thesis will be explained. First, the reader will be guided into getting familiar with the topics related to this thesis, such as IoT, Digital Twin, Service Design, Servitization, and Everything-as-a-Service (XaaS). The main point in this chapter is to provide an academical view of this subject and to prepare the reader for understanding the empirical part of this thesis. With the help of chapter two, even though the reader is not familiar with the main topic, it provides the information needed to understand why this research is conducted in the first place.

After this, the thesis will provide information on what servitization in manufacturing means in general. The reasons for transforming from product to service will be gone through. The benefits and barriers of servitization will also be explained. The study will then approach the subject of adding value to service design with growth hacking, which is something that has not that much academic study behind it.

Chapter five is where the case company BaseN is described on a deeper level. The reasons why BaseN was chosen as the thesis commissioner will be explained. This chapter also goes through the research approach and methodology. After this, the empirical part comes along. Chapter six provides the reader with the results obtained from the survey questionnaire. The results are presented in their appropriate order, and they are divided into three categories, the first one concentrating more on the side of business needs, the second one on goals at industrial manufacturing companies in question, and the last part focusing on the technical matters of these companies.

The next chapter, chapter seven, discusses the results and analyzes them. Here the comprehensive comparison to the literature review is made for creating solid information. The final chapter concludes the findings in this research and answers the research questions conducted at the beginning of this thesis. This chapter is about conclusions and discusses future research.

2   DEFINITIONS OF TERMS USED IN THE RESEARCH

This chapter is focused on describing the terminology used in this research. The chapter goes through the main topics related to service design and Internet of Things. This will help the reader to better understand the big picture of this thesis.

2.1   Internet of things

The technology nowadays relies on the Internet and all the devices connected to it. Smartphones, PCs, WiFi-enabled sensors, tablets, wearable devices, and household appliances all form the Internet of Things, in which we refer to as IoT. According to Ahmed et al. (2017), there are more Internet-connected devices than there are human beings on earth. And this is expected to still increase from what it is now. So, when thinking about the world we are living in now, the world of the Internet, it only makes sense to take advantage of it. Almost all industries nowadays are using the sensors of IoT to generate huge amounts of data. But for enterprises to benefit from IoT, a platform needs to be created where all the data to be collected can be placed and then managed and analyzed. Here we now face big data which is a huge volume, high velocity, and high variety sensor data. There needs to be a platform that helps in dealing with a huge amount of diverse data for obtaining valuable insights out of it. Different data integration and analytics tools are also vital and according to Ahmed et al. "*allow organizations to revolutionize their business process*". (Ahmed et al. 2017)

The value big data offers to organizations is that it has an incremental improvement and optimization of current business practices, processes, and services. It gives more value with adding small new data sources versus starting to create and develop whole new algorithms. With the help of big data, innovation of new products and business models is easier. (Laher 2016)

Figure 3. Big Data Sources in IoT (Ahmed et al. 2017, pp. 460)

Yet another term closely related to the above-mentioned topics is Industrial Internet of Things (IIoT). With IIoT comes many new possibilities for industries. Integration of cyber-physical systems (CPS), IoT itself, cloud computing, automation such as using intelligent robots, wireless technologies, etc. are all technologies related to IIoT. Big Data in these IIoT systems arise since there are many both internal and external activities that are important for production and machines, different business operations, and especially customers. These advances have caused manufacturing processes to become more flexible and efficient. (Rehman et al. 2019) So IIoT in general helps factories to work with intelligence and to digitize all the work around it. This means that all the operations can be done very accurately, and many other areas of business can be improved, such as safety and predictive maintenance. (Joshi 2017)

The Industrial Internet of Things gives factories benefits such as cost savings, connectivity for industrial organizations, scalability, and efficiency. IIoT breaks down the silos in the factory and offers information to everyone. (Joshi 2017) While transparency is achieved within the organization, all different functions can run more efficiently and effectively.

2.2   Digital twin

Digital twins are virtual representations of real-world objects and all the information about the product system is in it (Chavali et al. 2017). It can be a virtual version of a product, factory, or some other asset or system in the organization (Gould 2018). With digital twins also consequences of design decisions can be spotted (Schleich et al. 2017). These representations provide its users a possibility to review all the activities happening in a real system, interactions and consequences of decisions made on a simple platform. With digital twin creation in industries, the technology in it helps to improve efficiency, productivity, availability, scalability, and quality of a product or a service. Bottlenecks can be spotted more easily, sustainability can be gained, and the integration of digital twins with managerial processes can make decision-making much easier within the organization. Here IoT has a huge role in connecting all the parties together. (Farsi et al. 2020)

Being a cornerstone of digital transformation, digital twin technology is constantly applied in the new industry 4.0 revolution. Its accessibility nowadays makes it easy to implement and to start innovating within the company. Digital twins can be implemented in different sections of the product lifecycle such as product, production, and performance. When the product has its virtual representation, it can be tested for validation of the performance under specific use conditions. In addition to manufacturing companies' business, there are also other sectors taking advantage of digital twin technology, such as the space industry and healthcare. (Pang et al. 2021)

In digital twin technology, there is a connection of data between the physical object and its virtual version. The reason for digital twins to exist is simply for enhancing the performance of the physical objects using different computational simulations and techniques. The University of Michigan is where the concept of the digital twin was first introduced, and later on, it was further developed by Michael Grieves. (Pang et al. 2021; Grieves 2014)

Digital twin benefits the manufacturer in what comes to production process optimization and in improvements of the product. New innovation can be done, and processes can run more efficiently. While this itself is an advantage for the manufacturer, missing the link between

manufacturers and their customers there is no additional value achieved in the customer-centric aspect.

2.3   Service design, servitization, and product-service systems

Service Design refers to a process that aims to create more sustainable solutions for existing ones. It also creates an optimal experience for both customers and service providers which is desirable and effective. In service design, the key value for success is customer experience which makes it a human-centered approach. So, in order to just sell a car as a product, one could sell a possibility for elderly people to travel easily, so sell car-as-a-service. Service design should be both holistic and systematic for being successful. (Saco & Goncalves 2008)
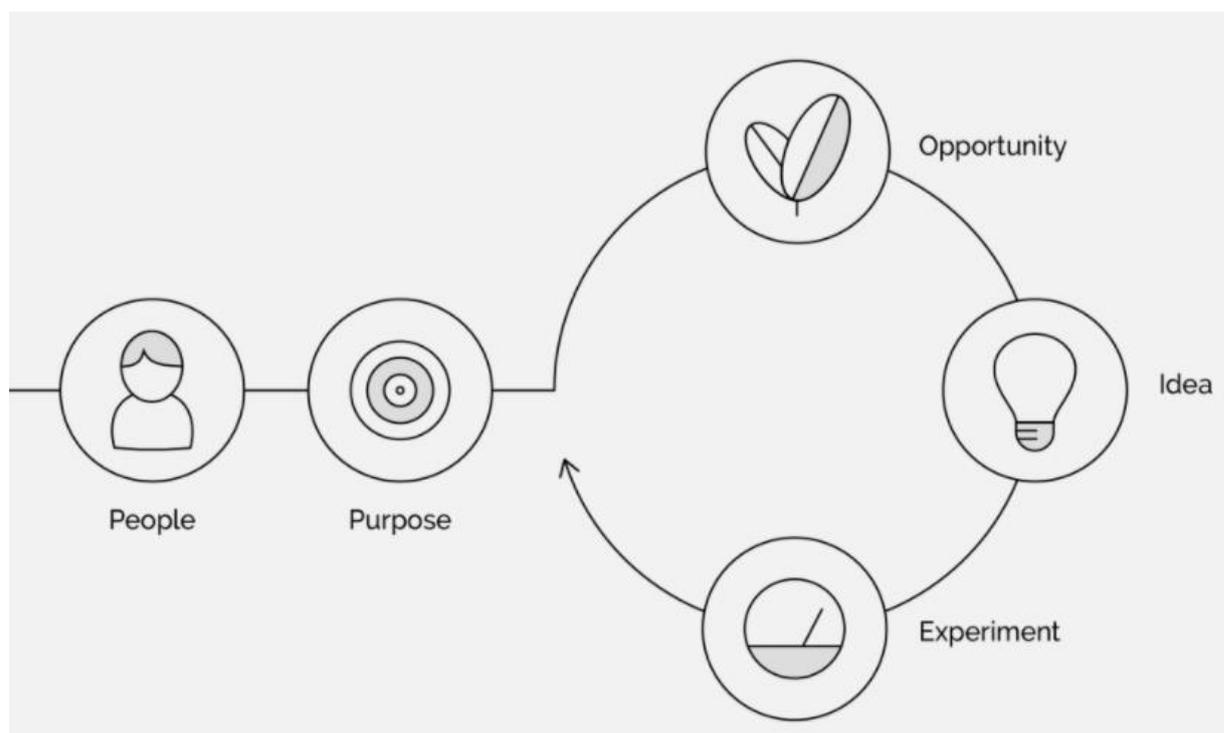
Figure 4. Basics of service design process by Lean Service Design (2021).

Production has been facing more and more complex demands in this age of information technology (Morelli 2002). With practicing service design, demands are better considered and customer needs fulfilled. In service design, every touchpoint with the service provider and the entire journey of the user are emphasized and value is created. There are some other closely

related terms to service design, such as platforms, transformation, and co-creation. (Holmlid 2009) Service design involves service engineering both with technological service infrastructure which consists of different systems, devices, and many other digital devices for generating co-value (Pfannstiel & Rasche 2019). With service design companies get to adopt new tools and methods for also enhancing the innovation process they might be used to. Storytelling, service blueprints, and prototyping are all part of service design and help companies innovate. (Kurtmollaiev et al. 2017)

Product service system, PSS, is defined as "*a mix of tangible products and intangible services designed and combined so that they are jointly capable of fulfilling final customer needs,*" according to Tenucci and Supino (2019, pp. 565). PSS is something that manufacturers nowadays rely on to create the best value for customers. With PSS, companies focus their value proposition more on the final users of their products rather than just on the product. Customer needs are in this system the ones that cause the terms of the service. With the added value to the product, companies can prolong the service life of products. Parts can be reused after the life cycle of the product has ended, and in this way, everything is more cost-efficient and sustainable. PSS requires a lot of innovation since there is a need to fulfill the empty space just producing a product leaves for serving customers in the best way. (Annarelli et al. 2016)

Servitization is said to be an innovation of organizations' capabilities to shift from selling products to selling PSS and creating mutual value for both sides in this way. So servitization can be understood as a synonym for PSS. (Tenucci & Supino 2019) The term servitization was first used in the 80s, and it started to develop first as more of a movement type of trend. Companies would start to add value to the products in the sense of services, which would create better customer satisfaction. With the help of servitization, more features could be provided, and customer needs would be considered more thoroughly. (Tenucci & Supino 2019)

In servitization, the point is to not just deliver a one-off sale but rather to use the product for selling an outcome as a service. For example, Netflix and Spotify are very good examples of servitization. They both deliver media as a service and not just CDs or DVDs. In this thesis, we will use the word servitization for describing the issue.

2.4   Everything-as-a-service

The as-a-Service model has now been in our lives for a long time, and it is still developing. Terms such as SaaS (Software-as-a-Service), IaaS (Infrastructure-as-a-Service), and PaaS (Platform-as-a-Service) are familiar to many, but Everything-as-a-Service (XaaS) might not be that known. The way of providing services over the Internet, this model of cloud computing, is something important and still gaining a lot of attraction over the world and across different industries. (Watts 2020) The world we live in where access to the global internet is easy combined with cloud computing gives XaaS a very good ground to start growing just anywhere (Bigelow 2017).

Everything-as-a-Service (XaaS) is an important term in this research. Its main idea is to reflect how organizations adopt the as-a-Service method in everything they do. So XaaS refers to the delivery of anything as a service over a network - most commonly the Internet (Bigelow 2017). Here the customer is in the center point. With XaaS the point is to increase the value the customer can get by trying to make them subscribers of the service rather than buying the product just one time. (Watts 2020)

Cloud services help organizations simplify IT deployments such as complex servers, hard drives, and software deployments. This as-a-service model cuts costs for companies since less on-premises IT means fewer physical objects. This on the other hand means that there is no need for all the IT staff. Then again, some companies do not feel so comfortable using XaaS due to security, compliance, and business governance concerns. (Bigelow 2017)

Servitization, the combination of product and services, is something companies are very interested in and it is closely related to XaaS. By servitizing, customers get more value than just by buying a product or a service itself. (Watts 2020)

2.5   Growth hacking

Missing an official definition, having no boundaries, and lacking the scientific definition of the term, growth hacking is sometimes seen as a useful buzzword. Since the era we are living in is very digitalized and big data exists and offers a lot of new information, it is only fair for industrial manufacturing companies to start taking advantage of it. Growth hacking is still seen mostly as a tech start-up way of doing marketing, but the idea behind it is so good that it would be a shame for larger companies not to implement the same mindset. (Zylka et al. 2016) A growth hacking mindset includes having a creative mind both with being very analytical and using social metrics to gain business growth.

Growth hacking is a marketing strategy with a huge digital twist of leading the whole marketing of the company. It is a lean method that uses a data-driven approach for deeply understanding customers' needs and how to both acquire and keep them as customers. With the Internet of Things, every time a person uses an electronic device, he or she is giving new information about his or her interests. Companies that use growth hacking are continuously combining insights gained from Big Data and IoT and using this for creating behavioral change. (Tomescu 2019) Since the growth hacker can be anyone in the company it implies that the role is flexible and something that has not existed before. Still, no matter the background of the hacker, there are three most important elements of doing the job which are in common to all the hackers, segmentation, customer engagement and use of customer feedback, and online focus. (Troisi et al. 2020; Tomescu 2019; Laher 2016)

With the focus on marketing and the needs of customers which leads to product development, a growth hacker breaks down the silos between these two departments. In growth hacking, there is a need to take everything into consideration through the whole touch point of the organization. In this way, the most optimal customer experience is maintained. (Laher 2016) Growth hacking embraces rapid experimentation through the whole cycle, and it also embraces the possibility of failure. Iteration of things is one of the success keys in growth hacking and with the help of it a growth hacker has learned a lot from the mistakes and results in the end with minimal losses and maximal gains. (Jones 2021)

The need for product development in a company is always essential and companies need to have a good understanding of customers' needs and feelings concerning the products. To stay up to date about the changes happening in the field of customers, companies need to do research and product development efficiently. According to Svendsen et al. (2009), the ability to gain information and knowledge about a key customer is very crucial since this provides important knowledge about the customer needs and wishes which is a backbone for companies. Growth hackers tend to provide this in a very inclusive way.

The link between marketing and product development is very important for a growth hacker. First, marketing strategy should concentrate on each touchpoint and the use of customer data is highly important. With the help of this, more customized targeting to the customers can be done and savings are made. Customer experience is to be considered in every step of the marketing strategy and this faces a lot of difficulties in large organizations due to silos between departments. (CMG 2021)

3   ADDING VALUE WITH SERVICE DESIGN IN MANUFACTURING

This thesis focuses on how manufacturing companies can use servitization and transform their business models for achieving growth. Servitization is clearly not just for the use of special industries, it can be applied in everything. Manufacturing companies can add value to the product in many ways, such as maintenance service, training, safety, repair, support, etc. Servitization needs its implementer to change the mindset and processes things have been done before, and also really know about the benefits in order to start wanting to servitize the business. This chapter aims to provide academic information about this.

3.1   Servitization in manufacturing

When the term servitization was first introduced in 1988 by authors Sandra Vandermerwe and Juan Rada, the goal was to make manufacturing industries see the importance in not just competing with their competitors but to keep their own customers satisfied and really understand their customer base and, in this way, increase differentiation levels. (Vandermerwe & Rada 1988) Servitization is a transition process, where companies want to become more service-focused rather than product-focused and, in this way, face the challenges the experience economy is putting on them. This transition requires companies to both change their mindset and processes. (Calabretta et al. 2016) With servitization, organizations can adapt to this new kind of economy where services play a huge role in serving customers the best (Ostrom et al. 2015).

It requires a different mindset for manufacturing companies to suddenly change their organizational culture to one which embraces service design rather than just the design of products. This is a challenge that these companies face and for service design to become successful it needs to be implemented correctly, starting from the way people within the organization think. (Raistrick 2020)

It is a challenge for many companies to transform their organization and the culture into a more service-led business. Manufacturing companies need to gain a customer-centric mindset but still not lose their leverage on existing resources. (Calabretta et al. 2016) Service design

methodologies can help solve this problem since it is a human-centered iterative approach for the creation of new services. Service design can help companies to reframe their processes and business in general for achieving service- and customer-centric mindsets and practices, and in this way achieve organizational transformation (Andreassen et al. 2016; Sangiorgi & Prendiville 2014).

According to Raistrick (2020), there are three levels of how servitization can be seen within manufacturing companies. In figure 5 below, these three levels are represented:

PRODUCT PROVISION	AFTERSALES	ADVANCED SERVICES

Figure 5. Three levels of servitization in manufacturing described by Raistrick.

Product provision means that the manufacturer usually builds and then sells. After the product leaves the factory, it is no longer a concern to the manufacturer. In a case where the product would get damaged or so, it is not a manufacturer's concern anymore. So, in this way the manufacturer is also losing potential revenue which could be gained through different kinds of maintenance or other services. (Raistrick 2020)

Aftersales, level two, refers to the manufacturer doing some service on the sold product. This causes a source of revenue stream for the manufacturer. The product which has left the factory will need servicing, repairing, and condition monitoring usually at some point. (Raistrick 2020)

Aftersales is a better level than product provision obviously, it takes the customer more into account and it also brings more revenue to the manufacturer. This makes both parts of the trade more satisfied. Still, an even more customer-oriented approach is level number three, advanced services. Here the manufacturer invests more in developing the best customer relationship, each relationship being customized specifically for that customer. This is different from just selling and maintaining a product. Here usually the services are delivered on a continuous basis. This

kind of subscription model gives the customer the benefit of paying for an outcome that serves them the best. (Raistrick 2020)

Nowadays' advances in technology and especially in information technology have changed the way services are delivered and experienced. It has changed the way in many respects how customers serve themselves before, during, and after the specific purchase. (Ostrom et al. 2015) Information technologies that are rapidly evolving, such as Internet of Things and cloud computing, enable new kinds of customer communications. The acquisition and storage of big data and the analysis of it offers opportunities for a more customized and higher quality service for customers and the relationship with them. (Rust & Huang 2014) Companies are constantly looking for new services to offer for achieving differentiation and growth (Ostrom et al. 2015).

The Internet of Things and machine embedded sensors being present and possible give servitization easier opportunities. The reason for this is because servitization is only a continuous and reliable source of revenue if the service to be provided to the customer is also continuous and reliable. For the service to be continuous and reliable, factories need to have machines connected to platforms that provide information with the help of sensors feeding data to the manufacturer or service provider about the product or parts of it. With this, different enhancement actions can be done and predictions for possibly occurring problems can be made. (Raistrick 2020)

The most important part of servitization is meeting customer demands. Keeping customers satisfied and happy is very crucial for each business, and this plays a big role in differentiation from competitors. The time is clearly behind us when the product could itself lead to retaining customers and keeping business running perfectly. Requirements and demands of customers have changed a lot during the past years, and this is something organizations should take into consideration to keep themselves running. Servitization in manufacturing offers many possibilities for industries since they have a great possibility to keep the revenue stream running incrementally. Manufacturers can gain very important and useful insights from servitizing business and use it for analyzing future actions as well. (Raistrick 2020)

3.2   Benefits and barriers of servitization

Companies are striving for attracting and retaining their customers. The digital era of today has caused a need for industry transformation and pushed manufacturing organizations to rethink their traditional dominant logic. For a sustainable competitive advantage, servitization is a perfect differentiation strategy that should be developed and implemented within the organization. Over one-third of large industrial manufacturing firms have been recognized for offering services. IBM, Rolls Royce, Aerospace, Siemens, and Xerox are all examples of how becoming more service-oriented helps in overcoming challenges in a market of weak demand, hard competition, and decreasing margins. Companies who want to start the servitization process need to change their business models, organizational mindset and structure, operational processes both with the relationship with all the stakeholders. (Cavalieri et al. 2017)

Crozet and Milet (2017) have studied how servitization affects the performance of the company. According to them the most expected benefits gained from servitization are higher revenues and higher profitabilities. Servitization is also said to be positively correlated with employment, meaning that the more business is servitized the more employees there are. Croze and Milet also argue that the benefits gained from servitization are bigger than the costs it creates for the business. (Crozet & Milet 2017)

According to Annarelli et al. (2016), benefits manufacturing organizations can gain using servitization are the followings:

1. Lock out competitors
2. Lock in customers
3. Differentiation
4. Image improvement
5. New market development
6. Reduce environmental impact
7. Consumption efficiency
8. Production efficiency

9. Cost reduction
10. Revenue increase
11. Customer engagement
12. Legitimacy of servitization

Different authors who have discussed this topic have found similar benefits servitization gives companies. The most common benefit found is the environmental impact. So servitization is very closely related to sustainability and environmental issues, and that is one of the reasons why it should be an increasing trend amongst industrial manufacturing companies especially now. (Annarelli et al. 2016) Environmental impact means that while providing customers with ongoing services, parts of the products can be for example easily repaired and reused. Clarke et al. (1994) referred to this matter back when they wrote an article about the challenges of going green in Harvard Business Review, saying that in this new world new ways of doing business will emerge which causes a win-win situation for both the business maker and the business receiver. They discussed about managers coming up with a way of redesigning products in a way that doesn't use that much environmentally harmful resources.

Servitization besides the financial benefits it provides to its implementers such as revenue increase and cost reduction, it also creates strategic benefits. These strategic benefits refer mostly to the fact that it gives the implementer a competitive advantage. The differentiation it does to the manufacturing offerings is significant. (Kryvinska et al. 2014)

There can clearly be achieved growth in both revenue and profitability according to many sources, and this is one of the main benefits servitization offers. By adding services to the company's offerings there comes additional ways for the company to receive payments. Also, financial stability can be achieved since by providing ongoing services to customers, incomes become ongoing as well. Manufacturing companies being the manufacturer of their complex equipment, they are the ones which have the stronger capability of fixing any errors occurring in the product. Providing the "product-as-a-service" makes more sense in this matter and provides the manufacturer with more benefits. This also strengthens the customer relationship when focusing on the solution rather than just on the product itself. Here customer's needs are

taken into account and loyalty is gained. The customers are less likely to change their equipment supplier when they feel they are receiving the outcomes they were expecting. With servitization, innovation can also be increased. Making improvements to existing products or services becomes easier and the ideas for this can come straight from the customers which will help in locking them in. This causes barriers to entry for other competitors, so the market share is more secured. (NextService 2020)

A very important barrier that has been recognized causing troubles in shifting to servitization is a wide organizational cultural change. Changing the culture within the organization needs pretty much acceptance from every stakeholder too. Also, a lack of technological information and knowledge on how to implement service design and use its methodology and tools for innovation is a huge barrier. Service design development also needs to have skilled personnel who know how to implement and do it correctly so that it can benefit the organization in the long term. (Annarelli et al. 2016; Kang et al. 2018)

Another key concern between servitized and non-servitized manufacturing companies is that servitization needs time to develop and become profitable for the company implementing it. It is shown that companies doing servitization tend to report bankruptcies more often than the ones not doing it. This makes companies back off from servitization plans. Also, companies not doing servitization report higher sales than the ones doing it. This is another challenge in a servitization manner and keeps companies uncertain about it. (Raistrick 2020) Manufacturing companies need to really understand how servitization would benefit them and their business, and that transforming the business to it will take time for it to become more profitable.

All the above-mentioned obstacles need investment. This is something that can make the organizations back off from the plan of implementing service design, moreover, to start the servitization process. Especially since service design usually does not pay off immediately, it needs time to run correctly and benefit the one doing it. So, lack of profitability is another major obstacle causing skeptical behavior. (Annarelli et al. 2016)

In figure 6 below the main benefits and barriers servitization causes in manufacturing companies are presented. The figure shows that there are more benefits than barriers in total. It is essential for the companies to start by minimizing the barriers to achieve a successful servitization and start gaining benefits out of it.
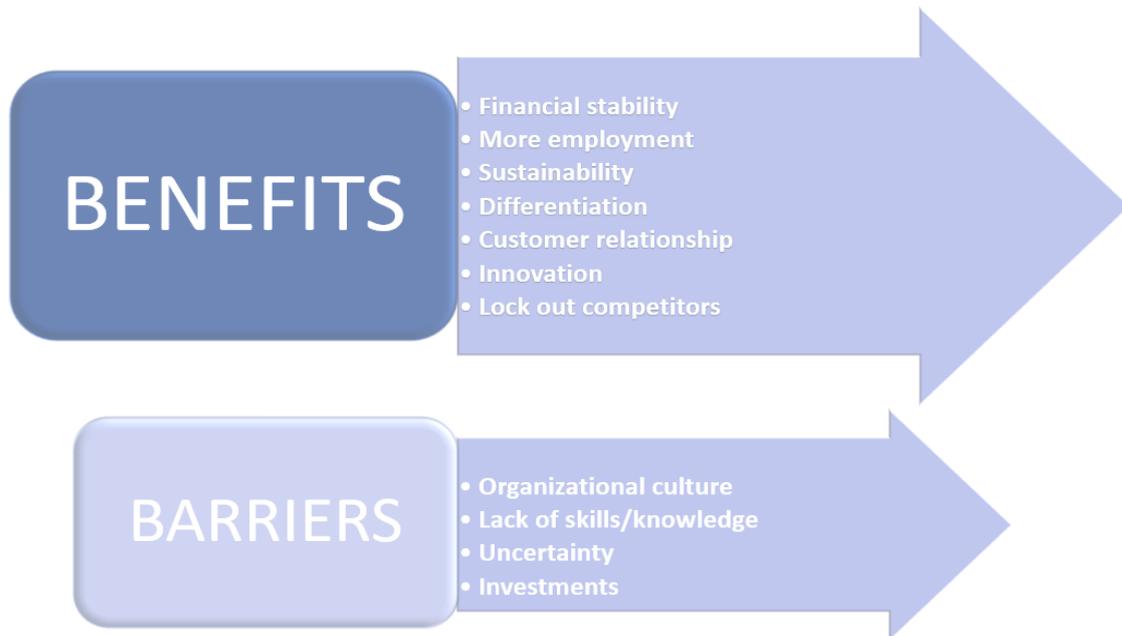

Figure 6. Benefits and barriers of servitization in manufacturing.

4 ADDING VALUE TO SERVICE DESIGN WITH GROWTH HACKING

Chapter four aims to combine service design with growth hacking in order to provide information on how these two could benefit the organization. Both service design and growth hacking are industry-independent and can be applied to any goal set. Still, both of these terms are not yet that familiar to industrial manufacturing companies, and therefore should be studied for helping them possibly gain benefits from these issues.

4.1 Service design in growth hacking

Growth hacking is a mindset that embraces a growth mentality. It has many advantages if used correctly. Any company or team or even individual can practice growth hacking for discovering new business models and product ideas. It can be used to serve any goals set with a data-driven approach. The proper use of growth hacking comes when aiming for aggressive growth within the company. This way experiments and iterations are done more quickly and the results of what works and what does not work can be discovered faster. (Troisi et al. 2020; Tomescu 2019)

This thesis suggests for the companies in question to start implementing growth hacking while the goal is to achieve servitization. The changes should start across the marketing department, product development, and management. Growth hacking is all about making different experiments and including customers in these experiments. (CMG 2021)

Usually, when starting to do service design, the first steps are to gather internal wishes and needs to form the idea of the new service and then designing it. Then all of this would be followed by the implementation of that service. This way is more of a traditional way of doing service design, and it is challenged since customer needs are not at a high priority level. Another strong challenge in this model is that design and implementation phases should go hand in hand since for a successful service design to be achieved it is important to learn and adjust those phases depending on each other. So clearly this would be a more agile/lean way of implementing service design. (Columbia Road 2019)

Even by doing the above-mentioned improvements to service design development, there is still no guarantee that the changes will bring more customers and revenue to the company. Service design in growth hacking context points at this. (Columbia Road 2019) By applying that combination, it helps in gaining more customers.

We have discussed the meaning of growth hacking earlier in this thesis, and next, we use it in the context of service design for creating value. Columbia Road (2019) discusses how service design in growth hacking takes feedback based on customer goals achievements at each step of the customer journey into account, and in this way has a huge impact on the revenue. This should all be applied to the design process of the service. While having the growth hacking mindset when doing service design, it means to design and build as little as possible and at the same time test out multiple risky assumptions for knowing what the best possible way is of designing a service. (Columbia Road 2019)

Service design should really focus on what the customer wants instead of what are the organization's internal wishes and assumptions. This is important for the service not to become comfortable only to the most educated persons about that service. The process of designation should start by asking customers why they use or visit that specific service and what they want to accomplish with it. Organizations should go live even when the smallest possible part of the service is done for gathering insights on the users and their feelings and feedback about the service. (Columbia Road 2019) This helps with validating the initial assumptions and creating the next steps.

The traditional design process focus is not that much on customer feedback and for example, marketing departments usually have the last word on it, which is an internal department of the organization. Growth hacking-minded designers embrace the fact that the customer might not care about what the new product brand is but rather the service itself and how it can solve their problems. (Columbia Road 2019)

Growth hacking and design thinking can be used together in order to achieve creativity and innovation within the organization. In figure 7 below the process for describing this issue is

presented. The first thing is the acquisition, which refers to the fact that by combining design thinking with growth hacking together, customer acquisition expands. Secondly comes optimizing customer activation followed by improving customer retention. This means that by working on the two matters together, activating customers plays a huge role in it and it all ends up in client retention. After this generating more revenue takes place and finally, as the last step of the process there happens boosting of the referrals. (Luke 2018)
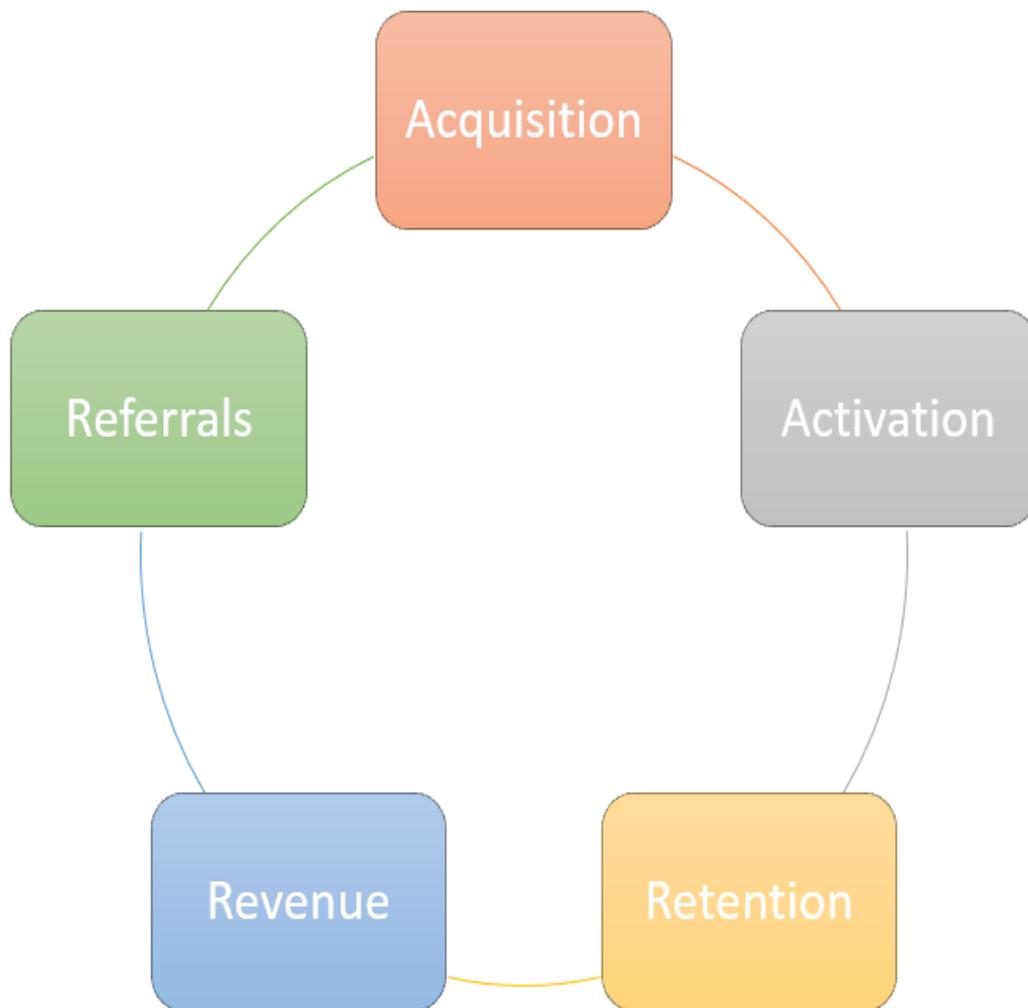

Figure 7. Growth hacking and design thinking together according to Luke.

4.2 Case Netflix

Netflix is a pioneer example that uses both service design and growth hacking. The reason why it has become as successful as it is today stems from the ability to use service design and growth hacking. Case Netflix will be used as an example in this research. Netflix coming from a different industry than the ones to be researched in this thesis still can provide information backing up the benefits which could be gained using service design and growth hacking.

Netflix has transferred its business model from offering products to offering services. This helps Netflix in predicting its revenue better, re-invest in customer experience improvements, up-selling and introducing new services more efficiently to the already existing customer base. (Parekh 2017)

Netflix has benefitted from service design and having service agreements between both parties, Netflix and its users. It has achieved brand loyalty which creates more successful customer relationships. Every stakeholder in this situation benefits when both the customer's needs are taken into account and the service provider retains its customers.

In 1998 Netflix started a brilliant growth hacking strategy and still today it is creating new ways of hacking growth. Where the company stands today, is producing so much content that no one could be able to use it all. For coming to this point where Netflix is now it has had to experiment with numerous amount of different strategies over its two-decade of existence. At that time, DVD markets were not that tested. In 1996 the first DVD players showed up in Japan and replaced VHS recording. DVDs were extremely expensive and the technology used in them was fairly rare. Netflix initiated the idea of starting to sell DVDs-by-email to the public at low prices. These DVDs were mostly political testimonies which was the perfect idea to start making people interested in DVDs. (Smith 2020)

As said before, growth hacking is usually used in smaller technology start-up companies. Still today, Netflix has launched a new growth hacking strategy that is against traditional TV (Vogt 2020). This proves that growth hacking doesn't have to remain only for the use of specific companies or even industries.

The new strategy is based on creating a "Netflix Direct". Netflix has recognized that TV users might browse the TV without achieving a satisfying end which usually ends up in abandoning TV. Usually, less might be more and consumers might experience choice overload when there are too many options to choose from. This so-called paradox of choice existing in traditional TV has opened Netflix a perfect opportunity to expand its business. Choice overload can often result in decreased satisfaction amongst consumers. This results in spending less or even in spending none. Netflix is trying to pre-program the TV content for each customer in a way that satisfies the user. With this linear TV programming, the set of options decreases which do not result in consumer switching off the TV since the content is customized for that specific user and satisfies the needs. (Vogt 2020)

Case Netflix is just a case example of how no matter the industry in question companies can achieve growth by making different experiments. These changes shall come from inside the company. The organization in question will need to have an open-minded attitude towards iteration and experimentation and being willing to make mistakes and learn from them.

5 RESEARCH DESIGN

This chapter describes the case company in question BaseN both with research approach and methodology. Chapter 5 provides information about this thesis' commissioner which will go into more details for understanding why the subject of the thesis was created. This chapter also goes through the research method of this thesis. Survey both with its design will be explained and the reasons why a survey was conducted will be provided.

5.1 Case company description

BaseN Corporation is a multinational corporation that consists of BaseN Inc. (HQ), BaseN North America Inc., Basen Netherlands BV, and BaseN Baltics OÜ. BaseN is a software company, which operates in the field of IoT and digital twin platforms. With platforms provided by this company, innovative products, services, and mission-critical next generation digital twins are easily hosted and managed. IoT Digital Twin platforms help to achieve cross-functionality within the organization and to serve end customers the best. These platforms being agile, the user can continuously optimize operations and add value to the existing products and services. (Basen 2021)

The case company of this thesis, BaseN, was founded in 2001 and since then it has been doing its own full-stack IoT platform. Fault tolerance, scalability, sustainability, and inherently distributed architecture are the features this company really invests in. (Basen 2021) BaseN has really appreciated the importance of service design and this is one of the most important things it offers to its customers. It started its business to provide network and service management systems for telecommunications operators and large multinational enterprises. Since then, BaseN's core has been providing a platform for Spimes in the Industrial Internet and Internet of Things.

Spime being a virtual master of the physical object, it is the next evolution of the digital twin and the seed of IoT. Digital twin offers just the physical object in a digitized form, spime offers the physical thing before anything is even manufactured. With spimes, it is possible to control the whole lifecycle of a product. Spimes refers to a class of near future with sustainably

manufactured products. Unlike a disposable product, a spime could be managed sustainably throughout its lifecycle. (Stead 2017)
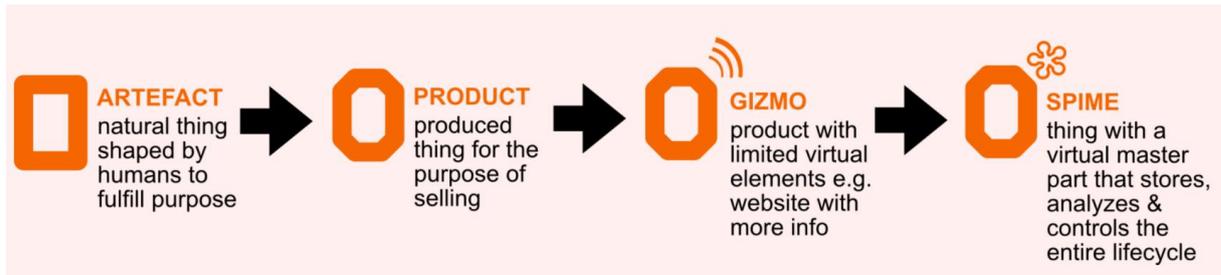
Figure 8. Development of spimes. (Basen 2016)

BaseN is the first platform that is capable of hosting spimes. Providing network management system-as-a-service to its customers was one of BaseN's first applications deployed. BaseN's focus is providing Software as a Service (SaaS) and Platform as a Service (PaaS). With these, new ways of capturing big data, storing, processing, analyzing, and visualizing huge volumes of data, is possible and efficient. Understanding what IoT world has to offer, working with the focus on customers' needs, and willing to become more sustainable both with not losing any market share or revenue are the main issues concerning this thesis. This is the reason why BaseN Inc. was seen as the perfect thesis commissioner.

5.2   Research approach and methodology

A survey was chosen as the research method to collect information from a wide range of individuals with backgrounds from different industrial manufacturing companies. With surveys, one can gather data from many different sources in a short time (Jackson 2011; Denscombe 2010). This research methodology was seen as a good choice for linking the literature review to the empirical part and to complete the objectives of this work.

There are different types of surveys and one of them is online surveys. Advantages of an online survey are that it has a very low cost, responses can be gathered fast, respondents may more easily be willing to answer sensitive questions, questionnaires are programmed, and they are convenient. (Research Connections 2019) Surveys can also have multiple variations, and one

of these is a survey questionnaire. Questionnaires are a series of predefined questions and the main purpose here is to question individuals on a topic and then describe their responses (Research Connections 2019). (Jackson 2011; Denscombe 2010) Since the main idea of this thesis is to find out whether industrial manufacturing companies use IoT and service design and if yes, to get the idea of how much they actually use it, a survey questionnaire with its possibility of generating a large amount of data was a perfect choice for this research.

The survey conducted for this research was designed in an Internet-based program called SurveyMonkey. The survey questionnaire was based on 10 questions related to the subject of this thesis. The questions can be seen in appendix 1 at the end of this thesis. Link to this questionnaire was first sent to 90 individuals and afterward also posted on LinkedIn groups related to manufacturing. These groups were Manufacturing UK, Electrical Manufacturing, Semiconductor Manufacturing, Electronics Manufacturing, and Supply Chain, Semiconductor Equipment Manufacturing. Besides this, Sales Navigator in LinkedIn was used to reach out to some more individuals working in different industrial manufacturing companies with titles including smart factory, digitalization, IoT, digital transformation, business development, etc.

There were 18 respondents in total for all 10 questions. Two questions were skipped by one and the same respondent. Questions in the survey approach the subject of the thesis in a comprehensive way, first understanding familiarity with the terms related to the thesis and then finding out how much industrial manufacturing companies do use service design and IoT, in a way that it aims to find out the needs these companies have. In addition to this, finding out if the companies are taking the full advantage service design has to offer was also essential. Besides this, the questions aim to get answers to whether the companies in question do use technology service providers in the sense of IoT platforms.

6   RESULTS

This chapter brings the results of the survey questionnaire together. There were 18 responses in total from 10 different survey questions. Two questions were skipped by one respondent. The results cover the questions and they are described in three different categories. The first category is focused on the first part of the survey questionnaire which is finding out the needs and business goals. The next part goes through the results of what comes to actual service design implementation in these companies. The last category gathers results of usage of technology service providers.

6.1   Background information and business goals

In figure 9 below, answers for question one can be seen. This question was "*Are you familiar with those terms - tick the boxes for those you know.*" The results tell us how IoT and Digital Twin are more known and emphasized by this specific industry we are researching. The term IoT was known by everyone and digital twin was known by 89 %. When it comes to doing service design in these industries, only 10 out of 18 respondents, which makes 56 %, were familiar with the term. Everything-as-a-Service was known by 61 % of people within the industry. Servitization received only 44 % answers while growth hacking as a term remained to get the lowest amount of points, 6 out of 18 which is 33 %.
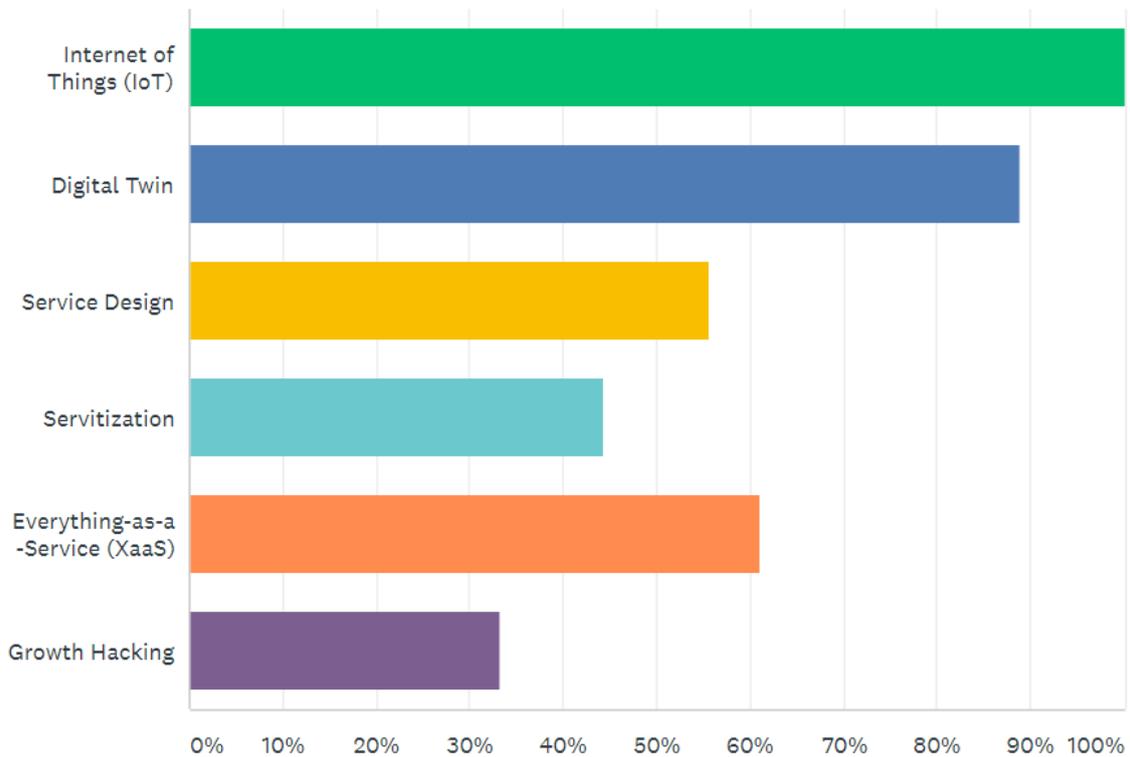
Figure 9. Familiarity of terms.

The second question was about gathering information on customer feedback collection within these types of industries. Collecting and utilizing customer feedback in service design is important in order to achieve successful product-service systems. Fortunately only 5 out of 18 answered that they do not collect feedback from customers. 72 % answered yes to this second question and described how they do the feedback collection. Ways for doing this in different companies were sending out annual questionnaires/surveys, using phones for reaching out to clients, sending emails, using personal contact/client engagement, quality reviews, and star rating. It was also mentioned that feedback collection is not that systematic in the company.

In table 3 below, we can see a chart representing answers for question number 3 of the survey. The question was "*What are your business goals for the coming 5 years? Select everything that applies.*"

Table 3. Business goals for the coming 5 years.

ANSWER CHOICES		RESPONSES	
▼	Increase sustainability	83.33%	15
▼	Changing business model from manufacturing products to offering services	5.56%	1
▼	Keeping the manufactured products but also adding service offerings	61.11%	11
▼	To only sell products	5.56%	1
▼	Improve cost-efficiency	77.78%	14
▼	Entering Internet of Things/Smart Factory, connecting products and processes	61.11%	11
▼	Offering more customization to your customers	22.22%	4
▼	Starting a new business line	33.33%	6
▼	Other, what? Responses	27.78%	5
Total Respondents: 18			

As results point out here, increasing sustainability is a business goal for almost all companies. No matter the industry in question, gaining sustainability is an important topic especially nowadays. The goal to increase sustainability received 15 out of 18 points, so 83 %. The second most important goal for the companies in this specific industry was improving cost-efficiency. This received 14 out of 18 responses (78 %), so one answer less than sustainability.

Both choices "*keeping the manufactured products but also adding service offerings"* and "*entering Internet of Things/Smart Factory (connecting products and processes)*" ended up getting 61 % of the answers. So based on the answers gotten from the survey, adding service offerings and entering IoT are the second most important business goals that these companies have.

Questions that received only 1 point were wanting to only sell products in the near future and changing the business model from manufacturing products to offering services. There were also 5 out of 18 responses (28 %) describing other kinds of goals their company has for the coming five years. These were developing products that leverage the existing IoT platform, standardizing, all aspects of 5G and Industrial IoT, and increasing product portfolio.

6.2   Implementation of service design

In table 4 below we can see results for the fourth question, "*Why do you use service design at your company?*" We can immediately spot that 4 responses deny the use of service design. Reasons for not using it will be discussed in the next question.

Table 4. Reasons for using service design.

ANSWER CHOICES	RESPONSES	
We don't use it, I continue with question 5	22.22%	4
Highly unfamiliar with it – not just myself but also others in the company/top management	5.56%	1
We use it to introduce new services to our customers	16.67%	3
Reduce environmental impact	11.11%	2
Lock out competitors	5.56%	1
Lock in customers	16.67%	3
Differentiation	61.11%	11
Image improvement	33.33%	6
New market development	27.78%	5
Consumption efficiency	11.11%	2
Production efficiency	11.11%	2
Cost reduction	27.78%	5
Revenue increase	38.89%	7
Other, what? Responses	16.67%	3
Total Respondents: 18		

This question indicated that differentiation is the most common reason for using service design, getting the largest amount of points, 61 %. Revenue increase was the second most important reason for these companies to implement service design reaching 39 % of total points. Reducing environmental impact, consumption efficiency, and production efficiency all received only 11 % of points. There were also three (out of 18) answers describing other reasons for implementing service design. These reasons were for making internal processes efficient, designing new services, and defining key value drivers for understanding customers deeper.

Most of the responses said that they use service design, meaning 47 % of the respondents use it. In figure 10 below we can see the results for these industrial manufacturing companies not

to implement service design at their company. This question was skipped by one respondent. Two main reasons for not using it were organizational culture and lack of skilled personnel. Both of these choices received 29 %.
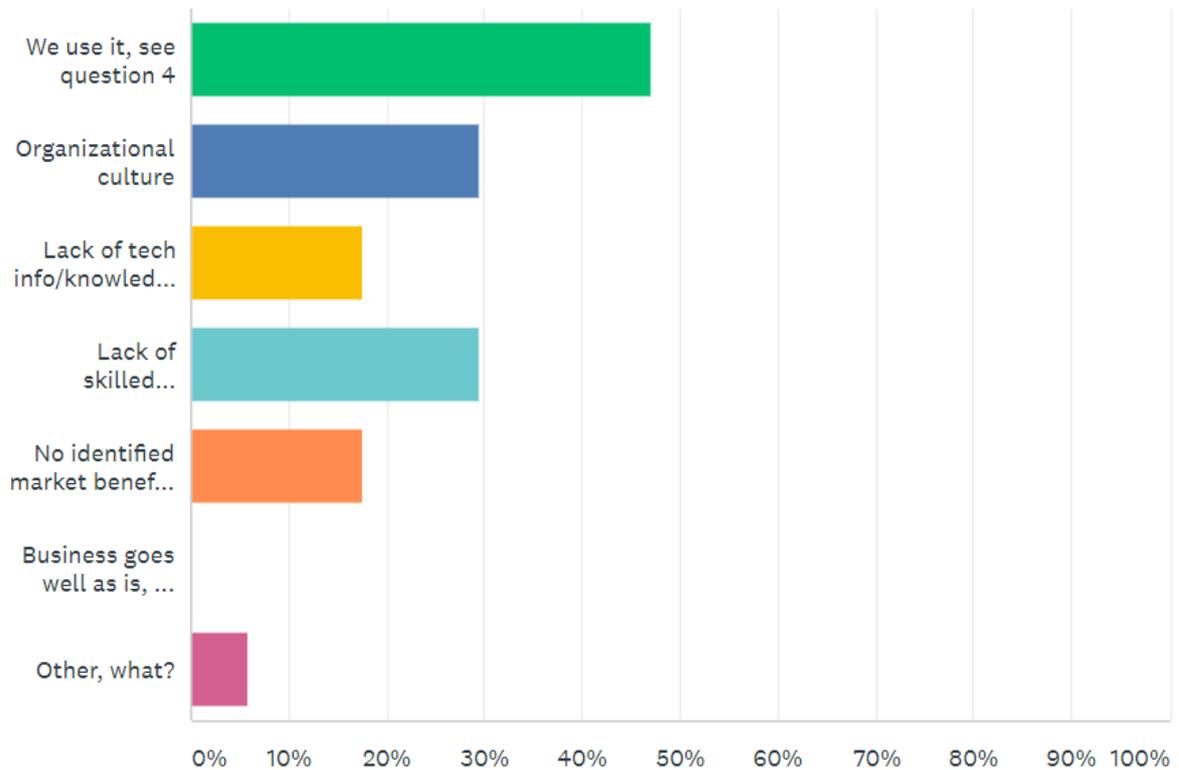
**Figure 10.** Reasons for not using service design.

The second most important reasons for not implementing service design were both "*Lacking technical knowledge especially what comes to IoT and digital twins*" and "*Not having identified the market benefit yet*" received 18 % of points. The last option received one answer saying that their company is not using service design in a systematic and holistic way.

6.3   Technology service providers

The last part of the questionnaire was concentrating on understanding what kind of technology service providers industrial manufacturing companies use or are interested to use. Question 7 was about if these companies already use technology service providers and if they are also interested in looking for other value-adding providers to be included in their business ecosystem.

In figure 11 below results of question 7, "*We already use technology service providers, but we always look for more value-adding providers to include in our ecosystem*", are presented. Receiving 18 responses in total, 14 of them answered yes. This makes it 78 % in total. Four companies answered no.
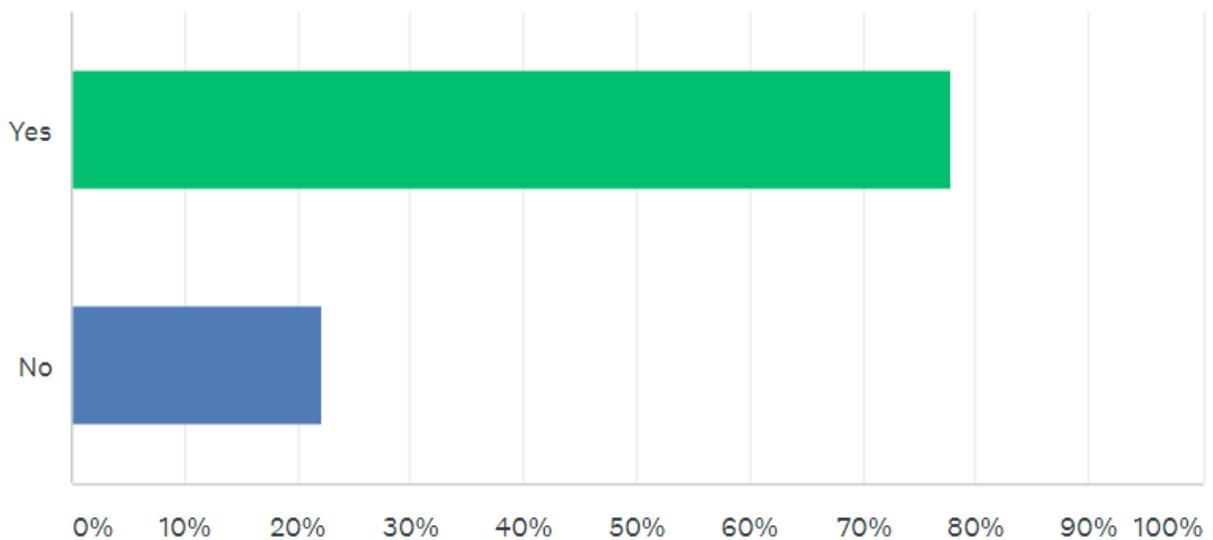
**Figure 11.** Use of technology service providers with interest in adding new ones.

From the results obtained in this question part, we can also see that one company (6 %) said that they do not use any technology service providers, due to the fact that they have not identified any needs yet. Two companies (11 %) answered this saying that they have identified the needs but are not sure where to find a suitable technology provider.

Question 9 was about researching if industrial manufacturing companies want their service design agency to also cover the technology part of the new digitized new service offering, not just the business side of the new service to be implemented. This question claimed 61 % answers saying yes they do. So 11 out of 18 respondents want to see this happening, and the rest of the 7 do not want their service design agency to also cover the technology side.

The last question of this survey focuses on whether these companies use the most prominently known technology providers when a need of using such arises (such as AWS, Google, Microsoft, IBM) or if they prefer other providers with more flexibility to gather their specific needs. This question was skipped by one respondent. Results in this were almost in balance, still, the winning side being that other providers with more flexibility and cost transparency to be a better choice. This received 53 % of points and the other answer choice being wanting to use big names because they are broadly known and must be good received 47 %.

7   DISCUSSION

Chapter 7 analyzes and discusses the results of the research. After completing the literature review both with the empirical part of the thesis, this chapter aims to gather insights gained from them and provide information about the results.

Based on the answers received from the survey questionnaire designed for this research, the expectations about manufacturing companies not using service design in a systematic and holistic way were true. We will go through and explain the identified needs and potential these companies have and discuss the status of their business transformation plans. After analyzing those, we will use the gathered insights for helping BaseN improve their service design messaging for manufacturing companies to be utilized in their sales and marketing approach.

7.1   Identifying needs and business goals at industrial manufacturing companies

The results of question one about the familiarity of terms tell us how IoT and Digital Twin are more known than service design, Servitization, and XaaS. This tells us that IoT and digital twin are more emphasized by this specific industry we are researching. Creating digital twins of physical objects in manufacturing and using IoT platforms for doing this is something already very many manufacturing companies take advantage of. When it comes to doing service design in these industries, results claim that industrial manufacturing companies may still be just producing products and not selling outcomes as a service even though they might have the needed potential for practicing it. As discussed before, just a digital twin from a physical product does not itself bring any value related to customer needs and experience. Therefore, additional services to traditional products and principles of service design should be applied in this matter in order to achieve better customer satisfaction and use it for IoT development that satisfies the servitization process as well.

In conclusion, the most important observation from the first question is that IoT and Digital Twin are very much known, but service design, servitization, and XaaS are known by just half of the respondents. Growth hacking is even more unknown, and this was also predictable since the use of growth hacking still remains more in the tech-start-up world. A growth hacking

mindset can be applied in every industry, so embracing it would also create new unknown potential which has been in the organization.

By not reaching a 100 % rate in feedback collection question it tells us that industrial manufacturing companies may not really know how important customer feedback collection is for them to be successful in the markets. Gathering customer feedback and being updated all the time about customer needs is something very crucial for service design and growth hacking. Still having a good amount of responses saying that they do collect feedback from their customers about their products is a good sign. Whether they use it just for product development or servitization/growth hacking processes remains unknown. Customer feedback should be taken into account in every step of both service design implementation and growth hacking experiments and iterations.

What comes to the status of business transformation plans of these companies, increasing sustainability was a goal for almost all the companies. No matter the industry in question, gaining sustainability is an important topic especially nowadays. People want to buy products and services from companies that support their values. And these companies have recognized this trend. Producing disposable products is not a solution for this. The more servitization is made in the company, the more sustainable its offerings get.

Improving cost-efficiency is also something very important to companies. Cost-efficiency is crucial for the company to become or remain profitable. Considering that sustainability and cost-efficiency are the two most important goals for these companies, based on the literature review where Annarelli et al. (2016) discuss the benefits gained from servitization, we can agree that by utilizing servitization both of those business goals can be achieved.

Since also choices "*keeping the manufactured products but also adding service offerings"* both with "*entering Internet of Things/Smart Factory (connecting products and processes)*" resulted in being important in the business transformation plans question, it indicates that industrial manufacturing companies are interested in becoming more service-oriented and ready to utilize IoT platforms in the near future.

An interesting observation from this question is to see how balanced are the answers for the business goal to be only to sell products in the near future and for changing the business model from manufacturing products to offering services. For gaining sustainability, as proven to be one of the main goals in the results of this question, the answer choice percent for "*changing business model from manufacturing products to offering services*" should have been higher. This is where XaaS and servitization come into place.

Differentiation in the markets resulted as one of the main reasons for industrial manufacturing companies to use service design. Another main reason for using it was revenue increase. What was interesting to notice is that reducing environmental impact, consumption efficiency, and production efficiency was one of the most unimportant items for using service design. This tells us that companies in this specific industry are not that familiar with the benefits of using service design. If they knew the benefits, they would know that service design would help them achieve the two most valued set goals for their business; sustainability and cost-efficiency.

The reasons not to use service design were mostly obstacles from the organizational culture and lack of skilled personnel or technical knowledge. Also not identified market benefit resulted in 18 %. This refers to the fact that these companies are not that familiar with what service design could offer them.

A very interesting thing to notice while going through the survey answers was that answers to question 4 "*Service design means designing a specific service in a way that it meets user's and customer's needs as good as possible. Why do you use service design at your company?*" and question 5 "*Why do you not use service design at your company as of now?*" proved the fact that these companies either do not do service design in a holistic and systematic way or don't really understand thoroughly what it is and what it has to offer. This assumption is based on the fact that 22 % answered question 4 saying that they do not use service design, but then 47 % answered question 5 that they use it. The answer choices may have confused them which indicates that service design implementation is not on a level it should be.

Clearly, industrial manufacturing companies want to achieve sustainability and cost-efficiency, and also to differentiate in the markets which would benefit them in the competitive markets. Based on the results gotten from the survey questionnaire these companies are not relying on servitization or selling more outcomes as a service to bring them closer to these goals. The situation could be improved, since the results of the survey pointed out pretty clearly that these businesses might just not be that familiar with what service design, IoT could bring to their table, which would actually be exactly what they want to achieve in the next five years. Here BaseN Inc. as a service and platform provider has a perfect opportunity to serve these industries in a way that would benefit both parties. We will discuss this issue next.

7.2 Improving BaseN's service design messaging for manufacturing companies

The results above pointed out what this research was originally aiming to prove, there are needs at industrial manufacturing companies which could be fulfilled with knowing more about service design and IoT and their benefits. As said before, BaseN being a provider for IoT platforms both with really appreciating the importance of service design, it has a lot to offer to industrial manufacturing companies.

In figure 12 below there are gathered the identified needs transformed into knowledge that should be maximized at industrial manufacturing companies for helping them achieve their set business goals. Knowledge should be maximized in a sense that it means for example increasing the familiarity with the terms related between these industries. Besides this, there is a need for these companies to use customer feedback collection even more, and to know how and where to use it. Knowledge about this should also be maximized for applying it in different sectors of business. The companies in question clearly were missing about knowing the benefits servitization both with IoT offer if used properly, so this need for knowledge about the benefits should also be maximized. Companies that have answered to the questionnaire that they implement and use service design compared with other answers received indicate that if they use service design they don't use it in a way with the best possible outcome.

Based on the results we can agree that the biggest barriers not to implement service design at these companies were organizational culture, lack of skilled personnel, lack of technical

knowledge and not having identified the market benefit just yet. These can be seen in figure 12. The reasons apply to industrial manufacturing companies in question, and based on the literature review (Annarelli et al. 2016; Kang et al. 2018) these are the common barriers for servitization there exist in the industry of manufacturing.
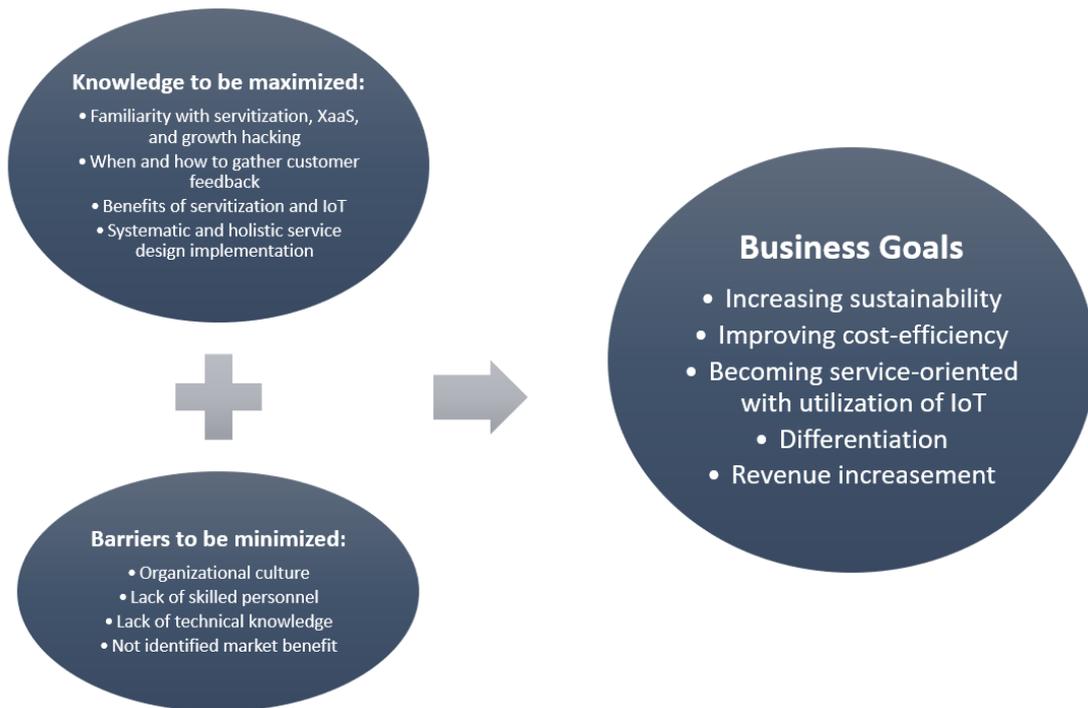

Figure 12. Requirements for achieving the set business goals.

By minimizing the barriers and fulfilling the occurred needs these businesses may achieve easily their most common business goals set for the near future. BaseN's service design messaging for manufacturing companies should concentrate on emphasizing what can be achieved with implementing it. The most common barriers which cause the companies to back off from the possible servitization plans is an important place where to start. By getting rid of the barriers at least to a certain point, there opens new space for starting to create something new and hack some unknown potential.

78 % of respondents have answered that they are always looking for new value-adding technology service providers to be included in their ecosystem. Besides this, 61 % of respondents have expressed their desire to see their partners provide them with both business

and technology side consultancy and help in what comes to implementing service design. Knowing this, BaseN has the perfect opportunity to support its existing and new clients in such a manner. BaseN could offer more flexibility and cost-transparency while being a partner, and in addition to this, it has the possibility to cater to the client's specific needs.

8 CONCLUSIONS

Current technology, such as IoT and digital twins, has provided with many new opportunities if known how to take advantage of it. Different opportunities for making business more efficient and saving both time and money have come alongside with new technology tools. Sustainability in this decade has received a lot of appreciation, and solutions for improving businesses and making the operations and products more sustainable are important topics. Managers and business leaders are constantly trying to come up with new ways of maintaining the business profitable and gaining sustainability. Customer relationships are a high priority in a competitive global market. An old traditional way of just producing products is soon going to be behind us, and new ways of serving customers better are continuously increasing. Industrial world needs to take customer experience, product and service lifecycle, and sustainability more into account. Technology being present and available, competitors are going to take the full advantage of it so it is not wise for anyone to wait too long before starting to take advantage of it themselves too.

This thesis was focused on researching whether industrial manufacturing companies know about service design, and whether they have servitization implementation on their radar. Also, the use of IoT platforms was at a center point. Service design having a key role in successful IoT implementation, the combination of these two was also critical for this thesis. The thesis aimed to find out where do these companies currently stand and where do they want to aim in the near future. By studying their business goals and finding out what kind of needs do these companies have, BaseN can use the information in approaching industrial manufacturing companies in an appropriate manner.

Q1: What are the needs industrial manufacturing companies have concerning service design and IoT (transforming from product to service)

The identified needs at industrial manufacturing companies based on the obtained results from the survey questionnaire were most importantly not being familiar with the benefits of service design. The needs at these companies were being familiar with the concepts related to service design and each of their benefits, gathering customer feedback more systematically, and

understanding how and when to implement service design. Transforming from product to service is not possible if the company is not familiar with the process or even with the terms related to service design, such as servitization or everything-as-a-service. There was also clearly a need to collect feedback even more.

Companies in question want to differentiate and increase their revenue. Many of them were also interested in the reduction of cost. Besides these, image improvement and new market development were reasons why the companies implemented service design. Still, approximately 35 % of the companies saying that they use service design for the above-mentioned reasons also listed barriers for not using it. This indicated that there is a need for them to really understand how to implement service design successfully in a way that there would not exist any more barriers making the service design less efficient. Knowing more about growth hacking and what it has to offer would help in getting rid of the barriers and finding out new ways for achieving goals.

Q2: What is the business transformation plan status at industrial manufacturing companies?

Most of the companies are aiming in the near future to increase sustainability and improve cost-efficiency. Connecting products and processes to IoT is also something many companies want to achieve within the next 5 years. There were also references to the fact that the companies want to increase their service offerings. Increasement of service offerings is still not something with what they want to replace their existing manufactured products. This is understandable since we are talking about the next five years but this is something BaseN could take into account.

Q3: How can BaseN improve its service design messaging to be utilized in their sales and marketing approach with the insights provided?

The industrial manufacturing companies in question may not themselves be aware of the needs nor potential they have related to service design and IoT. What they are aware of is their set business goals for the next five years. BaseN needs to customize service design messaging by approaching the benefits that could be gained by the servitization of the business. Almost all

the benefits servitization offers were also listed as business goals of these companies, such as sustainability and cost-efficiency. Differentiation is also something many of these companies want to achieve, so this indicates that the companies want to be competitive in the global market.

BaseN should also focus on lowering the barriers these companies are facing in order to overcome the challenges the barriers bring. Lack of skilled personnel and lack of technical knowledge are something that causes these companies to back off from servitization. Organizational culture was also one of the most important barrier there is at industrial manufacturing companies for doing servitization. So, the service design messaging should concentrate on approaching the benefits gained from it in order for the companies to be willing to adopt these new implementations.

BaseN being a full-stack IoT platform provider, it has the capability of helping these companies connect products and processes and enter the IoT world which also brings its advantages in the enhancement of processes and serving customers better. BaseN should include in their service design messaging that in order to be ahead of other competitors, there should be readiness to connect all products to IoT and be aware in every touchpoint of the product what the customer thinks of it.

There were a few but crucial limitations of the study. Having only 18 responses in the questionnaire does not provide that solid information that could be used in generalizing the companies in manufacturing. Also, the respondents being anonymous restricts the information what comes to the company size, profitability of it, or area of industry for a more specific limitation.

Growth hacking at industrial manufacturing companies is something that is not that studied before, even though it can be applied no matter the industry in question. This is something which needs to be further studied. Growth hacking with its nonexisting limitations could offer new possibilities for industrial manufacturing companies.

This thesis provides a good foundation for future research. The study was focusing on a very current matter which can help industrial manufacturing companies solve many problems, such as being able to differentiate in the markets both with acquiring sustainability and cost-efficiency. By using a growth hacking mindset within the organization, it could help many companies to discover the hidden potential they might have. For example, the barriers found for implementing servitization can actually be easily faced just within the company. Growth hacking can be used for any goal, whether it is for achieving a successful servitization or developing a product in a way that satisfies the customer. Factories can apply this mindset of hacking growth for instance in creating digital twins in which they could experiment new things without causing any troubles to the real factory object.

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Appendix 1. Online survey questions

Question 1:

Are you familiar with those terms – tick the boxes for those you know:

- o Internet of Things (IoT)
- o Digital Twin
- o Service Design
- o Servitization
- o Everything-as-a-Service (XaaS)
- o Growth Hacking

Question 2:

Do you collect feedback from your customers about your products?

Question 3:

What are your business goals for the coming 5 years?

Question 4:

Why do you use service design at your company?

Question 5:

Why do you not use service design at your company as of now?

Question 6:

Are you as a company interested in mass-customization?

Question 7:

Appendix 1. Online survey questions

We already use technology service providers, e.g. an Internet of Things platform like AWS, Microsoft, Google, IBM but we always look for more value adding providers to include in our ecosystem.

Question 8:

We don't use any technology service providers yet. The main reason is:

Question 9:

Many companies work with service design agency on a consulting basis. This usually covers only the business side of a new service to be planned and implemented. The technology needed is usually not covered but a very important part of digitalized new service offerings or for optimizing existing digital services. Would you like to see both business and technology covered by your service design partner (regardless whether or not you are currently using one)?

Question 10:

When a need to use a new technology provider arises, do you go for the most prominently known option (AWS, Google, Microsoft, IBM) or do you prefer other providers with more flexibility to cater to your specific needs?