Haaga-Helia
University of Applied Sciences

The influence of ICT on the accommodation industry in the upcoming industry 5.0

Long Ngo

Bachelor's / Master's Thesis
Degree Programme in …
2019

Haaga-Helia
University of Applied Sciences

Abstract

Date

Author(s)
Long Ngo

Degree programme
Bachelor's degree of Hospitality, Tourism and Experience Management

Report/thesis title
The influence of ICT on the accommodation industry in the up-coming industry 5.0

Number of pages and appendix pages
38 +7

In the current era, technology has become more and more advanced. Its important role is undeniable in society and industry. This is the marking of the industry 4.0, where technology plays the foundation of both manufacturing and monitoring of many activities. The accommodation is also without exception as it has received tremendous benefits from this era. But many experts have discussed and stimulated the next phase of the process, which is called industry 5.0. The thesis studies the influence of Information and Communication Technology (ICT) to the accommodation business from two different viewpoints, hotelier experts and service design experts.

The primary goal of this thesis is to find out how these accommodation businesses and service design businesses understand the upcoming industry 5.0 and how they will adjust themselves to it. For this study, only hotels and service design experts that are familiar with the concept of ICT have been chosen. The secondary goal is to uncover the drawback of using ICT in the current 4.0 era.

This thesis can be categorized as a product-based. The final product – the Using ICT guideline- is the result of a combination from the theoretical part conducted by the author, and the result from analyzing the data gathered by the author from interviews. The aim of the final product is based on two goals of the study, which are to help the accommodation business to familiarize themselves with the concept of industry 5.0 and adjust themselves correctly, as well as limit the drawbacks that werel be mentioned in the second goal.

The main method to gather data that the author has used is a qualitative research method with an interpretive position for an in-depth and concepts generating of the matter. Therefore, data will be archived from interviews, which are recorded and transcripted.

Keywords
Industry 5.0, ICT, automation service, accommodation business, service design

Table of contents

1 Introduction

In the current industry 4.0 era, everyday plenty of new ideas, products, and services have been introduced to worldwide consumers by companies. In this intense competition, only a small percentage of these ideas have achieved success. Ideas such as Uber, Airbnb have attracted a variety of consumers from all age groups in a different part of the world to become their loyal customers. Just like Steve Jobs once said: “To me, ideas are worth nothing unless executed. They are just a multiplier. Execution is worth millions.” (Steve Job, 2005) While each of them has their formula, all of them share a common trait that is the influence of Information technology (IT) to their success. This IT influence comes in many forms, such as in case of Airbnb is its Internet platform, while Uber is the smart mobile platform. Accord-ing to Tridip Saha, Head of the US and European Business at Sonata Software, the executioner of ideas like Uber and Airbnb can adapt themselves in the current era where Internet technology and digital become more and more crucial to part of people like. For companies, the ability to reach out millions of people who can become a company’s potential customer in just a few simple clicks it quite attractive and one of many ways for a company to ensure their position in the competitive market. By utilizing IT especially in management and marketing field, companies will have a better opportunity to achieve success. Henceforth, IT can provide assistant to organizations through manage/ sorting information and better decision making. Using IT will create a better response to customer demands. In a strategically way of speaking, IT has al-ready and currently remolding the fundamental of industry and society (Buha-lis, 1998, 2003.)

To stand out from the mass in this era, companies need to know how to use this kind of technology to express their idea. One way to do this is to focus on one of the important sections in every company: customer service. The hospitality industry can be considered to be information-intensive industry (Cox et al, 2009), in which customer service plays as one of the foundations in deciding the success of a business. All activities in the hospitality, in a simple way of speaking, are all related to information, including creating/ generating, scout-ing, stacking, retrieving and transferring information. All of the above actions can be done using ICT (information and communication technology). ICT is usually considered to be an extended version of IT (Daria Elzbieta Jaramen, 2016). To adapt to the situation, many changes have been made by the operators and professional service providers to conduct their business. This trend also affects the customer side of the business. The customer decision-making process has transformed into an created a new trend that is popular in the hospitality industry. All of the processes have happened that been mentioned above are achieved with the development of industry 4.0. But many analysts have been making predictions about how the industry 5.0 will change the current situation. With

that in mind, the author will use the following paper to discuss the theoretical framework of information and communication technology, as well as how its influence on the hotel industry. From the result of the analysis, the author will create a model for the hotel industry to apply to their operation which will suitable for the changes in the industry 5.0 era.

1.1 Background research

Like the author has mentioned above, from the beginning of the 21st century, consumers have become more and more active in managing their purchasing online. This is the result of the influence of ICT on the service industry and the society, where everything is connected and easy to access via the Internet, which is part of ICT. All the steps from searching, evaluating, discussing to purchasing, have been decided by customers. In the current time, people from generation Y and Z have been called by many experts as the self-service generation due to the changing in the consumer's behavior, especially in how they interact with sellers. For instance, activities such as managing their subscription, or changing the password of their email account like Gmail, people want to do this by themselves instead of asking for people who in charge of these, like helpdesk or professional computer expert in consumer's workplace.

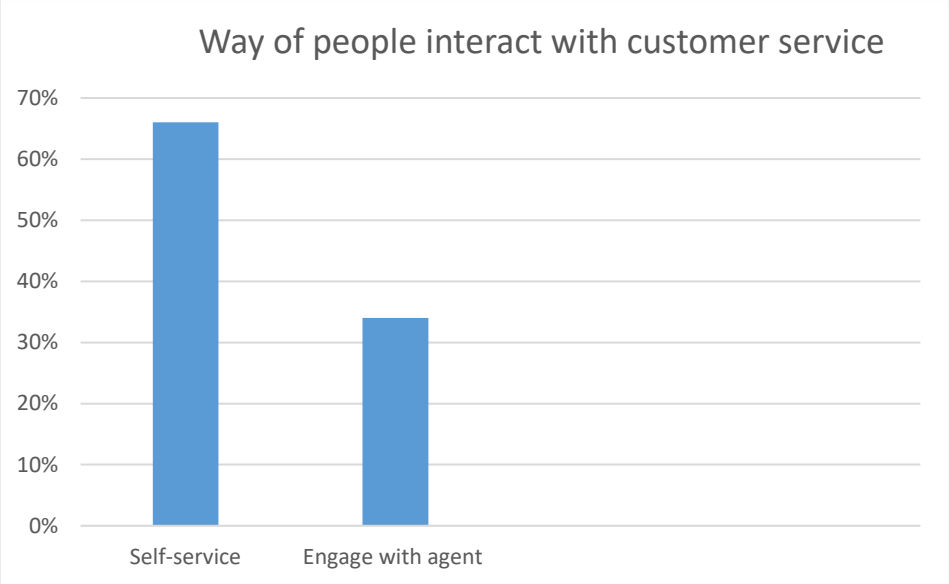


Figure 1: Percentage of people answer for question: "When engaging with customer service, do you try to use self-service first, or do you immediately engage with an agent?". (Source: adapted from E. Mazareanu, 2019, Statista.)

Nowadays, the core of the service is no longer just surrounding the products. As it has been shown in figure 1, the number of people prefer self-service is almost as twice as

people who want to have someone guide them while deciding on purchasing the product/service. It is not enough to just have a good product, but the company also need to pay attention to how their product or service present to potential customers. In the case of service, especially involving traveling and leisure business, potential customers choose to go through an online platform such as TripAdvisor.com, booking.com, Trivago.com, etc. it is easier for the viewer to manage their booking as well as control their preference by doing this. This has created a trend of using Internet technology and alike to fortify the quality of service in the hospitality industry. To further support this, in 2016, Oracle hospitality and Phocuswright have joined hand to create a study called “Creating the Convented hotel Guest Experience: Perspective from Consumers and Hoteliers. To gain insight on the impact of technology on hotel-guest experience in different stages of a customer’s experience journey, the survey has been conducted on 2,700 U.S and European travelers. The result of the survey can be summarized as follow:

About two- third of participant thinks that it is “very or extremely important” for hotel to further investing on technology, which can lead to enhancement of guest experience.
94% of business travelers and 80% of leisure travelers think that the ability to use their smartphones to request hotel services or communicate with staff is quite pleasant.
The amount of information that guests willing to share with hoteliers are high- with 71% about good preferences/ allergies, and 64% about their entertainment preferences.
62% of guests prefer recommendation from Internet over hotel staff.
The amount of business travelers returned to the same hotel for another vacation is 80%

While this result cannot be used to measure the mass of travelers, it also cannot be denied many travelers share the same opinion, which is the attraction of technology. By moving toward and linked themselves into the era, the service provided has become even more personalized and tailored to the individual. Among all the trends that happen in the current era, this thesis only focuses on analyzing the ICT service trend. As a result of this trend, the definition of service, its framework will adjust itself, leading to changes in many fields that we have already established. These changes had led to a question that is up to debate about its pros and cons of implanting technology into accommodation business.

1.2. Objectives and target audience

The scope of this thesis is to find out the influence of ICT to the service of a hotel in the current era and the upcoming industry 5.0 era, what kind of benefits/ drawback it brings to the accommodation industry.

As the author has mentioned in the background research, the result from others research has shown in increasing in number of consumers appreciate and demand the existence of ICT in the service industry. Also, from the result, we can clearly see that the application of ICT that appeal to consumers have been mostly focus on the marketing and front office department. In true, the application of ICT can use to cover a wide area in a hotel's structure.

The aim of this thesis is to create a model from the result of these researches to further utilize the benefits that ICT brings to the hotel industry, while balancing between human factor and technology factor, which will suitable for the hotel industry in the upcoming industry 5.0 era. Using what the author has gathered by following the qualitative research approach combined with self-research from different sources like books and articles, the author wants to create a model which help the target hotel have a better understanding about the situation, as well as how to adapt themselves to the industry 5.0 era. And to achieve this, this thesis started from gaining understanding from the previous generation of industrial revolution, industry 4.0, which helped author created some speculations and understanding for the industry 5.0.

Since this area requires professional knowledge as well as understanding toward creating and maintaining service, the author first target audience is expertise specialize in the following areas: Service design, consultant, customer service, operation, and product delivery and service analysts. The second target audience that can be benefited from this is people who are currently interested in this field without prior knowledge.

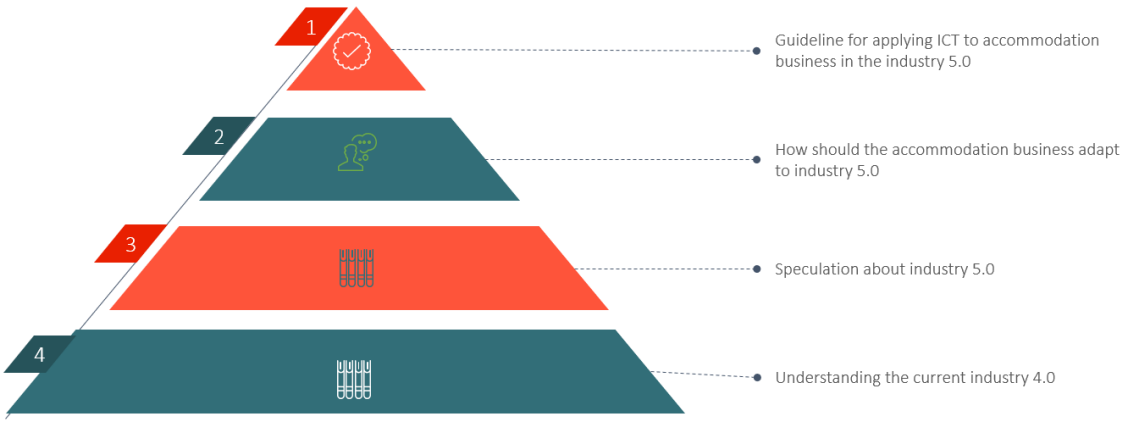


Figure 2: Visualize of thesis's objectives. (Source: Self-drawing)

In the following subchapter, the author will present the research question that can be considered the core of the whole research part, as well as three sub-questions that will help the author to answer the research question in a deeper level.

1.3. Research questions

The core research question (RQ) of this thesis is: “How to create a t suitable service structure for a hotel in the upcoming industry 5.0 era?”. To further analyze this question, the author divided into the following questions:

RQ1: What is industry 5.0 era? (In hotel’s point of view and in experts ‘s point of view)

RQ2: What will affect the hospitality industry in the industry 5.0 era?
RQ3: How should the hotel adapt themselves to it?

The table below will present the theoretical framework, research method and result for each research question

T able 1: Question matrix

Research question	Theoretical framework	Research method
RQ1: What is industry 5.0 era?	Answer from interviewee Compare with other sources	Interview + Chapter 2.1.2 articles and journals from online
RQ2: What will affect the hospitality industry in the industry 5.0 era? ?	Answer from interviewee Compare with other sources Hotel’s financial report	Interview + chapter 2.2.2 Secondary source: books, academic articles and journals from online
RQ3: How should the hotel adapt themselves to it?	RQ1, RQ2 outcome	Interview + model proposed by the author Secondary source: books, academic articles and journals from online

1.4. Thesis structure

The thesis is structured including two big components. The first component is the theoretical part which include three major factors: the concept of industry 5.0, ICT and service. The second component is the result of the interview, which mainly focus on opinions of the interviewees about the current situation of hospitality industry in the industry 4.0 era, as well as ideas about the three major factors that have been mentioned above. The final product, which is the guideline will by created using a combination of these two components

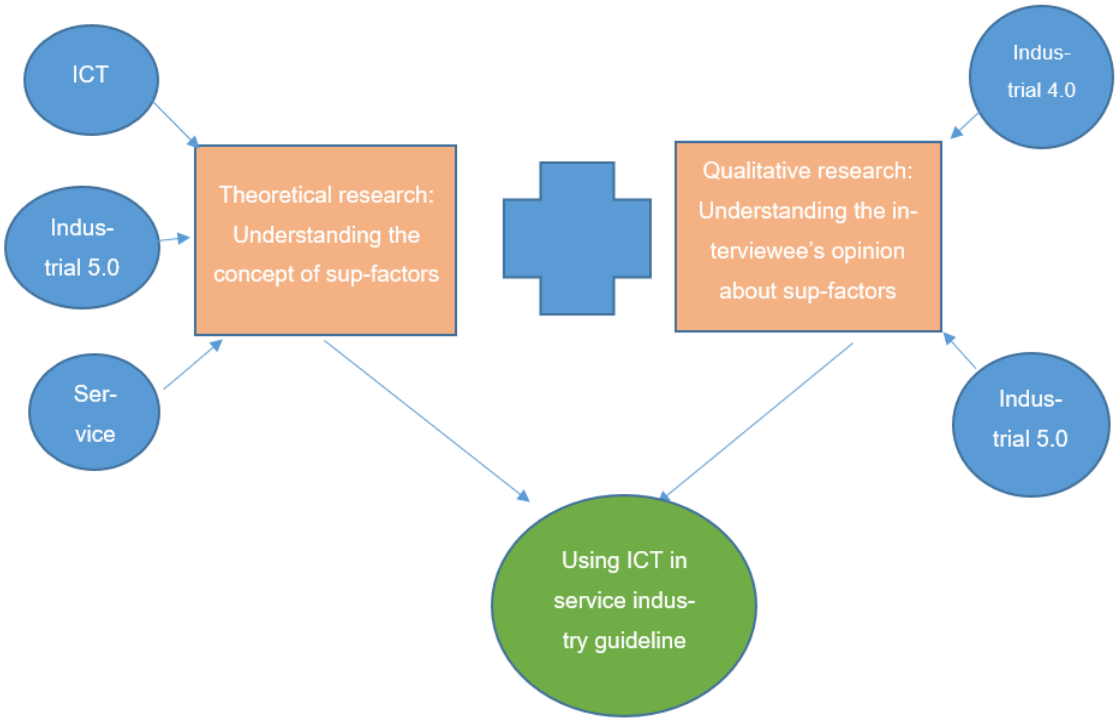


Figure 3: Structure of thesis (Source: Self -drawing)

1.2 Key concept

ICT: ICT or Information and Communication Technology refers to a set of developed technologies that are used mainly in information management and distribution. Covering a wide range of solutions but most predominant ICT's features include storing and post retrieving, sending and receiving information between sides, and information processing and documentation. (Tech reviews, 2019)

Industry 4.0: Industry 4.0 is a terminology that is used to describe the fourth revolution occurred in manufacturing. Unlike the first and second industrial revolution (mechanization through water and steam power) involving the mass production and assembly lined utilizing electricity, the fourth one is the successor of the third in adopting computers and automation but with more enhancement in smart and autonomous systems fueled by data and machine learning. (Marr B., 2018)

Industry 5.0: As a natural evolution of Industry 4.0, Industry 5.0 dominates most of the small and medium-sized firms. Originating from the development of its predecessor, technologies 4.0, Industry 5.0 continues the path to reach the Cyber Physical System (CPS) at lighting speed, in particular in the ICT, AI and robotics fields and increasingly powerful IoT devices. With the ultimate aim to give an additionallif value to production, Industry 5.0 focuses strongly on the cooperation between machines and human beings to create personalized products able to meet customers' requirements. (Maida I., 2019)

Service industry: An industry consists of companies that mainly earn revenue through providing intangible products and services. Service industry companies are including retail, transport, distribution, food services, as well as other service-dominated businesses. (Businessdictionary)

Hospitality industry: The hospitality industry is a group of businesses that focus on providing services to customers and users. It is focused on the satisfy customers by providing experiences in the form of services/ products for them. The hospitality industry is unique because it relies so heavily on discretionary income and free time of its customers. (Samoszuk S., 2017)

Hotel business: Hotel Business means the hospitality and related business operations from time to time carried on at, within or from the Hotel during the Term of this Lease, including, without limitation, the rental or sale of rooms, suites and other accommodations for transient occupancy by Hotel guests, patrons and customers, the provision of meeting, conference, banquet and other facilities and services for use by Hotel guests, patrons and customers, the subleasing of retail, office, and other usable space in the Hotel for the provision of various business, retail, and personal services and concessions for the use and enjoyment of Hotel guests, patrons and customers, and the operation of all amenities available at or associated with the Hotel, including food and beverage facilities and services (including the sale and serving of alcoholic beverages at, within and from the Hotel, mini-bar, and room service), parking services, spa and health facilities, and any and all other features, services and amenities from time to time provided at or by the Hotel for the use or enjoyment of the Hotel guests, patrons and customers or the public at large. (Law insider).

Automation service: Service automation is the process of integrating all domain and functionality tools into various automation layers in order to have unified interface for all workflows. It is the process of automating events, processes, tasks and business functions. Service automation helps in achieving multi-dimensional visibility into businesses and helps in streamlining the service process. (HCL technology)

2 Analysis about service encounter, ICT and industry 5.0

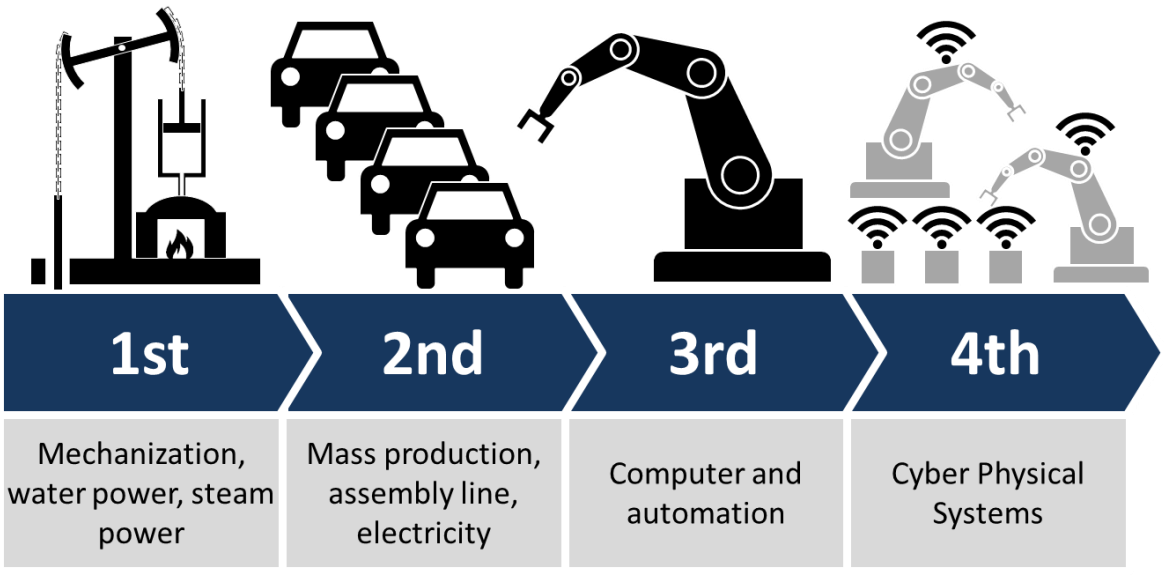
The following analysis consisted of three different sections; each represents part of the research. These parts are the industry 5.0 era, service encounter, ICT, which represented by automation service. The reason the author chooses automation service as represented ICT due to this type of service can be considered to be the core the hotels that the author chooses to research (Omena hotel).

The industry 5.0 era

The world has received enormous benefits from the industry 4.0, but many professional and researcher, such as Phill Cartwright (2018) have pointed out about how we are in the middle of the era, and a new era will soon emerge the industry 5.0 era. In the following chapter, the author will give an overview about the development history of the industry era, and how its effect to the current trend of using ICT in service, as well as how the future industry 5.0 era will change this.

2.1 History of industry from 1.0 to 4.0

Technology has played an important role in helping humankind with more accomplishments while spending less effort. Throughout time, the industry has come through several eras of development, each era has its unique pros and cons. Based on the research made by Mikeli P.Groover and Jan-Wilem Middelburg, the following subchapters will express the author's understanding of these eras and how its effect on the current trend in creating and using automation service.



Picture 1: History of the industry from 1.0 to 4.0. (Source: Wikipedia, CC use license)

The development of Automation can be divided into two different timelines, which are early development and modern development (Mikell P. Groover, 2019). The idea of automation technology is an evolved form from a related area called mechanization, which starts in the Industrial Revolution era (end of the 18th century – 19th century). During this time, the idea of automation represents the replacement of human/ animal power factor with a simple machine. But the start of automation machine can be traced back even further into the humankind's history. Its first start in the form of mechanical device like the wheel, the lever, etc. before advancing to devices that require less human's influence like a windmill, water wheels, etc. But the first truly automatic self- regulatory is the water clock of Ktesibios by ancient Egypt (around 250 B.C) (Nocks, 2008, 12-13). New ideas have been introduced now and then, but it is not until 1620, the Dutch inventor Cornelis Drebbel presented the world the first feedback loop system, which helps operate a furnace by changing the temperature automatically to optimize the use of fuel. (Ashley S, 2015). Another important innovation came from Dutch is to tent the sail with windmills, which many people consider to be the first form of mechanical automation. From this, one of the most significant inventions in mechanical automation has been designed: the steam engine. This idea was introduced in 1781 by Scottish inventor James Watt. This marked the beginning of an era called the Industrial Revolution, also known as the beginning of industry 1.0 era. (Wilde R., 2019). About 1801 the French inventor Joseph-Marie Jacquard created an automatic loom system. The main idea of this is to produce a complex pattern in textiles by controlling the motions of many shuttles of different colored threads. By 1804, the concept of the programmable machine was illustrated to the world in the form of Jacquard Room

The next important mark in the history of industrial development after the steam engine is the breakthrough in commercialization of electricity and direct current in the 1880s. This breakthrough used mainly lighting. After the discovery of electromagnetic induction in 1831 by Michael Faraday, many ideas start to implant electricity. This mark the end of mechanical automation and the start of electrical automation, industry 2.0. (Howard E., 2018). The whole era was built on the concept of electricity, which consists of an automated flow of electric particles through electrical networks. Through this, a feedback loop system can be created and fully functional without any input from a human. The main purpose of this was to ensure a self-regulating mechanism for the machine in a more automatic way. Electrical automation opened up a whole new wave of innovation and ideas for technology advancement. Using electricity, tasks that used to be done mechanically moved to executed by electricity. One of the most obvious benefits that this development brings to humankind is convenient and easy to control the system. Many of the current technology is built upon the foundation laid by electrical automation.

These innovators with their innovations have laid the foundation for humankind with mechanical automation and electrical automation. Together they made up the early development of automation technology, which is the predecessor of automation service. Following the early development era is the modern era. Programmable Logic Controller (PLC), invented in the 1960s, marked the booming of automation using electronics, the industry 3.0 era. In Just a short time after that, in the 20th century, the beginning of industry 4.0 era is marked with a large number of crucial innovation technology such as the digital computer, programming software, sensor technology, etc. The industry 4.0 can be summarized to be used on the following innovations as its core: Cyber-physical system; The Internet of thing (IoT); cloud computing and cognitive computing (Anna L., 2017). By optimizing the computerization of industry 3.0, industry 4.0's aim is to combine all core innovations mentioned above to create a smart machine that can get smarter over time, a process to create product/ service with more efficient and productive and less wasteful. With that, everything can be connected through a digital network to help share information more quickly. (Bernard M. 2018). Industry 4.0 has four main components that people usually refers to as cyberphysical system (CPS), Internet of Things (IOT), Internet of Service and Smart factory. Further analyses also point out the six major technologies including (the Industrial Internet of Things (IIoT) and CPS, additive production (3D - the printing), BigData, an artificial intelligence (AI), Collaborative Robots (CoBot) and the virtual reality). (P.O. Skobelev and S.Yu. Borovik, 2017). With the existence of these four main components and six major technology, it is now possible for people to develop a full system operate by computer as well as create the foundation in for the next generation of industrial transformation, industry 5.0. Many people called this era industry 4.0 as processing automation. Some pioneers during this time were IBM and Intel. Both of them were two of the earliest corporation that successfully created and distributed a fully functional family computer system (namely the IBM system and Intel microprocessors). This era has taken the world to an upper stage of automation technology, namely information technology and computerization. This is one of the main ways of development that automation technology until nowadays. By creating and applying software, all the executions in a project with predetermined algorithms, in turn, higher the quality of the outcome product as well as lower the number of mistake that human can encounter during the process. In truth, while the software is what keeps the process going, hardware is what controls the software and help it works like its plan in an automated way.

Like two sides of a coin, while the world and the society receive a huge amount of benefits from each and every generation of industry revolution, there still potential risks and challenges that exist. Since the world still in the industry 4.0 to 5.0, the author wants to analyze the risks and challenges of this generation.

According to a research made by Techutzpah in 2019, a Media company that specialize in providing news about the growth of technology, risks and challenges of industry can be summarized in three main points. First of all is capital. Since industry 4.0 emphasize the needs of technology in the process, the industry, in the process of adapting themselves, needs to have an enormous amount of investment of money. Technology like AI, IoT or Robotics are not cheap and easy to use, therefore, beside the investment in technology, companies also need to consider the cost and training professional in using and maintaining these machineries. The second point is Security. This can be considered to be one of the main problems that exist nowadays. Security here is not normal well-being security of a human, but cyber security. In a world where many personal information has been put online, such as your bank account, social security number, personal messages, etc. the risk for these informations to be known by others is very high. When take this problem into the level of companies, when there is a leak in information related to customers or employees, the cost to control these problems is quite high, not to mention the reputation of that company also affected. For instance, in 2011, information about 77 million people with accounts on PlayStation Network (PSN) have been stolen. The result of this is the fined of £ 250,000 and compensations for their users. The third problem is privacy, while this problem can be considered to be a branch of the previous problem, what the researchers of Techutzpah want to aim for is the process of collecting data from internet users. Information like this will later be sold to manufactures to analyze. If a user while surfing Internet receive ad that related to their previous preference/ searching history, it means that his/her information has been recorded. This can also a threat to privacy of that user.

2.2 About the future development of industry 5.0

Like the author has mentioned above, while the world instills the process of receiving and optimizing themselves to the industry 4.0, many experts have proposed the idea industry 5.0. First introduced on December 1st, 2015 by Michael Rada, his article “From virtual to physical” give the viewer the first insight about what is industry 5.0 and the oriented development of its. Compare to the industry 4.0, which aims to fully using machines and systems for optimal performance, the industry 5.0 aims to bring back this human factor and

create an environment in which human and machine can co-op with each other in harmony (Cartwright P. 2018). Or like Esben Østergaard (2018), Universal Robots chief technology officer and co-founder have stated in an article published on Enterprise IoT Insights: “Industry 5.0 will make the factory a place where creative people can come and work, to create a more personalized and human experience for workers and their customers,”. For the hospitality industry, industry 5.0 provides a significant change in a way the service is provided. By bringing back the human factor into the industrial production, combined with robots, workers will be upskilled to provided value-added tasks in production, which in turn creating a chance for mass customization and personalization for customers. Like Michael Rada (2018), the original proposers of the term industry 5.0, have stated and the author quoted: “Industry 5.0 valuate life standard, creativity, and high- quality custom-made products.”

Moreover, the revolution called industry 5.0 will not only limit to the manufacturing sections, but also solves social problems with the help of technology. Therefore, Skobelev and Borovik have refer industry 5.0 as Society 5.0, where technology that make up mainly the six major from industry 4.0 will be actively use in the common life, in the manufacturing industry, health care industry, and other activities, where the benefits and convenience for each and everyone will be emphasize.

While it can not be denied the benefits that industry 5.0 will bring to the society, there are still some debate about the drawbacks, challenges and risks that it can bring. According to a research made by Michael Rada (2018), as well as another research made by Nahvandi S., several challenges can be summarized as follow:

- Legal problems that are the result of the difference between the development of technology and society, as well as the change in community and business market/ environment.

- Changes in the disproportion between the number of old and young people due to changes in society and work environment

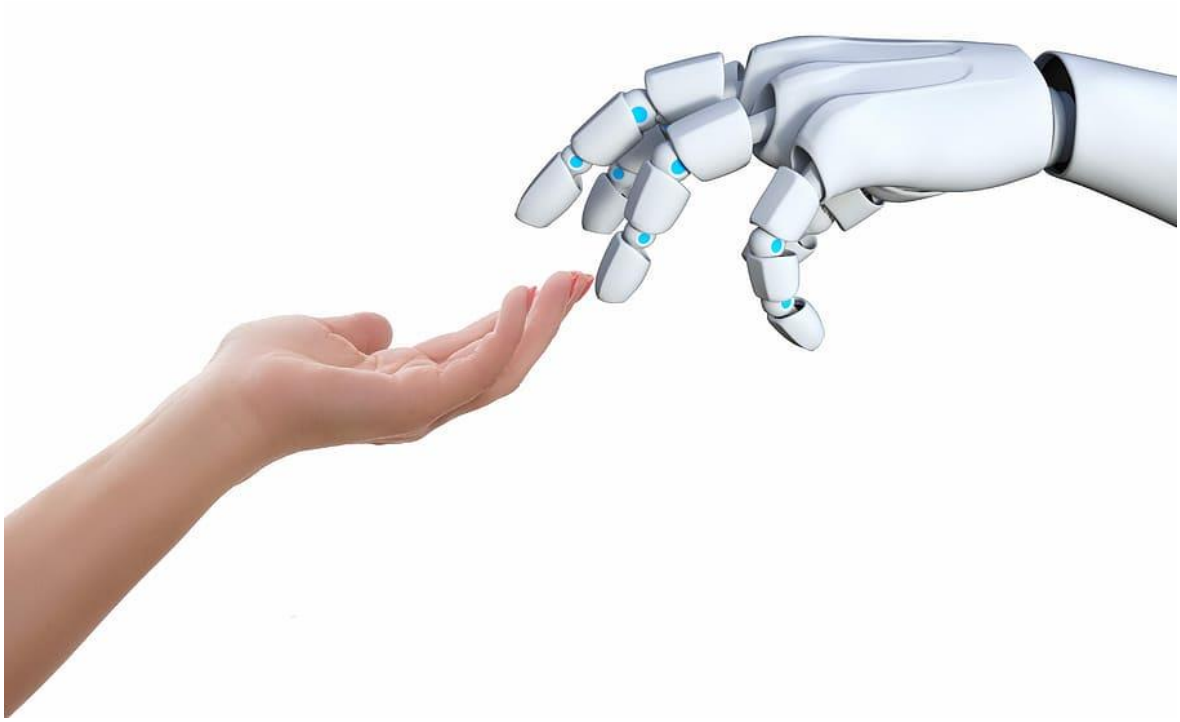
- The need to control the system to avoid overproduction

- Reducing the clarity of implantation technology in processes and industries due to its new way of implanting

- Technology can be used with the wrong purpose, and in the future, it is easier to utilize this due to technology development

- Dependency on IT and electricity

- Stakeholders, Senior members may not willing to change



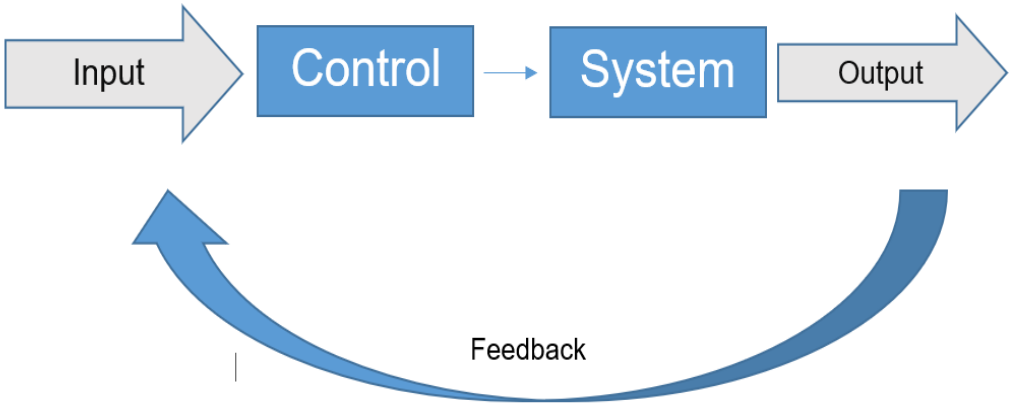
Picture 4: The next phase in industrialization- Industry 5.0: A combination between human and machine. (Source: pxfeul, CCO use license)

If the hospitality industry takes its step into the industry 5.0 era, the service and product provided by service providers will mostly be fully personalization and customize to each customer, which already happen nowadays but not in a large scale. A combination of human and robot workforce will take the concept of personalization to the next level, which in turn, create a unique experience for each customer with their own customized product/ service. This scenario will be inevitable, as Cindy Fazzi and co. from MasterControl (2018) have analyzed in their article “3 things you need to know about industry 5.0”. Henceforth, it is unavoidable for the hospitality industry to prepare themselves to adapt to the upcoming changes. To do this, they must understand the fundamental of industry 5.0. One is the human factor, and another is the technology, which the author will analyze in the following subchapter.

2.3 What is ICT/ automation service

The concept of automation service has evolved from its infant state with the development of technology and computer science. But at the very essence of most of the modern definitions about automation service is about a system or mechanical device that can fully functional with minimum inputs/ instructions from humans. This can be achieved using a model built based on three basic factors called a feedback loop, source of power and machine programming. Through this model, the characteristic of automation has been defined.

The first factor is the power source. An automated system is created with an idea to accomplish steps/ actions in a process. And for this process to produce a product, power is required. There are many sources of power that can satisfy this requirement. One of the common power sources is electrical power since this power can be readily generated or converted from/to other sources like solar, wind, hydroelectric, etc. to power the necessary power for steps/ actions in the process.



Model 1: The feedback loop factor (Source: Adapted from model proposed by Sivaranjith. 2019)

Next, the second factor is the feedback loop system. This can be considered to be the core of the framework. The loop has four basic components: Input, System (process and control), Output and Feedback. These components are illustrated in Model 1 above. Input represents the information from outside input, combined with the feedback result from the previous loop. This information will go through the system to analyze and create changes if needed. After that, the final result will go out through output and receive feedback from users/ consumers before that feedback goes back as new information for the new input.

The third and final factor to complete the framework is machine programming. If those previous two provided power to work, as well as information to create the most optimized product with the customer's need, then this third-factor focus on controlling the whole framework automatically. The program will help the machine/process understand what to do and when to do something without the need to remind from the human factor. By doing this, the result will mostly be efficient and synchronization between every step of the process, and the final product will also achieve the same amount of quality.

2.2.1. ICT/ automation service definition

According to HCL technology, automation service can be summarized as "process of integrating all domain and functionality tools into various automation layers to have a unified interface for all workflows." ("What is service automation? | HCL Technologies"). Meaning that by using a different kind of technology-related tools into the process of creating/ delivering service, the workload will mostly handle in an automatic way. By using automation service, users gain access to a variety of benefits. The most visible benefit is the ability to achieve multi-dimension visibility and streamlining the service process. Not only that, by creating a strategy based on automation, companies can reduce the human needs in the service process, which in turn lower the percentage of an incident that causes by human factor. (Rossi B., 2019) Which in turn reducing the processing time, enhance the accuracy and efficiency of the service process. Adding to that, the improvement in the competitiveness of a company while using automation service is also one of many benefits that it brings to the company (Keefer A., 2019)., This is the result of the lower-cost in-service process but higher output results in quantum. An example of all those benefits is the ATM that we use every day to withdraw money. With the existence of these machines, the public can easily access to their bank account without requiring to be presented at a bank, which also creates less work for bank's employees, so they can have more time carrying out other tasks.

But like two side of a coin, while we cannot deny the benefits this type of service brings to the industry, there are still several drawback and risk that carry within the service while going automatic. First of all is the initial cost to set up the service, which in most case is quite high, resulting in not profitable for some companies. Another concern is the number of people may go unemployed because of this is high, since workers have been replaced with technology (in many cases). Last but not least is the limitation of a machine, since automation service is created by human, all problems encountered during the service process will be handled by how the automation service designed. Some problems require the human ability to read and adapt to the situation, which in case of automation service is a huge drawback since this is not something that they are currently capable of like a human.

2.2.2. In hospitality industry

Hospitality industry without exception also receives a tremendous gain from the development of ICT/ automation service. There are already several cases where the implantation of technology created new trends of service for the hotel. First is the benefit of the Internet, in which the limitation from time and geographic is erased. Thanks to the Internet, customer can now search for information and purchase service directly from the service provider without needing to go to their office/ company. Secondly is the existing of online review, which many people consider to be an electronic form of word-of-mouth, in which if can fully utilize, can help a hotel receive a huge boost in reputation. ICTs technology also enables communication between customers and service providers in a different form, such as email, live chat, online calling, which in turn create an easy to access way to boost sale and promotion. (Jenčková and Abrhám, 2015). ICTs also create a way for service providers to recognize consumer's profiles and create personalized services for them, in which is the basic form of service that hospitality industry will need to use in the industry 5.0 era.
The main benefits that ICTs bring to the hospitality industry come in the form of cost reduction in operation and employee, increasing the convenience for consumers, as well as reducing the transaction time, which in turn create more time for upsale activities. (Abrhám et al., 2015). A better marketing strategy with a wider reach and lower cost of spreading. One of the significant benefits that ICT brings to the hospitality industry is the handling of information, including storing, distributing and communicating.

There are already many hotels achieved success by applying ICT/ automation technology into their service. Cammax company's analysis (2015) has provided some example for this case. First of all, is the Comfort Xpress Hotel in Oslo creates an entire service experience without any human interaction between the hotel's staffs and their customers by using multiple integrated automated systems. To use facilities of the hotel, guest requires to have a mobile app created by the hotel. In this app, a customer can check-in using their preference detail, using the app as a key to open the door. Furthermore, all services can be accessed through the interface of the app and hotel's website, so guest can book a reservation for any leisure activities anywhere, anytime without the need to speak with staff members. All booking information will be stored in the key (customer's phone), allowing them to access their desire's facility.

Another hotel chain also follows the ICT trend is Hotel Marriott chain. Upon arrival at the hotel, the guest will receive an electronic key called using a mobile application called Marriott MobileApp, which provided access to their room. Using this app allows the hotel's

staff to have more time to engage themselves with guests and provide an exceptional experience for them. In addition to that, it creates branding and customer loyalty. (Hospitality technology, 2017).

In Japan, hotel Henn-na has taken the concept of automation service into a whole new level. Half of the entire staff members are robots, making the service looks futuristic. When arriving at this hotel, guests are greeted by an android that looks and act like a human. To check-in, the guest will require to use a kiosk with a fully and easily explanation to follow. There are several kiosks around a hotel, in which guest can also use to book the service they want to experience. There also an automated motorized trolley robot that helps customers with their luggage and collects data from the customer. This hotel has stood out in the market for their unique idea.(Joseph S., 2017)

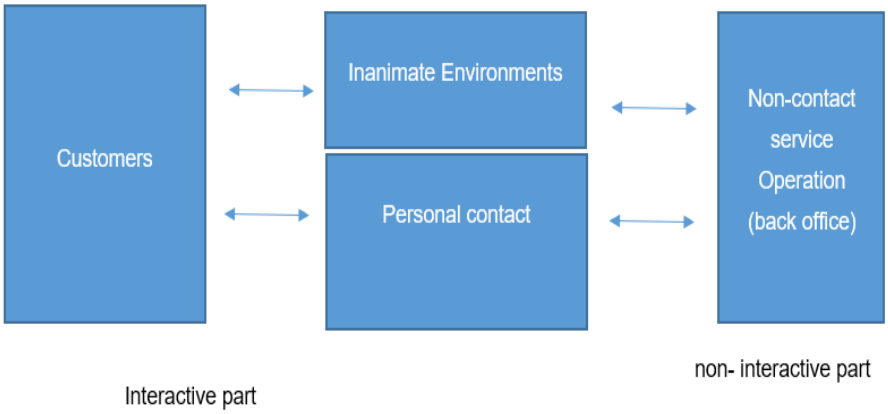
In general, automation service brings to the accommodation business a huge amount of benefits and opportunities, but everything exists in two ways. While the benefits are there for everyone to see, there are still some concerns about transforming from tradition service into fully automatic service, especially when it comes to the human factor. To applying ICT into service with a minimum drawback, people need to understand the concept of service. In the following subchapter, the author will provide an analysis of service encounter, which can be considered to be one of the core factors of the service industry.

2.3. The concept of service encounter throughout time

Jacob Munns, CEO of Boomsourcing has stated and the author quoted: “Human interaction is irreplaceable when providing superior customer service,”.(Lanre o., 2017) The service from the past until now has always been built on the principle of an encounter between the one who provides the service and the one who one to use the service (Brian H., Toni I., 2015, Design Service Excellence People, and Technology, 2). While the core may stay the same, throughout the year, the concept of service encounter has some changes to adapt to its era. The following table will present the concept of service encounter

Author/ researcher	Key concept definition
Solomon, et al. (1985)	Service encounter mainly consists of face to face encounter between customer and service provider
Norman (1986) Calzon and Peters (1989)	Service encounter is a combination of contact management (like moment of true) between customers and service providers.
Shostack (1985) Bitner (1990)	Service encounter is a customer's direct interaction with the service provider during a limited time slot, including employees, facilities, technology or any other tangible elements that belong the to the service provider.
Gutek (1995)	Service encounter is a customer's accidental interaction with the service employee. The interaction between two is called service encounter
Lockwood (1994)	Service encounter is a customer's direct interaction with the service provider in any period of time, including employees, facilities, technology or any other tangible elements that belong the to the service provider.
Roger W. Schmenner (1995)	Service encounter is a process where customer and service provider meet, with the process of creating, modifying and delivering include in the encounter.
Fitzsimmons and Bordoloi (2008)	Service encounter is customer's interaction with a service provider and everything belongs to it. In additional, the interaction between service provider' customers also include in service encounter.
Voorhee, et al. (2017)	Service encounter is any interaction of a customer with a service provider during the core service process.

Table 2: Some authors and their definition about service encounter. (Source: adapted from tablets made by Clay M. Voorhees, Paul w. Frombelle, yany Gregoire, Streling bone, Anders Gustafsson, Ruisousa, Travis Walkowiak., 2017)



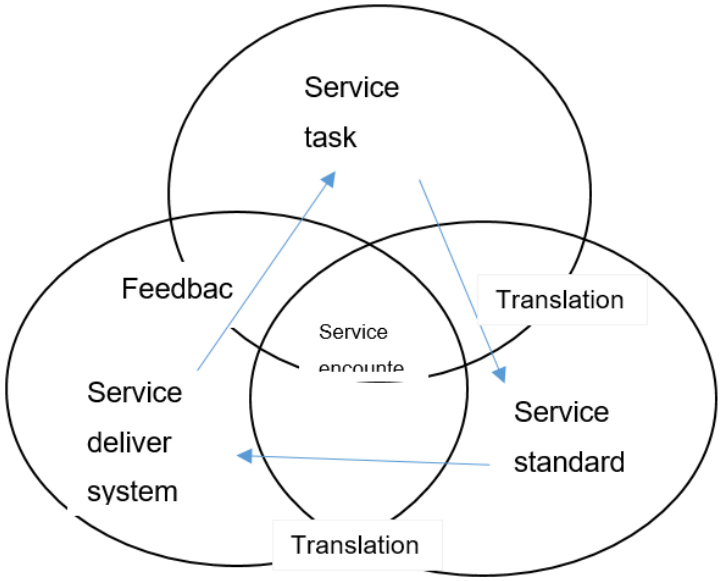
Model 2: The service encounter, (Source: Adapted from Mthchell M. Tseng, Ma Qinhai, and Chuan-jun Su (1999), mappaing customer's service experience for Operation Improvement, Business Process Management, 5(1), 51.)

From what figure 1 has presented, these three components share a symbiosis relationship. The first part and can considered to be the core of this model is the interactive part, which includes two types of interaction: environment and person to person. The main function of this part is to introduce and present the product/service to the customer. This part is usually visible to the consumer. On the other hand, the convert elements from consumer view are what made up the non-interactive part. These elements which non-visible to customer take part in creating and controlling the process of product/ service delivered. But of course, everything has its exception. For instance, when a customer visits a hotel, during the booking and checking phase, the interactive part of the hotel will first be the interface of booking, such as booking website, and then during checking phase, it is the reception area with receptionists and bellboy. The non-interactive part of these phases includes an engineer who designs the booking interface or housekeeper who prepares the room for their customer. While the customer aware of the existence of these people, they cannot see it. Another instance happens inside a restaurant, where customer come to enjoy the food. There is mainly two types of service, one where people cannot see[SV1] how the food is prepared[SV2], and another is where customer cannot Each has their pros and cons in the experience it brings.

The environment factor in interactive part carries no less important compared to personal interaction in service encounter model. This factor can be defined as the place where the service/ product is delivered, including the atmosphere of the place, as well as physical its characteristics like color, music, noise, lighting, etc. These aspects can further enhance or decrease the quality of the service that takes place there. This can add to the complexity

of creating a perfect experience that will satisfy the customer. Beside factors that have been mentioned above, a human factor also one of the main challenges that service designers need to take into consideration when designing the service. The human factor here consists of people that stay at the location where service encounter happens, such as other customers, potential customers, or people already finished experience the service, in some cases, the presence of competitors, while not being in the center of the service encounter, can still influent the quality of service.

Both interactive and non-interactive parts combine to create a full experience that customer desire and experience, which in turn bring revenue and popularity to the service provider.



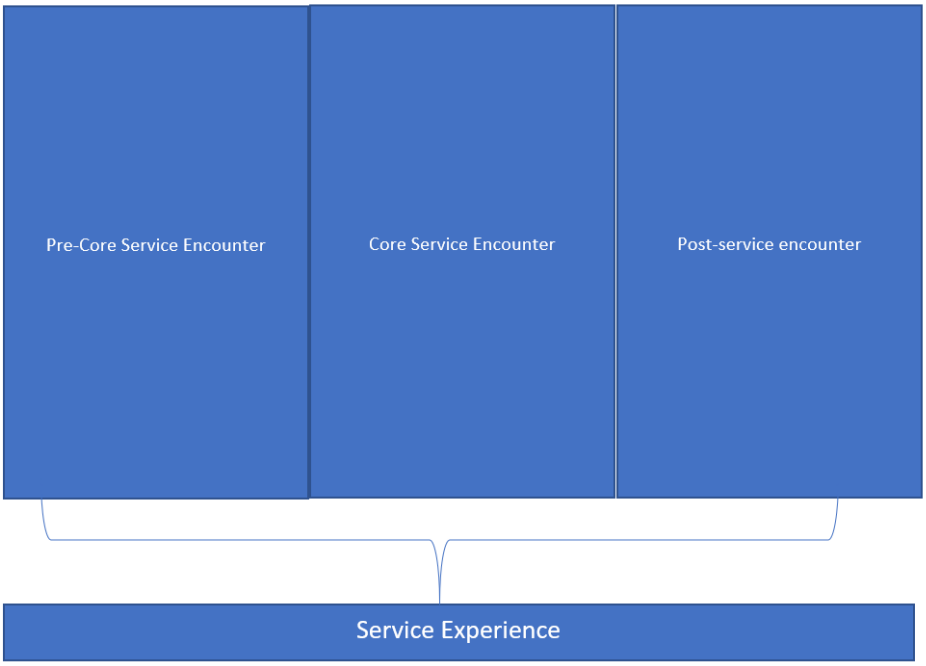
Model 3: The service encounter. (Source: Adapted from Roger W. Schmenner (1995), Service Operations Management, Eaglewood Cliffs, NJ: Practice Hall International, P.19.)

When diving further into analyzing the service, Roger W has proposed a model with further detail, dividing the service encounter into three different essential ingredients: a system to deliver the service, a list of tasks to accomplish and a set of standards to follow. Like what figure 2 has presented, these three figures combine and influent with each other to create a cycle of the service encounter. The first point is the list of tasks. These tasks can be considered the requirement that the service being offered need to have. This plays the role of converting the meaning, the demand of customer to the service provider company. From these tasks, people in charge of service design know what to do and set up a suitable plan for creating a service that will satisfy the customer. In real life situation, there

are many occasions where a phenomenon called customer rage, where customer's expectations have been misled or not reach. The result of these phenomena is quite severe, mainly on the trusting of the customer to the quality of service and in the company's reputation in general. And since a service provider needs customers to survive, the other way is not the same. Since most type of service is not fully unique, customer can choose to use another service provider that provides the same kind of experience. As a result, the consequence can sometimes lead to the downfall of the company. In some cases, where self-service as the main type that the company use, the list tasks that the company need to have prior steps, plans or any type of instruction need to present to clarify the process for a customer. The main purpose of these is to minimize the chance of confusion, uncertainty or error that customer may encounter while experiencing the service

Next is the set of service standards, which create from the list of tasks. These standards create an outline for the quality of the service task. Therefore, by having these standards to follow, companies or users can understand and set the direction to optimize steps in the process, which in turn help them achieve something that up to the service standards. These standards are how a customer view a company, in a way, it is the reflection of the company's value in the market, and these standards also include the human factor in it. This is one of the main reasons a company need to pay attention to control these standards. One of the representatives of these value in human factor in these standards is the employee who faces the customer every day, these people are the face of a company to their customer. The relationship between these employees to their employer can sometimes affect the quality of the service that the company provides. As a result, the value of this company will decrease in customer's point of view. Another way for the company to control these values is to let their customers take part in perfecting the standards of a company (mostly in the form of feedback).

The last component in this model is the point of delivery. Traditionally, this component in the past is mainly face-to-face delivery. Before the booming of the internet reaches a peak like nowadays, most customers prefer to seal the service transaction in a close-up and personal style. This can lead to both pros and cons depending on the situation. For instance, by being close up and personal, a seller has more chance to read customer's body language and verbal to guess and help the customer to their needs. But customers can also read seller body language and verbal too, and like the author have mentioned above, these sellers usually represent the value of a company in customer's eyes, so if some negative emotions/ idea affect the seller, it can affect the image of the company. After the Internet become a normal thing, this point of delivery has some major changes, and the author will analyze it in a later chapter.



Model 4: Service encounter model (Adapted from model proposed by Voorhees, Clay & Fombelle, Paul & Grégoire, Yany & Bone, Sterling & Gustafsson, Anders & Sousa, Rui & Walkowiak, Travis. (2017))

According to Voorhee and co. definition, Service encounter is any interaction of a customer with a service provider during the core service process. To them, service encounter can be divided into three segments, pre-core service encounter, core service encounter, and post-service encounter. Only by combing all three segments will a company provide the fully service experience for their clients.
The first segment is called the pre-core service encounter. The encounter during this timeline can happen online, through the website, phone or face-to-face or any form available for the customer to see the product/service that the company offers. The core idea of this is to help the company to size the “moment of truth”, the concept is been described as a critical encounter between customers and firms that will impact the impression and interest of the customer. (Beaujean, Davidson, & Madge, 2006; Bitner & Wang, 2014; Löfgren, 2005).

The second segment of the model is the core service encounter. This is the encounter happens during the interval between offering the service/ product and seizing the correct final deal. The product should be built based on the customer needs, which can become a motivation to increase the interaction between the customer and the seller, despite the platform they are using.

The third and final encounter is the post-service encounter. This is the time following two previous encounters. During this time, the main goal of the company is to establish a way to retain customers and make them into loyal customers if possible. Furthermore, they also need to collect the data from two previous encounters to improve future service experience. Proactive actions include during this period are post-transaction satisfaction survey, feedback, reviews about the encounter experience, a recommendation from the guests, relationship development, etc. In some cases, there will need to have some service recovery efforts in case the result of either previous encounter is bad/ not satisfying.

From three models above, as ICT becomes more and more influence on the designing of the service, the model of service encounter become more and more meticulous. Take the third model, for instance, compared to the two previous models, it has two more phases which are pre- encounter and after an encounter, which both enabling thank to the utilizing of ICT technology.

3 Methodology in use

In this empirical part, the author will present the research method that this research has used to gather its data. The core idea of this interview is to analyze the understanding of experts in ICT and accommodation business about the influence of ICT on the accommodation business and/or service design business. As a result, the author chooses five experts to come from different backgrounds to do an in-depth interview. The author believes that the result comes from different points of view that will help to generate better in-sight, resulting in creating a better and more suitable guideline for the target group. The research methods exploited an in-dept interview and its result will be analyzed in the following chapter. From the result of the interview, the construction of the guideline, which author names it Using ICT guideline, will be strengthened, as well as its validity and necessary.

3.1 Qualitative research and its justification

Qualitative research is a method to gather data by analysing the meaning of responds from participants of the interview. The method of analyzing these data is by the process of interpretation, which carried out for the purpose of generating concepts and exploring the relationships in the raw data (responds from interviewees), and then organizing them into the guideline. (Strauss A., Corbin J., 2014). The author uses in-depth interview because this kind of approach brings many advantages and potential, as the process of interview, especially face- to face, the author has an opportunity to observe interviewee's expression, as well as acquire some extra information that not been covered in the question list.

The object of the interview was gathering comprehensive data on the expert's opinions about the three main concepts that have been mentioned in the previous part. On the basis of creating a throughout understanding the concept and the essence of industry 5.0 for all parties involved in the interview process, the usefulness, relevance and effectiveness of the "Using ICT" guideline will be more valid and persuasive. By using the guideline, accommodation companies can apply ICT to create a personalized experience while maintaining the influence of human nature to the core of their service, which the author hopes to create competitiveness in the future market.

As the author has stated above, the main purpose of this thesis is to create a useable guideline for the accommodation business to apply ICT to their service in the industry 5.0 era. To do this, it is required for the author to gain a basic understanding of these accommodation business's point of view about the upcoming 5.0 and ICT. The target interviewees are representative from five different sources, with three of them are representatives

from an accommodation business, and two of them from an IT/ service design business. But in reality, as the world is still in the industry 4.0 era, the concept of industry 5.0 is still in speculation and research, with perception, acknowledgement to reach a conclusion on what may happen in the future. As a result of this, the author believed that the qualitative research method is the most fitting course of action in gathering and evaluating the data.

3.2 Gathering data process

The process of selecting the candidates for the interview have been made by the author, with suggestions from the author's supervisor. The main qualification to choose a candidate is how much influence technology has in their service. The author chooses Delphi as the main method to approach qualitative research. In its essence, Delphi method is a method to create a group communication channel with a group of experts and listen to their opinion, which can help the author to create a solution for the topic at hand. (Based on Linstone and Turoff's definition, 1975). Furthermore, by choosing Delphi as the main way of approach, the candidates for interviews need to be experts, as it is the most important requirement for the use of Delphi (Habibi A., Sarafrazi A., Izadvar S., 2014). Using this as a base, the author has invited three different accommodation businesses to take part in his interview. In order to keep the interviewees' identity anonymous, the author decides to called them business 1, 2 and 3. With business 1 is a hotel that comes from a big chain, with several hotels located in Helsinki. Business 2 is an accommodation company that provide accommodation in a different scale. Business 3 is a small - scale hotel that their service is heavy based on technology. Besides those targets interviewees that have been mentioned above, after a discussion with the supervisor, the author has been advised to look for a different point of view to the previous one, especially experts that have IT/ ICT background. After looking and asking for permission, the author has succeeded in inviting two experts with IT background. The common trait between these two experts, which authors named expert 1 and expert 2, besides having IT background is that both of them have/ currently working for a service design company.

Due to busy combined with a tight schedule, among all five interviewees, the authors have a chance to conduct two face to face interviews with business 1 and 2, as well as online interview with expert 1. The average time of each interview is 20 minutes with 11 questions. After discussion with business 3, the author and business 3 both decided that the best course of action is for author to send the list of questions through email and received answers written by representatives in a later day. The same happens with expert 2, as expert 2 received list of question through a chat group, and the discussion of questions have been carried through this chat group.

The data of the research have been analysed after the transcript of the interviews, as well as the answer from the rest of the participants. This data illustrates the concepts, opinions, understanding and future planning of these accommodation business in the upcoming industry 5.0.

3.3 Interview questions structure

The questionnaire has been constructed based on the research questions that have been mentioned in section 1.3. There are 11 questions in total, which can be separated into two different parts, industry 4.0 and industry 5.0. There are only two questions in the industry 4.0 part, which are the first and second question. The rest is in the second part called industry 5.0 part. Depend on the nature of the interviewee, the questions can be changed from accommodation business to service design business. All 11 questions have been constructed as an extension to three main questions RQ1, RQ2 and RQ3 that have been mentioned in section 1.3. For the list of questions, all question from number one to number eleven will be labelled as Q1 to Q11 respectively. The following picture will help reader visualize the process of creating the list of question

Industry 4.0		Q1; Q2
Industry 5.0	RQ1	Q3; Q4
	RQ2	Q5; Q6; Q7; Q8
	RQ3	Q9; Q10; Q11

Table 3: Visualize of the process of creating list of interview question

3.4 Data analysis

After the author has transcribed the raw data, it was categorized using the code method. The process of coding the transcript increases the understanding of the subject. The coding process results in the data has been separated into keywords, which later use for categories and analyses. These categories are called themes. These themes that occur will be labeled and discussed in later chapter. The next stage of the process is to interpreting the data to check for similarities and differences between different respondents. The final stage is data verification, which mainly includes the process of checking the validity of the data. This can be done by rechecking the transcripts combine with codes, which can help the author verify and modify his understanding of the subject.

4 Analyse the data

In this chapter, the author will present the result of observation and evaluate the data gathered from the interview and topic covered. The author will divide the list of questions into two different sections, namely industry 4.0 and industry 5.0, to analyse. The key themes that emerged when coding the data can be summarized as following: timeline of industry 5.0, potentials, risks of ICT to the service aspect, technology that been based on the four components and six technologies from industry 4.0 (mentioned above on chapter 2.1.1), personalization, and human factor. Each of these themes will be analysed in the following subchapters.
Like the author has designated above, all the participants will be called in order accommodation business 1 (AC1), business 2 (AC2) and AC3, as well as expert 1 (E1) and expert 2 (E2).

4.1 Timeline of industry 5.0.

The first theme here is the timeline of industry 5.0, which is covered mostly by Q4: When do you think it (industry 5.0) will happen? The answers to this question really surprise the author while doing the interview, with only one of them (AC1) thinks that it will happen soon.

AC1: We're **still inside** the 4.0 era. As far as I know, the company IHG is leading the development of new technology in the hotel system. I also know that the Scandic hotel chain is already developing the new system.

As for the rest four of the interviewees, they all believe that industry 5.0 is already happen, even if right now the industry, both accommodation and service design, are still in the testing and adapting phase.

4.2 Potentials and risks/ challenges of ICT to the industry

The next theme that the author chooses is the potential of ICT to the industry, both in accommodation and in service design. This theme is mainly covered in question number three, five and eight. While both parties have different points of view, they all agree on the potential of ICT

Q8: How would it affect the management/ customers/ investors?

E2: It is getting easier for management to have control over everything. The customers can find all the information easily anywhere, anytime. The information is spread faster, and everyone can reach it.

The investors have all the information about their customers, what they need and what they prefer. It is also in a dangerous way that customer information is collected by some companies for their purposes.

E1: - Customers will have the luxury to choose what service/product they want from a much larger pool, due to the fact that information sharing as well as data processing technologies are present and evolving. E.g. I'll visit Boston this Christmas. I've already booked a car at the Boston airport. But I didn't have to search for too long, there were sites which compared the car renting companies based on cost/type/distances, etc. Imagine the same if it would happen in the 1970s. Most probably my only option is to ask someone at the airport if he/she can suggest to me one car renting company near the airport. And as you can see my option would fall to a few percent to able to choose the fittest car to myself compare to nowadays.

- Management has to be much more cautious and flexible. The competition to win over a customer is probably a question of the future existence of a company.

- Investors will invest in the “winners”, not the “losers”, which puts an even harder burden on management to fulfil investor’s wishes.

AC3: More KPI’s and more budget to gadgets and AI /faster service, less H2H /new ideas, more tech funding

But from the expert side, both experts express their opinion in a more cautious way. Words that express this caution thinking will be bold in the following paragraph. This trend is especially clear when answering Q2: What is the thing that you feel missing now regarding using technology in industry 4.0?

E1: - Control. It is **getting out of control** now. Perhaps from time to time, you will hear news data has been leak here and there, or IT professionals amazed by how sophisticated those hacker code could be, and the fact that these “bad” codes has been created 5

years before they discovered. Following this logic, this tells me currently there are things running in the background and probably will be discovered in 2024. and so on …

- capacity **boundaries.** Currently, there are limits in data transfers, storing huge amounts of data or read/process them.

E2: - I would say **LAW**. We need law not only in the real world but on the internet as well. As right now, most people are using social media. Some people used it in a bad way and can harm others easily

.

Q3: What is your point of view about the upcoming industry 5.0:

E1: The very first thing comes to my mind, is a saying “this kind of technology growth what we currently have, is a bad thing against our society, democracy”. What does it mean? It means our society, laws cannot follow or react in time to the new things/**dangers** which these technologies discover, implements. For example, you probably may have heard, during the US election social media had made a big impact (in a more or less negative way) to the outcome of the election. Individuals are easily **manipulated** due to the fact that their data are not protected carefully. And of course, the laws try to fix this (e.g. GDPR), but this kind of behavior is reactive and not preventive, hence you will be always behind.

Q5: What kind of change do you think the service/ service design will have?

E2: Human is **getting relying on it** and it will become a challenge in the future that human will **lose some abilities** if human still depends on machines especially intelligent machines.

E1: AI (Artificial Intelligence) will playing a big role. As time goes by, we will collect more and more data and we are able to process them in a faster and faster way. If data = you, then AI + data = prediction. So, for example in a candy store an AI will able to tell me approx. 99% correctly, which type of candies I will buy because he knows my taste as well as my historical purchases etc. I would **hate** to live in this kind of era.

All of these risks that been mentioned by experts have been mentioned by the author in chapter 2.2.1. From that, we can see the difference between how IT experts approach the usage of technology compare to hoteliers.

One thing that author pays extra attention to is the answer of AC2 for Q2: “It is depending on the **concept** that we want to express to your guest. As you may know, we have different categories of accommodation facilities, each of them has their own target group and kind of service provided, so in a way, I understand the importance of human in service, but if the concept does not really require it then I don’t think we need it. “

AC2 uses the word **concept** here, which to author is really fascinating because unlike other answers, in here the needs and the benefits that ICT brings to the service are based on the concept of that service. People can only maximize the benefits of the concept if service and technology share a mutualism relationship. AC2’s answer may differ from others due to the core of AC2 contain a variety of concepts, from hostel, to apartment to hotel. So, they understand how and when to use technology compare to other business.

This kind of thinking can be originally from the different approaches to ICT between two parties. While people on the accommodation business using ICT in their daily service, their contact with ICT is not as deep as people from service design business, where they come from IT background, combined with a working environment where they need to keep updating and monitoring the technology that they use for their product.

4.3 Technology

The next keyword theme is technology. The reason for the author to choose this theme is due to the relation between all technology that all five interviewees have mentioned in their answer. All of them can be traced back to the original of four major components and six technologies, which is the foundation of industry 4.0. This has illustrated and further consolidate the idea of industry 5.0 is not a totally new concept but an evolution form industry 4.0. For instance, AI, robot, Internet of Things (IoT), etc. All of these can be found in the quote from the previous chapter.

4.4 Personalization

The term personalization holds a very special meaning to industry 5.0, as this word describe one of the main goals of industry 5.0, which is to increase the personalization of the service/ product to the next level. This idea is reflected in the answer to Q5 and Q7

Q5: What kind of changes do you think the service industry will have?

AC1: The guests can customize their say before they come, they can book a room and then they can select the bar tab or rather a shower, on a certain corridor with a certain view and anything else there might be. A room with Mini bar or anything they can customize it or they stay where they come and then we select the room that they have. So, it's like more options for the guests

In Our Loyalty Program Guests can add on their profile what they like. For instance, they like relaxing sports in line or they like yoga. There are many options. And then when they come, we can get the report off and see what they like and then we can set up a conversation or offer them a new wine.

AC2: People want to use technology to customize the experience for this type of this happening like for example if we have a profile for the customer which saves some information about let's say. I can. I can imagine like even what temperature was infeasible and when he come last time came last time or what level of light it was for next time when the customer log- in to the system meaning put pin code on the door and the room will automatically put the most comfortable temperature and the length for the customer from the same information from the previous stay.

When answering the question Q7, the representative of AC1 has presented a very thoughtful answer, which is: “In small hotels right now it's even easier to do the research and personalize the service because they might not be as busy as a big hotel. But a big hotel tends to have more staff, so it’s hard to say.” The author wants to point out the difficulty of changing for big hotel/ company when adapting themselves to new thing, cause AC1 belongs to a big chain, so their number of customers received daily is more compare to AC2 and AC3. The concept of personalization to them is limited by the number of staffs and technology nowadays. To them, the idea of personalization on the individual level is not really possible, unlike small scale hotels/ companies.

4.5 Human factor

Since the aim of industry 5.0 is to bring the human back to the process of creating service/product, there will be changes for human factor compare to the industry 4.0 era. To analyse this change, the author has used two questions, Q6 and Q10 to discuss with

these experts about their opinion of the human's role in industry 5.0 and what is the qualification/ requirement one needs to have to work in service/ service design business. While words maybe different, but all of them agree on one thing, which is the importance of human factor in the process will increase compare to industry 4.0.

Q6: What do you think is the role of human labor in the industry 5.0 in the service industry?

AC1: There are loyal guests who will come here every week. And the reason is because of the staff. I hope that in the future this will also happen in the future

AC2: Humans will be the one who making the decision of the process in creating and providing the service.

AC3: More admin (developing content), less H2H customer interaction

E1: This is something hard to predict. It is one hundred percent there will be new types of jobs which we cannot imagine now. There will be jobs remains, especially those which fulfil human needs such as food, housing, etc. Looking back in human history new jobs grew from old ones and there were the ones which faded away as well.

E2: It is still an important part. The human can do unlimitedly. Without human labor, there is nothing.

Q10: What will you think is the most qualification that a service provider/ service designer needs to have in this era?

AC1: Well, I guess both are based on good customer service. In 4.0 they have to care for the customers. But in 5.0, they have to do the research and care more. They should have better social skills than they have now.

It should always be as separate as possible between people who do IT and those who serve the guest. But it is possible for the reception, for example, to know how to make changes in the system because they have to get the information from the system and provide them to the guest.

AC2: Decision making, education, experience, entrepreneurial kind of thinking, open mind, focus. For an IT background or Service background, it is depending on the position that we need.

AC3: Understanding of the opportunities provided by new tech (= understanding of customer needs)

E1: To able to adapt to new changes. Our era is a much faster changing era compare to the past. It is not certainly a good thing. But to able to adapt to it, differentiate the good and the bad side of it. It is something a minimum requirement to the road of success

E2: Marketing. In a world that everyone has the same access to same information, it is not hard to see something same but to get more attractive for customer, the provider needs to have high skill in marketing to convince customer to use their products and maybe unique design can get their attention

5 Discussion and guideline

The exploration of this thesis has led the author to realize many things. First of all. while industry 5.0 is still not widely known and apply to the industry, from the data gathered from the interview, the author can conclude about its existence and many places, even if it is only in the testing and adjusting phase. For something that will bound to happen, the sooner people prepare for it, the better their competitiveness will be in the future.

Secondly, throughout the research process, with reading different sources and watching many videos, this thesis has increased the author's understanding of the industry 5.0, and the author also hopes the readers feel the same. Just like the different points of view between experts and hoteliers in the concept of industry 5.0, depending on your experience and understanding, as well as how you perceive technology, each person should have their own thought about the influence of industry 5.0 to the society in the future. To increase the adaptability of a business to the future, they need to keep learning and changing themselves. The result may not show up right away, but with the right strategy, the result is bound to bring benefits to that business. Mastering the concept industry 5.0 is just one of the beginning steps for the accommodation industry to prepare themselves to the future. In essence, it is important to understand the requirements for knowledge, time and money in the process of fitting to the new market.

By using the Delphi method to approach the qualitative method, the findings of this thesis are all based on previous researches combined with analysis that been extracted from professionals and experts in both accommodation business and service design business, with IT background. Henceforth, the findings should be reliable and able to use it in future research. All participants show interested in the topic and present different but mind- provoking ideas about what can happen in the near future, as well as how should industry change to adapt themselves to it.

The world is constantly changing and developing into the new stage, with that the market of every industry, including the accommodation business. There isn't any limitation on how should accommodation business should change itself, if there is a limit, then it is the ability to adapt themselves to the situation. What the author will suggest in the next subchapter will only one of many ways for future hoteliers to develop in industry 5.0. By continuously learning and evolving, the future of industry 5.0 will bring to humankind a change that will go to history, where human and technology can have a balanced relationship between operating and controlling a manufacturing process of products, or in the accommodation business case, the experience of both their customers and hoteliers.

5.1 Learning outcome

As the author has stated above, this thesis brought various valuable learning outcome for the author. Besides the knowledge, the author also has a chance to honed his skills in doing research. This statement and the next paragraph are demonstrations on what kind of benefits the author has retained while doing this thesis. The outcome of this thesis shall not only bring benefits that limit to the author and future researchers, as well hotelier who want to go deeper into this topic, but also outsider who interested in this industry 5.0 topic.

During the process of finishing the thesis, the author acquired knowledge about research methods, how to search for materials and analyse the data using qualitative method, especially the Delphi approach method. The author also understands the different between types of thesis and types of research, as well as what kind of situation is suitable to use the qualitative research method. The method that was chosen for this thesis is qualitative research with Delphi method approach, which already been justified in the previous chapter. The author uses the in-depth interview as a way to gather data, which also increase his ability to carry out interview and communication skills. Last but not least, the process of establishing the questionnaire for the research also increases the logic thinking of the author.

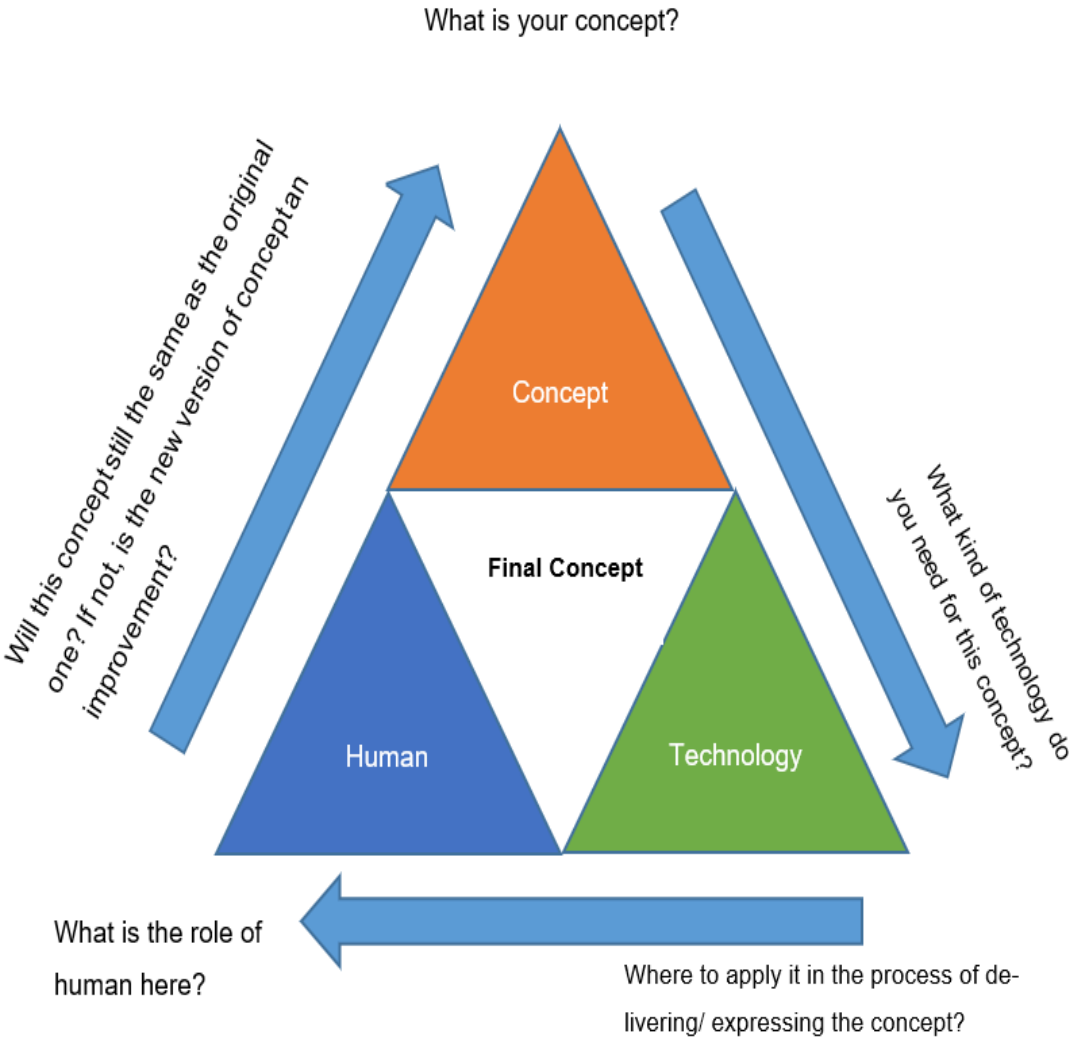
Even though it is hard to imagine how the future will change when the world officially steps into the industry 5.0 era, the author can give out some speculations based on the result of this thesis. These speculations will mainly have based on all previous themes that have been mentioned in the previous chapter, combined with literature research made by the author. First of all, a new model of service encounter will surely emerge, as the authors have pointed out the changes in the previous chapter 2.3. With that, the role of human and technology will change compared to the current model, where technology plays the majority of the process. Secondly, the change of human role and the qualification of humans to work in the industry will also change. In the future, the requirement for a candidate to have a basic understanding of technology may increase, and with that, the focus of their study may change to adapt to it. Thirdly, for technology aspect, like all interviewees have mentioned in their answers, it is important to increase the understanding about all four majors components and six technologies, not only that, but researchers also need to analyse on how to combine human factor to these technologies, to maximize the efficiency is the final goal of industry 5.0. If they can archive this, the final but no less important compared to other point that the author want to point out is personalization, which is the main advantages that will bring to the society, or like Skobelev and Borovik have refer to as society 5.0. With that concludes all the finding that the author has through this thesis. In the next subchapter, the author will use all these findings as a base to create the final guideline, which is the main objective of this whole thesis.

5.2 Using ICT guideline

Like the author have stated above, this guideline will use the findings as the foundation. This guideline will consist of three components, which create a flow of thinking that the author think it is necessary. Each component will have their own supplementary questions that researchers can use to identify the correct path to reach the final goal. These components include “Concept”, “Technology” and “Human”.

For the first component, “Concept”, the author uses the question “What is your concept?”. By understanding what is the concept that they aiming for, the scope and scale of the concept, should they move on to the next phase of the guideline, which is “Technology”.
For this component, the author chooses two questions: “What kind of technology do you need for this concept?” and “Where to apply it in the process of delivering/ expressing the concept?”. These two questions should help the researcher go into deeper about the need of technology, as the author have analyse above, whether technology is suitable or not depends on the initial concept, which should already be thoroughly analyse the previous part of the guideline. The final part of the guideline is “Human” component, which aims to

identify the role of human in the process. With the question “What is the role of human here?” By identifying the human role, where will human stand, what do they need to do in the process of manufacturing/ delivering the concept, it is easier for researchers to balance this with the technology factor and combine them together to create the most efficient way to give out a perfect final concept. These components stand together in the triangle position, with one final question for “Concept”, which will only use after the whole process has been completed. This question is “Will this concept still the same as the original one? If not, is the new version an improvement?” This question aims to identify whether after implanting the technology and human aspect into the concept, the core concept still stays the same, and if not, whether this new version is an improvement or not is up to debate.



Picture 6: Visualize of Using ICT guideline. (Source: Self- drawing)

5.3 Future research

Since the concept of industry 5.0 still is still in the process of testing and adjusting, this research can provide some initial ideas about what to understand when research on this topic. But because of the fresh idea, this thesis still has some limitations that can be solved in future research.

The first limitation is the data. All the data that have been collected are based on the speculations and experience of experts in the field. It is not represented as the final explanation about the concept of industry 5.0. There will be changes in the future, which can be used as a topic to analyze. The author also suggests some questions such as:

- What are the changes compare to the initial definition?
- What leads to these changes?

The second limitation is the scope of research. This thesis aims to only the application of industry 5.0 to the accommodation business, but other fields of business can also receive the benefits of industry 5.0. Each of these fields can have their own research, and the idea of comparing these researches with each other to see the difference is very appealing to the author.

Last but not least is the location of research. This research has been carried out in Helsinki, Finland. Finland can be considered to be one of the leading countries in using ICT for its competitiveness and well- being (Statistics Finland, 2018). Therefore, researchers can carry out the same type of research in different parts of the world, where maybe the concept of ICT is not been thoroughly analyze and apply like in Finland.

Appendix 1. List of interview question

Name of company:

Question to interview:

1. What is your point of view about the role of technology in industry 4.0 to the service design/ accommodation industry?
2. what is the thing that you feel missing now regarding using technology in industry 4.0?
3. What is your point of view about the upcoming industry 5.0?
4. When do you think it will happen?
5. What kind of changes do you think the service industry will have?
6. What do you think is the role of human labor in the industry 5.0 in service industry?
7. how would it affect service designer of different scale?
8. how would it affect the management / customers / investors?
9. who would be benefit more and who less?
10. What will you think is the most qualification that a service provider/ service designer needs to have in this era?
11. Will the changes affect the pricing of the service? How?

Appendix 2. Example of coding system

Theme keyword: technology
Answer of interviewees: - I think **AI** is becoming a part of life, in every country, every house, everyone. - **IoT (internet of things)** connecting people in an exponential speed - So, it means both you as hotel owner and both pharmacies owner should provide a standard “leg” which my IoT (e.g. smart glass) can connect to. real time processing, **augmented reality (AR)** etc. this is what I'm expecting in the 5.0. Conclusion from author: All technologies that have been mentioned (bold words) belong to what makes the foundation of industry 4.0, namely the four major components and six major technologies.
Theme keyword: Personalization
Answer of interviewees: - The guests can **customize** their say before they come, they can book a room and then they can select the bar tab or rather a shower, on a certain corridor with a certain view and anything else there might be. A room with Mini bar or anything they can customize it or they stay where they come and then we select the room that they have. So, it's like more options for the guests - People want to use technology to **customize** the experience for this type of this happening like for example if we have a profile for the customer which saves some information about let's say. I can. I can imagine like even what temperature was infeasible and when he come last time came last time or what level of light it was for next time when the customer log- in to the system meaning put pin code on the door and the room will automatically put the most comfortable temperature and the length for the customer from the same information from the previous stay. Conclusion from author: The term customize (bold words) have been repeated in several answers from interviewees, which enhance the clarity of what author believes to be the main focus of industry 5.0.

Reference

Saha, T. 19 February 2018. Here's Why Uber & AirBnB Work So Well. In CEOtoday. URL: https://www.ceotodaymagazine.com/2018/02/heres-why-uber-airbnb-work-so-well/. Accessed day: 01 April 2019

Service Futures. n.d. The future of service and how to amaze Millennials and Generation Z. In Service Futures. URL: https://www.servicefutures.com/future-service-amaze-millennials-generation-z
Accessed day: 01 April 2019

Yasuda, G. 1 February 2017. New Report from Oracle Hospitality: Creating the Coveted Hotel Guest Experience. In Oracle blogs. URL: https://blogs.oracle.com/hospitality/oracle-hospitality-hotel-guest-experience-research-report. Accessed day: 20.03.2019

Rossi, B. 5 October 2016. What is automation and how can it improve customer service? - Information Age. URL: https://www.information-age.com/what-automation-and-how-can-it-improve-customer-service-123461408/. Accessed day: 20.03.2019

HCL. n.d. What is service automation? In HCL Technologies. (2019). URL: https://www.hcltech.com/technology-qa/what-is-service-automation. Accessed day: 20.03.2019

Keefer, A. 2019. Automation in the Service Industry. URL: https://smallbusiness.chron.com/automation-service-industry-37635.html. Accessed day: 20.03.2019

INTELITY. 16 March 2017 Studies Show Guest Expect Hotels to Invest in Technology. INTELITY BLOG. URL: https://intelity.com/blog/2017/guests-demand-hotel-technology/. Accessed day: 20.03.2019

Onibalusi, L., & Onibalusi, L. 2 August 2017. 5 Reasons Why Robots Will Never Fully Replace Humans. Techco. URL: https://tech.co/news/robots-replace-humans-work-2017-08. Accessed day: 20.03.2019

Mazareanu E., 27 March 2019. When engaging with customer service, do you try to use self service first, or do you immediately engage with an agent? Statista/ URl: https://www.statista.com/statistics/810299/ways-in-which-customers-initiate-customer-service-interaction/. Accessed day: 10 April 2019

Bellis, M. 12 May 2019. History of the IBM PC. ThoughtCo. URL: https://www.thoughtco.com/history-of-the-ibm-pc-1991408. Accessed day 15 April 2019

Ashley, S. 10 April 2014. The Vulgar Mechanic and His Magical Oven
A Renaissance alchemist pioneers feedback control. Nautilus. URL: http://nautil.us/issue/12/feedback/the-vulgar-mechanic-and-his-magical-oven Accessed day: 16 April 2019

Hunt, B. & Ivergard, T. 2014. Designing service excellence: People and technology. Boca Raton: Taylor & Francis. pp.1-17

Kinzel, H. September 2016. Industry 4.0 – Where does this leave the Human Factor?". 27th Annual Conference of Human Dignity and Humiliation Studies, Dubrovnik, Croatia. URL: https://goo.gl/srmnof. Accessed day: 20 April 2019

Solomon, M.R.; Surprenant, C.; Czepiel, J.A.; Gutman, E.G. A Role Theory Perspective on Dyadic Interactions: The Service Encounter. J. Mark. 1985, 49, 99–111. URL: https://journals.sagepub.com/doi/10.1177/002224298504900110. Accessed day: 25 April 2019

Norman, R.J. 1986. Service Management: Strategy and Leadership in Service Businesses; In Wiley: Hoboken, NJ, USA,

Carlzon, J. 1989. Moments of Truth; In Harper Paperbacks: New York, NY, USA.

Shostack, G.L. 1985. Planning the Service Encounter; In Lexington Books: Lexington, MA, USA,

Bitner, M.J. Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. J. Mark. 1990, 54, 69–82. URL: https://journals.sagepub.com/doi/10.1177/002224299005400206 Accessed day: 1 May 2019

Roger W. Schmenner (1995), Service Operations Management, Eaglewood Cliffs, NJ: Practice Hall International, P.19

Beaujean, M., Davidson, J., & Madge, S. 2006. The "moment of truth" in customer service. Mckinsey In Quarterly, 1, pp. 62–73. URL: http://ibrahimm.com/Financial%20Research%20and%20%20Tools/McKinsey%20Articles%20BANKING%20AND%20FINANCE/Customer%20Service.pdf. Accessed day: 1 May 2019

Joseph, S. 5 September 2017. How Japan's hospitality robots could improve customer service.In BDhotels. URL: https://www.businessdestinations.com/relax/hotels/japans-hospitality-robots/. Accessed day: 7 May 2019

OP editor. 15 November 2011. Steve Jobs: Great Idea is WORTHLESS without Polished Execution. In Obama Pacman. URI:http://obamapacman.com/2011/11/steve-jobs-great-idea-worthless-without-execution/ Accessed day: 8 May 2019

Menze, J. 25 January 2019. Consumers want companionship - but not from humans - while traveling. In PhocusWire.URL:https://www.phocuswire.com/sabre-2019-consumer-hospitality-trends Accessed day: 25.03.2019

Buhalis, D. 2003. eTourism: Information technology for strategic tourism management. London: Pearson (Financial Times/Prentice Hall).

Buhalis, D. (1998). Strategic use of information technologies in the tourism industry. Tourism Management, 19(5), 409-421.

Nocks, L. January 2008, The Robot. The Life Story of a Technology. Johns Hopkins University pp.12-13.

Rossi, B. 7 March 2018. What will Industry 5.0 mean for manufacturing? In Raconteur. URL: https://www.raconteur.net/technology/manufacturing-gets-personal-industry-5-0. Accessed day: 25 August 2019.

Howard, E. 5 September 2018. The Evolution of the Industrial Ages: Industry 1.0 to 4.0. In Simio. URL:https://www.simio.com/blog/2018/09/05/evolution-industrial-ages-industry-1-0-4-0/ . Accessed day: 25 August 2019.

Waterfield, P. 27 April 2018. Fine watches, craft beer and the psychology of Industry 5.0. In Enterpriseiotinsights. URL: https://enterpriseiotinsights.com/20180427/channels/fundamentals/the-psychology-of-industry-50-tag99. Accessed day: 30 August 2019.

Rada, M. 21 January 2018. INDUSTRY 5.0 definition. In A Medium corporation. URL: https://medium.com/@michael.rada/industry-5-0-definition-6a2f9922dc48 Accessed day: 31 August 2019

Jenčková, J., & Abrhám, J. 2015, Implementation and regional deployment of hotel management systems by accommodation facilities in the Czech Republic, Czech Journal of Social Sciences Business and Economics, Vol. 4, Issue 2, pp. 14-22

Abrhám, J., Bilan, Y., Krauchenia, A., & Strielkowski, W. 2015, Planning horizon in labour supply of Belarusian small entrepreneurs. Economic Research-Ekonomska Istraživanja, Vol. 28, No. 1, pp. 773-787

Hospitalitytech. 11 June 2017. 7 Ways Hotels are Moving to an Automated Future. In Hospitalitytech. URL:https://hospitalitytech.com/7-ways-hotels-are-moving-automated-future. Accessed day: 10 May 2019.

Cammax, n.d. Automation in hotel industry. In Cammax. URL:https://www.cammaxlimited.co.uk/news/general/automation-in-the-hotel-industry/ Accessed day: 11 May 2019

Marr, B. 2 September 2018. What is Industry 4.0? Here's A Super Easy Explanation for anyone. In Forbes. URL: https://www.forbes.com/sites/bernardmarr/2018/09/02/what-is-industry-4-0-heres-a-super-easy-explanation-for-anyone/#1bda0ba69788. Accessed day: 19 May 2019

Tech reviews. August 2019. What is ICT (Information and Communication Technologies)? – Definition. In Computer tech reviews. URL: https://www.computertechreviews.com/definition/ict/. Accessed day: 15 September 2019

Maida, I. 20 Sep 2019. Industry 5.0: towards a new revolution. In Criticalcase blog. URL: https://www.criticalcase.com/blog/industry-5-0-towards-a-new-revolution.html. Accessed day 22 September 2019

Business dictionary. URL:http://www.businessdictionary.com/definition/service-industry.html. Accessed day: 25 September 2019

Samoszuk S. 4 may 2017. Hospitality Industry: Definition & Overview. In Study. URL: https://study.com/academy/lesson/hospitality-industry-definition-overview.html. Accessed day: 25 September 2019

P.O. Skobelev & Sc. S.Yu. Borovik. 2017. ON THE WAY FROM INDUSTRY 4.0 TO INDUSTRY 5.0: FROM DIGITAL MANUFACTURING TO DIGITAL SOCIETY. In Institute for the Control of Complex Systems of Russian Academy of Sciences, Russian Federation.

URL: https://stumejournals.com/journals/i4/2017/6/307.full.pdf Accessed day: 28 September 2019

Mitroff, I. I., & Turoff, M. 1975. Philosophical and methodological foundations of Delphi. In H. A. Linstone & M. Turoff (Eds.), The Delphi method: Techniques and applications (pp. 17-34). Boston, MA: Addison-Wesley.

Statistics Finland. 5 December 2018, Finland among the best in the world. In Statistics Finland. URL: https://www.stat.fi/tup/satavuotias-suomi/suomi-maailman-karjessa_en.html Accessed day: 28 October 2019

File: Industry 4.0.png., 6 April 2019. *Wikimedia Commons, the free media repository*. URL: https://commons.wikimedia.org/w/index.php?title=File:Industry_4.0.png&oldid=345053230. Accessed day: 4 December 2019

PXFUEL, URL: https://www.pxfuel.com/en/free-photo-ehngo. Accessed day: 4 December 2019