IS THERE ROOM FOR HIGH TECH IN A HIGH TOUCH INDUSTRY?

AN EXPLORATORY STUDY ON ADOPTION OF SOCIAL ROBOTS IN THE HOTEL INDUSTRY

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ABSTRACT

This master thesis explores the possibilities of social robot adoption in the hotel industry. Social robots represent a new product group, a radical innovation, that has yet not seen commercialization in the hotel industry in Sweden. Furthermore, previous research has requested studies that determine success factors for social robot adoption in specific markets. This thesis therefore investigates what the motivations and barriers to adoption of social robots are for hotels, and subsequently what is needed from innovators to facilitate adoption. The case of Furhat Robotics, a Swedish startup, has been used to explore this topic and answer the research questions.

The methodology used in this master thesis is a qualitative case study with data collection through 16 interviews with hotel management representatives. The interview data was later analyzed through the theoretical framework, mainly consisting of Behavioral Reasoning Theory, that suggests mapping reasons for and against adoption and applying strategies to overcome barriers.

The three most significant motivations for adoption of social robots in hotels are to reduce personnel costs, increase the service level and strengthen the hotel brand. Initially, many barriers to adoption were found. However, when segmenting the hotel industry and choosing social robot applications that solve challenges for the respective hotels, several barriers can be overcome. In conclusion, the social robot innovator needs to modify the innovation in accordance with customer needs and educate about its relative advantage in order to facilitate adoption of social robots in the hotel industry.

Keywords: Social robots, Barriers to adoption, Hotel industry, Digitalization of the hotel industry, Behavioral Reasoning Theory, B2B and B2C commercialization

PREFACE

Five years of studying a M.Sc. in Industrial Engineering and Management has come to an end, and this master thesis concludes this interesting and educational journey. Much like the engineering program we chose, our master thesis has covered the land between high technology and business strategy, knowledge that has been brought to us during our time at Lund University, LTH.

This thesis was conducted in cooperation with Furhat Robotics, who opened our minds to the social robotics technology and its endless possibilities and applications. We want to thank Furhat Robotics, and specifically our point of contact Arnaud Henneville-Wedholm, for helping us define the direction of this thesis and providing us with valuable insights.

We would further like to express our appreciation and gratitude to our mentor Izabelle Bäckström at the Division of Production Management. Your feedback and support during this project has been very valuable and you have encouraged us to always push beyond our limits.

Lastly, we would like to thank all of you CEOs, managers and board members in the hotel industry that participated in our interviews and gave us valuable insights into the exciting world of hotels. This thesis would not have been possible without your answers and generosity with your time.

Lund, June 2023

Emelie Dellby Svensk and Kajsa Jernetz

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1 INTRODUCTION

Chapter 1 aims to present the purpose and scope of this thesis, along with a background to social robots and the company that works as a subject for this case study, Furhat Robotics. Lastly, the chapter covers the research questions and relevant delimitations.

1.1 Background

The adoption of high technological breakthroughs is more widespread than ever and a report from the United Nations argues that artificial intelligence and robotics drives a fourth industrial revolution that will have a great impact on labor markets and lead to a societal change (Bruckner, LaFleur & Pitterle 2017).

The field of social robotics is one of the newer among these high technological innovations, which has witnessed an increase in interest in the recent decade (Tulli, Ambrossio, Najjar & Lera 2019). Being a rather new phenomenon, there is yet no uniform definition of social robots. Even though a lot of studies investigate their appearances and characteristics, there is a lack of consensus in terms of what a robot must do to be considered social. (Henschel, Laban & Cross 2021) However, a recent study has examined the social robotics market covering 334 social robots, their functions and potential applications (Mahdi, Akgun, Saleh & Dautenhahn 2022). In the selection of survey objects, the authors chose a definition of social robots created by Cynthia Braezeal. Breazeal is a pioneer within the field of social robotics (Massachusetts Institute of Technology n.d.), and defines these as follows:

"Social robots are designed to interact with people in human-centric terms and to operate in human environments alongside people. Many social robots are

humanoid or animal-like in form, although this does not have to be the case. A unifying characteristic is that social robots engage people in an interpersonal manner, communicating and coordinating their behavior with humans through verbal, nonverbal, or affective modalities" (Breazeal, Dautenhahn & Kanda 2016).

For this thesis, the definition mentioned above will be used to describe social robots in order to examine the research questions and the case study of the social robotics company Furhat Robotics.

1.1.1 Social robotics industry

The market of social robots is still evolving quickly and it is therefore hard to define which and how many players exist on the global market. Mahdi, Akgun, Saleh and Dautenhahn (2022) analyzed 9000 papers and mapped the major robots existing on the market. The results of their market analysis partly covered to what extent social robots have been commercialized, which can be found in Figure 1.1.

As can be seen in Figure 1.1, many social robots are still unavailable on the market, and among the available products most target a business-to-consumer market. The focus for social robots still lies within the academic sphere. However, the biggest commercial applications for social robots up until now are healthcare, education, entertainment and service, with research mainly focusing on the first two. (Mahdi, Akgun, Saleh & Dautenhahn 2022)

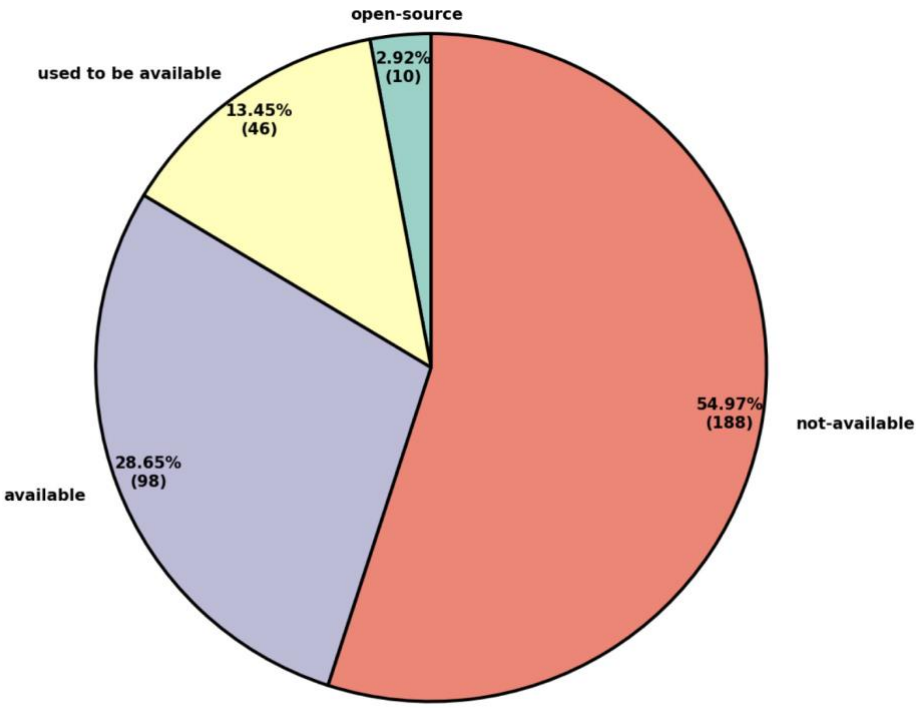

Figure 1.1 Percentage of social robots available on the market (Mahdi, Akgun, Saleh & Dautenhahn 2022).

1.1.2 Furhat Robotics

The case company for this master thesis, Furhat Robotics, is a Stockholm-based startup that was founded in 2014. They produce social robots for various customers and use cases. At the moment, they have 20 employees, many of them stemming from the academic sector. The company's mission is to build social robots that empower people to interact with technology the way humans interact with each other. (Furhat Robotics n.d.)

Furhat Robotics is growing fast and acquired the company Misty Robotics in 2022 (Furhat Robotics n.d.-a). The company's main product, the Furhat robot, is designed for several use cases. Furhat Robotics offers three different

packages of the social Furhat robot ranging from $15,000 - $27,000, with an additional monthly fee of $400. The three packages have different levels of customization and onboarding services. For commercial purposes however, Furhat Robotics offers the product through a monthly leasing-model where support, maintenance and full warranty is included. The robot has a face that can mimic human expressions like returning smiles, making head movements and glancing over to a different person. Furhat is a conversational robot that can speak over 40 languages and the robot is customizable in a way that it can take on over 200 different voices and 22 animated faces with varying genders, ages and appearances, see Figure 1.2. To enable human interaction, the robot has a built-in facial detection and facial recognition system that can handle a conversation with up to 10 people simultaneously with the possibility to distinguish and remember people during the course of an interaction. The Furhat Robot is also able to operate in noisy environments due to an array mic and powerful speakers. (Furhat Robotics n.d.-b)

Figure 1.2 Three examples of the Furhat robot with different faces (Furhat Robotics n.d.)

Arnaud Henneville-Wedholm[1], Business Director at Furhat Robotics, states that the Furhat robot is in the beginning of the adoption curve and that the product has not yet been commercialized. Like for almost all social robots in the market, few replicable, scalable applications have been developed in a commercial setting. At the moment, the Furhat robot is mainly being sold to research laboratories and universities, where development of the robot for several different use cases is in progress. Beyond that, the robot is not being deployed in any commercial long-term setting except for proof of concept-studies that Furhat Robotics is doing in collaboration with pioneers in different sectors. The company has in particular explored commercialization opportunities in the tourism industry, with use cases in for example museums, train stations and hotels. Arnaud Henneville-Wedholm says that Furhat Robotics has a specific interest in the hotel industry which has steered the direction for the case study in this masters thesis.

1.1.3 The hotel industry

The Swedish hotel sector reached total revenues of 2.66 billion US dollars in 2022, following two slow years during the Covid-19 pandemic (Statista 2023). However, the pandemic has not been the only challenge hotels have met the last couple of years. The industry has seen new intra-sectoral competition driven by sharing economy businesses like Airbnb. At the same time, a new era of technology has changed the way guests evaluate, book and review their hotel stays (Wikhamn, Armbrecht & Wikhamn 2018). The ever changing environment that hotels navigate in puts pressure on the industry to innovate their businesses. However, the hotel industry has traditionally been seen as rigid with a limited innovation orientation (Campo, Díaz & Yagüe 2014). Nevertheless, a recent study by Wikhamn, Armbrecht and Wikhamn (2018) concludes that over 60% of studied hotels in Sweden have produced either service, product or marketing innovations. Unlike other industries, the innovation process for hotels depends mostly on other functions than an R&D

[1] Arnaud Henneville-Wedholm, Business Director at Furhat Robotics, Virtual interview January 27th 2023.

department. Instead, employee and guest involvement create a more practice-driven innovation. Another noticeable finding by Wikhamn, Armbrecht and Wikhamn (2018) is that the likelihood of innovation increases for independent hotels that are not part of any chain.

The hotel industry is customer-centric and the importance of developing relationships with guests is increasing for hotels. This gives rise to a strong focus on consumer-brand relationships as a strategy to retain loyal and contempt customers in a highly competitive industry (Casidy, Wymer & O'Cass 2018). Grissemann, Plank and Brunner-Spendrin (2013) further stress that customer orientation directly impacts hotels' financial performance, customer retention and reputation. The authors further present the correlation between customer orientation and innovativeness, suggesting that the decision to adopt a certain innovation is highly driven by the demand from the specific hotel's customers.

As a result of Covid-19, the hotel industry was forced to digitalize their services faster and digital transformation is more present than ever within the industry (Zhu, Wang & Cheng 2021). This digital revolution has affected the ways hotels operate, with digital tools as primary sources of efficiency and competitive advantage (Iranmanesh, Ghobakhloo, Nilashi, Tseng, Yadegaridehkordi & Leung 2022). Some of the common digital tools that have been introduced into hotels include mobile apps, self service technologies like self check-in/out systems, information systems and smart systems (Iranmanesh et al. 2022).

Today, social robots as well as virtual reality and internet of things applications are becoming more relevant for hotel owners (Zhu, Wang & Cheng 2021). Henn-na Hotel in Tokyo was the first to staff its hotel with social robots in front desk service and in-room assistance during 2015 (Nakanishi, Kuramoto, Baba, Ogawa, Yoshikawa & Ishiguro 2020). This effort met early resistance from guests and half of the robots were later "fired" after complaints (Cheng & Guo 2021). Since then, further experiments have been made with social robots used

for information broadcasting, bellboy tasks and gathering customer feedback (Nakanishi et al. 2020). Although several experiments have been made, the commercialization journey for social robots in the hotel industry has not yet taken off.

1.2 Problem discussion

So far, social robots have been popular mainly in the academic sphere rather than a commercial one (Tulli, Ambrossio, Najjar & Lera 2019). It has previously been noted that future research should be focused on attributes and circumstances that contribute to the success in commercializing social robots (Tulli, Ambrossio, Najjar & Lera 2019). Although the gap pointed out by Tulli, Ambrossio, Najjar and Lera (2019) is still valid, some case studies on commercialization of social robots have been done. However, they are mainly limited to the healthcare and education sector. In particular, the usage of social robots within elderly care is widely studied. For instance, Kalisz, Khelladi, Castellano and Sorio (2021) investigate how social robots can be implemented in the personal health care sector. By interviewing healthcare professionals, they conclude that while there are barriers to adoption of social robots within the sector, there are promising opportunities of increasing their acceptance. Social robots have further been deployed in the education sector, and Belpaeme, Kennedy, Ramachandran, Scassellati and Tanaka (2018) have performed a review study on their performance and potential. These conclusions cover the gap defined by Tulli, Ambrossio, Najjar and Lera (2019) to some extent, but they are linked specifically to attributes of the elderly care sector. Therefore, the stated gap by Tulli, Ambrossio, Najjar and Lera (2019) is still deemed relevant concerning other industries where similar studies on commercialization of social robots have not yet been made.

The choice to look into the hotel sector in particular is partly based on interviews with employees at Furhat Robotics. This industry is of interest to the company and it has seen a limited number of experiments with social robots, which indicates that the choice of market for the case study is reasonable.

Furthermore, an academic gap on the research of commercialization of social robots within the hotel industry has been identified, which is illustrated in Figure 1.3 and presented below.

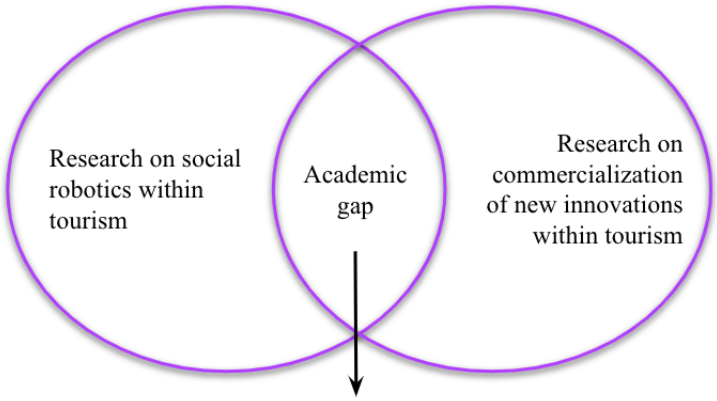

Figure 1.3. The academic gaps leading up to the main research question of this master thesis (Personal collection)

Looking at research focusing on social robots in the tourism sector, or specifically hotels, there have been several efforts to explore this from different angles. However, while there is some research on social robots in a hotel setting, it is mainly quantitative and does not focus on classical commercialization or diffusion theory. Rather, it explores narrow topics like implementation or guest reactions to the robots. For example, Nakanishi et al. (2020) have conducted a quantitative survey on how hotel guests respond to being greeted by robots, while Cakmak and Chung (2018) investigated how social robots can be used to gather feedback in a hotel setting. Studies have further been conducted on how the implementation of social robots in tourism service affects the company's brand (McLeay, Osburg, Yoganathan & Patterson 2021). The identified gap here is the scarcity of research on social robots in hotels from a broader commercialization angle, and McLeay, Osburg,

Yoganathan and Patterson (2021) suggest future research to explore technology and customer-related drivers and barriers for adoption of AI in tourism.

On the other hand, there has been some research on the topic of commercialization of innovations in the tourism sector, although not with a specific focus on social robots. Sánchez, Williams and García-Andreu (2019) have interviewed entrepreneurs to map the problems they encounter within the tourism industry. As a concluding remark, the authors point out how more specific markets within the tourism industry need to be investigated to gain a deeper understanding of the risks. As the hotel industry is to be considered part of the tourism industry, this highlights a gap within the commercialization theory within hotels. They also mention that the overall literature on innovation resistance within the tourism sector is scarce (Sánchez, Williams & García-Andreu 2019). Furthermore, Ivanov and Webster (2018) have been looking at the adoption challenges of AI, robots and service automation systems within the broader tourism industry, where hotels are included. Regarding future research, they suggest looking into how tourism companies can incorporate technological innovations operations-wise (Ivanov & Webster 2018).

In conclusion, all of the studies above shape the field of commercialization of social robots within the hotel industry. However, up until now, no research has addressed both commercialization of social robots *and* social robots in a hotel setting. The overlap of these topics, seen in Figure 1.3, is therefore the identified academic gap that acts as a baseline for the main research question of this master thesis.

1.3 Purpose

The purpose of this thesis is to investigate the early stages of the commercialization process for social robots in the hotel industry. The aim is to examine how social robots can benefit different segments within the hotel industry and what barriers there are that could hinder adoption. Additionally,

the thesis looks into how the innovator can strive to adapt its offering to facilitate adoption in the hotel market.

1.3.1 Research questions

The main research question that will be investigated in this thesis is: **"How can the innovator facilitate adoption of social robots in the hotel industry?"**. To be able to answer this question, it has been operationalized into two sub-questions that are presented below.

RQ1: What are the motivations versus barriers to adoption of social robots within the hotel industry?

RQ2: How can the innovator overcome the barriers to adoption of social robots within the hotel industry?

By answering these questions this thesis aims to contribute to academia with new insights regarding adoption of social robots within the hotel industry. Regarding more practical contributions, this thesis aims to guide Furhat Robotics, together with other companies within the social robotics industry, on viable ways for launching their product within the hotel industry.

1.4 Delimitations

This master thesis addresses commercialization in general, and adoption in particular, of social robots within the hotel industry. The commercialization process is a large concept that ranges from initial marketing activities to fully completed market penetration. As social robots belong to a new product category that has not yet been fully commercialized in any markets, this master thesis limits its focus to the earlier commercialization stages like adoption intention.

This master thesis further has geographical limitations and the Swedish hotel market has primarily been studied. Although some exceptions where hotels

located in Scandinavia have been examined, the case company Furhat Robotics as well as the majority of hotel subjects are based in Sweden.

1.5 Target audience

The main target audience of this thesis is the sales & marketing team at Furhat Robotics as well as other innovators within the industry of social robots. Meanwhile, the thesis discusses digitalization and innovation strategies for hotels. Thus, it might also be of relevance to hotel representatives who are looking to improve their digitalization strategies. Lastly, the thesis targets academics with an interest in commercialization and high technological innovation.

1.6 Thesis outline

Chapter 1 – Introduction
The first chapter is an introduction to the master thesis and aims to give relevant background to the topic. The introduction includes relevant descriptions of the hotel industry, social robots and the case company in particular. In the introduction, the purpose of the thesis and the research questions are further presented.

Chapter 2 – Theoretical framework
Chapter two presents the theoretical framework that is the basis for all further analysis, discussion and results of this master thesis. The theoretical framework is constructed to enable analysis of the empirical findings through a theoretical lens.

Chapter 3 – Methodology
The third chapter describes all methodological choices that have been made to construct this study. These include research philosophy, approach, strategies as well as data analysis. The methodology chapter concludes with a discussion of the trustworthiness of this master thesis.

Chapter 4 – Empirical findings
The chapter Empirical findings summarizes all relevant data gathered from interviews. The findings are divided into common themes discussed in the interviews, and presents how the interviewees viewed the business environment, hotel characteristics and commercialization of social robots.

Chapter 5 – Analysis
The fifth chapter contains the analysis of this master thesis. In this chapter, the empirical findings are analyzed through the lens of all theories presented in chapter two. The analysis is structured so that motivations, barriers and facilitators are all examined.

Chapter 6 – Discussion
This chapter further builds on the insights from the analysis in chapter five, but discusses the practical implications even more thoroughly in order to answer the research questions of this master thesis.

Chapter 7 – Conclusion
The final chapter answers the overarching research question by summarizing the empirical findings, analysis and discussion. Finally, theoretical and practical contributions of this master thesis are highlighted and a final discussion around suggested future research is held.

2 THEORETICAL FRAMEWORK

In this chapter, the results from the literature review are presented. They compose an important framework for analyzing commercialization of high technological innovations. The section covers overarching theories on commercialization, diffusion of innovation and customer resistance to innovation.

2.1 Commercialization theory

This master thesis covers research questions related to adoption of innovations, namely early stages of commercialization. Consequently, theory on the concept of commercialization is a key cornerstone of this theoretical framework. Several definitions of commercialization are used within academia, however, consensus is that the concept covers the activities of bringing an innovation to market.

Commercialization is widely known as a critical and costly step in the innovation process (Bianchi, Benedetto, Franzò, Frattini 2017). Aarikka-Stenroos and Lehtimäki (2014) describe commercialization as "marketing an innovation with the aim of converting it into a profit-making position in the marketplace". They further mention activities linked to the commercialization process, like planning for marketing strategies, market launches and implementation. Even though commercialization of an innovation often is conceptualized as a later stage of the innovation process, the authors argue that front-end activities like ideation and technical development are still mutually linked and interdependent. The need for commercialization often stems from the limited funding for basic research, thus commercializing a product is a common long term goal for scientists and research institutes (Gbadegeshin 2018).

Whether the commercialization of an innovation is successful or not does not solely depend on the product's actual performance. On the contrary, research shows that most innovations fail even though being superior compared to competing offerings (Aarikka-Stenroos & Lehtimäki 2014). In fact, studies show that between 40-50% of commercialized products fail, mainly due to a poor commercialization strategy (Chiesa & Frattini 2011).

When studying commercialization, most products or services covered are new innovations, however innovations can be classified as either radical or incremental. A radical innovation can be defined as a new product with new technologies that alters consumption patterns and changes consumer behavior, in comparison to incremental innovations that only improve current delivered benefits without any need for behavior change (Frattini, De Massis, Chiesa, Cassia, Campopiano 2012).

The foundation of commercialization literature is mainly based on business-to-consumer (B2C) studies, and industrial markets have received much less scholarly attention (Bianchi, Benedetto, Franzò & Frattini 2017). Even though this thesis concerns a business-to-business (B2B) target market, the B2C perspective is still deemed relevant. Studying the end consumer's resistance to innovations is important, since demand for B2B products often is derived from sales to the end user (Ellis 2011, p. 16). As mentioned in section 1.1.3, the hotel industry is very customer-oriented and sensitive to its customers' impressions. Therefore, the B2C literature will help to gain a deeper understanding of the target market. At the same time, given that it is a B2B market, B2B literature has been included in the theoretical framework as well.

2.1.1 Commercialization of radical innovations

Cubero, Gbadegeshin and Consolación (2021), suggest that the commercialization process for specifically radical innovations follows three integrative stages. In the first stage, the innovator's focus should lie on *Concept and Value Proposition Validation*, where the target market is tested and feedback is received from early users. Secondly, the stage *Business Validation*

and Market Creation aims to adjust the offering on the market, by refining the innovation, business model and target segment. Finally the innovator enters the third stage, *Creating Sales in Majority market*, in which the potential sales should be captured and a mainstream market be addressed.

Aarikka-Stenroos and Lehtimäki (2014) also developed a framework for commercialization of radical innovations, focusing on mapping the commercialization process and its corresponding challenges. The authors argue that the challenges in the commercialization process of radical innovations stem from three discontinuities. Firstly, *Technological Discontinuity* is created when navigating new technological domains that require different implementations and processes. Secondly, *Customer Discontinuity* arises from the required change in customer behavior that both affects customers' perception of risk and the need for customer education. This leads to difficulties for customers to understand the benefits and often create adoption barriers. The third one is *Marketing Discontinuity*, which refers to the issues of operating in new marketing domains, for example navigating new product categories, competitors or distribution channels. (Aarikka-Stenroos & Lehtimäki 2014)

The authors identified six commercialization challenges that were triggered by the three discontinuities mentioned. The two most relevant challenges in the context of this master thesis are the following:

1) *Challenge of understanding the customer's perspective*
2) *Challenge of overcoming adoption barriers and facilitating the adoption*

The first challenge arises when the innovator is targeting a market without sufficient insight into the customers' needs and business environment. This challenge stems from the customer and marketing discontinuities where the new product still has to be matched to latent customer needs. The innovator is often focused on the technical aspects and advantages of the product, rather than trying to understand what value potential the customers have to gain from it. The challenge for the innovator is to step outside of their own perspectives and

understand the business situation of the customers, their needs and their potential use contexts for the product.

The second challenge stems from the same discontinuities and the fact that the radical innovation requires altered behavior and attitudes from the customers. The big challenge for the innovator is to identify what barriers exist for customers to adopt the innovation, and consequently finding facilitators to overcome these. Aarikka-Stenroos and Lehtimäki (2014) suggest that the innovator should create and prepare the market through for example customer education, encouragement of behavior change and alteration of the innovation.

2.2 Technology adoption

Technology adoption is a concept that covers the motivations for an individual to adopt a certain technology. Fred D. Davis (1989) developed the first framework on this theme, the Technology Acceptance Model (TAM). TAM was created in a study on predicting B2C adoption of computers. Davis's study (1989) resulted in the presentation of two variables that could help determine user acceptance of a product. The first variable, *perceived usefulness*, describes to what extent the user believes that the product will enhance his or her job performance. The second one, *perceived ease of use*, refers to the user's belief about the level of effort required to interact with the product or system. Davis's research (1989) shows that higher scores on both variables correlate with higher likelihood of technology adoption.

The study has been replicated and built upon even outside of the computer field, leading to TAM being a framework useful for analyzing technology adoption in general. The TAM framework has further been extended several times by Davis and other authors, adding numerous variables that affect the user acceptance of technological innovations (Lai 2017). However, the original two variables identified by Davis in 1989 remain to be the most effective ones in TAM. (Avci Yucel & Gulbahar 2013)

2.3 Diffusion of innovation

The evolution of theory on diffusion of innovation (DOI) starts with Everett M. Rogers (1962). Since then, the theory has been developed and refined by, for instance, Geoffry A. Moore (1991) and Bianchi, Benedetto, Franzò and Frattini (2017).

Rogers' (1983) DOI model describes how innovations get spread to different categories of adopters in a social system over time, that is the diffusion of an innovation. As Rogers explores this theory, he describes the characteristics of an innovation as well as the five different adopter categories. According to Rogers, the rate of adoption is determined by the attributes of the innovation, namely (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability and (5) observability. Relative advantage concerns whether the innovation can offer a higher value than the existing alternatives, while compatibility addresses how the innovation complies with existing behavior among the consumers. Complexity is, in this sense, defined by how easy the innovation is to use, buy and understand. Trialability, meaning how easy the product is to try before adopting it, can be increased through e.g free samples, demos or test-runs. Lastly, observability refers to how easy it is to observe the product's benefits. The theory further defines the innovation-decision process in which a consumer goes from learning about a new product, to forming an attitude towards this innovation, to either deciding to adopt or reject it, to implementation and later confirmation of the decision.

Rogers also defines five different adopter categories, characterized by their level of innovativeness, among which the innovation spreads. These categories are (1) innovators, (2) early adopters, (3) early majority, (4) late majority and (5) laggards. The smallest category, innovators, act as gatekeepers in the flow of new ideas into a population. This is because innovators are usually the first to adopt a new innovation and are willing to accept a product even though it proves unsuccessful. Early adopters make up a more sizable portion of the population but are still prone to adopt innovations quicker than average. In

general, they have a more favorable attitude towards technology and risk. The innovation usually spreads further to the other adopter categories through communication like word of mouth and interconnectedness between the groups. The early adopters have social influence on the early majority, who in turn spread ideas to the late majority, while the laggards are the latest to adopt a new innovation due to a highly skeptical and cautious approach. (Rogers 1983) As the research questions of this master thesis are centered around adoption rather than the whole commercialization process, most focus will be on the earlier adopter categories.

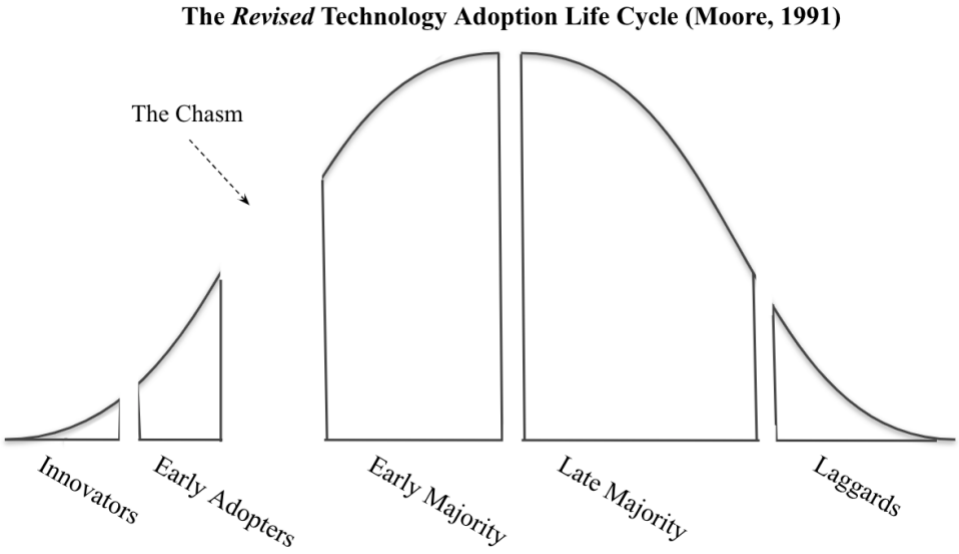

Figure 2.1. The Technology Adoption Life Cycle displaying the chasm and the five adopter categories (Personal collection, adapted from Moore 1991)

This seemingly smooth diffusion process has later been disputed by for example Geoffrey A. Moore (1991) when introducing the theory Crossing the chasm. Moore describes the chasm as the separation between the two distinct groups early adopters and early majority, see Figure 2.1, making the diffusion of an innovation from the one to the other much more difficult than the spread

between the other groups. The chasm represents the biggest challenge of DOI as most commercialization efforts tend to fall through the cracks where the innovation never sees the light in terms of adoption by the mainstream market.

The theories Crossing the chasm and DOI have further been built upon by authors like Bianchi, Benedetto, Franzò and Frattini (2017), however this time with a B2B lens where industrial markets have been studied rather than end users. Bianchi, Benedetto, Franzò and Frattini (2017) corroborate the important role that early adopters play in the diffusion of an innovation. These early adopting companies should trigger acceptance in the mainstream market through word of mouth or industry benchmark. The authors contribute to this field with a new notion on how the innovating company should successfully address these early adopters. Initially, the innovator should repeatedly engage with different kinds of companies that could be targeted as early adopters and simultaneously in this process alter the product innovation to fit this category of companies. In conclusion, the group of companies categorized as early adopters are not predetermined as have been stated by for example Rogers (1983), but rather the innovator takes a proactive role in shaping this group and concurrently modifies the innovation to suit their requirements (Bianchi, Benedetto, Franzò & Frattini 2017).

2.4 Customer resistance to innovation

An additional perspective to Diffusion of Innovation (DOI) literature is offered by Behavioral Reasoning Theory (BRT) researchers. They claim that it is not enough to look at the positive attributes of a product, like relative advantage, to understand the customer's response. Instead, they suggest understanding the customer's resistance to it (Claudy, Garcia & O'Driscoll 2015). BRT is a relatively new topic within marketing of products, and has enabled a new understanding of decision making processes related to adoption intentions (Sahu, Padhy & Dhir 2020). Originally, BRT stems from the field of social psychology and is an extension of behavioral intention models (Westaby 2005).

Founded by Westaby (2005), it was a response to the lack of "reason" perspective when analyzing motivational mechanisms.

The main finding of BRT is that both reasons for and against adoption have an important impact on customers' decision making processes. The reasons for and against adoption are not necessarily opposites. (Claudy, Garcia & O'Driscoll 2015; Sahu, Padhy & Dhir 2020). As an example, Claudy, Garcia and O'Driscoll (2015) describe how reasons for adopting electrical vehicles in a B2C setting may be the environmental advantages. However, the reasons against adopting are unlikely to be a will to harm the environment. Hence, both reasons for and against an innovation need to be understood in order to comprehend the adoption intentions. Therefore, BRT theory suggests using both reasons for and against an innovation to identify its salient factors. Knowledge about the salient factors, in turn, allow for a deeper understanding of the consumers' decision making process. Depending on the innovation and the situation, the importance of reasons for versus reasons against may differ. (Claudy, Garcia & O'Driscoll 2015)

Another important researcher within the field of decision-making is Gourville (2006). In his research, he relates the theories on loss aversion and the endowment effect to decision-making processes on the market for the final customer. He concludes that because of the psychological effects, consumers are unwilling to switch to new products when they deem their current alternative as sufficient. Therefore, the reasons for adoption must far outweigh the reasons against if a consumer is to buy the new product. (Gourville 2006).

In this thesis, BRT theory will be treated as a counter-reaction to DOI. Even though positive attributes of a product, like relative advantage, is important in both fields, DOI can be criticized from a BRT perspective because it is not taking "reasons against" into account (Claudy, Garcia & O'Driscoll 2015). Even though Gourville was not one of the founders of BRT, his thoughts are closely linked with those of BRT. As mentioned, he claims that the reasons against adoption are highly important when studying decision-making

processes. This connects to the BRT literature, and suggests that reasons against adoption are even more crucial to understand than reasons for adoption.

Connecting to reasons against adoption, Joachim, Spieth and Heidenreich (2018) have tested 17 barriers that constitute active innovation resistance (AIR). The barriers investigated are presented in Table 2.1 below. By interviewing potential B2C customers, they investigate the frequency of the barriers.

Table 2.1. The 17 active innovation resistance barriers examined by Joachim, Spieth and Heidenreich (2018)

Barrier	**Explanation**
Value barrier	The new product is not perceived to have a relative advantage when compared to the current alternative.
Complexity barrier	The innovation is perceived as being too difficult to understand or use.
Co-dependence barrier	The innovation is perceived to need complementing parts/services.
Trialability barrier	The innovation is perceived as being hard to try.
Compatibility barrier	The innovation is perceived as incompatible with other products.
Amenability barrier	The innovation is perceived as impossible to modify to suit the consumers' needs.
Realization barrier	The innovation is perceived to take too long time to become beneficial.
Visibility barrier	The innovation is perceived to be unable to observe when using it.

Communicability barrier	The innovation is perceived as being hard to describe in words.
Functional risk barrier	Worries that the innovation might not work as expected.
Personal risk barrier	Worries that the innovation might threaten the users' physical condition.
Economic risk barrier	Perception that innovations' costs are too high or unprofitable.
Social risk barrier	Fear that the surrounding would not approve of the innovation.
Information barrier	Perception that the innovator leaves out important information, leading to the conclusion that the innovation has undesirable consequences.
Image barrier	Negative impressions of e.g the brand of the company providing the service/product.
Norm barriers	Perceptions that the innovation conflicts with prevailing norms.
Usage barriers	Perception that usage of the innovation requires breaking patterns or habits.

Through a quantitative study, the authors found that 92.95% of reasons against adoption in their study could be linked to the AIR barriers. Regarding how the barriers affected the intention to adopt, all 17 showed a significant negative effect. The three barriers with the strongest impact on adoption intention were the norm, value and communicability barriers. (Joachim, Spieth & Heidenreich 2018).

To tackle the barriers, the authors suggest a two-step managerial approach. In the first step, the barriers should be examined to determine their impact on the intention to adopt among the target audience. Secondly, possible strategies for overcoming the barriers should be examined and implemented. (Joachim, Spieth & Heidenreich 2018).

2.4.1 Customer resistance to tourism innovations

The theory of customer resistance can be applied directly to the tourism industry, including the hotel industry among others. However, as mentioned in section 1.2, the area of research is scarce (Sánchez, Williams & García-Andreu 2019). In their study, Sánchez, Williams and García-Andreu (2019) investigate the adoption resistance that entrepreneurs within the tourism sector face. The study concerns entrepreneurs addressing both B2B and B2C markets. Their research could be considered an example of the two-step approach suggested by Joachim, Spieth and Heidenreich (2019) in the previous section. Sánchez, Williams and García-Andreu (2019) find that a lot of entrepreneurs within the tourism sector face difficulties related to the status quo bias, meaning that customers have a disproportionate preference for the status quo. The bias relates to reluctancy of e.g changing habits and switching costs.

After the 56 interviews, the authors were able to group the challenges faced by the entrepreneurs into 2 themes – innovation resistance versus lack of understanding of relative advantage and benefit of the innovation. Within the first theme, the examples mentioned are presented in Table 2.2.

Table 2.2. Innovation resistance grouped into 7 types of risks (Sánchez, Williams & García-Andreu 2019)

Innovation resistance risk	**Explanation**
Performance risks inherent to innovation	Consumers' disbelief in products that had not yet been tested by other customers.

Lack of business reputation risks	Especially for B2B innovations, consumers choose products that already have an established reputation.
First movers' risks	Risk that the innovator is targeting a market that is not mature enough for this disruptive product, creating resistance from customers.
Control and transparency risks	Innovations that impose control requirements on the customers faced resistance due to perceived loss of autonomy.
Psychological risks	Some innovations faced resistance because their purpose did not cohere with the customers' vision or opinions.
Privacy and safety risks	Innovations that gathered data or tracked information about the customers/the company met resistance because of privacy risks.
Other types of risks	Mainly regarded time-consuming risks. Customers were skeptical because of the implementation costs.

The second theme constituted the most common fear, *lack of understanding the relative advantage and benefit of the innovation*. They explain this through the status quo bias. Another explanation was that the customers could not understand the benefits due to complex attributes of the innovation. The authors were also able to define five resistance management strategies based on the interviews, which are presented in Table 2.3.

Table 2.3. Resistance management strategies for minimizing innovation resistance (Sánchez, Williams & García-Andreu 2019)

Resistance Management Strategy	**Explanation**
Target the innovative and organizational leaders	Segmenting to find early adopters.
Modify the innovation	Adapting the innovation to lower complexity.
Education and information on relative advantage	Providing information both on the innovation and the challenge it aims to solve.
Innovation demonstrations for customers to test	Increase trialability by providing demonstrations.
Trust and credibility building	Building a stronger network to increase trust.

The authors highlight the importance of understanding the nature of customer resistance when launching a new innovation. They find that the tourism industry in general, due to its customer experience orientation, is risk-averse and has a weak innovation culture. Profitability is important to the B2B customers, and innovations with a chance of increasing profitability has seen a slightly higher acceptance rate. Furthermore, they come to the conclusion that innovations with the aim of increasing the pleasure in an experience are in general easier to commercialize. (Sánchez, Williams & García-Andreu 2019).

Some of the risks mentioned above are unavoidable to certain innovations. The target is not always to avoid risk completely, but rather to be aware of it and introduce the innovation in an adequate way. (Sánchez, Williams & García-Andreu 2019).

3 METHODOLOGY

In this chapter, research strategies and methods are presented and motivated. Further, the chosen strategy for data collection and analysis are discussed and finally we review the trustworthiness of this study.

3.1 Research philosophy

In this thesis, the "research onion" framework by Saunders, Lewis and Thornhill (2007) has been used to construct the research methodology, see Figure 3.1. The first step in designing a research methodology is to work out what research philosophy will be adapted. After that, the methodology "zooms in" step by step until the core of the research onion is reached – the practical techniques and procedures. This framework helps us to start at a top-down perspective. First, the more overarching direction of the research is decided, after which each decision gets more hands-on and detailed.

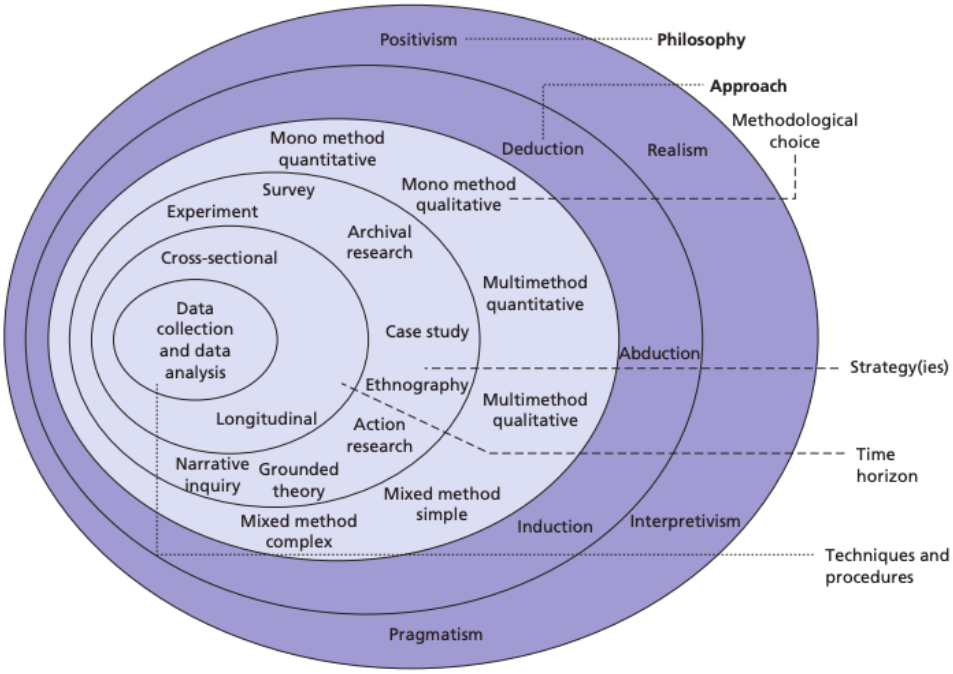

Figure 3.1 The research onion (Saunders, Lewis & Thornhill 2007)

The choice between ontology and epistemology has, for a long time, been thought of as a dichotomous choice. However, recent advice suggests a multidimensional approach when designing the research method. (Saunders, Lewis & Thornhill 2007). Ontologists are studying the nature of reality, and are interested in how we perceive reality. Within the field, there are two subfields; objectivism and subjectivism. The core difference between the fields is that while objectivists believe that there exists a reality independent of social actors and norms, subjectivists believe that social actors create social phenomena. (Saunders, Lewis & Thornhill 2007).

Within epistemology, there are three major subfields; positivism, realism and interpretivism. Epistemologists are interested in knowledge about knowledge, how we value knowledge and how we acquire it. Positivists prefer studying a reality that is observable, and hence generally conduct quantitative research. Realists on the other hand believe that there exists an objective reality,

autonomous from the reality we create in our minds. The last branch is interpretivism, in which norms and social actors play a major role. According to interpretivists, there is a significant difference between studying objects and people. When studying social actors, it is important that everyone is unique and the research has to adapt to that. Given the complexity of people, interpretivists generally conduct qualitative research. (Saunders, Lewis & Thornhill 2007).

This study will undertake an interpretivist research philosophy, in the field of epistemology. In our study, we aim to understand different hotel managers' perspectives on social robots in the industry.

3.2 Research approach

When selecting a research strategy it is also important to specify which approach to deploy for the use of theory (Saunders, Lewis & Thornhill 2007). Kovács and Spens (2005) state that the main central Western research approaches include deduction and induction. However, in later research the hybrid concept of abduction has also been introduced as studies seldom follow a strictly deductive or inductive approach.

The deductive reasoning approach is applied when pre-existing theoretical frameworks or concepts are tested in the study (Robson & McCartan 2016). Saunders, Lewis and Thornhill (2007) further mention that deductive approaches usually involve testing hypotheses, most often by collecting and analyzing quantitative data to find cause-effect links. Consequently, deduction is commonly adopted in natural sciences where the occurrence and relationship between variables is present which can be controlled and tested.

The inductive reasoning approach on the other hand starts with the data collection that leads to the development of new theories or conceptual frameworks. The researcher looks for codes or themes in the data and inductively derives theories based on this. (Robson & McCartan 2016) In comparison to deduction, inductive reasoning stems from social sciences where

researchers were critical to the approach of finding a cause-effect relationship between variables without including the situational human factor in the social world. Inductive reasoning is particularly prevalent when studying a specific context, thus a small sample of subjects is usually more appropriate in comparison to a larger number for deductive approaches. (Saunders, Lewis & Thornhill 2007)

An abductive reasoning approach can be seen as a hybrid version of the two earlier mentioned. As deductive logic moves from theory to data and inductive moves from data to theory, abduction is the mixed approach that moves back and forth. (Saunders, Lewis & Thornhill 2007) Kovács and Spens (2005) say that abductive reasoning usually provides new insights about an existing phenomenon by studying this from a new perspective. Many business and management researchers apply abductive reasoning. This is an iterative approach where data is usually grouped into themes to later modify or develop existing theories, followed by additional data collection to test these theories (Saunders, Lewis & Thornhill 2007).

In this study an abductive approach will be adopted to ensure an iterative process of combining theory with empirical data. The choice of an abductive approach is further supported by the qualitative nature of this study and the fact that there are existing theories on the topic, however with room for modification in context-specific areas (Saunders, Lewis & Thornhill 2007).

3.3 Methodological choice

When designing the methodology of a study, the first step is to choose whether to use a mono method or multiple methods (Saunders, Lewis & Thornhill 2007). Multiple methods have an increased complexity, and due to the scope of this study a mono method was chosen in an early stage.

Another important consideration is whether the study should be exploratory, descriptive or explanatory. The direction of the study is often indicated already

when the research questions are formulated. During explanatory studies, the casual links and relationships between two or more variables are investigated. Descriptive studies on the other hand aim to correctly explain situations. It is closely related to explanatory studies, as descriptive studies can be used to lay the ground for explanatory studies. Descriptive studies rarely have their own isolated purpose, but are used to draw conclusions. (Saunders, Lewis & Thornhill 2007).

Exploratory studies are used to gain understanding of a topic or situation. Normally, the research is introduced very broad, to become more narrow with time (Saunders, Lewis & Thornhill 2007). This study is exploratory in its nature, and methods that are normally associated with exploratory studies are well suited for this thesis as well.

3.3.1 Quantitative versus qualitative

A fundamental choice when designing a research strategy is whether the focus should be quantitative or qualitative (Denscombe 2010). Quantitative analysis can be seen as a way of making data understandable by processing and visualization (Saunders, Lewis & Thornhill 2007). The advantages of using a quantitative approach is that it, in some cases, might increase the credibility due to statistical significance. In addition, the analysis is in general quite straightforward and easy to present. At the same time, a quantitative method sets high demands on data management technicalities. In general, quantitative methods use larger datasets for analysis. (Denscombe 2010)

On the other hand, qualitative methods tend to give more detailed descriptions of the studied problem. For more complex situations, qualitative methods tend to generate better information. The qualitative methods leave more room for alternative explanations and understanding of nuances. Then again the risks of a result that is biased by the researcher is higher, and if the chosen cases are not representative for the broader situation the result might be misleading. It is also more time consuming to analyze a problem qualitatively than quantitatively. (Denscombe 2010)

This study will maintain a qualitative focus rather than a quantitative one. Throughout the study, data will be collected and analyzed in-depth. As the topic of the study, adoption of social robots in a hotel-setting, is quite complex, qualitative methods are deemed more suitable for the occasion. This is because of the previously mentioned ability to understand nuances and details. Another reason for using a qualitative method is that there is little to no data available. Data will have to be collected throughout the study, which is generally not the case in quantitative studies (Denscombe 2010).

3.4 Research strategy

To choose a suitable research method, one must first define a relevant research strategy that aligns with the overall objectives of the project. Denscombe (2010) describes the research strategy as a plan of action that gives the research a direction. The research strategy can be seen as the link between the research philosophy and the following choice of methods for data collection and analysis (Saunders, Lewis & Thornhill 2007). A good research strategy must further align with the three characteristics: suitability, feasibility and ethicality. In other words, the strategy must be appropriate for the purpose of the project, the strategy chosen must be feasible in terms of access to data and time constraints, and the strategy must align with ethical research guidelines. (Denscombe 2010)

Some popular research strategies include surveys, experiments and case studies. The survey strategy is used to comprehensively view something in detail and later map the data. (Denscombe 2010) Although using questionnaires is a popular method for this strategy, methods like structured interviews and observations are also associated with the survey strategy (Denscombe 2010). Saunders, Lewis and Thornhill (2007) point out that surveys are commonly used for exploratory or explanatory research using a deductive approach. It is also appropriate when a large sample of subjects should be studied in a standardized way.

The experiment strategy is suitable when the researcher has formulated hypotheses to test rather than open research questions (Saunders, Lewis & Thornhill 2007). An experiment aims to understand and investigate the relationship between specific variables while keeping the surrounding conditions controlled (Denscombe 2010). There are several types of experimental strategies to deploy, but the suitability of this strategy depends on whether it is feasible to observe the effects on one variable while holding other variables constant.

A third common research strategy is the case study which is deployed to understand a complex social phenomenon in a real-life context. The case study is the opposite to an experiment in the sense that contextual variables can not be controlled. (Saunders, Lewis & Thornhill 2007) Denscombe (2010) notes that a case study is characterized by its focus on just one instance of the thing that is investigated. The author further describes the aim as "to illuminate the general by looking at the particular". The case study approach enables an in-depth investigation of a topic by looking at details through a smaller sample, compared to the more superficial research a survey strategy can give. When selecting what case to study, the most common justification is that this instance is typical for the overarching area investigated and therefore the findings can likely be generalized. (Denscombe 2010)

Case studies can either be designed as a single case versus multiple cases. The use of multiple cases can be likened to doing multiple experiments with the aim of strengthening the theoretical generalizations (Robson & McCartan 2016). While some argue that multiple case studies can provide better results than single case studies, Dubois and Gadde (2002) disagree as this is a tradeoff between breadth and depth. Additionally, most students tend to do single case studies because it is more manageable (Saunders, Lewis & Thornhill 2007).

Although each researcher must choose a strategy that aligns with the unique research question examined, there are some situations when one strategy is preferable over others. Yin (2003) for example argues that studies that aim to

answer questions in the form of “how”, “what” and “why” are best executed with exploratory case studies. On the other hand, research questions regarding “what” or “how many” are more favored by research strategies as for example surveys. In particular, Yin (2003) argues that when studying a contemporary subject where the author has little control over the contextual events, a case study is preferable.

In this master thesis, the most suitable and feasible research strategy to deploy is a single case study. This thesis aims to explore the topic of adoption of social robots within the hotel industry, which is a complex issue in a real-life context. The research questions are defined in terms of “how” and “what” and require an in-depth investigation that can be performed using a single case, the Furhat robot, as an instance of the larger social robotics industry.

3.5 Time horizon

Studies can be divided into two dichotomous categories in regards to time horizon – cross-sectional or longitudinal. Cross-sectional studies are isolated to studying a phenomenon at a certain time, while longitudinal studies span over a time-series. Longitudinal studies can be conducted even when time is limited as a lot of data is available for analysis. (Saunders, Lewis & Thornhill 2007).

This study will maintain a cross-sectional focus. Since the master thesis is limited to a short period of time and access to data is scarce, the only reasonable time horizon for this study is to apply a cross-sectional lens.

3.6 Techniques and procedures

As previously mentioned, the data acting as a foundation for this study will be qualitative. The two data collection methods that will constitute the most important techniques for this thesis are interviews and a literature review. This way, the study will be composed of primary as well as secondary data. The

primary data is gathered through the interviews, while the secondary data is gathered by investigating other researchers' observations and conclusions.

3.6.1 Literature review

In research, the literature is defined as what is already written down and known relating to the research topic (Robson & McCartan 2016). Saunders, Lewis & Thornhill (2007) define two main reasons for literature review, preliminary search to discover the research questions and a critical review which lays a foundation for the theoretical framework.

The initial literature review serves the purpose of understanding the existing research related to the topic. When this research is reviewed, gaps can be identified, which are related topics where crucial literature is scarce. The gaps found in the early literature review steer the direction of the research project. (Denscombe 2010)

The critical literature review, however, is the continued search for relevant literature throughout the project's life. This literature is the foundation of the theoretical framework that the study relies on and is one of the sources of data that is collected in the project. (Saunders, Lewis & Thornhill 2007) Furthermore, the literature is used for interpretation of other data types in terms of finding relationships and interpreting empirical findings (Dubois & Gadde 2002). Robson and McCartan (2016) stress the importance of relevance rather than quantity when selecting literature to include in the theoretical framework. This is further discussed by Dubois and Gadde (2002) defined as parsimony, the act of being selective and singling out literature that loses relevance to the case throughout the project.

The literature in this project is consequently reviewed with the two focuses mentioned above. In an initial phase of the project, previous studies on commercialization of social robots were reviewed to identify in what areas and industries research was scarce. This review led to the definition of research questions and direction for the thesis. The second focus for the literature review

was prevalent throughout the entire process of the project, where relevant literature was collected to form a theoretical framework. This literature includes mostly primary sources, such as scientific studies and reports, that cover different topics related to this thesis. The main areas of literature that build the theoretical framework consist of classical commercialization theory, customer resistance to innovation and specific research relating to high-technological innovations in the hospitality industry. The literature was collected with the help of databases such as Google Scholar and LUB Search, as well as occasional search in physical libraries.

3.6.2 Interviews

With the purpose of gathering data on the chosen topic, 16 interviews were held during the thesis work. Interviews can be a helpful method of gathering data when a qualitative method is preferred. However, for interviewing to be successful it is important to be well prepared as well as to ask the right questions and listen carefully (Saunders, Lewis & Thornhill 2007). Silverman (2017) argues that too many qualitative studies choose interviews as a method, while these require a thorough review of the approach to conducting the interviews and analyzing them in a correct manner.

The interviews for this master thesis were held in a semi-structured manner, meaning that even though the same questions were asked there was room for the interviewee to steer the interview (Saunders, Lewis & Thornhill 2007). The Furhat robot was used as an exemplifying case during the interviews to explain, and help picture, social robots to the interviewee.

All interviews began with general questions about the hotel represented by the interviewee. These included hotel operations and how the interviewee viewed the hotel industry and its challenges. After that, strategic questions regarding digitalization, innovation and branding were asked. To avoid priming the interviewees, the social robot was introduced as late during the interview as possible. A short presentation of the case robot was then held for the interviewee, covering the main functionalities and features of the Furhat robot

as well as two shorter movies demonstrating it in action. See Appendix A.2 for a summary of the robot presentation. The interviewee was thereafter asked to state their initial impressions and thoughts on the robot, followed by specific questions about their view on adoption of social robots within the hotel industry. One of the specific questions asked was in what use cases or what functions in the hotel the social robot could be useful. In order not to influence the interviewee, this question was asked prior to introducing any example use cases we had acquired from Furhat Robotics. This resulted in creative and unbiased answers from all interviewees that came up with ways or places that social robots could be implemented within hotels. Examples of where and how the social robot might fit in the organization were not introduced until the end of the interview. See Appendix A.1 for the interview guide in whole.

Each interview took between 40-60 minutes, depending on how talkative the interviewee was. For interviews to be successful, the interviewees should have a clear picture of what will be covered throughout the interview and how they will be portrayed (Hopf 2004). Being transparent with the interview set-up is further stressed by Silverman (2017). Before the interviews started, interviewees were therefore briefed per email on the topic. The interview guide was also sent out in advance in order for the interviewees to be able to prepare.

3.6.2.1 Interview sampling

In this study, interviewees were selected based on relevance and experience. To answer the research questions for this master thesis, we primarily targeted CEOs and hotel managers in the hotel industry in Sweden. In order for the interviewee to be able to answer questions about digitalization, strategy and industry trends, it was necessary to reach people that worked with hotel management on a strategic level. We systematically reviewed all hotel chains in Sweden and a number of independent hotels, where we sent an interview request to a random sample. One could say that we initially used convenience sampling, since we chose the participants from availability and willingness to take part (Denscombe 2010). This sampling method however gained us access to interviews with hotels from different segments. It was important that we

maintained unbiasedness in the segmentation of hotels. Therefore, we reached out to a large number of hotels, in order to avoid choosing hotels that we already in advance believed would be compatible with social robots.

However, after the first interviews were held, snowball sampling was used. Snowball sampling occurs when interview objects refer the interviewer further to other possible interview objects (Denscombe 2010). During the interviews, the interviewees were asked to refer us further to hotels that could be relevant for social robot applications. These hotel representatives were thereafter contacted and the interview scope expanded. A list of the interviews held can be found in Table 3.1, together with a description of the interviewee's title and the hotel attributes. Due to confidentiality, the interviewees' names and represented hotels are anonymized.

Table 3.1. List of interviews held, interviewees and their respective hotels are anonymized but the represented hotels are described

Hotel description	**Interviewee's role at the company**	**Hotel location**	**Number of rooms**
Luxury, modern, playful	CEO	Malmö	<100
Luxury, traditional, spa & wellness	CEO	Countryside	~150
Luxury, traditional, business	CEO	Stockholm	~200
Luxury, modern, design, art &	Hotel Manager	Stockholm	~350

nightlife			
Luxury, traditional, nightlife & entertainment	Hotel Manager	Stockholm	<100
Standard, modern, business	Hotel Manager	Malmö	~350
Standard, traditional, business	Commercial Manager	Solna	~200
Standard/luxury, traditional, boutique	Sales & Marketing Manager	Stockholm	~150
Luxury, modern, business	Hotel Manager	Stockholm	~200
Standard, modern, business	CEO	Malmö	<100
Luxury, traditional, boutique, design	CEO	Stockholm	<100
Luxury, traditional, spa & wellness	Sales & Marketing Manager	Countryside	~150
standard/luxury, modern, business	Hotel Manager	Stockholm	~400

Hotel group description	Interviewee's role at the company	Location	Number of hotels
Centralized, standard	Board Member	The Nordics	~300
Franchise, many independent hotels	CEO Scandinavia	Scandinavia	~150
Centralized, luxury & design	E-commerce Manager	Scandinavia & Spain	~10

3.7 Data analysis

To analyze data is to gain a better understanding of it by interpreting what it means. Qualitative data analysis differs from quantitative in the sense that it often is associated with interpretivism, researcher involvement and holistic perspectives. (Denscombe 2010). Saunders, Lewis & Thornhill (2007) further explains the iterative nature of qualitative data analysis meaning that the activities are highly interrelated. The analysis phase starts immediately after the first set of data is collected and continues throughout the project, both during and after data collection.

There is no standard process for analyzing qualitative data, however, for studies with explorative, abductive approaches with semi-structured interviews there are some general steps that are usually taken (Denscombe 2010):

1. *Data preparation* - Data is cataloged and interviews and texts are transcribed.

2. *Initial data exploration* - Obvious occuring themes are identified, notes are written to capture ideas.

3. *Analysis of the data* - The data is coded and grouped into categories and themes. Relationships and concepts are identified.

4. *Data presentation and display* - Empirical findings are interpreted into text, visual figures and tables. Quotes are highlighted and the identified themes are illustrated.

5. *Validation of the data* - The data is validated and empirical findings are compared with alternative explanations.

For this master thesis, the aim is to cross-analyze the empirical data gathered from interviews with the theoretical framework collected in the literature review. The data analysis phase started when the first literature review was initiated, and the theoretical framework was grouped into important themes which also laid the foundation for the interview guide. Iteratively, the theoretical framework was further developed when new themes were discovered in the empirical data, namely relevant literature was added according to the topics brought up in the semi-structured interviews.

The audio-recordings collected from interviews were transcribed via a software to enable preparation and initial exploration of the empirical data. A second transcription was made manually to make sure that the software did not miss any important parts from the interview. Silverman (2017) stresses that a successful analysis of interview data must be transcribed in detail in order to not miss subtle tones, pauses and response tokens like “mm”. The subsequent analysis of this data focused on coding the interviews by finding keywords in the text and identifying common themes across all interviews. A clustering technique was utilized to find patterns between answers and corresponding characteristics of hotels. Both themes where interviewees agreed and where statements differed were highlighted to find relationships and discrepancy in

empirical findings. It is important to triangulate information gathered from interviews to corroborate the data (Denscombe 2010). This was performed by cross referencing data from the interviews with public information from company websites. The data was further triangulated with previous studies made on social robots and the hotel industry, to validate the empirical findings.

The identified topics were simultaneously analyzed in comparison with the theoretical framework to find consistency and inconsistencies with existent studies within the research area. The findings from this data analysis was later presented in section 5. Analysis.

It should be noted that in qualitative data analysis, the researcher plays a significant role in interpreting the data. This researcher-centered analysis causes influence from the researcher's own values and experiences. (Denscombe 2010) Hence, the researcher needs to be aware of the deficiencies of humans as analysts. Robson and McCartan (2016) highlight that the researcher should be aware that humans for example put unproportionately large emphasis on first impressions, tend to ignore information contradicting already held hypotheses and interpreting co-occurrence as evidence for correlation. When conducting the data analysis for this thesis, we thoroughly discussed all interpretations made in order to try avoiding any human deficiencies that could reduce the trustworthiness of the empirical findings.

In summary, all methodological choices made for this master thesis can be seen in Figure 3.2.

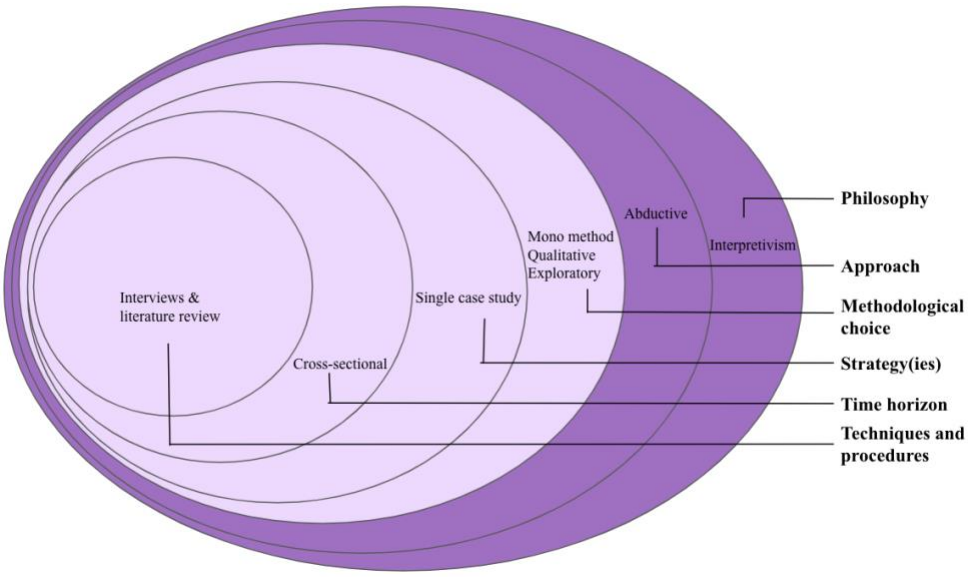

Figure 3.2. The research onion by Saunders, Lewis & Thornhill (2007) modified with all the chosen research choices in this master thesis (Personal collection)

3.8 Trustworthiness

The trustworthiness of a thesis depends on the research quality, and qualitative studies are usually measured according to the four parameters credibility, dependability, transferability and confirmability (Denscombe 2010). The methodological direction of this master thesis has been chosen to strengthen all four parameters and thus increase the trustworthiness.

Credibility

Credibility is associated with how accurate the qualitative data is and that good practice has been applied when the data has been produced and checked (Denscombe 2010). Since the majority of the data collected for this thesis has been obtained through interviews, it is important to note that the findings have been drawn from the interviewees' own opinions. Several different hotels have been interviewed, and further triangulation with the literature review has been

made. However, only one person at every hotel has been interviewed. Their views therefore need to be treated with caution as their answers could be biased by their own opinion, and therefore divert from those of the represented hotel. This has been taken into account by checking factual accuracy when possible.

Dependability

The dependability of a study relates to how much the researchers' 'self' influence the data, and the question if another set of researchers would obtain the same results and conclusions (Denscombe 2010). In this methodology chapter, we have presented all techniques and procedures used and hence it is possible to replicate the study with a similar methodology. However, it should be noted that the use of semi-structured interviews entails sometimes diverting from the interview guide and hence makes the interview data difficult to fully replicate. To ensure the dependability of this master thesis, the interview guide and product presentation used in the interviews have been included in the Appendix, and all interviews have been recorded and transcribed, thus making them available for auditing.

Transferability

The transferability of a study means how easy it is to transfer the conclusions drawn from the examined case (Denscombe 2010). In this case, it is a matter of how representative the Furhat robot is for social robots, and if the conclusions drawn about the Furhat robot's adoption potential in the hotel market can be transferred to other instances of social robots. The case product, the Furhat robot, has functionalities that align with the overall product group features and is therefore considered to be transferable. However, social robots differ and in order to increase the transparency of this thesis, the product presentation has been included in Appendix A.2. Hence, the reader of this master thesis can easily identify similarities and differences between the Furhat robot and other products to validate the transferability. Lastly, since this master thesis is limited to the Swedish hotel market, findings are presumed not to be transferable to other geographical markets.

Confirmability

The confirmability of a study relates to its objectivity, and whether the researchers' own interpretations have influenced the findings (Denscombe 2010). When conducting qualitative studies, one needs to be aware of the constant risk of subjectivity. This has been addressed in section 3.7, discussing deficiencies of humans as analysts and ways to increase confirmability. Furthermore, the influence from the case company is also a risk when it comes to confirmability. However, very little information has been gathered through interviews with the case company. Most of the details regarding Furhat Robotics have been gathered from their website. The case company has not been involved in the selection of any interview subjects, the interpretation of any findings or offered any compensation for this master thesis.

4 EMPIRICAL FINDINGS

This chapter intends to present all relevant data gathered from the interviews. The findings are grouped into three themes, namely interviewees' views on the hotel business environment, common hotel characteristics as well as adoption potential for social robots in the hotel industry. The empirical findings generated from interviews are intended to be analyzed with theory in chapter 5.

4.1 Business environment

Looking at the hotel business environment and the characteristics of the industry, many aspects were covered in the interviews. In particular, the core offer in the hospitality industry is centered around a high service level and guest satisfaction. As an example, several hotels that were interviewed stated that they had hired guest excellence managers whose only goal was to mingle with and take care of the guests. A vast majority of the interviewees highlight the importance of personal touch within the hotel industry, and how it permeates every aspect and decision of the business.

All interviewees that worked directly at a hotel, in general hotel CEOs and managers, used the word guest instead of customers when referring to their target groups. However, in interviews with hotel group representatives the word customer journey was used rather than guest journey.

4.1.1 Staffing

In general, hotel managers describe their personnel as quite young and inexperienced. Many tackle this by maintaining an openness to educating and training their staff instead of demanding previous experience when recruiting. The general attitude among the interviewees was that personality is far more

important than previous experience or having a specific skill set. At the same time, some of the more advanced roles require experience and prior know-how. Furthermore, recruiting new staff is a time-consuming task for many, and a common strategy for avoiding it is to incentivize staying at the workplace through employee satisfaction. According to one hotel manager, it takes three to six months before an employee is fully trained. Therefore, the need to make employees stay within the business was mentioned in the interviews. At several hotels we interviewed, they had developed internal educational programmes for new hires to tackle the lack of experience.

After the Covid-19 pandemic, it became a workers' labor market. Many hotels were forced to fire a large share of their employees, and the industry is currently suffering a brain drain. During the pandemic, many employees switched industries and are now reluctant to return to the hotel industry. Therefore, it has become even more important to hire based on personality rather than experience. Re-hiring has been time-consuming and tedious, and the hotels have been forced to lower their demands. "As long as you have two hands and a head, you are welcome to join us" was a telling quote by one of the interviewed hotel managers. A majority of the hotels reported recruiting competent staff as a challenge. However, this was not the case for the more luxurious, high-end hotels.

Because of the scarcity of personnel, the market dynamics have changed in favor of the employees. As many hotels have been competing for the same employees during the last years, some hotels have abandoned their traditional policies regarding salaries and work hours. One interviewee mentioned that this makes it hard to compete. When some hotels promise the most competent staff better conditions, for instance that they will not have to work during weekends, it becomes harder for others to construct an attractive offer for employees since they in fact always need someone to work during weekends.

Another staffing problem that was commonly mentioned is how large the wage costs are. One hotel group representative estimated that between 35 to 40

percent of the price of a hotel room goes directly to paying salaries. Plenty of both the hotel managers and the hotel group representatives mention both reducing labor costs as well as attracting employees as strategic questions of importance for the near future.

An additional issue connected to staffing and employee satisfaction is the job description and responsibilities. For example, among the daily responsibilities of a receptionist, a lot of time is dedicated to administrative tasks. Some of the interviewed hotel managers pointed out that the responsibilities of a receptionist are much more complex than the common perception of the role. At the same time, they emphasize that the industry is outdated. The hotel industry is experiencing an efficiency transformation with the aim to reduce and automate administrative tasks. Due to the high amount of administrative work, some hotel managers emphasize the need for having a balanced team, with some employees being more service-minded while others administrative experts.

4.1.2 Economic situation

The interviews that primarily act as a basis for data collection in this master thesis were conducted during March and April of 2023, a time when the economy was turning, an active war was present in Europe and the high inflation was noticeable. In most interviews, the economic situation was mentioned as a notable problem for the hotel representatives. Indexed rents and rising prices for energy, food and supplies means dealing with higher operational costs. Many hotels also mentioned that they have experienced a lower demand and fewer bookings of their hotel rooms as a consequence, with an exception of some hotels catering to less price sensitive customers. On top of this, the hotel industry suffers from low margins. Hence, many hotel managers experience pressure from this economic situation. This creates a need to either increase hotel room prices or reduce costs, such as those for personnel. Many of the interviewees however showed concern for their customers regarding increasing prices, and said that they did not want to take it out on their guests. Others who had already raised their prices struggled with getting their customers to understand why and for what they were paying more for. A key

challenge arising from the economic downturn therefore concerns the need to improve the delivered product in line with the increase in price.

4.1.3 Customer behavior

When speaking about the behavior and trends among customers, many hotel managers pointed out a shorter booking window as a factor behind operational problems. Today, customers create their bookings much later than they used to. As it was unclear what time period the hotel managers were referring to, it is not possible to determine if this is a trend related to the pandemic or something else. The fact that customers decide to book only a couple of days before arrival creates difficulties when planning staffing and purchasing. One resort-like, well-established hotel was described as spared from the short booking windows. Another hotel mentioned the problems with guests paying late. Usually, you do not have to pay for your accommodation until you have arrived, which may create planning problems as the tolerance for late cancellation is high, according to one interviewee.

Plenty of the interviewees see a trend of consciousness among the customers. Third-party booking services such as Booking.com or Expedia have increased the accessibility of information and made it easier to compare prices between different hotels, which results in well-informed and conscious choices among the customers. In addition, the competition is very high within the hotel industry. Interviewees mention the large amount of hotel rooms being built in for example Stockholm, and the high amount of hotels already existing. The market is described as price sensitive, which results in many customers having very high expectations when staying at a hotel. Customers perceive hotel stays as quite expensive, in particular the leisure guests, and they are described as wanting “bang for the buck”. The increased accessibility of information has also made the customers less loyal. In addition, the decrease in international traveling due to the pandemic and customers choosing alternative accommodation such as Airbnb are mentioned as factors also increasing the competition. One strategy mentioned to tackle the high competition and

increased disloyalty was to create regulars and a high degree of retention by "making the guests feel at home".

4.1.4 Environmental situation

When asked about future trends within the hotel industry, only one interviewee mentioned sustainability. In general, very few mention problems or opinions related to climate change. One hotel manager expressed concern about future restrictions on travel due to climate change. Another interviewee mentioned having a completely climate-compensated suite for the environmentally conscious guest. Other than that, the topic was only mentioned in passing.

4.1.5 Digitalization and innovation

The hotel industry is lagging behind other industries when it comes to digitalization and innovation. This is a notion shared by all interviewees, and the industry is commonly defined as a late adopter. Many compare the innovativeness and digitalization rate in the hotel industry with the airline business, which has experienced a rapid digital transformation in the last few years. Despite this, the Covid-19 pandemic forced the hotel industry to make changes in their operations and several digital solutions were introduced with the aim to reduce physical contact and cope with a reduced workforce. One interviewee said that "Following the pandemic, a decade of technological development took place in the hotel industry during one year". There was suddenly an increased focus on the digital customer journey, which included the usage of QR codes and self check-in/check-out. However, there is a scattered view on whether these efforts were temporary measures to endure the pandemic, or if the digitalization journey is here to stay.

The interviewed hotels reported different levels of digital influences in their hotels, where some had dismantled digital solutions since the pandemic whilst others saw it as a catalyst to add more innovations to their pipeline. Much of the conversation on innovation and digitalization concerned self check-in/check-out, which about half of the interviewed hotels reported not to have. Among the

other half, some only offered this service to a limited group of guests, for example those that were members of the hotel's loyalty program. Others were currently conducting pilot tests with digital check-in solutions and only a handful of the hotels had a self check-in system in place.

The rationale behind the choice of having a self check-in system or not differed between hotels. A common reason for not implementing digital check-in is that it would remove the personal touch that the receptionist offers during a manual check-in process. One hotel manager says that "We don't want to go in that direction, a hotel is a place where guests should be taken care of by humans". Additionally, smaller hotels argue that self check-in only adds value to hotels with a lot of waiting time in the reception area. A third reason mentioned during the interviews was that the current digital check-in systems available still do not solve issues that involve identity checks of guests and key hand-outs. On the other hand, interviewees that provide self check-in today argue that it is important to offer guests alternative channels to meet all customer needs. Some target groups are more prone to choose digital journeys if offered. This is also the case according to some hotel managers with a self check-in system in place. However, one interviewee estimates that only 10% of their guests use the self service option. Moreover, many interviewees see check-in/check-out as a transactional process which motivates digitalizing this step whilst still keeping the personal touch in other interactions with guests. Beyond digital check-in, other common digital innovations mentioned by the interviewees included digital internal tools like online booking systems and automated communication systems. Several of the hotel managers had also implemented or tried out cleaning robots, however some mentioned that they did not live up to their expectations.

When asked how innovative the interviewees would describe their hotels to be, a vast majority said that they are "very open to innovation". One interviewee says the road to growth and development in the hotel industry is through innovation. However, when asked to give examples of previous innovation adoption, few of the interviewees were able to give any concrete answers. All in

all, three factors were commonly mentioned when deciding on adoption of innovations. Firstly, whether the innovation can prove to deliver long-term value and improve efficiency. Secondly, whether the innovation is in line with the hotel brand. And finally, whether the innovation enhances the customer experience, since the guest is always the main focus in an adoption decision.

The general attitude towards digitalization in hotels differs a bit more. One hotel manager showed concern about the increased use of technology and artificial intelligence, and another stated that "when the industry is moving towards more digitalization, we want to move in the opposite direction". Most interviewees however saw some degree of digitalization as a necessity going forward. One notable concern shared by all of them is the challenge of balancing the digital with the analog. As mentioned, the personal touch is seen as the core offering in a hotel business, and the fear of losing this whilst introducing digital solutions is the key challenge managers deal with in their digitalization strategies. Solving the trade-off between the need to cut personnel costs and maintaining personalization is what one interviewee described as finding digital customer journeys that combine "high tech" with "high touch". There were several other barriers to digital transformation addressed in the interviews, for example the wish to integrate all digital systems into one. Many are worried that adoption of new technologies means adding multiple new platforms, and the possibility to gather everything in one system or application is desired. Furthermore, an attitude found during interviews was that digitalization and the presence of high-tech is connected to the low-budget hotel segment. On the other hand, some interviewees disagreed and one person expressed that "nowadays hotels with a high rate of digitalization do not even necessarily have to be less luxurious". Lastly, the question about data protection is something managers worry about when adopting new technologies.

Nevertheless, the industry is unanimous in its conviction that hotels are becoming more and more digital. One interviewee said that "There is a lot happening right now with robots and AI, and I think it's going to be a disrupter, maybe even a bigger disrupter than the advent of the mobile phone". A lot of

industry trends are motivating a digital transformation and the new generation of customers are expecting it. The economic situation is forcing hotels to cut costs, mainly by running operations more efficiently or decreasing man hours. As plenty of reasons for digitalizing hotels were brought up during interviews, the biggest motivation seems to be reducing personnel costs. However, one interviewee that works for a large hotel chain says that “I think we are past the point where we would adopt technology with the purpose of replacing personnel, the problem is that there is no personnel to hire in the first place“. Many also mention the need to relieve the staff of administrative or repetitive tasks. All in all, there are many industry trends that point in the digital direction.

4.2 Hotel characteristics

Several questions in the interviews concerned business characteristics typical to the hotel industry. In this section, common organizational structures among the interviewed hotels will be presented. Additionally, themes connected to brand strategy, hotel target groups as well as how the hotel industry deals with guest feedback collection will be highlighted.

4.2.1 Organizational structures

During the process, 13 hotel specific representatives and 3 group level representatives were interviewed, see Table 3.1 in section 3.6.2.1. Out of the hotel specific representatives, 10 described their role as hotel manager/CEO and 3 as sales or marketing managers. On group level, one was E-commerce manager, one was a member of the board and one was CEO of the Scandinavian branch of a global hotel chain.

Out of the three group level representatives, two described their chains as centrally managed, with minor decisions being made by the individual hotels. The third one, whose company has a franchise-model, described the independence of the individual hotels as high even though long-term strategies are decided on group level. All of the group level representatives mentioned

that they were fond of pilot testing, and that they had some kind of flagship hotel where innovations are implemented first.

Regarding the hotel specific representatives, many different owner structures were present. Many of the privately owned hotels are also part of franchise programs, while some hotels are owned and governed by larger hotel chains. When asked about decisions made on group level, many bring up cost efficiency and synergies between the hotels as drivers for central control. Overall, the perceived independence varies a lot between the different hotels. The decision-making processes vary a lot, both between hotels with different owner structures and between hotels with similar owner structures.

4.2.2 Brands and target groups

Many of the representatives of hotels located in larger cities want to maintain a balance between leisure guests and business guests. As business customers are mainly present during weekdays, leisure guests are important during weekends in order to maintain an even occupancy over the week. The resort-like hotels, such as spa and wellness locations, describe that the business segment is important for them as well, but rather than providing accommodation for business travelers they organize conferences. Regarding the business segment, their behavior and needs deviate from the leisure segment. Many hotel managers describe that the business customers prefer smooth processes over personal contact. They are used to traveling and want the check-in process to be as quick as possible. Many of them are contractual customers and have stayed at the hotel multiple times before, so they do not need any personal introduction. As an example, some interviewees mention that this segment would benefit the most from automated check-in processes. One hotel chain is targeting this segment by launching a new concept with less personal service, more automated processes and lower prices.

When asked about their brand strategy, many of the interviewees answered in vague terms. In general, few of the hotels have an outspoken brand strategy that they work actively with. Some hotels have outsourced the brand-building while

others say that their budget is too small. Only one hotel mentioned PR as a part of their brand strategy. However, a lot of the hotel managers describe striving for “the same language” throughout the entire experience – housekeeping staff and receptionists are expected to have the same tonality as social media posts and pre-stay emails. Some interviewees brought up having difficulties with conveying the same feeling throughout the entire experience. Even though social media is a vital part of branding, it is important that the expectations set by Instagram posts match the actual experience.

A relatively common concept, both for city hotels and resorts, is to aim to keep the customers at the hotel during their stay by providing high quality food and beverage, entertainment and events. The resorts located in the countryside are particularly successful with this concept, as customers arrive at their hotels to stay there, rather than to explore the surroundings.

4.2.3 Guest feedback

The group level representatives mention feedback as a strategic question of importance. Feedback is an important way for hotels to get insight into their own product. On top of this, one hotel representative also mentions that the slightest change in hotel rating can affect the price point of a hotel room tremendously. Furthermore, feedback is a cornerstone in decision making processes surrounding investments and business development.

All hotels gather feedback by sending out forms via email and many also use digital tools to aggregate reviews from third-party sites. As previously mentioned, some have also hired guest excellence managers or similar roles, whose responsibility is to gather feedback during the customers’ stay. The response rate varies greatly, and not every hotel manager knew their response rate. Several interviewees saw increasing response rates as a strategic question.

4.3 Adoption of social robots

When presented with the Furhat robot, the most common initial reaction from the interviewees was how cool, exciting and fun the robot is. Plenty of the interviewees mentioned that this is a futuristic invention and that it will be natural in a couple of years. However, the estimated time horizon for when social robots will be perceived as normal and integrated in our lives varied. Some thought that we are ready for it today, while others said that it is reasonable to expect this within 20 years.

4.3.1 Potential hotel use cases for social robots

During the interviews, all participants were asked to think about what use cases could be relevant for the Furhat robot in a hotel setting. They were asked to consider in what physical spaces of a hotel the robot could be placed, what tasks or functions it could perform and in what applications the hotel would benefit the most from implementing the robot. Initially, interviewees were asked to brainstorm freely, after which they were offered a list of additional example use cases. They were then asked to describe what motivations and barriers they saw to using the robot in these specific applications. A summary of the motivations and barriers to the different use cases can be found in Table 4.1.

Table 4.1. Summary of the use cases for the Furhat robot in a hotel setting and the respective motivations and barriers to each use case discussed by the interviewees.

Potential use cases	**Motivations**	**Barriers**
Receptionist	● Can work 24/7 and solve issues of unmanned reception night time ● Can greet/answer	● A receptionist must be able to do so much more than check-in/out, can the robot really handle

	international customers in their own language ● Great complement/support to self check-in, more personal touch ● Offer alternative check-in route if long waiting time in the reception	e.g. refunds, fire evacuations etc.? ● Reduces personal touch, e.g. can't offer champagne ● Check-in could easily be digitalized in other ways, easier/cheaper to check-in on your smartphone than with the robot ● Doesn't solve the issue of handing out physical keys or completing ID checks on guests
Concierge & information station	● Has more knowledge than employees and can give better recommendations than e.g Google ● Answers quick questions ● Can help book restaurants/taxis etc. ● Adds entertaining value to guests in the lobby ● Relieves receptionists from questions, meet guest needs by offering robot help	● People already easily book their own taxis/tickets with their smartphone ● Feels weird that a robot would recommend a restaurant it has not tried itself

	• Help people locate rooms or describe layout of conference rooms • Help with technical issues in conference rooms • Could welcome customers at parking lot • Provides service in unmanned parts of the hotel	
Feedback collector	• People find it hard to give concrete feedback to humans, could get more honest feedback • Possibility to extract and gather all data • More fun to give feedback through robot instead of email form • Could possibly improve the response rate	• If you are unhappy you want to speak to a human • It needs to have its own room for guests to feel comfortable sharing feedback? • Sounds expensive to implement robot for feedback applications alone, only for hotels where guests expect to be asked about their stay everyday • When people leave negative feedback they usually want to be anonymous • Already have good

		feedback collection in place ● Guests want check-out to be quick, not stopping for feedback
Robot suite	● Fun ● Attractive to tech-savvy customers ● Nice to offer a digital butler ● Can order room service from the robot ● Adds a tailored suite-experience – "enhanced stay" ● Hotel rooms can be lonely, good to offer meditation or movie recommendations through the robot ● A way of getting publicity	● Interferes with personal space ● "Does it listen to you?" ● Want to be able to turn it off ● Afraid people will tamper with the robot when they are alone ● Afraid it's more a PR trick than real value ● A digital butler in the room is advantageous, however could be done with a less expensive technology
Human Resources	● Saves HR man hours if it can collect employee feedback and conduct interviews ● Unbiased treatment when used in a recruitment setting	● Fear that it will recruit only based on merits instead of personality traits ● Employee trainings are already very digital and

	• Use for internal communication and employee training • Multilingual staff benefit from robot language skills	interactive, don't think the robot will cut any costs
Restaurant	• Can present the menu and give recommendations in a personal way • Increase personal touch if restaurant is already partly automated (e.g. qr codes)/lacks competent waitresses	

4.3.1.1 Receptionist

Many interviewees' initial response to potential use cases was to deploy the Furhat robot in the hotel reception, completing tasks like check-in and check-out of guests. This response was presumably a consequence of the video shown to all interviewees, showing the Furhat robot in a hotel lobby checking in guests, answering questions and recommending a sushi restaurant. The interviewees described the main motivations for the robot in a reception as that it can relieve staff of heavy workload, like working 24/7 and cover night shifts. The robot can further offer an alternative route for customers that speak other languages or appreciate a digital and quicker check-in. In addition, the robot could increase personal touch when compared to a touchscreen or smartphone app. Although many interviewees mentioned this use case as a possible way to implement the robot, there were several issues brought up in connection with this use case as well. One interviewee said "It is easy to believe that the robot

should replace a receptionist, but I am not sure that will create any added value". Few interviewees saw the reception use case as the most beneficial way of implementing a robot, especially since they did not believe that the robot could perform all necessary functions as receptionists do today. As an example, many highlighted tasks like crisis management, when the lobby needs to be evacuated or you need to attend to a sick guest. Additional barriers to a receptionist robot are that many hotels require an ID check of guests and need to hand out physical room keys, which increase the specifications and system integrations for the robot. Some hotel managers described the check-in process as transactional, which worked as an argument both for and against the implementation of a social robot. On the one hand, as this process is transactional a robot could take over this task to give room for the receptionists to focus on more complex tasks. On the other hand, hotel managers that already saw check-in as a "hygiene factor" preferred to offer a cheaper solution like self check-in through the guest's smartphone. One interviewee said that he did not think that the guests who self check-in online today would rather talk to a robot. Some interviewees however still saw the check-in process as the most important touchpoint with the customer, and therefore were afraid that the robot would reduce the personal touch.

4.3.1.2 Concierge service and information station

Out of all use cases, the interviewees saw the most value in letting the Furhat robot offer concierge-services and answer any questions the guest might have. This use case included giving information about both the hotel and the surrounding environment. For example, the robot could help guests navigate within the facilities, recommend and book restaurants or tourist attractions or educate guests about the city they are visiting. The interviewees gave lots of arguments for why this use case was beneficial for hotels. Many of the hotels did not have a concierge service today, and felt that they did not have sufficient time to answer all questions that their guests had. Additionally, many highlighted the relative advantage of having a robot concierge, who's knowledge far exceeds that of a person. In comparison to if the guest would use a search engine like Google, they also thought that the robot could give more

concrete answers and a more personalized service. Many also pointed out that the robot would bring added value and increase the service level of the hotel if it was placed for example by the elevators, in the gym or the conference rooms. These are places where many do not have staff today and where a robot could increase guest satisfaction. The only actual use case-specific negative remarks mentioned about the implementation of the Furhat robot as a concierge were regarding the robot recommendations and booking services. One interviewee pointed out that guests easily book their own taxis or restaurants with their smartphone, while another said that they did not think their guests would appreciate recommendations from a robot that has never experienced the restaurant it is recommending.

4.3.1.3 Feedback collector

One of the use cases presented to the interviewees was to use the Furhat robot as a feedback collector within the hotel. The robot could be placed in the lobby or any other suitable location and gather oral feedback from guests during their stay. The collected answers could later be extracted as data and compiled for the hotel staff. This is a use case that was presented to us by Furhat Robotics, who have done a pilot test using the robot as a feedback collector at a museum. Henneville-Wedholm[2] stated that the response rate when using the Furhat robot reached above 90%.

Many interviewees found this use case interesting, as guest feedback is important in the hotel industry and low response rates is a challenge to solve. Several hotel managers thought that feedback collection via the robot would lead to more honest answers. Furthermore, some believed it would bring a higher response rate as it is a more fun experience to talk to a robot than filling out a feedback form. As some hotel managers compile and answer feedback manually today, the automated data extraction is also highly valued. In contrast, several barriers to this use case also emerged during the interviews. First and

[2] Arnaud Henneville-Wedholm, Business Director at Furhat Robotics, Virtual interview, January 27th 2023.

foremost, hotel managers highlight that negative feedback from guests is a delicate matter and needs to receive appropriate attention from staff. For example, the interviewees were skeptical about how the robot would handle a dissatisfied or angry guest and if it could properly manage refunds, compensation or find solutions to a problem. In this matter, one interviewee said “if a guest is unhappy about something, I think they want immediate attention from a real person that represents the experience they have just had”. Furthermore, one hotel manager thought that when guests are checking out from a hotel, they want the process to be smooth and not stop to converse with a robot. The issue of anonymity also came up during these discussions, and some hotel managers thought that guests would feel uncomfortable sharing feedback in person or they would need a separate room for the robot where it could collect the reviews.

4.3.1.4 Robot suite

A fifth use case presented to the interviewees, was to place the Furhat robot within a hotel room. This could either be offered in several rooms or as a unique experience where a customer can book the “Robot Suite” for a higher price. The robot would function as a personal butler in the room, but also offer entertainment services. For example, the robot could lead meditation sessions or give personal movie recommendations. Several interviewees responded to this use case as a fun way to increase the product offering by adding a tailored in-suite experience. One interviewee also saw this as a way to provide tech-savvy customers with an attractive deal. The main barriers connected to this use case surround privacy issues. One interviewee highlighted that a hotel room is a personal space where the guest might feel uncomfortable and scared that the robot is seeing or listening. Another interviewee was scared that such an expensive technology could get destroyed. The idea of offering personal assistance in the room was cherished, however some interviewees said that they saw equal value in a less expensive technology like a chatbot or a smart home device like Amazon’s Alexa. There was also skepticism in implementing the robot with such little exposure. If the robot would be placed in only one hotel

room, one interviewee thought that it would be more of a PR trick than actual added value to the business.

4.3.1.5 Human resources

Multiple hotel managers saw a benefit of using the Furhat robot in human resources applications. As mentioned, recruiting and staffing is a big challenge for the hotel industry, and many managers brought up time-consuming HR activities like interviewing, training and conducting employee appraisals. Some see the Furhat robot as a time-efficient solution to this problem with the extra value in its unbiasedness when it comes to interviewing. One interviewee even said “this would be a perfect complement to our HR department, or actually I see the robot even replacing an HR employee”. An additional benefit to the HR application is that many have multilingual people among their staff and the robot would improve internal communication. As barriers for the HR use case, one interviewee had doubts regarding how the robot would perceive and choose candidates in an interview process. He said that when recruiting hotel staff, more emphasis should be placed on the candidate’s personality and social skills, rather than his or her merits. He then doubted if the robot really could interpret those skills correctly. In regards to employee training, one interviewee mentioned that this process is already very digitalized and effective today, such that deploying a robot for this use case would be needless.

4.3.1.6 Restaurant

As most hotels manage a restaurant business as well this is also a possible use case for the robot, which one of the interviewees brought up on his own. The mentioned benefits of this use case is that the Furhat robot could personalize the restaurant experience by for example recommending food or beverage on the menu and taking orders. Since the hospitality industry is experiencing a difficulty in recruiting staff, he thought that the Furhat robot would increase the personal touch in comparison to an inexperienced waiter that induced waiting time and poor service. The Furhat robot would furthermore be a better substitute for automated restaurants where guests order with QR codes or touch screens.

4.3.2 Barriers to adoption of social robots

In this section, general barriers or concerns that the interviewees had about the Furhat robot are brought up. Several barriers connected to specific use cases are discussed in the previous section. However, the interviewees mentioned many other factors that could hinder their adoption of the Furhat robot.

4.3.2.1 Guest readiness

Many of the interviewees expressed a fear that their guests would react negatively when introduced to the robot. In particular, the older customer segment is described as somewhat scared or skeptical of new technology. However, none of the interviewees mentioned examples of when this has happened with other technologies at their hotels. Many describe that this is the future, but guests have to get used to the technology before it is introduced in a hotel setting. As a strategy to tackle this perceived attitude, one interviewee said that the guests need to be able to try it before they are "forced" to use it.

Many expressed a belief that few of their guests would prefer interacting with the robot instead of a human. "If presented with a choice between the robot or a receptionist, I think 95% of our customers would choose the receptionist" was a quote by one of the hotel managers.

4.3.2.2 Physical appearance

Some of the interviewees perceived the human resemblance as scary and negative. One interviewee said that she would have preferred the robot to look more "robot-like" instead of human. Another said that it was a failed attempt to make us feel safe by making it look human, while in reality it only makes the robot look creepy.

4.3.2.3 Personal touch

One of the most frequently mentioned barriers was the interference with the personal touch. The robot is described as less personal than a human, and multiple interviewees thought that their customers would be disappointed by the

lack of service. If the hotel is not explicitly branded as high-tech or low-budget, it would be a negative factor for the customers.

Even when the robot does provide personal service, the hotel managers describe it as less trustworthy than a human. As an example, some mentioned that customers would probably prefer a human recommending them a restaurant as the human might have visited it before, while the robot only relies on data.

4.3.2.4 Staffing

Within the staffing aspect, there were two important barriers. Firstly, hotel managers mentioned that they are reluctant to fire their staff. Even when using the robot as a complement to human staff, the introduction of a social robot within the business could create distrust and uncertainty among the employees. The fear of being fired or replaced by a robot might damage the work environment, according to the interviewees.

Secondly, hotel employees are very focused on, and used to, giving great service. If they are not convinced by digitalization in general, and the robot's abilities in particular, they might be hesitant to adapt to the social robot. The solution to both problems was, according to the hotel managers, to let their employees get used to the robot before launching it to their customers.

4.3.2.5 Brand incompatibility

As mentioned previously, many of the hotels have centered their branding around personal touch and high service. Therefore, many of them did not think that the robot matches their brand strategy. Even some hotels who described their brands as innovative said that even though it matches that part of their brand, it all comes down to the personal touch. In addition, some hotels mentioned the specific way of communicating and creating an atmosphere as possibly incompatible with the robot. They expressed a fear that the robot would not be able to learn their way of conveying a certain feeling or representing their values. One interviewee said that "Robots are really smart,

but it would have to understand our brand and be programmed to convey what we want".

4.3.2.6 Functionality

Before buying the robot, some mentioned that they would need to decide what use case the robot would fill. This was lifted as an internal process at the hotel as well as a collaboration with the robot company. One interviewee said that the robot company would have to sell it in an appropriate way, and help the hotel find the gaps that it would fill. Several interviewees said that for the partnership to work, the social robot supplier needs to be engaged and a close relationship developed for the hotel to feel safe adopting such an innovative and high-tech product.

Several of the interviewees expressed concern that the robot would not work as expected. While some were afraid that it would give inaccurate or "weird" answers, others mentioned a fear that it would stop functioning. Since few hotels have IT competence in-house, many stated that the most important entity of the augmented product would be an extensive support agreement. Some interviewees mentioned a 24/7 support offering needed for this technology, even as much as a project manager on site during the first period. Several hotel managers were worried that the robot would stop working, for example in the middle of the night, and identified a risk that the robot company would not be able to provide fast repairs. Apart from a comprehensive instruction of the product, interviewees also mentioned that they needed some kind of insurance from the supplier. The insurance needs to cover both robot malfunctions, but also situations where the robot might make wrong decisions or impose harm to the business. This is a question regarding liability and artificial intelligence where several interviewees saw a risk of carrying this accountability themselves.

Functionality concerns were also raised from an interactive perspective. Many were afraid that the robot is not ready to tackle upset or stressed customers. This concern regards both the fact that the robot might upset angry customers even

more since it is not sensitive enough, as well as the risk that the robot would not be able to handle complaints, which are quite delicate situations, correctly. One interviewee mentioned the balance between having full control of the robot's responses and restricting it a lot, and letting the robot use information from e.g internet to make it smarter but risk losing control over inaccurate responses. At the same time, some also pointed out that humans have error margins as well. Some also mentioned that since chatbots and similar have come so far, the expectations on the performance of the robot may be set too high, which could result in disappointment.

4.3.2.7 Privacy and security

Several of the hotel managers mentioned the risks connected to privacy, data and security. First of all, they expressed regulatory concerns such as if the robot is compliant with GDPR and other data protection regulations. According to many interviewees, for the robot to be an attractive offer, the company needs to be able to guarantee this kind of compliancy. Furthermore, the hotels are afraid that their data will leak to other parties. Apart from that, some hotel managers are afraid that it will scare their customers in terms of surveillance. For instance, one hotel manager was afraid that guests would think the robot was watching or listening to them. "We have to get used to being monitored" was a quote by another hotel manager who said that guests might be afraid that the robot saves information about them after interacting with it.

4.3.2.8 Integration of systems

A recurring point of view among the hotel managers was that they strive to have as few systems and technical products as possible. Instead, they want to integrate as much as they can in the existing systems. For instance, a few mentioned that they are currently using the TV:s as a hub for technical solutions – room service, music or movies and information can all be found there. The same goes for their internal systems, such as communication or booking tools. In general, one should be careful before adding yet another system or product instead of trying to integrate it to the current solution as it increases effort both

for the personnel and for the customers. As they saw the Furhat robot as a separate system, some interviewees viewed this as a barrier.

4.3.2.9 Cost

No matter the use case, the robot must add a clear value to the business. Many said that it either has to impose economic value or improve their brand, which would in turn create economic value. Some interviewees said that as the robot would act as a complement to human staff, it would have to be significantly cheaper than hiring someone. When the robot is used for PR, customer experience or brand purposes, one interviewee mentioned that they are more price-sensitive as it is hard to measure the final economic contribution.

Even though the price point for the Furhat robot was not discussed in the interviews, some mentioned that their willingness to pay would depend on the specific use case and projected outcomes for the hotel. One interviewee highlighted that with such big investments they want flexible payment models and the possibility to discuss the benefits with down payments, direct investments or monthly subscriptions.

4.3.2.10 First mover

The hotel industry is cautious rather than brave, according to several of the hotel managers. Many of them did not want to be the first hotel with a social robot, for multiple reasons. Firstly, they wanted other hotels to adopt it first in order for them to see that it works properly and can be integrated in a hotel setting. Secondly, as many were afraid that their customers would react negatively to the robot, they wanted them to get used to it both by encounters at other hotels and in other sectors. Lastly, many hotel managers simply did not think of themselves as pioneers or early adopters. Despite this, there were two interviewees that said that if they were to adopt the robot, being the first hotel to do it was rather an advantage.

4.3.2.11 Trialability

Several interviewees noted that for these types of investments, the contract needs to be highly flexible. Many said that they would only adopt this type of innovation if the supplier could offer a pilot project as they would not be prepared to sign up for a three year contract without testing the product first. The pilot test would further need to involve a tailored solution where implementation is customized for their specific needs. In other words, the hotel customer wants a joint development of the product with for example system integrations and unique concept solutions.

4.3.3 Motivations for adoption of social robots

In this section the general motivations for implementation of the Furhat robot shared by the interviewees are presented. However, some motivations for specific use cases can be found in section 4.3.1. The motivation for adopting this innovation comes down to a matter of cutting costs or increasing revenue, regardless of whether this is achieved through replacing staff, offering a higher service level or strengthening the brand.

4.3.3.1 Staff replacement

When asked what the biggest motivation for adopting a social robot in a hotel would be, most interviewees refer to cost-effectiveness. As previously mentioned, one of the biggest costs for a hotel business is personnel, and within such a low-margin business any solution to this problem is worth looking at. The interviewees say they believe that the Furhat robot could replace personnel or lead to reduced man hours, consequently leading to a cut in costs. They highlight the advantages of a robot that works day and night, needs no sick leave and operates more efficiently than humans. This leads many interviewees to suspect that the robot would be more cost-effective than staff, obviously depending on the size of the investment. One interviewee representing a hotel that targets a low-budget business segment through technological solutions, saw staff replacement as such a great motivation that he explicitly expressed adoption intentions of the Furhat robot.

4.3.3.2 Increased service

If the motivation is not to cut personnel costs, a common opinion is that the interviewees would rather adopt the innovation to strengthen their product offering. Many say that the most notable motivation for implementation of a social robot would be to increase the level of service, which in turn should lead to a better product and increased revenues.

Once again, the motivation stems from staffing problems, but perhaps maybe this time the lack of competent staff to hire. The shortage of staff and its corresponding problems gives reason to find a solution and maintain or increase the service level towards guests. Many interviewees thus mention that a great motivation for adopting a social robot would be to decrease waiting time in the lobby and relieve overloaded personnel of certain tasks. For example, by relieving receptionists of transactional and simple tasks, the staff could focus more on attending to guests in more complex issues and thus increase guest satisfaction. One larger, business-oriented hotel representative mentioned that during certain times of the day, bottlenecks are created in the reception as all customers arrive at once. They were therefore very positive about adopting the robot, as it could increase their service when the receptionists were already busy handling other guests.

In addition to relieving staff of certain tasks, some interviewees believe that the robot in itself could increase the service offer. One interviewee said “A couple of years ago I would have said that the biggest motivation is to make operations more efficient, but soon I think we will be in a place where a social robot can offer even better service than humans”. Compared to human staff, the social robot has a much broader spectrum of knowledge, a steeper learning curve and can give more precise answers to niche questions. Some interviewees also mention that the language skills of the Furhat robot will increase the personal feeling for international guests. Asian guests with low English language level are especially mentioned as the staff has a hard time delivering a personal touch to these guests today. Furthermore, the possibility of changing the appearance of the robot could give a sense of familiarity to foreign guests. A fourth reason

mentioned that can increase the level of service is its unbiasedness and that it has no preconceptions and greets everyone the same way. Interviewees also mentioned that the social robot could contribute to better service when either placed in unmanned locations of the hotel or when replacing already automated processes. Lastly, the interviewees mentioned that offering an option for guests to engage with the robot is a motivating factor since it responds to an increased demand from certain customer segments, like business travelers or young guests.

4.3.3.3 Branding

During the interviews, some mentioned that the robot could be a good way of signaling that their hotel is at the forefront of technology and innovation. Many expressed that it would be a fun way to create a different brand centered around technology and give the hotel a modern atmosphere. One hotel group representative said that the strategy in that case should be to involve the marketing department to create a campaign and a buzz around the robot, after which it should be rolled out to a closed group of guests before being introduced to the public. One interviewee representing a hotel with a strong brand built around art, entertainment and luxury expressed that the robot is aligned with their ambition to offer a unique and cool experience to their guests.

5 ANALYSIS

This chapter aims to analyze the empirical findings with an abductive approach through the lens of the theoretical framework.

5.1 Commercialization of radical innovations

When analyzing an innovation and its corresponding challenges of adoption and commercialization the type of innovation must be identified. With the classification by Frattini et al. (2012) of innovations as either radical or incremental, the Furhat robot is identified as radical. Furhat is based on break-through technologies like artificial intelligence and belongs to a new product category, namely social robots. A radical innovation must further impose changes in consumer behavior and as noted in the chapter empirical findings, many hotel managers highlighted a needed behavioral change by guests and coworkers that would interact with a robot instead of a human.

The commercialization process for radical innovations (Cubero, Gbadegeshin & Consolación 2021), as described in the theory section, follows three stages. As this master thesis aims to answer how social robots can be adopted, rather than commercialized to the fullest extent, only the first two steps are applicable. The first stage, *Concept and Value Proposition Validation* rhymes with the methodology and the first research question of this master thesis. The aim is to understand the target market and receive feedback from potential customers, which has been performed by aggregating attitudes towards the Furhat robot from a selection of hotel representatives. The second stage presented by Cubero, Gbadegeshin and Consolación (2021), *Business Validation and Market Creation*, involves adjusting the offer and refining the innovation, as well as selecting a target segment. This stage rather rhymes with the second research question of how the innovator should overcome barriers and construct an offer

to facilitate adoption in the market. Thus, by answering the research questions of this master thesis with the chosen methodology, the first two stages of the commercialization process for radical innovations are explored.

A second commercialization framework discussed in the theoretical framework is the three discontinuities and challenges by Aarikka-Stenroos and Lehtimäki (2014). When looking through this lens at the Furhat robot in a hotel setting, all three discontinuities can be identified. Firstly, there is a big variance between the technologically advanced Furhat robot and the low innovativeness and readiness in the hotel industry. This *technology discontinuity* complicates the commercialization process as the complex technology does not fit into the customers' current consumption patterns. This in turn leads to a *customer discontinuity* where required behavior changes associated with the innovation create barriers to adoption. As can be seen in the chapter empirical findings, all interviewees showed some hesitancy towards this radical innovation since it did not align fully with their behavior patterns. Lastly, *marketing discontinuity* can be seen in this commercialization process as the Furhat robot belongs to a new product category. Furthermore, since Furhat Robotics has previously only been targeting the academic research sector, the shift to a new customer base requires learning how to match the innovation's technical features to market opportunities.

As all discontinuities presented by Aarikka-Stenroos and Lehtimäki (2014) are present for the Furhat robot on the hotel market, the subsequent associated challenges need to be addressed. The two most notable challenges, as discussed in the theoretical framework, are therefore applied in the following sections of the analysis. Firstly, the *challenge of understanding the customer's perspective* is discussed in section 5.2 by looking at the empirical findings on the business environment. The second *challenge of overcoming adoption barriers* is analyzed in section 5.4.

5.2 Challenge of understanding the customer's perspective

The challenge of understanding the customer's perspective (Aarikka-Stenroos & Lehtimäki 2014) is about zooming out from the features of the innovation and rather focusing on what the customers need and how the innovation can be a solution to their problems. This is a significant challenge for Furhat Robotics as the hotel industry is unknown to the company at the same time as social robots are unknown to the hotel market. Furhat Robotics, as many other innovators, is overly focused on the technical features and benefits of the robot. But to successfully commercialize a radical innovation in a new market the needs of the specific customers have to be in the center of attention.

Empirical findings from interviews about the business environment in the hotel industry are presented in section 4.1. Looking at these from the lens of Aarikka-Stenroos and Lehtimäki's (2014) framework, these highlight what needs and challenges hotels are facing, and consequently what value the Furhat robot could bring in different use contexts. The most notable finding is that the hotel industry is highly customer-oriented and that personal touch and a high service level are the ultimate goals for hotels. This supports previous theory presented in section 1.1.3, that the industry is extra sensitive to derived demand where adoption decisions are made based on end-consumer's preferences (Grissemann, Plank & Brunner-Spendrin 2013).

Understanding the customer's perspective also includes identifying what challenges hotels face in their business environment, such as staffing problems and economic uncertainty. Two key takeaways from findings are that the industry is lacking competent personnel to hire while at the same time struggling with high personnel costs in a low-margin industry. In short: the hotel industry thus has two incentives to reduce their workforce, but must at the same time balance this with maintaining the personal touch towards their guests. Insights like this is what the innovator needs in order to adjust and frame the product offering in a way that is attractive to the target market. In summary, Furhat Robotics needs to realize what value their innovation can bring to their

customers, not in terms of general features of the robot, but rather in what use cases the robot can solve specific problems for their customers.

5.3 Diffusion of innovation

According to Rogers' (1983) five factors that determine the rate of adoption (DOI), the Furhat robot gets mixed results. Being a radical innovation, it is not yet determined or known what the robot will replace. Therefore, the relative advantage depends on what use case is deployed. The fact that the use case is still undetermined makes it difficult for the customers to nail down the relative advantage. If the robot is intended to replace an employee, the relative advantage is high. Given that the robot can work 24/7 and never gets tired or sick, it is relatively cheaper and more reliable. However, if the robot is instead deployed for entertainment in a hotel room, the relative advantage is weaker. When compared to current technology alternatives such as Alexa or a TV, many interviewees do not see a relative advantage in the robot. Multiple reasons for that were mentioned, such as the physical appearance not being valued, the big investment or the hassle of integrating the robot with existing systems.

Regarding the robot's compatibility with the industry, our empirical findings suggest that it is quite incompatible from several perspectives. Firstly, the general opinion among interviewees was that the robot is conflicting with the foundation of the hotel industry – the personal touch. The robot is perceived as replacing the personal touch provided by a human, even though this is not necessarily the case for every use case. Secondly, it is technologically incompatible with the general preferences of the industry. As many of the interviewees mentioned that they prefer keeping the number of technological innovations to a minimum and integrating add-ons to for instance the TV rather than having multiple products that serve different functions, the robot might be perceived as an unnecessary expansion of the current product offering. Lastly, it does not comply with the staffing situation. A few hotel managers mentioned the difficulties of leading a team where some are human and others are robotic. Many brought up the fact that a robot could damage the workplace dynamics as

the employees would feel threatened, and that the employees would not be convinced by the idea of having a robot.

Concerning the complexity of the innovation, it all depends on the augmented service offering from the company. In general, the technical skill level in the industry seems to be quite low. The hotel managers showed low confidence in their own ability to handle, evaluate and implement technical innovations which increases the perceived complexity of the robot. At the same time, many expressed a theoretical openness to trying new innovations and digitalizing their businesses. The most common worry regarding the complexity of the robot was that it would be incorrectly programmed or tailored to their business. Therefore, the complexity can be decreased as long as the company provides sufficient tailoring, training and technical support.

Given the fact that the robot is tailored to the different use cases and businesses, the trialability is low. Even if it is possible to "meet" the robot before buying, it is hard to envision how it would behave in a specific setting or organization without a pilot test. Furthermore, it is not an innovation that allows for offers such as free trials, as the cost of developing and tailoring it is large.

The category in which the robot performs best is probably the observability. Unlike chatbots, social robots have a physical appearance which increases observability. In most use cases, it is integrated directly in customer-facing applications. At the same time, it is observable internally as well as employees will have to interact with the robot. Given the fact that it is a radical innovation, it is also likely to receive publicity and attention in the media through PR. If the purpose of the robot is to relieve staff during bottlenecks or with repetitive tasks, the benefits are highly visible both to guests and to personnel as operations become smoother. It is less visible when used for entertainment and branding, but the observability is still deemed high as the new innovation is likely to receive attention and PR.

5.3.1 Technology adoption model

Even though the Diffusion of Innovation theory can be used to estimate the rate of adoption, the framework is insufficient in this setting. As the derived demand from guests is of high importance to the decision-makers in the hotel industry, analyzing the situation from a B2C perspective is also important. Therefore, the Technology Adoption Model (TAM) is a suitable framework to investigate the end users' attitude towards the innovation. TAM reveals that there are two main variables that determine user acceptance of a product; *perceived usefulness* and *perceived ease of use* (Davis 1989).

The perceived usefulness can be estimated by taking the guests' habits into consideration. As described by many hotel managers, the business travelers have a demand for self check-in as it is quick and easy. To these customers, the robot is likely to be perceived as useful as it can check them in easily as well as answer questions, without forcing them to go through the reception. Another perk of the robot is that it can possess more information than a human, which makes it useful in a concierge or information station setting. As it is able to work around the clock, it might also be useful during periods when the hotels are normally unmanned, such as during the night. At the same time, the hotel guests might perceive the robot as less competent than a human which reduces the usefulness. The perceived usefulness to guests comes down to the hotel-specific application of the robot and who the hotel's guests are.

Regarding the ease of use, it varies between age groups according to the interviewees. However, due to the robot being a radical innovation, most guests are unfamiliar with the usage. While older guests might find it particularly difficult to use, it is likely to be perceived as hard to use by other segments as well. At the same time, using the robot is similar to talking to human staff which increases the ease of use. Other high-tech innovations might demand more technical knowledge as the robot is built to be as similar to human interaction as possible.

5.4 Adoption barriers

Following the logic reasoning in the theoretical framework, an additional perspective to Diffusion of Innovation (DOI) is offered by Behavioral Reasoning Theory (BRT). BRT suggests that the positive attributes of a product, like those analyzed in section 5.3, are not enough to evaluate the adoption potential of an innovation (Claudy, Garcia & O'Driscoll 2015). Instead, the innovator should focus on customer resistance and their reasons against adopting a certain product. Consequently, in this master thesis we have decided to strengthen the analysis by also looking at the adoption barriers of the Furhat robot in the hotel market.

As discussed in the theoretical framework, the main finding from BRT is that reasons against as well as reasons for adopting an innovation are equally important to identify. Furthermore, Claudy, Garcia and O'Driscoll (2015) argue that reasons for and against are not necessarily opposites. This theory is applicable to the Furhat robot case as well. To exemplify this we can highlight the empirical findings in section 4.3 where motivations and barriers were addressed by the hotel managers. One of the reasons for adopting the robot is its great language skills, making it possible to greet all international customers in a way a human cannot. However, as Claudy, Garcia and O'Driscoll (2015) suggest, the reason against adopting it is not the opposite, namely that a hotel manager would want to limit the languages spoken among their staff. Reasons against adopting the Furhat robot instead include other topics, like fears that it would not be functional in its applications or too big of an investment. However, there are some reasons for and against the Furhat robot that do have opposing attributes. The most notable is that a salient motivation for adopting the robot is to replace humans, in order to solve issues with staffing and high personnel costs. However, a strong reason against adoption is the risk of losing personal touch when replacing humans with robots. In other words, replacement of humans is both a reason for and against adoption of the Furhat robot. In conclusion, the Furhat robot case aligns with Claudy, Garcia and O'Driscoll's (2015) theory as not all reasons for and against adoption are opposites.

However, exceptions were found in some instances where this was not applicable.

5.4.1 Customer resistance to innovation

In the BRT analysis, the framework built by Joachim, Spieth and Heidenreich (2018) has been used to identify and group the barriers to adoption of the social robot. The barriers to adoption of the Furhat robot have been analyzed through this framework, see Table 5.1. Although the original study by Joachim, Spieth and Heidenreich (2018) was carried out in a B2C setting, our mapping against the framework suggests that it is somewhat applicable in a B2B setting as well. Out of the 17 barriers defined by the authors, 10 were present in our study, as can be seen in Table 5.1. An explanation might be the hotel representatives' sensitivity towards their customers. As shown in our empirical findings, the presumed reactions and opinions of the hotel guests are extremely important to the hotel managers. Throughout the interviews, the interviewees kept taking what they thought their customers would think into account. Hence, the presumed opinions by the hotel guests are likely to have spilled over at the very customer-oriented hotel representatives.

After analyzing our empirical findings by applying the barriers identified by Joachim, Spieth and Heidenreich (2018), we created a heatmap based on which barriers were most crucial to the hotel representatives. The rows marked with a red color are classified as the most crucial barriers. Orange rows are ranked as having medium importance, while the yellow ones are least relevant. Even though the barriers marked with a yellow color were mentioned in the interviews, they were described as concerns rather than salient barriers by the interviewees. The classification was based on two factors – frequency and degree of importance. The red barriers were mentioned frequently and seemed to have a large significance to the interviewees, the orange ones were mentioned *either* frequently or with strong emphasis and the yellow barriers had a low frequency *and* a low emphasis on importance.

In the original study by Joachim, Spieth and Heidenreich (2018), the barriers with the strongest negative impact on adoption intention were the norm, value and communicability barriers. As can be seen in Table 5.1, our findings deviate slightly. Even though the value and norm barriers were listed as highly important to our interviewees as well, the communicability barrier was not present at all. An explanation to this might be that the purchasing process differs between B2B and B2C customers. As B2C customers often base their purchase decision on information received from advertising, web pages or word-of-mouth (Rėklaitis & Pilelienė 2019), it is reasonable that the communicability barrier is strong. On the other hand, B2B decisions can be assumed to be more thorough, informed and involve more decision-makers. Unlike B2C customers, B2B customers get their information from e.g extensive sales pitches and product exhibitions. The decision making process is longer, more rational and not based on advertising in mass media (Rėklaitis & Pilelienė 2019). Hence, communicability is less important as the decision-makers have a different way of gathering information. At the same time, the norm and value barrier are very important in our research setting as well. Both barriers touched upon one of the most important values within the hotel industry – personal touch.

Table 5.1. The 17 active innovation resistance barriers examined by Joachim, Spieth and Heidenreich (2018) mapped against the barriers found in empirical findings to adoption of the Furhat robot.

Barrier	**Explanation**	**Examples for the Furhat robot**
Value barrier	The new product is not perceived to have a relative advantage when compared to the current alternative.	Compared to a receptionist, the robot is unable to do complex tasks and reduces personal touch. Other innovations, such as digital mobile check-in and room service through the TV, are easier and cheaper to integrate. Many struggle with finding a perfect use case, hence relative advantage is difficult to identify.

Complexity barrier	The innovation is perceived as being too difficult to understand or use.	Many hotels do not possess enough technical expertise in-house for them to feel comfortable with handling the robot.
Co-dependence barrier	The innovation is perceived to need complementing parts/services.	The hotel would need extensive support and implementation services from the innovator.
Trialability barrier	The innovation is perceived as being hard to try.	Hotels would like to have flexible contracts due to large investments. Difficult to do pilot projects because of highly tailored products and high development costs.
Compatibility barrier	The innovation is perceived as incompatible with other products.	Less personal touch, which is the core offering of the hotel product. Internally, the robot might not be possible to integrate with systems and programs.
Amenability barrier	The innovation is perceived as impossible to modify to suit the consumers' needs.	Worrying that the robot will not learn their way of communicating.
Realization barrier	The innovation is perceived to take too long time to become beneficial.	–
Visibility barrier	The innovation is perceived to be	–

	unable to observe when using it.	
Communicability barrier	The innovation is perceived as being hard to describe in words.	–
Functional risk barrier	Worries that the innovation might not work as expected.	Worry that the robot stops work if internet connection is lost. Afraid robot would give “weird” answers to guests.
Personal risk barrier	Worries that the innovation might threaten the users’ physical condition.	–
Economic risk barrier	Perception that innovations’ costs are too high or unprofitable.	Substantial investment. If the investment does not directly reduce any other existing costs, one becomes price sensitive as its’ only purpose is to increase guest satisfaction
Social risk barrier	Fear that the surrounding would not approve of the innovation.	–
Information barrier	Perception that the innovator leaves out important information, leading to the conclusion that the innovation	–

	has undesirable consequences.	
Image barrier	Negative impressions of e.g the brand of the company providing the service/product.	–
Norm barriers	Perceptions that the innovation conflicts with prevailing norms, family values or existing traditions	Personal touch is the most prevalent norm within the hotel industry, the robot might decrease the perceived personal service. Traditionally not an innovative or digital industry.
Usage barriers	Perception that usage of the innovation requires breaking patterns or habits.	Worrying that talking to a robot instead of a human is a big change of habits for guests, especially the older generation. The hotel staff would have to change their ways of working if a robot was implemented.

5.4.2 Customer resistance to tourism innovation

A second study highlighted in the theoretical framework relating to BRT and customer resistance is the one by Sánchez, Williams and García-Andreu (2019). This framework specifically investigates innovation resistance in the tourism industry. In contrast to the previous framework of adoption barriers by Joachim, Spieth and Heidenreich (2018), all six themes of innovation resistance risks could be identified in the case of Furhat Robotics, see Table 5.2. The heatmap, which was constructed in the same way as for Table 5.1, further shows that these risks are of high significance, as three of them are high, two medium and only one is marked as having low impact.

There are several explanations possible to the fact that all risks in this framework are also present in our study of the Furhat robot. Firstly, the framework by Sánchez, Williams and García-Andreu (2019) specifically addresses the tourism industry, which includes the hotel industry that is the focus of this master thesis. Secondly, the themes presented by Sánchez, Williams & García-Andreu (2019) are formulated in a much broader sense than those by Joachim, Spieth and Heidenreich (2018), thus including more barriers in each theme. Lastly, one substantial reason for this framework being more spot on is that the study by Sánchez, Williams and García-Andreu (2019) concerns customer resistance in both B2B and B2C markets. The adoption resistance to the Furhat robot can therefore appropriately be examined through the lens of the theory developed by Sánchez, Williams and García-Andreu (2019).

As mentioned in the theoretical framework section, many innovation resistance factors in the tourism industry relate to the status quo bias (Sánchez, Williams and García-Andreu 2019). This can be corroborated by the finding in our study, that the hotel market is lagging behind on digitalization and innovation. The status quo bias involves a reluctance to change habits and high switching costs. Before the pandemic, these two blockers were main explanations to why the industry did not digitalize in line with other industries. It was first when the pandemic disrupted the status quo, that hotels got pushed into adopting innovations and creating digital customer journeys.

Table 5.2. The six different innovation resistance risks discovered by Sánchez, Williams & García-Andreu (2019) are mapped against the barriers found to adoption of the Furhat robot

Innovation resistance risk	**Explanation**	**Examples for the Furhat robot**

Performance risks inherent to innovation	Consumers' disbelief in products that had not yet been tested by other customers.	Many fear that the technology might malfunction in interactions with guests or lower personal touch. Want to see created value at other hotels before adopting it themselves.
Lack of business reputation risks	Especially for B2B innovations, consumers choose products that already have an established reputation.	Several express that a close partnership and an engaged innovator is needed for adoption of the social robot.
First movers' risks	Risk that the innovator is targeting a market that is not mature enough for this disruptive product, creating resistance from customers.	The hotel industry is lagging behind on innovation and digitalization. Many hotels are afraid of how their guests will react since they have not interacted with the robot elsewhere, therefore resisting adoption due to lack of readiness.
Control and transparency risks	Innovations that impose control requirements on the customers faced resistance due to perceived loss of autonomy.	Fear of losing control when the robot makes decisions in the hotel's name, fear of losing control of tonality in robot interactions with guests. Hotels see a risk in letting the robot gather information from the internet that could be wrong, but don't want to restrict the robot's responses completely either.
Psychological risks	Some innovations faced resistance	The robot is not coherent with the hotel industry where personal touch

	because their purpose did not cohere with the customers' vision or opinions.	is the main vision. Many hotels also connect robot technology with low-budget segments, which is not coherent with many hotels' visions and brands.
Privacy and safety risks	Innovations that gathered data or tracked information about the customers/the company met resistance because of privacy risks.	Fear that the robot tracks data about guests and the hotel, questions about who owns this data and GDPR. Fear that the robot is watching/listening.
Other types of risks	-	For other risks and barriers, see section 4.3 Empirical Findings

5.5 Challenge of overcoming adoption barriers

The second commercialization challenge presented by Aarikka-Stenroos and Lehtimäki (2014) is the challenge of overcoming adoption barriers and facilitating the adoption. Naturally, this challenge applies to Furhat Robotics as well. After having mapped relevant barriers to adoption of the Furhat robot in previous sections, strategies to lower these barriers need to be found in order for the innovator to proceed with the commercialization process. As Claudy, Garcia and O'Driscoll (2015) express, the reasons for adoption must far outweigh the reasons against, which further supports the need for the innovator to overcome barriers.

Aarikka-Stenroos and Lehtimäki (2014) state that this challenge can be addressed by for example customer education, encouragement of behavior change and modification of the innovation. Similar measures are presented by

Sánchez, Williams and García-Andreu (2019) within their resistance management strategies presented in Table 2.3 in the theoretical framework. The first strategy defined by Sánchez, Williams and García-Andreu (2019) is to *Target the innovative and organizational leaders*. According to the explanation, this strategy is about segmenting to find early adopters. In the case of Furhat robotics, this means finding specific hotel segments that have less barriers toward adoption of the robot and more motivations. The innovator should thus segment the hotel market to identify what type of hotel is most likely to adopt the innovation in an early stage. There are several factors that differ hotels, for example size, price level, target group, brand and vision. Consequently, the hotel segmentation should be based on several factors and how these can be connected to the respective hotel's willingness to adopt.

The second strategy suggested by Sánchez, Williams and García-Andreu (2019) is to *Modify the innovation.* This is particularly important for the Furhat robot since its use cases in hotels are not predefined. The strategy of modifying the product in order to overcome customer resistance can also be linked to our findings where different robot use cases are connected to different barriers. For Furhat robotics, the strategies of targeting early adopters and modifying the innovation can be seen as interlinked. In order to overcome adoption barriers, the innovator has to both find suitable hotels as their first targets as well as find the use case that fits those types of hotels the best. Interestingly enough, the interlinkedness of these two strategies supports the theory suggested by Bianchi, Benedetto, Franzò and Frattini (2017), that the early adopter group is not a predetermined group of companies. Rather, the innovator should engage with different types of customers and take a proactive role in shaping this group and modify the innovation to meet their needs.

The third resistance management strategy suggested by Sánchez, Williams and García-Andreu (2019) is *Education and information on relative advantage*. Once again this is a relevant strategy for Furhat robotics in their commercialization efforts of the robot, but is also connected to what use case is sold to which target group. Consequently, the previous strategies must first be

addressed in order to start informing customers about the relative advantage of the innovation. Sánchez, Williams and García-Andreu (2019) further recommend the strategy *Innovation demonstrations for customers to test*, to address the barrier of low trialability. As discussed in section 5.4.1, the trialability barrier for the Furhat robot is marked as having high impact due to the product attributes such as cost and tailoring. Furhat Robotics should therefore find cost effective ways to offer pilot projects and demonstrations to customers with the aim of increasing trialability.

The last resistance management strategy is *Trust and credibility building*, which means that the innovator should build trustworthiness towards its customers to facilitate adoption. This strategy addresses the Lack of business reputation risk, mentioned in section 5.4.2. As this risk was only barely addressed by the interviewees and therefore deemed to have low importance for Furhat robotics, this last strategy is not as important for the company. However, in order to successfully commercialize the robot the supplier always needs to build a strong relationship with the customer.

6 DISCUSSION

In this section, the empirical findings will be discussed more thoroughly together with key takeaways from the analysis in order to create a foundation for answering the research questions of this master thesis. The perspective will be changed from that of the case company to concerning social robots in general.

6.1 Facilitating adoption of social robots

Looking back at the description presented in chapter 1.1, the Furhat robot can be concluded to fit the description of social robots. The criteria for a robot to be considered social are that it operates together with, and alongside, humans, in a human way. Furthermore, they are usually humanoid or animal-like. The Furhat robot, as previously described, can make eye contact as well as interact with multiple people simultaneously. In addition to this, it has a physical "head" and a human appearance. Therefore, it is a reasonable representation of social robots in general. Given that it has the basic characteristics of a social robot, it should be possible to transfer the interviewees' comments to include social robots in general.

The discussion around RQ1 has been covered in section 4. Empirical Findings and 5. Analysis, where adoption barriers have been identified. In chapter 5.5, the five resistance management strategies invented by Sánchez, Williams and García-Andreu (2019) were briefly analyzed, which relate to answering RQ2. In this chapter, a deeper discussion regarding resistance management strategies will be presented. This includes segmenting the hotel industry to *target the early adopters*, and *modify the innovation* to fit the segments' needs and use cases. After having applied these two strategies, the remaining barriers to adoption of the social robots for these segments will be reviewed with the

resistance management strategies suggested by Sánchez, Williams and García-Andreu (2019).

6.1.1 Early adopter segmentation

In order to segment the hotel industry to find what types of hotels are most likely early adopters of a social robot, we need to go back to the empirical findings and review the biggest motivations for adoption. Three main motivations were found, namely staff replacement, increased service and branding. As mentioned in section 5.5, if we can find specific types of hotels that see any of these motivations as extra salient, the reasons for adoption are more likely to outweigh the reasons against.

Staff replacement as a motivation builds upon the notion that the social robot could replace personnel, and thus decrease hotel costs and solve issues with recruiting. The types of hotels that would have an extra strong incentive to do this would be low-margin businesses that struggle with high personnel costs. Furthermore, it would not include the most luxurious hotels, as these have an easier time attracting highly skilled employees, but rather the mid or low budget segment. The motivation for staff replacement is also mostly applicable to a hotel segment that has less emphasis on the personal touch, as this would otherwise be a barrier to staff replacement. As mentioned in empirical findings, the guest segment that is most likely to go through digital channels and not demand a high personal touch are business travelers that only see the hotel as a convenient place to sleep, rather than a destination experience. Thus, staff replacement as a big motive for adoption is most probable to be found among low-budget hotels that target business travelers.

Increased service refers to improving the service where it currently does not exist. As mentioned in findings, many interviewees were positive to using social robots where it is too expensive to put staff – e.g the gym, the corridors or in the elevators. This was because of the fact that the robot provides worse personal touch than a human, but better than nothing at all. This includes hotels that need to improve their service because they can not hire more staff, either

due to economical reasons or to shortage of personnel within the industry. For instance, it could concern very large hotels where it is impossible to have staff spread out across the hotel, which creates a high burden on the receptionists. At the same time, the motivation also includes hotels with an outstanding personal touch and service level that want to increase it even more.

The third motivation for adoption of social robots is branding, namely that the hotel would benefit from introducing a radical innovation into their hotel and receive media attention and strengthen their brand. In order for this to be a motivation, the hotel needs to have incentives for investing in brand strategies and furthermore that a social robot would be compatible with their brand. On the one hand, the type of hotel that would have this motivation is a hotel that already brands itself as being in the forefront of technology and invests in digital solutions. For this type of hotel, adopting a social robot would not be as strange to their guests who already expect these types of solutions from the hotel. On the other hand, a more luxurious, high-end hotel that has a bold brand and wants to stand out from the crowd, could also see a social robot as the perfect product to deliver something cool and unique to their guests. The guests of this type of hotel also expect a one of a kind experience and pay a higher price for the hotel to deliver something memorable.

In conclusion, these three motivations and the corresponding characteristics of hotels that would have them, lead us to two specific segments within the hotel industry that would be more likely to adopt the social robot.

1) The big, low to mid budget hotel that targets business travelers and has a positive attitude towards digitalization

2) The niched, high-end hotel with a bold brand that focuses on high service

To reach one or both of these segments, the innovator needs to adapt its offering and communication to each segment so that it increases the benefits for the

segment and lowers the specific barriers. In other words, the communication, relative advantage and offering will vary greatly between the two segments. In the next section, the appropriate use case for each of these segments, that is to say the necessary modifications to the innovation, will be discussed.

6.1.2 Use case selection

In this section, we will go through the potential use cases for social robots discussed in section 4.3.1, and match the right use case to the right early adopter segment. The most appropriate use case, according to the theory of BRT, is the one that the customer segment sees has the biggest motivations at the same time as least significant barriers. Consequently, this would lead to finding a use case where the reasons for adopting this innovation far outweigh the reasons against. Since all hotel use cases vary and require different functionalities from the robot, finding the right use case can be linked to the resistance management strategy *Modify the innovation* by Sánchez, Williams and García-Andreu (2019).

6.1.2.1 Discarded use cases

There are three use cases presented in section 4.3.1 that neither of the early adopter segments would likely find as most beneficial. Firstly, deploying a social robot as a feedback collector is an interesting case. However, when looking at Table 4.1, there are just too many barriers to this use case. Even though the social robot could increase the response rate and honesty and concurrently be a more fun way for guests to leave feedback, the barriers brought up in the interviews are difficult to get around. For the bold, high-end hotel, feedback is most likely to be a strategic question and thus worth investing in. Although this could be a motivation, the risk that complaining guests get even more distraught by talking to an unsentimental social robot is a big barrier. On the other hand, for the big, business hotel, the barriers rather surround the fact that their guests prefer a smooth check out experience without stopping to leave feedback to a social robot placed somewhere in the hotel. Furthermore, the difficulty of anonymity when deploying a social robot as feedback collector is a barrier applicable to both early adopter segments. All in all, the motivations

for this use case are not salient for any of the segments while the many strong barriers are difficult to overcome.

The second use case not ideal for any of the early adopter segments is the robot suite application. This use case could be applied in a hotel either through offering a limited number of hotel rooms or placing a robot in every room as a digital butler. The main motivations for the big, business hotel to adopt a social robot are as mentioned to cut costs, replace personnel and increase service. Neither of these motivations are being met by a robot suite use case, as the main benefits of this application is to invest in additional service and entertainment in order to justify a higher price point of the hotel room. Thus, the use case is deemed as too unattractive for this early adopter segment. For the other segment, the bold, luxury hotel, the robot suite sounds compatible at first sight. The use case is aligned with the overall motivation of increased service and branding, as it would cater to tech-savvy guests and create a tailored hotel room experience. Nevertheless, there are still big barriers to overcome. The privacy issues regarding robot surveillance in the hotel room as well as the lack of relative advantage compared to smart home technology are notable barriers for the bold, high-end hotel. In addition, if this hotel would adopt a social robot for increased service and branding purposes, it is hard to imagine that they would place the innovation hidden in one room instead of in a public space to maximize its exposure to guests.

Human resources applications for the social robot in a hotel can include both using the robot as an interviewer during recruitment, but also in employee training and appraisals. As HR and recruiting activities are time-consuming and expensive for the big, low-budget hotels in particular, this could be an advantageous use case. It would further answer to the motivation of staff replacement, although within the HR department rather than customer facing roles. Despite this, the HR use case is not specific to the hotel industry but rather addresses the HR industry in general. The main barriers found in Table 4.1 are further applicable to both of the early adopter segments. Cheaper digital tools for employee training are already available which decreases the relative

advantage. The fear that the social robot would focus too much on merits during interviews and less on personal traits is also a barrier specifically in the hotel industry since many recruit less based on resumes and more on personality. All in all, the HR use case could be interesting as a future application in the hotel industry, but is not rated as the use case that speaks to the respective early adopter group's motivations the most.

Lastly, the restaurant use case could be beneficial in the hotel industry, but is still discarded at this stage since it speaks to adjacent industries rather than the hotel market in particular. Firstly, this use case was only briefly mentioned in the interviews. Therefore, not enough information about its motivations versus barriers were gathered. The niched, high-end hotels usually manage expensive restaurants with unique concepts and high touch, thus social robots would not be compatible. The restaurants at the big, business hotels however, tend to offer less personal touch and sometimes even have strategies for digital service and unmanned operations. For this segment, the motivations in Table 4.1 are strong as the social robot could increase the personal touch, replace staff and enhance the unmanned restaurant concept. Although this use case deserves a more thorough investigation for the digital, big, business hotels, it is not possible to conclude with the data in this thesis that it would be hotel restaurants in particular that should be targeted by this use case.

6.1.2.2 Relevant use cases

Regarding the remaining use cases, the different early adopter segments have varying barriers and motivations. Therefore, we will evaluate the use cases separately for each early adopter segment. Starting off with the large business hotels, their key general motivations are to cut costs as well as remove bottlenecks. The receptionist use case is interesting because the robot could relieve the human receptionists from work during peak hours. When looking at Table 4.1, all of the motivations mentioned are valid for this hotel segment. They are driven by the fact that business travelers are more prone to self check-in, that there are often bottlenecks and that they are likely to have many international guests. At the same time, two of the barriers are also relevant for

this segment. Firstly, some interviewees thought that the robot does not have any clear relative advantage when compared to checking in through smartphones or touchscreens. However, many hotels do not currently have automated check in systems. Relating back to the status quo bias mentioned in section 2.4.1, it might therefore be an idea to target hotels that have not yet implemented self check-in. Regardless of what check-in alternative is being used, there are practical barriers that need to be solved as well. For instance, the hand-out of physical keys or checking the guests' IDs have to be possible for the robot to do. These barriers need to be overcome by the innovator, as the strong motivations create a large potential for this use case.

For the bold, luxurious hotel, the receptionist use case is less relevant. Given that their demands on personal touch are very high, it is unlikely that they would want the customers' first interaction at the hotel to be with a robot. This kind of hotel also has more practical issues, such as handing out champagne when their guests arrive or tending to each guest's unique and specific requests for their hotel stay.

Using the robot as a concierge or information station was a popular idea both among the business hotels and among the bold, luxurious hotels. The motivation for the first segment was that, given the size of their hotels, the robot could man parts that are currently unmanned. For instance, it could be used to help guests locate their rooms, inform about breakfast opening hours, answer questions about the conference rooms or book taxis. This would increase the personal touch at the hotel, as the receptionists' workload is described as so high they barely have time for answering questions. The main barrier is that the current alternative might be sufficient. It is already quite easy to book taxis and restaurants through your smartphone. At the same time, many of the guests are international with little knowledge on how to get by in the city.

For the bold, luxurious hotels, the robot could serve as another type of information station and concierge service. Instead of relying on the robot for basic services, it could enhance the guest experience by answering questions on,

for instance, the history of the art in the hotel or fun facts about the city. As the robot can contain much more information than a human, this would respond to the motivation of increasing the service at the hotel. The concierge use case would create a fun and unique improvement of the guest experience, almost like an art installation. Furthermore, as the guests targeted by this hotel segment are usually traveling for leisure purposes, chances are that they are more interested in receiving tailored recommendations on things to experience while visiting, such as restaurants or tourist activities. In this sense, there are no specific barriers for the bold, luxurious hotel in this use case, except for the general overarching barriers. Additionally, placing the social robot in a public, visible space in the hotel for concierge purposes further is aligned with the motivation of branding.

In summary, after reviewing all use cases from the two early adopter group's point of views, it is clear how the innovation should be modified to suit their needs and motivations. See the identified early adopter segments and their use cases in Table 6.1 below.

Table 6.1 The identified early adopter hotel segments and their corresponding most beneficial use cases for the social robot

	Early adopter segment	**Best use case**
1)	The big, low to mid budget hotel that targets business travelers and has a positive attitude towards digitalization	Receptionist *or* information station/concierge
2)	The niched, high-end hotel with a bold brand that focuses on high service	Information station /concierge

6.1.3 How to overcome the barriers

The five resistance management strategies by Sánchez, Williams and García-Andreu (2019) presented in Table 2.3 are relevant to apply to the remaining barriers. By having addressed the first two strategies in the previous sections of

the discussion, *Target the early adopters* and *Modify the innovation*, many of the use case specific barriers have already been eliminated. However, to thoroughly address all the barriers presented in the empirical findings section, the remaining ones will here be reviewed and connected to any of the five resistance management strategies.

The only use case specific barrier remaining to the social robot receptionist for big, business hotels, is the belief that it lacks relative advantage compared to other cheaper, technical solutions. Some interviewees thought that a social robot would not be more beneficial compared to check-in through a smartphone or touchscreen, even though it adds an element of personal touch. This is an important barrier that has yet not been overcome, and it requires immediate attention from the innovator in order to facilitate adoption. If the social robot in question de facto does not have a clear relative advantage in the receptionist use case, the big, business hotel segment should only be targeted with the information station or concierge use case. The reason for this is that the barrier is otherwise too salient and the risk of rejection of the innovation is high. On the other hand, if the social robot in question does have clear relative advantages, only that the customer has yet not comprehended it, the strategy *Education and information on relative advantage* should be applied by the innovator.

The first general barrier stated in section 4.3.2, guest readiness, is that hotel managers expressed fear that their guests would react negatively towards the social robot and would not be ready to interact with it. This is still a risk, and the decision maker needs to be convinced that their guests would not react like this in reality. The strategy *Innovation demonstrations for customers to test* by Sánchez, Williams & García-Andreu (2019) is the most suitable one to address this barrier. If the hotel manager sees this as a salient barrier, the barrier can only be overcome by letting the hotel test the social robot in interactions with their guests through some kind of pilot test. However, after selecting the two early adopter segments and their respective use cases, this barrier is drastically lowered. This is due to, firstly, that the big business hotel's guests are likely to choose a digital channel, and secondly, that the bold, luxury hotel only offers

the social robot as an add-on experience where the robot interaction is voluntary.

A barrier that was briefly mentioned in some interviews was that social robots tend to look creepy when they appear too human. This can be tackled through *modifying the innovation*, in this case making it look less human. There are plenty of ways this could be done, for instance the social robotics innovator could make it look more like a "traditional" robot.

The key barrier when interviewing hotel representatives appeared to be the fact that social robots reduce personal touch. However, this barrier can be considered overcome by *targeting the early adopters* and finding their use cases, *modifying the innovation.* By reaching out specifically to hotels where the intended use case either does not threaten the personal touch or hotels where personal touch is not as valued, this barrier can be avoided. Regarding the receptionist use case for larger business hotels, the robot is intended to either replace self check-in or to relieve the receptionists. This does not necessarily decrease the personal touch, as the robot is likely to feel more personal than checking in on your own or waiting in line. It also gives the receptionist more time for questions and less transactional interactions. If the robot is used as an information station rather than a receptionist, it does not replace staff. On the opposite, it is intended to increase the personal touch where no staff is present. When used as an information station in the other segment, the bold and luxurious hotels, the robot does not compete with human interaction at all. As it is intended to be viewed more as an art or entertainment installation used to enhance the guest experience, it is unlikely that it will replace any of the chores of the receptionist or concierge. Thus, it does not lower the personal touch of the hotel.

The staffing barrier, that hotel managers are reluctant to adopt the social robot since they do not want to replace staff or create distrust and uncertainty among their workforce, is further overcome by the first two resistance management strategies. The motivation for the big, business hotel to adopt the innovation

stems from a need to replace staff, thus this is not a barrier for them. The concierge use case for the bold, luxury hotel, on the other hand, is not replacing any personnel as it is deployed as an add-on guest experience. Through the strategies *Targeting the early adopters* and *Modifying the innovation*, this barrier has hence been overcome. Nevertheless, as mentioned in empirical findings, the hotel should still make sure that their employees are introduced to the social robot in advance and understand the reasons for its implementation.

Brand incompatibility is a barrier that has also been overcome by *targeting the early adopters* and *modifying the innovation*. As the big, business hotel segment includes hotels that have a positive attitude toward digitalization and staff replacement, the brand is aligned with the social robot. The luxury hotel with a bold brand is further compatible with adoption of a social robot, since it is deployed in an application that aims to increase the service offering and media attention. Another factor connected to this barrier is that the social robot needs to learn the hotel brand and communication. This can be overcome by *Modifying the innovation* further so that it lives up to the adopter's expectations.

Regarding the functionality barrier, one of the aspects was that the interviewees wanted assistance when deciding on use cases. This has been solved by segmenting and targeting different segments with different use cases. However, there were also worries that the robot would give wrong answers, reduce control or stop working, which is still a large remaining barrier. The key strategies for tackling this is *Trust & credibility building*, *Modifying the innovation* and *Innovation demonstrations*. Trust can be built by adapting the offer to include for instance warranty, insurance and extensive support programmes, giving the hotels a bigger sense of safety. The modifications that need to be made depend on the hotels' demands and requests. Some might prefer to give the robot more freedom to get better answers, while others might want to limit it and therefore avoid risks. Lastly, the innovator needs to be able to demonstrate that the robot works as expected before it is sold.

In regards to the privacy & security concerns that came up during the

interviews, there are many ways of tackling these. Firstly, the innovator can *modify the innovation* into being compliant with for instance GDPR or other local regulations. Secondly, *Trust & credibility building* is a necessary strategy in this case, and goes hand in hand with *Innovation demonstrations*. If the innovator can demonstrate to the customers how, for instance, data collection and surveillance works, it will increase trust.

The barrier addressing concerns about too many systems and a lack of integration between them is highly important for the big, business hotels with the receptionist use case. The transactions needed from a social robot receptionist are advanced and highly intertwined with for example booking and CRM systems. Furthermore, the social robot needs to be able to solve issues with key handouts and ID checks. This barrier needs to be addressed by the innovator through *modifying the innovation*, and thus developing necessary functionalities and integrating them with the hotel's current data systems. If the innovator can not seamlessly integrate these systems, this will be a salient barrier to adoption of the social robot for the receptionist use case. For the bold, luxury hotel deploying the social robot for concierge services, less system integrations are needed and thus this barrier is not deemed as relevant anymore.

The cost barrier is further brought up in findings where interviewees are skeptical that a social robot would be a costly investment. For the big, business hotels that deploy the robot as a staff replacement strategy the robot needs to be cheaper than hiring someone. For the bold, luxury brands, the innovator needs to investigate the customer's willingness to pay, since the innovation is adopted to enhance an experience rather than cutting any costs. The strategy *Education on relative advantage* can be applied to enlighten the customer of the value the social robot will bring, to highlight that the cost is reasonable even though it does not replace any existing costs. Furthermore, in order to overcome the cost barrier, the innovator should offer flexible payment structures so that the investment is more feasible for low-margin businesses like hotels.

Another barrier that needs to be addressed is the first mover barrier. Through careful segmentation and *targeting of early adopters*, this barrier has been lowered. To eliminate it, further targeting should be done to find the pioneers within each segment. In addition to this, the fifth strategy suggested by Sánchez, Williams and García-Andreu (2019), *Education and information on relative advantage*, should be applied to convince these early adopters.

Lastly, the trialability barrier persists to be an issue even after segmentation and use case specifications. The interviewees still demand shorter contracts or pilot tests before adoption. This barrier can be addressed through the strategy *Innovation demonstrations*, and requires the innovator to find viable ways of letting the customer test the innovation before signing a long contract.

In conclusion, after all remaining barriers have been analyzed and discussed through the lens of Sánchez, Williams and García-Andreu's (2019) theoretical framework, it is clear to see that every barrier could be addressed by one or many of the five resistance management strategies. Some are easier to overcome with the corresponding strategies, while others remain barriers to adoption and need attention from the innovator to be lowered as much as possible. Even though not all barriers found in this master thesis could be linked to the barrier themes presented by Joachim, Spieth and Heidenreich (2018) and Sánchez, Williams and García-Andreu (2019) in section 5.4, the strategies to overcome the barriers were still easily connected to each. Furthermore, presented in section 2.4.1, Sánchez, Williams and García-Andreu (2019) found that for B2B innovations in the tourism industry, innovations with the possibility of increasing profitability or increasing the pleasure in an experience are in general easier to commercialize. This further aligns with the two identified early adopter group segments and their corresponding social robot use cases, see Table 6.1.

Relating back to the clash between the BRT field and Diffusion of Innovation theories, the results of this thesis lean towards a BRT perspective rather than DOI. As empirical findings show, there are many barriers to adoption of social

robots in the hotel industry at the same time as there are salient motivations. If only the DOI perspective would have been applied, only success factors like relative advantage would have been measured and hence many salient barriers would have been missed. The BRT perspective therefore helped understanding the adoption intentions better and highlighting what would be needed from an innovator in order to overcome customer resistance.

7 CONCLUSION

In this section, a summary of the answers to the research questions covered in the analysis and discussion will be presented. The academic as well as practical contributions of this master thesis will also be discussed and finally, suggestions for future research will be presented.

7.1 Answering research question 1

RQ1: What are the motivations versus barriers to adoption of social robots within the hotel industry?

The motivations for adoption of a social robot within the hotel industry stem from the needs of either cutting costs or increasing revenue. These motivations can be divided into three different themes, namely:

- *Staff replacement* – Hotels are low-margin businesses and struggle with high personnel costs, hence a motivation for adoption is to replace staff with a more cost-effective social robot.

- *Increased service* – Hotels want to increase service and strengthen their product offering. A motivation for adoption of a social robot is that it could increase service by being placed in unmanned places of the hotel, relieve staff of transactional tasks or offer guest interactions in multiple languages and with more knowledge.

- *Branding* – Through social robots, hotels can strengthen their brand as it signals innovativeness, uniqueness and being at the technological forefront.

The barriers against adoption of social robots varied in importance and frequency during the interviews with the hotel representatives. Below, all of them are listed with a short description. For more detailed information, see Section 4.3.2.

- *Relative advantage to cheaper, technical solutions* – One barrier to adoption of social robots as receptionists is that some do not see a clear relative advantage compared to other cheaper, technical solutions like smartphones or touch screens.

- *Guest readiness* – Hotels are very sensitive to the impressions of their customers. Therefore, one barrier to adoption is the fear that guests might not be willing to use the robot.

- *Physical appearance* – When robots have an appearance that is too humanoid, they create discomfort.

- *Personal touch* – Hotels are reluctant to adopt a social robot since it would reduce the personal touch and trustworthiness towards guests.

- *Staffing* – Adoption of a social robot could be seen as an indication that the hotel wants to fire staff. Alternatively, if adopted as a complement to existing employees, it could create distrust and uncertainty among the workforce.

- *Brand incompatibility* – Hotels that do not view a social robot as aligned with their brand are not willing to adopt it.

- *Functionality* – The fact that social robots might not work as expected or give “wrong” answers creates an unwillingness to adopt them.

- *Privacy and security* – For technological innovations like social robots, hotels are reluctant to adopt due to fear of breaking data privacy regulations and increasing surveillance of guests.

- *Integration of systems* – The concern that social robots either will be impossible to integrate, or be very time-consuming to integrate with existing systems.

- *Cost* – Hotels are afraid that adopting a social robot will be a costly investment and do not clearly see potential economic value gains from the innovation.

- *First mover* – The unwillingness to be the first hotel in the market with a social robot makes the hotels want to wait for others to adopt it, which slows down the adoption process and creates a barrier.

- *Trialability* – Hotels do not want to sign up for long contracts, but rather an option to do pilot tests with the robot or have flexible contracts.

7.2 Answering research question 2

RQ2: How can the innovator overcome the barriers to adoption of social robots within the hotel industry?

The innovator can address and strive to overcome the barriers in RQ1 with the five resistance management strategies suggested by Sánchez, Williams and García-Andreu (2019), see Table 2.3 at page number 25. However, the barriers vary in difficulty to overcome, and it is highly dependent on the specific innovator's social robot, resources and the barriers experienced by the targeted hotels.

Many of the barriers can be lowered by using the strategies *Targeting of early adopters* and *Modifying the innovation*. In the case of social robots, these

strategies have been interpreted as segmenting the hotel industry as well as finding specific use cases per segment and adapting the robot to them. By identifying each hotel segment's specific needs and motivations to adopt a social robot, two early adopter groups and use cases were found, see Figure 7.1. When targeting these, many of the salient barriers to adoption are removed.

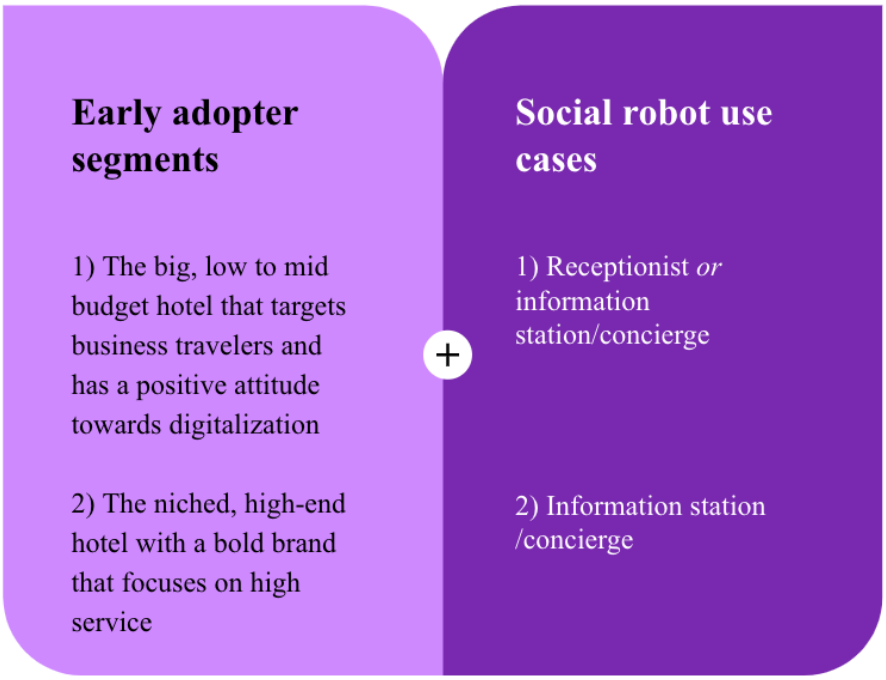

Figure 7.1 The identified early adopter hotel segments and their corresponding most beneficial use cases for the social robot (Personal collection)

The barriers that are significantly lowered by these strategies are guest readiness, personal touch and staffing. The concern that guests are not ready is less prevalent in the chosen segments. Furthermore, the barrier of personal touch is dampened in two different ways – it is less important for the big business hotels and the robot is not intended to replace any personal touch in the bold, high-end segment use case. Regarding the staffing barrier, it is not a concern for the big business hotel segment, as they are already looking to

replace staff. For the niche, high-end segment, it is not a concern either, as the social robot is not intended to replace staff.

There are two additional barriers that can be lowered when targeting the segments in Figure 7.1, namely brand incompatibility and first mover. The brand incompatibility barrier is reduced by targeting segments whose brand already is a match with high-tech innovations like social robots. However, the barrier also includes a fear that the robot would not rhyme with the brand communication or language spoken in the hotel, thus the innovator needs to embrace the strategy *Modify the innovation* and tailor the social robot so that it represents the hotel through correct tonality. Regarding the first mover barrier, the innovator can lower it even more by identifying the pioneers within each segment and also use the strategy *Educate on relative advantage*.

Even if the innovator manages to target the segments with the respective use cases mentioned in Figure 7.1, there are still barriers to overcome. Some of the barriers can be dampened by simply *modifying the innovation*, such as the physical appearance and the integration of systems barriers. This is true for the functionality and the privacy & the security barriers as well. However, they are more complex and a combination of strategies should be used. Regarding the functionality barrier, the innovator needs to modify it to suit the hotels' needs as well as adapt the offer to *build trust and credibility.* This can be done through e.g including warranty, insurance and support programmes. This strategy is closely related to the strategy *Innovation demonstrations* – if the innovator can demonstrate that the innovation works as supposed, they will gain the customers' trust. A similar strategy can be used to overcome the privacy & security barrier. Firstly, the innovation needs to be modified in order to follow local regulations. Secondly, *Innovation demonstrations* can be used to accomplish *trust and credibility building.* If the innovator can prove to the customers how, for instance, data management is handled, the barrier is lowered.

The cost barrier is also remaining after targeting relevant segments, however the importance of this barrier is highly dependent on the price of the social robot in focus. To overcome this barrier, the innovator needs to *Educate on relative advantages* of the specific social robot use case, so that the willingness to pay matches the price wanted from the innovator. In addition, the trialability barrier remains and needs to be addressed through *innovation demonstrations*, where the innovator should find viable ways of offering pilot tests to customers.

Lastly, the remaining barrier that is the most salient one, is the customers' fear that a social robot lacks relative advantage compared to other use case specific technical solutions. If the social robot does not have a relative advantage compared to its alternatives, the receptionist use case should be discarded. If the social robot has relative advantages that are not apparent to the customers, the innovator should apply the strategy *Education and information on relative advantage* to convince its customers.

7.3 Answering the main research question

Main RQ: How can the innovator facilitate adoption of social robots in the hotel industry?

In the process of answering RQ1 and RQ2, the main research question has also been answered. To facilitate the adoption of an innovation, the innovator needs to understand the needs of their customers, identify the motivations and barriers they might have to adopt the innovation, and then find strategies to overcome the barriers. By answering RQ1, the biggest motivations and barriers to adoption of a social robot are presented for the innovator to find measures to facilitate. As the theoretical framework applied in this thesis suggests that the key to facilitating adoption is through overcoming the barriers rather than increasing the motivations, RQ2 has focused on, and given suggestions to, overcoming barriers. Therefore, the answer to the main research question lies in RQ2, which in turn depends on RQ1. A social robotics innovator can hence facilitate adoption in the hotel industry by targeting early adopter segments with

the right use cases and thereafter finding strategies to overcome remaining barriers.

7.4 Contributions

This thesis contributes in two separate ways, to the academic sphere with theoretical contributions as well as with more practical knowledge to social robotic innovators.

7.4.1 Academic contributions

The overarching academic contribution of this master thesis is that it fills the research gap, noted by Tulli, Ambrossio, Najjar and Lera (2019), of a study that focuses on attributes and circumstances that contribute to successful adoption of social robots within specific markets. This master thesis answered the research question of how to facilitate adoption of social robots in the hotel industry, hence the gap has been filled and this study contributes with market specific research to the field of commercialization of social robots.

Related to the gap highlighted by Tulli, Ambrossio, Najjar and Lera (2019), the academic sector has further requested studies that explore customer-related drivers and barriers for adoption of AI in tourism (McLeay, Osburg, Yoganathan & Patterson 2021), and a deeper dive into specific markets within the tourism industry (Sánchez, Williams & García-Andreu 2019). By answering RQ1 this master thesis has additionally contributed to the mentioned gap, as AI is an important technology for social robots and the case study has zoomed in on the hotel market.

Beyond these mentioned filled gaps, academic contributions have been found in relation to the adapted theoretical framework deployed that works as a basis to analyze the empirical findings. First and foremost, we discovered that commercialization efforts in the hotel industry can only be analyzed when including both B2B and B2C frameworks. The empirical findings of this thesis concluded that the hotel industry is very customer oriented with a strong

derived demand, hence the end-consumer's perspective is highly present in adoption decisions of B2B innovations. This finding explained why B2C frameworks such as that of Joachim, Spieth and Heidenreich's (2018) 17 innovation resistance barriers could be applied to our case-specific setting of hotel adoption of social robots.

A second contribution related to our theoretical framework, involves the conclusion that BRT, although a relatively new research field, is a valuable perspective to include when looking at adoption intentions of social robots in the hotel industry. As could be seen, the five resistance management strategies by Sánchez, Williams and García-Andreu (2019) were applicable in every step of overcoming adoption barriers.

7.4.2 Practical contributions

This master thesis was written upon request from the case company, Furhat Robotics, who expressed interest in exploring commercialization possibilities for their social robot in the hotel market. Consequently, the answers to the research questions are the main practical contributions of this master thesis. Furhat Robotics can through this report learn about the hotel specific motivations and barriers to adoption of the Furhat robot as well as strategies to overcome barriers and facilitate adoption. As the results based on the Furhat robot have been considered transferable to social robots in general, these practical contributions are relevant for other social robotics innovators as well. In particular, the discussion presented two different hotel segments and their corresponding most preferable use cases for a social robot, see Figure 7.1, which can help innovators in practice who want to further develop and commercialize their product.

In addition to the main practical contribution to social robotics innovators, there are several important findings in this master thesis that also have practical implications for the hotel industry in general. The empirical findings and the discussion have implications for hotels regarding digitalization strategies,

adoption of innovations and how to best make use of social robot technology to enhance a hotel offering.

7.5 Future research suggestions

Throughout the process of writing this master thesis and exploring the research topic of social robot adoption, several adjacent areas of research have been encountered that should become focus for future studies. The future research suggestions directly relate to the limitations of the research questions in this master thesis, but do also relate to the theoretical framework and studies needed for further academic contributions.

Firstly, the methodology and the scope of this master thesis limited us from looking at more than one case example of a social robot, as well as other geographical markets than Sweden. To confirm the results of this thesis, we suggest that future research should include similar research questions but be replicated with other social robots and in other markets. As social robots belong to a new product category, the features and functionalities may differ between robots and the readiness to adopt may also differ between countries. For example, Asian customers might be more accustomed to robotization in service industries and hence more ready to adopt social robots within hotels as well. An additional limitation of this master thesis is that price was not included in the interviews, and since the cost barrier was a prominent factor, further research should be made on willingness to pay for social robots in the hotel industry.

This master thesis was further limited to studying adoption intentions and early adopters of social robots, excluding later steps in the commercialization process. We suggest that future research should focus on how to fully commercialize social robots and achieve diffusion in the mainstream market (Moore 1991). As the answer to RQ2 in this master thesis includes two distinctly different early adopter groups with varying social robot applications, future research could also include looking at the potential for further diffusion depending on which of these target groups are addressed first.

A third study that becomes important to conduct related to the results of this master thesis, is one that investigates how hotel guests experience the interaction with a social robot. As mentioned, the decision makers in the hotel industry are highly customer-oriented and hence adopt innovations based on presumed demand from their hotel guests. Many of the important barriers to adoption of social robots are based on expected guest reactions, for example the personal touch barrier. Only if the guests' perceived value of the robot can be established, in contrast to the hotel staffs' beliefs, can the adoption possibilities of social robots in the hotel industry really be understood.

In the process of developing the theoretical framework for this master thesis and analyzing it together with the empirical findings, some additional research topics within Behavioral Reasoning Theory have been identified. Firstly, the framework by Joachim, Spieth and Heidenreich (2018) concerning customer resistance to B2C innovations acted as a foundation for analysis in this master thesis. As mentioned, the B2C perspective was an important element in answering the research questions for this study. However, there are few general BRT frameworks looking at customer resistance from a B2B perspective today, and hence future studies should develop a B2B BRT framework. To ensure a general customer resistance framework with new barrier themes, the study should include a broad selection of B2B innovations and not only social robots.

Another interesting area of the BRT is Claudy, Garcia and O'Driscoll's (2015) theory that reasons for and against adoption of an innovation should not necessarily be viewed as opposites. Nevertheless, in the analysis section of this master thesis we highlight that this is not the case for social robots, as staff replacement is both a reason for and against adoption. We therefore suggest further research into this phenomenon, exploring when this theory is true and not, and if there are any innovation-specific factors that determine if the theory is applicable. For example, factors like market maturity or radicalness of an innovation could be relevant to study in relation to this theory.

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A. Appendix

A.1 Interview guide

This interview guide acted as a basis for the interviews, however modifications were made depending on the target subject. Semi-structured interviews were held, therefore not all questions were asked in the below presented order.

[Introduction of us and the research questions for this master thesis]

General questions

Personal aspects

- What role do you have at the hotel/hotel chain?
- What are your responsibilities and everyday tasks?

Venue or organization

If hotel manager or similar:

- How would you describe the hotel/hotels you represent?
- What kind of customers does your hotel mainly have?
    - Ages, languages, personalities, business/tourists/couples etc.
- For how long has the venue been in business?
- What does the owner structure look like?
    - Franchise/part of a chain/independent?

If part of a chain/similar:

- How much independence does the specific hotel have? Is strategy/concept etc decided by the bigger organization?

If representative of a hotel chain:

- What different kinds of hotels do they have in their portfolio?

Current business

- What do you think influences the success of your business?
- In short, what is your mission statement and strategy?
- What problems keep you awake at night? / what are your pain points?
- What do your customers value the most with your hotel?
- What is the most common negative feedback given by your hotel guests?
- What have you seen being the biggest trends in the hotel industry in the last few years?
    - Have you adapted to them? If yes, how?
- What do you think are the biggest challenges for the hotel industry in the coming years?

Operations

- What digital influences are incorporated into the customer journey and experience?
- How does your check in/check out process work right now?
- How do you collect feedback from customers?
- What additional services does the reception offer today?
    - e.g. booking tours/restaurants/
- What does your staffing situation look like today?
    - Is it difficult or easy to find enough qualified personnel?
    - Do you have staff operating 24/7?
- What pain points does your staff usually experience in their daily work?

Adoption of innovations

- How open would you say that your organization is to trying out new products or services?
    - Give examples

- How often do you adopt new innovations in your business?
- What does the decision making process look like for adopting new innovations/products/services?

Digitalization

- What is your view on digitalization and how it can improve your business?
- How would you rate the current digitalization of your business?

Brand strategy

- How would you describe the brand of your hotel?
- Do you work actively with your brand strategy? If so, how?

Specifically on social robots

[Introduction of the Furhat robot through two videos and short description of product features] (See Appendix A.2)

[Introduction of example use cases for the Furhat robot in a hotel setting]

- *Receptionist*
- *Collecting feedback through surveys*
- *Helping with tourist questions like making reservations or booking tours*
- *Stationed in other parts of the hotel to answer questions, give out information, book spa/restaurant/cleaning*
- *Assistant in the hotel room; answering questions, entertainment, meditation sessions*

- *Human resources applications, conducting interviews or leading employee trainings*

General impressions

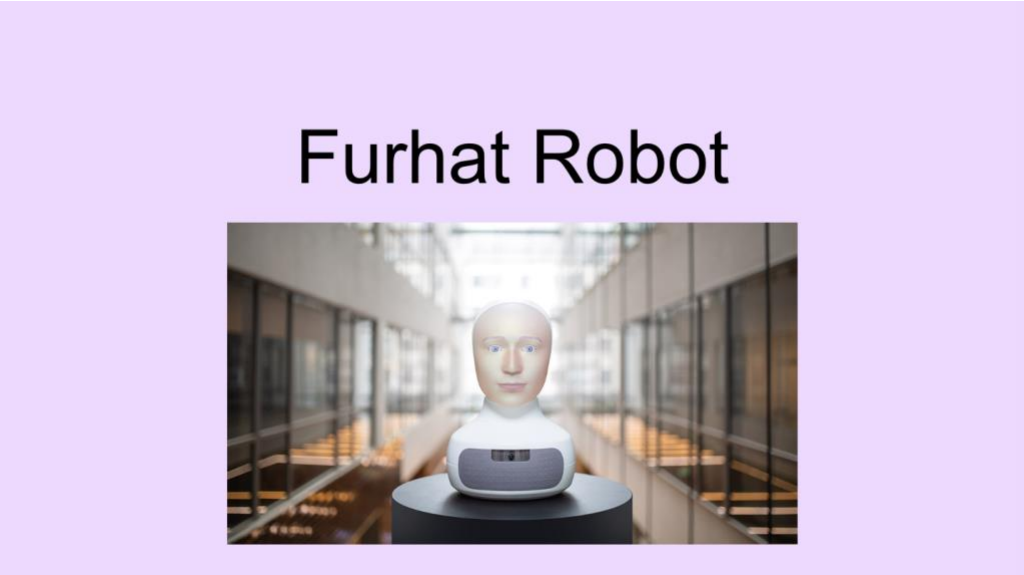
- What are your impressions of the robot? Overall positive/negative?
- Do you have any general concerns about the robot? If yes, what?

Hotel-specific

- How do you think your customers would respond to interacting with the robot?
- Does the robot align with your overall ambitions regarding digitalization?
- Do you see any possible use cases for the robot at your hotel? If yes, what? If not, is there any particular reason?
    - Optional: help them with examples
- What do you see as the biggest motivations for implementing social robots in a hotel setting?
- What do you see as the greatest barriers for implementing social robots in a hotel setting?
- What would you in theory be willing to pay for a social robot?
- What do you see as the most beneficial features of the social robot?
- What would be further needed from the social robot for you to be willing to adopt it?
    - e.g service level, price, other features, insurance, other hotels adopting first
- What would be further needed from the social robotics company for you to be willing to adopt it?
    - support, service, collaboration, PR collaboration, payment methods
- If not you, what kind of hotel do you think would adopt a social robot in Sweden? Other countries first?
- Anything else you would like to say that we haven't covered?

A.2 Product introduction to the Furhat robot

Below is the presentation shown to all interviewees with the purpose of introducing the Furhat robot, its features and functionalities. In the third slide, two videos of the robot were shown. The first video (Furhat Robotics 2022), shows a short introduction to the Furhat robot in an interaction with two people. The second video (Furhat Robotics 2023), is a demonstration of the Furhat robot in a hotel setting, checking in a guest and recommending a restaurant.



Furhat Robot Features

- Interact with humans as humans interact with each other - by speaking, listening and expressing emotions
- Deliver stand out customer experiences or relieve humans of time-consuming, repetitive tasks
- Customizable:
  - Over 35 languages
  - 200 different voices
  - 22 different animated faces with varying gender, ethnicity, species
- Built in facial detection and facial recognition system
  - Can handle a conversation with up to 10 people at the same time
- Can operate in noisy environments
- Can operate 24/7
- Unbiased - Greets every customer in the same way
- Only starts interacting with someone when approached

Furhat Robot examples