



# An Analysis of the Role of Artificial Intelligence and Robotics in Redefining the Meaning of Hotel Operational Work: A Case of M Singapore

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## Abstract

Artificially intelligent robotics start to slowly overtake many different industries. Hospitality industry is being one of them. Robotics are implemented in many different hotels all over the world, yet their development is growing rapidly as customers are more and more interested in robot services nowadays. Taking as an example, M Social Singapore hotel has shown a positive implementation of room service and kitchen robots. Moreover, customer perspective towards those robots also being positive because it is being seen as a unique and even personalised service. Theoretical frameworks also played a big role for this research as they helped to guide and justify the foundation of the study. Therefore, qualitative approach was chosen for this study due to the idea that author aims to gather the in-depth information about the robotic implementation in hotel, yet there seem to be a gap in dependability due to the progressive research work in robotic field in hospitality. Moreover, focus group sizes might be seen packed, however author wants to investigate employee perspective better by picking employees from different departments. The research is summarised in the way that there should be further qualitative research approach but for other destinations because of different cultures and perspectives about the robot implementations in hospitality sector, thus, gathering data and comparing it with this study to provide a clearer result in this field.

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## Chapter 1 Introduction

### 1.1 Background information

Technologies have grown considerably since industrial revolution. They have been implemented in different industries and brought a tremendous impact on business processes (Lu Lu, 2018). Technologies even have taken over the hospitality industry where people would think that it is impossible due to the idea that hospitality should have human touch only. However younger generations recognize those changes as beneficial ones (Ivanov & Webster, 2017). Technological experience is being most discussed

topic today. Hence, a lot of businesses are investing money in artificial intelligence for their further profit (Ekstein, 2017). Robots and artificial intelligence transform customers approach to the brand. The development of this form of consistently progressive technology in changing environment has now allowed hotels to use artificial intelligence and robots to set up a better personalized and remarkable experience for in-house guests while also reducing labor costs of the hotel brand. Nevertheless, current technological progress in robotics and artificial intelligence will have a huge influence on job roles, working hours and employee relationship not only between co-workers but as well as managers (Jun Li, 2018). However, employees

have to understand that artificial intelligence and robots do not have to be considered as a total replacement, because it can only affect low-skilled positions. The growing interest in robots and artificial intelligence in tourism industry suggests further investigation on this topic to increase the acknowledgment of this field of study (Ivanov et al., 2019). Therefore, this research paper investigates the importance of robots and artificial intelligence in hotels.

### 1.2 Rationale

Available literature seems to support the idea that robots and artificial intelligence slowly but surely taking over in hospitality industry and shaping it in the radically new way not for customers only but as well for employees (Kuo et al., 2017, Li et al., 2019). Therefore, the infusion of artificially intelligent robots to grant new service experience have quickly gained the attention of service researchers (Huang & Rust, 2018). Global research findings propose that three quarter of customers admit that robots and artificial intelligence can boost service experience pretty well. The research says that more than 65% of people who took part in this research welcome robots as front desk, room service, porters and waiter employees (TravelZoo, 2016). Artificial intelligence is integrated into service robots, which allowing them to communicate with the consumer as a normal waiter. On the other hand, robots will face emotional challenges due to the fact that it is just a machine and it cannot feel psychological part of human beings. Hence, developing a personalized scale involving elements that adapt to or obstruct consumers desire to accept service robots, is being an important part of a research (Lu et al., 2018). However, the lack of proper data results which are taken in one particular location and economic background. Another gap is an absence of different hotel sectors like boutique, three-four star hotels. (Jun et al., 2019). This paper will provide a better understanding of robots and artificial intelligence usage in hotels through literature reviews and factors which impact personalized services brought by robots and the way AI programmed to complete simple hotel operations.

### 1.3 Aim & objectives

The aim of this study is to analyse the impact of artificial intelligence and robotics on the workflow and service personalization at M Social Singapore

- o To identify communication and collaboration actions and procedure between humans and AI.

- o To explore the status and working tasks of artificially intelligent robots in the daily work routine.

- o To investigate artificial intelligence elements which will redefine employee perspective on conventional workflow in the M Hotel Singapore

## Chapter 2 Literature review

### 2.1 Introduction

In this chapter, author is going to examine recent theories, concepts and previous researches. Author aims to analyse the impact of artificial intelligence and robotics on the workflow in luxury hotels within current study. Moreover, 2.2.1 will be discussing the launch of robotics in hospitality industry. It will show the way AI theory is being applied in hotels. Section 2.2.2 will focus more on job design and how it develops and connects with robots in luxury hotels. Section 2.2.3 is going to examine more in-depth on the personalization of service, which brings customers exclusive experience and different level of organization. As well, in 2.3 section author is going to analyze previous researches and their findings on the topic to provide better understanding on AI implementation in luxury hotel sector.

### 2.2 Theoretical Background

#### 2.2.1 Artificial intelligence and robots in hospitality industry: Challenges and opportunities

According to Aghaei (2012), artificial intelligence is a representation of human intelligence processes that helps computer system to systematically learn from experience and execute human tasks in order to improve the efficiency of repetitive tasks. The dawn of interactive robots has opened up new opportunities for people to work side by side with robots to improve the efficiency. At that point we can observe several theories created by Zuboff (1988), Rogers (2003), and Lee and See (2004) which explain the way artificial intelligence completing their tasks. Zuboff (1988) states that AI relates to Trial-and-error experience theory. It shows the understanding of the robotics performance on certain tasks and as well trust in artificial intelligence which is similar to Rogers (2003) theory where author explains technological experience scale, recognition and being able to discover the errors. On the other hand, Lee and See (2004) state that people can build up trust towards technologies by recognizing the motives of robots or machines achievements. And it is being more reliable comparing to the trust which is build up on accuracy of the performance. Moreover, the usage of artificial intelligence and

robots in the hospitality industry is becoming more common, with technologies extending from AI chatbots that designed to support guest service procedures to robot assistants for smart concierge services in an effort to change hotel guest experience (Ivanov et al., 2017). Service robots which equipped with AI are program-based machines that communicate, collaborate and offer customer service as artificial service assistants (Wirtz et al., 2018). With help of numerous sensors that help collect data and adapt to specific situations, robots can make their decisions independently. Robots are identified by unique attributes to provide quality guest service in restaurant area. For instance, serving robots may be present in both virtual and physical ways. Mostly, they are designed to look more like us, humans, to simplify contact between them and guests. Furthermore, they have to act more cognitive. Robots are being empowered with exclusive system which allows them completing analytical tasks and/or social-emotional tasks. According to van Doorn (2017), researchers argue whether robots may generate new forms of automatic social relationships that might make customers feel being served by another “real” person. Malchus (2013) argues that there is another key issue which should be included in this field of research. Obviously it appears that a general recognition of robots is primarily associated with adopting particular robot functions in a service potential. Therefore, a crucial but obviously independent variable have to be integrated into all analysis of recognition of being served fully or particularly by artificially intelligent robots.

### 2.2.2 *Job design*

Job design is being a crucial part of any industry nowadays. That's why for every industry it is being different and unique. Hence, hospitality industry have been using job design oriented on employees to fulfill their requests to complete operational tasks efficiently. However, because of industrial revolution and birth of machines, hospitality industry has to adjust now. Today more and more hotels start to use artificially intelligent robotics on regular bases. At that point industry facing new problem connected to the job design topic and rises a question: what type of job design is going to be applicable for those machines? Menges et al. (2017), stated that prosocial motivation may be developed better by enhancing energy that strengthen job performance. Ryan and Deci (2000) created a self-determination theory, which states that “humans have the basic propensities to be intrinsically motivated, to assimilate their social and physical worlds, to integrate external regulations into self-regulations, and, in so doing, integrate themselves into a larger social whole”. Furthermore, it also

describes how the fulfillment of human's basic needs for independence, relatedness and professionalism affects the working process via encouragement. From this theory job design indicates to the actual framework of jobs which employees are executing. Hence, job design reflects on the job itself, the duties or operations which employees perform for the businesses they work for on daily basis. According to Babbage (1835) and Smith (1850), who were the first writers to point out the uniqueness of job design topic, they state that if tasks were specialized and simplified then it would be easier for employees to concentrate on fewer tasks which would increase their job-related skills. Later, their skills that they have been focused on would grant greater employee efficiency at work. According to Campion theory (1987), there are four different approaches on job design: The motivational approach, the mechanistic approach, the biological approach and the perceptual/motor approach. The motivational approach describes the working process where employees are being challenged performing their tasks. It makes workers feel responsible for their tasks, however performing task is the only motive for them. The mechanistic approach shows adjustments in performing the job. It explains that task have to be divided into specific, small tasks which should be completed persistently. The biological approach is focused on minimizing physical activities of the employees. This approach aim is to reduce physical concerns and enhance working environment conditions so workers will not get exhausted, fatigue or sick. The perceptual/motor approach focuses on employees' mental perception: limitations and capabilities. This approach acknowledges the consideration and concentration needed for job performance and makes sure that employees stay within the normal mental state to complete their tasks efficiently. It helps to minimize mental stress and lethargy of workers. Adopting a suitable job design in organizations will enable workers to understand that their work assignments are meaningful and important to their consumers. Grant (2007) stated that employees' connection with consumers increases affective engagement between them as well as helps to create a unique connection between two sides. It represents a concept of prosocial motivation, due to the idea that employees are being inspired to use more resources to benefit their consumers lives (Grant, 2007). According to previous literature employees explain that the main goal of their job is to fulfill customer requests and make a positive contrast in the people live. This research paper is paying a better attention for the consequences of this theory but from the robot side. How will this theory work together with robots, will it be applicable due to

the idea that robots don't have motivation and just being programmed to follow specific tasks.

### *2.2.3 Service Personalisation process*

Service personalization is the process of using the individuals' own information to configure the service and transactional atmosphere in order to improve the services that accrue towards them (Lee and Cranage, 2011). This process may typically be broken down into some subprocesses, described as a collection of operations that conduct a component of the specific task (Fahey et al. 2001). According to Murthi and Sarkar (2003), those two subprocesses are called learning and matching. All businesses have to have a clear knowledge of consumers demands and needs to provide personalized services. Learning subprocess includes data collection. It is the moment, when a company captures unique clients' desires by a simple communication between the employee and the customer. Learning process primary happens by asking consumers to share clear ideas about what they like or dislike. On the other hand, consumers may do it indirectly by inferring expectations from current situation and their previous experience (Adomavicius and Tuzhilin, 2005). Now this process splits into two again: in direct and indirect learning. Direct learning is more applicable when consumers have already experienced the service or product. Indirect learning is essential when customers' desires have to be noticed and/or cannot be efficiently formulated or shared. In reality, both processes are being applied when direct method used to collect general ideas and indirect method to shape them (Huang and Lin, 2005). Adomavicius and Tuzhilin (2005), stated that matching subprocess is customizing the offer in order to satisfy acquired requirements of customers. Matching consists of changing several elements of the service based on individual preferences. For instance, changing the service delivery, service goods, service structures and etc. With help of those processes luxury hotels that apply artificially intelligent robots in a hotel will bring new wave of service personalization. Robots will provide another level of service and bring consumers better understanding how hospitality industry is going to change.

## *2.3 Review of Empirical Research*

### *2.3.1 Artificially intelligent robots in service delivery*

Acknowledgment from previous researches (Ivanov et al. 2018; Aghaei 2012), artificially intelligent robot development has improved efficaciously in past decades. Moreover, those technologies have been used more frequently in travel and hospitality industry (Ivanov, 2017). The

progress of applying robotics is very noticeable in hotel operations. They are being beneficial for hotels because AI helps to reduce labor costs, improve the efficiency of working process and it is programmed in a way to complete operational tasks consistently (Li, 2019). Furthermore, robots might help businesses by solving the problem of seasonal staff and as well boost the working process during employee shortage. In fact, researches have described artificial intelligence as a valuable tool which helps to develop and reorganize human resources system. As well it simplifies the process of recruitment and employees' allocation (Ivanov, 2018). Since hotels start rapidly use AI in their properties, it creates a gap that describes the lack of attention to AI impact on service employees. According to Jun (2019), the data that they collected states that Artificial intelligence and robotics recognition represented the compelling influence on staff turnover. This shows the idea of implementation of robots in operational tasks is truly a positive phenomenon which businesses has to acknowledge. Thus, most of research papers suggest not to collect data only from one geographical area but to use different ones to gain appropriate and relevant data. Growing usage of robotics would force hotels and other businesses to invest significant amount of money into artificially intelligent robots, which will complete everyday tasks in their facilities.

### *2.3.2 Implementation of job design for robots*

Job design is being a significant topic which is closely connected with hospitality industry. Nowadays, there are tremendous amount of research papers covering this topic, yet authors describe it in a different theoretical way and have different result on their collected data. It makes this topic rich for content. Furthermore, most of researches are examining job design from human perspective, the way employees do their tasks and how efficiently they complete everyday activities. But now technologies are blooming in hospitality industry and consumers face robots in hotels. This brings the question, how does job design work along with robots? According to Ivanov et al. (2019), studies of robot design are divided on three main divisions: robotics that are working autonomously, robots cooperating with another robots and robots cooperating with humans. First ones complete their operations independently. This type of robots is based on job design which contains control and observation mostly. According to Huang and Lu (2017), the multi-robot system is designed when it comes for robot-robot interactions. Those robotic interactions may bring hotel operations to newer level of service. This design is aiming to develop new system between robots to enhance algorithms which will empower interactions between robots

(El-Ansary et al. 2016). On the other hand, human-to-robot interactions in hospitality industry occurs when consumers facing robots in hotels, for example: robot-bartender or robot-waiter (Foster et al., 2017; Lehmann et al., 2014). Osawa et al., (2017) states that, hotels should think about coordinating artificially intelligent robots in hotel operations instead of creating a new job design for their operations because of robot usage. Thus, job design is being a heart of our work experience but it appears that robots can develop their own job design which is going to suit them better (Holman et al., 2002).

### *2.3.3 Personalisation using artificial intelligence*

Personalization is a crucial part of any business. It helps companies achieve better profit by adjusting to consumers' needs and demands. Before it was only human-to-human approach, where an employee would create a unique atmosphere for a customer to satisfy them and as well build loyalty between customer and company. Furthermore, technologies help companies to build a better understanding about what kind of demands customers have nowadays. (Hongjun et al., 2017). A number of research found it positive to let artificial intelligence improve its' knowledge about personalized service by learning from customers' reactions and algorithms which people install into robots (Miao et al., 2002; Wellman et al., 1996). Moreover, researches are using different approaches to explain how artificial intelligence can create better personalization. For instance, Kun (2015) states that businesses can personalize service robots from humans behavioral "footprints". Artificially intelligent robot examines the cue based on an interaction between operator and object and in the end it learns a habit, which is based on operators' behavior. By following this method, robot can "understand" consumer behavior and adapt to it to get the relevant data and in the end share it with management team. On the other hand, there are still a lot of limitations regarding artificial intelligence system (Piccoli et al. 2017).

### *2.4 Primary background research*

The future lies in information technology and robotics. The Singapore government understands this and provides tax incentives and opportunities for Singapore companies working hand by hand with artificially intelligent robots (Erlanger, 2019). In response to favorable conditions for the development and implementation of innovative solutions, enterprises help solve the shortage of service personnel in the country by developing robots to perform particular tasks. Automation will increase productivity by freeing the staff of businesses from the routine work, giving them the opportunity to focus on customer interaction.

Letting artificially intelligent robots to work is going to accelerate the transformation of the business and create a competitive industry, supporting the future workforce (IW, 2019). Here author will examine M Social Hotel, where guest can experience robotic services. It is estimated that in Singapore the workforce in the hotel industry will increase annually by 1-2% per year until 2020 (IW, 2019). In light of this labor shortage Director of Hotels and Labor Sectors at the Singapore Tourism Board Ong Huey Hong (2013) stated that, the hotel industry needs to transform its processes through innovation and technology. Service delivery robots are designed to compensate the lack of manpower in Singapore hotels, so AURA who works in M Social hotel can deliver water bottles, toiletries and food to the room (Hotelier.pro 2017). Hotel "hired" Aura in 2017, yet the hotel itself was founded in 2016. Moreover, AURA is being the first ever robot, which was created in San Francisco US, by Savioke company, to start working in Singapore hotel. Richards (2017) stated that, people are for sure being the heart of hospitality industry. Thus, he does not want to replace humans by artificially intelligent robots, but use them to improve guest services. As well AURA has a "brother" who works in the kitchen in M Social as well and mostly cooks breakfast for hotel guests. On the other hand, AURA does not have any conversation with guests. Whenever it arrives to the right room, all it does is just calling guest with a special phone saying "Hello, your delivery has arrived" and that is all she can say to the guest. Author thinks that guests may have more experience in this by having a conversation with robot, however AURA is still not programmed well to freely communicate with customers. So, M Social Singapore is already working along with artificially intelligent robot AURA and the question is will there be any improvements in robot performance so it can reach a human level personalization and as well exceed customer expectation just like regular employees.

### *2.5 Conclusion*

In conclusion, artificially intelligent robotics are slowly taking over regular employees in hospitality industry. Moreover, numerous amount of researches have been working on this topic and examining it from different perspectives. However, there is a lack of research which aims to understand employee perspective. So, with help of theoretical background which was mention before in this paper, author is going to examine the process of how artificial intelligence and robots are redefining the meaning of hotel operational work with help of M Social hotel in Singapore.

## Chapter 3 Methodology

### 3.1 Aim and Objectives

The aim of this study is to analyse the impact of artificial intelligence and robotics on the workflow and service personalization at M Social Singapore

- o To identify communication and collaboration actions and procedure between humans and AI.

- o To explore the status and working tasks of artificially intelligent robots in the daily work routine.

- o To investigate artificial intelligence elements which will redefine employee perspective on conventional workflow in the M Hotel Singapore

### 3.2 Research Approach

To successfully deliver the objective and aims of this paper in understanding the way robotics and AI redefine hotel operational work in Singapore's M Hotel, author will use qualitative approach. However, Ivanov (2018), encourages to use quantitative approach due to the idea that robotics need to be understood not by a small group of people but by a wider audience. Moreover, it has a deductive approach which relates to quantitative approach. Quantitative approach is not going to fit this study due to the factors which bring the results down. Those factors are – unnatural environment, lack of proper data due to randomization of answers and individual characteristics (Garage, 2019). This approach helps to understand theory better and it might be a major plus for robotics research, however author is aiming for another results. Qualitative approach is better in this situation due to the idea it can provide insights that are good for future development of hospitality, it is flexible and the data collected is going to detail-oriented (Gaille, 2018). In order to achieve the decent and narrowed results, Clandinin and Connelly's (2000) three dimensional narrative-inquiry space will be applied. This method includes writing about the personal and social engagement in three dimensions: the past, present and future. This approach will help to identify better results on different time stages of AI robotics being adapted in the hospitality industry and the way humans both interacting and working together with them. Author is looking for a different answer from a smaller group, so better examination of behavior, perceptions and reactions are going to be done about the artificially intelligent robotics (Suzuki, 2007). Author will be having a small group of people from one generation so the data collected will fit author expectations and improve understanding on this topic.

### 3.3 Sampling

According to Glaser (1978), in the early phases of an investigation process, researchers would choose the groups or individuals that they consider will maximise the opportunities of acquiring decent information and suggestions for further evidence on their subject of study. Author is aiming to create a focus group of people which will participate in this research. Focus group will consist of Generation Y employees and customers. Gender does not have any importance due to the perception that Millennials are being in good relationship with technological processes. Author implements non-probability method because sampling involves specific criteria on participants and it will help easily collect the data (Freeman, 2017). Hence, data collection in qualitative research requires substantial amount of time, so implementing a small focus group is going to be most likely appropriate. There will be 2 focus groups. Each of them will consist of 15 people which makes it in total of 30. In first group there will be loyal customers of M Social Singapore who will examine robot behavior and in the second group will be employees from different operational departments working together with robot and scale its' working performance. No mix between employees and customers needed. Apart from focus group author aims to have an observation as first step of sampling. Firestone (1993) states that observation of generic process conducted in the study are crucial to gaining certain knowledge of new or current concepts about the problem which is being investigated. With observation author can see what reactions and emotions participants show. It will help understand behavior towards robots. Since Generation Y is being good with technology, it is just perfect for research sampling because participants can easily answer questions and describe their feelings about artificially intelligent robotics in hotel operations.

### 3.4 Data collection

In this research, focus group will be observing the way AI robot provides services according to the Footprints behavior theory Kun (2015), and then provide with their ideas and responses about the robot's performance. Data collection will be done in 3 steps. First of all, author will gather samplers and put them into focus group, according to the sampling ideas, in the environment of M Hotel Singapore. From this point observation starts. Author will collect data according to how participants behave in cooperation with AI robotics. This method is the simplest one, however it will show the best result for this research (Steber, 2017). Hence, after focus group observed robot's performance, they will be taken for an individual interview, where author is going

to collect data. Individual interviews help to understand samplers' attitude towards robotics by answering questions given by author. Kvale and Brinkmann (2009) argues that structured interview approach is suitable for qualitative approach because it provides with strong and on point information. Structured interview approach will be used for employee focus group because author wants to determine a clear picture of human-robotic cooperation's in the operational and repetitive tasks. So the data collected from employees will be useful for manager to consider in future. On the other hand, Semi structured interviews are going to be applied towards the second focus group of loyal M Social customers. According to DeJonckheere (2019) semi structured interviews are efficient when authors aiming to explore subjects' feelings and thoughts on the topic. It is essential not to restrict second focus group on strict questions but rather have slightly moderated questions in order to obtain the customer perspective on that topic. Nevertheless, data collected from customers may increase the interest for hotels to start implementing Artificially intelligent robotics. Hence, those interviews are going to be anonymous, however participants can any time access the information which author have collected.

### *3.5 Data Analysis*

Once obtaining all of the subjects' data from both observation and interview stages, the author will transfer the data from the recordings to documentations. However, Smith (2011) argues that researches should not underestimate the time consumption of data analysis in the early stages. It is essential to spend more time in analysing the collected data in order to make the finding more credible (Li, 2007). Moreover, Hammersley (1995) states that it is important for the study if the investigator obtain a through comprehension of the data's nuances, therefore, allowing an authentic reflection of the participants' personal experiences. Nevertheless, the collected data will be shared with participants as well as organised documents will not be used for deceitful motives. It is one of the greatest methods to judge the quality of data findings if new learnings into the examined study have been presented (Krippendorff, 2004). Author is aiming to develop and acknowledge the insights of analysed data by continuously inspecting both observation and interview results. In addition, author is going to implement thematic analysis. This analysis offers theoretical flexibility on the study which generates more meaningful and decent analysis for a certain topic (Clarke and Bruan, 2013). Thematic analysis will help to examine both positive and negative perspectives of robots

redefining the workflow and the repetitive operational tasks of M Social Singapore.

### *3.6 Credibility*

Credibility is related with the research's objectives and refers to the confidence in how effectively the data answers the stated concept (Polit, 2008). Moreover, author proposes triangulation approach to ensure the proper credibility level. Triangulation approach aims to use multiple methods to answer research objectives (Bhandari, 2022). Author will implement two types of triangulation which are Data and investigator triangulation. Data triangulation will help to clarify collected data from interviews and collected data is most certainly can assist to other studies (Korstjens, 2018). Investigator triangulation follows observation data collection, thus, assists in minimising the risks of observation BIAS. In addition, for successfully performing in investigator triangulation author suggests to work with other researchers together. Since robotics and AI are being a recent topic for the researchers of hospitality sector, it is essential to follow new theories presented in the field in order to provide credible data. Koch (1994) argues that self-awareness of the author is important from the credibility point of view. Therefore, author will implement small pre-interview with subjects of the study in order to understand if the interview questions are feasible and worthy for gathering appropriate data which resembles the proposed study objectives.

### *3.7 Confirmability*

Confirmability is aiming to show that the researcher's ideas and results are clearly derived from the collected data, therefore, require the researcher to explain how analyses and conclusions were achieved (Tobin and Begley, 2004). In addition, confirmability focuses on the idea that other researchers can confirm the results of the studied research. To ensure that confirmability is reached, author will implement audit trials. According to Lincoln and Guba (1985), audit trials are essential because authors are responsible in providing a detailed list of facts on all decisions made throughout the research process, sampling, expansions of results and etc. Moreover, gathered by author data about M Social Singapore will allow the auditor to examine the research study path's transparency. Considering readers' perspective, it will help further researchers to pursue and determine both logical findings and phases of the research process.

### *3.8 Dependability*

Lincoln and Guba (1985) state that dependability is known as the consistency of findings throughout time. Hence, dependability entails participants' judgments of the researcher's findings, analysis and suggestions, which are verified by the data that was collected from subjects of the research. The research procedures must be thoroughly documented in order to show researchers ability to address the issue of dependability more precisely, therefore, this allows future research investigators to recreate the research work, yet not necessarily acquire the same outcomes (Tobin and Begley, 2004). Author aims to present enough information about the study findings of AI robotics and the way they redefine the operational workflow of hotels, especially focusing on M Social Singapore in order to help future researchers to replicate the study and gather advanced findings on that topic. Moreover, author strongly believes that robotic implementation in Hospitality sector and theoretical frameworks may change over a short period of time due to the idea of popularity of this topic in research field, thus, research may lack dependability in this case.

### *3.9 Transferability*

Transferability is achieved by showing readers how the research study's results may be utilised to various situations, contexts, periods of time and different individuals (Gasson, 2004). Moreover, Lincoln and Guda (1985) state that transferability, unlike generalisation for quantitative research approach, does not include general claims but rather allows research readers to draw parallels between research components and readers' own experience and knowledge about the study topic. Author strongly believes that research transferability is effective because the completed interviews can be carried out in the same way for another hotels all over the world who also try to implement artificially intelligent robotics in the operational and repetitive tasks. In addition, author aiming to carefully explain research study background and its fundamental hypothesis. Eventually, it is the duty of the reader or researcher that is transferring to determine if the research transfer was reasonable.

### *3.10 Ethical issues*

This research will focus on younger generation also known as Generation Y. The research about AI robotics in hospitality will be explained to them in order to avoid any misunderstanding. Hence, they will be invited to stay in the hotel and observe AI in action. Data for research will come from observation documents, focus group analysis and individual interviews. Moreover,

interviews will be the main method of data collection. Author wants participants answer given questions honestly in order to complete data collection with right numbers. Here BIAS method will be used. Bias is going to help to identify the limitations in data and get the needed information. Hence, Author will be using specific direct questions in order to get richer data instead of just "Yes" or "No" answers. As well author confirms that all the data collected will be anonymous and author will provide access for participants on the data collected throughout the period. The research when it's done will be beneficial to the hospitality industry because it explains the implementation of robotics in hospitality industry and companies cannot avoid that development process.

### *3.11 Limitations*

According to Patton (2002), there will never exists a perfectly designed research, thus, the fundamental restriction is the conceptual framework and the design of the research itself. Moreover, that is why research authors must be critical towards their projects. First of all, author main aim is to analyse the way robotics redefine the workflow in operational tasks, hence it might be difficult to comprehend the data collected from two different focus groups. Utilise of interview questions results as a measuring instrument, author unable to prevent disclosing the purpose of the research and have to rely on the honesty of the subjects' answers. In addition, author is well aware that the results of the research may be proven wrong by more advanced and successful studies that are associated with the same theme and so gaining the "absolute truth" can be seen as a paradox (Neuman, 2006). Nevertheless, considering the size of the focus group (30 people in total) it may take a lot of time for the researcher to analyse all the answers given as well as time conducted for interview may take few days to complete. Therefore, observation stage may bring some challenges as well. Due to the idea that author is performing alone for this study, observation stage can deceive the findings over the time because author may get exhausted examining and taking notes on both guests and employees behavior towards robots. Moreover, since author is being alone there is a possibility of missing some details during observation. Yet, author strongly believes that qualitative approach suits this study the best because author aims to gather in-depth data about robot implementation in M Social Singapore hotel rather than broader picture of robotic perspective in hospitality sector.



## Chapter 4 Discussion

### 4.1 Introduction

Nowadays hospitality industry desires implementation of AI powered robotics due to the idea that customer mind is being slowly changed (Mastrogiovanni, 2013). Their changing expectations of service demand about more creative touch as well as technology involvement in the service. Yet, Pinillos (2016) states, that some customers faced problems communicating with robots, thus, this current problem can create a certain opposition for their usage. Moreover, the service that robotics deliver should be customised in order to satisfy needs of all types of guests. Nevertheless, recent robotics technologies provide unique services that bring additional benefits for hotel businesses, yet further evolution of AI will deliver even greater service results (Jabeen, 2021). Due to the missing primary research for this study, a synthesis of the information discovered in literature review will be utilised to investigate the implementation of AI and robotics and the way they redefine operational workflow in the hotel.

### 4.2 *To identify communication and collaboration actions and procedure between humans and AI.*

Right communication between service and customer is the key for the successful business. So how can AI powered robotics cooperate well with both guests and employees? Personalised service in hotels means creating a bond between customer and server by, for example, remembering customers name which may benefit the hotel by increasing customers revisit intentions since staff cares about them (Magnini, 2005). As a result, robots should carry certain name as well in order to achieve a unique relationship between customer and robot. It can be assumed that by giving robots human characteristics, it will boost their ability to form meaningful relationship with hotel guests (Wirtz, 2018). Yet, Mariani (2021) states, that programmed robots add specific entertainment features to the service process. This makes the guest experience more pleasant, engaging and memorable, which improves guest perspective about modern technologies in hospitality industry (Webster, 2019). Examining from the employee perspective, Lu (2021) suggests that well trained employees may show positive perception towards robots. Additionally, well trained employees are not frightened of being replaced by robots because they believe they can cooperate with them and be more useful than robots. Xu (2020) explains that correct leadership in the workplace being important in stabilising service robots and staff interactions. It is assumed that robots can also be programmed to analyse and follow

different leadership styles in order to deliver outstanding service together with humans. Nevertheless, due to the recent pandemic hospitality industry has experienced a serious problem in labour shortage (Bajrami, 2021). This factor brings additional benefit for the implementation of adaptive robots into hospitality sector. In order for AI powered robotics to success in communication with humans, both customers and employees, they should be well programmed so the risks will decrease. Author recommends to consider further development of AI since it can bring a unique service setting in the hospitality sector.

### 4.3 *To explore the status and working tasks of artificially intelligent robots in the daily work routine.*

Nowadays hospitality researchers have realised and explored the various advantages of utilising AI powered robotics in the hospitality sector, as the adoption and usage of such advanced technologies continue to grow swiftly (Ivanov, 2017). As we already know, artificial intelligence is broadly used in hotel sector, especially in revenue management, guest services and experiences and automation of daily operational repetitive tasks. Nowadays without AI it is harder for hotels to deliver high level and quality of service for your guests. Saul (2021) states that hospitality industry need to understand the advanced implementation of robotics in the hotels because new AI robotics development is already on the way and the tasks it may perform is beyond people expectations. Employees working together with robots would save plenty of time by simply utilising them in repetitive tasks. Moreover, that may allow employees to focus their abilities to more innovative, revenue-generating activities (Ivanov, 2017). It is assumed that research in robot design is vital in enhancing the technological and conceptual aspects for a better understanding of the framework for AI and robots being applied in hospitality sector. It may guarantee the successful execution of required activities and also the appropriate design and implementation of robots in hotel and tourism areas (Ivanov, 2019). Author recommend for hospitality industry to adapt the framework, which was mentioned above, of “footprint” learning for robotics. This framework will provide a better picture on how not only to program robots to perform their tasks, but also for them to learn from their own actions in order to adapt better for the further service delivery and personalisation for the customers.

### 4.4 *To investigate artificial intelligence elements which will redefine employee perspective on conventional workflow in the M Hotel Singapore.*

Bankins and Formosa (2019) assumes that the rise of AI and robots have dramatically changed many businesses. The essential task of AI in the workplace is to assist challenging F&B management decision making process by improving the effectiveness and efficiency in that process (Reddy, 2019). The complexity of AI controlled frameworks has recently advanced to the point where no human intervention is required for their design and deployment. Considering M Hotel Singapore, author assumes that AI powered robot which is working in the room service (AURA) redefines employee perspective on the repetitive tasks performed by that robot. It is programmed to deliver products to the guest room with the best efficiency and low chance of risks while delivering products. M Social implements robots in their operations due to the several reasons which are: cutting costs, as well as performing tiresome physical activities and repetitive task which human employee would dislike to perform (Tung and Au, 2018). Moreover, it is assumed that implementation of robot in a hotel created a unique customer experience as well as a certain bond with employees. M Social also focuses on developing their employees by utilising special trainings which include technological skills. Those skills help employees to not only understand the way robot is working but also improve their capabilities to work together with AURA (Yu, 2021). Furthermore, author recommends that hotel should continue the trend and implement a robot in the other departments due to the rising and unavoidable robotics implementation in the industry but also because of the successor in the room service department – AURA.

#### 4.5 Conclusion

To sum up, the evaluation of discussed objectives led to additional problems which can be investigated deeper in further researches. Yet discussion brought up some light on several question of implementation of AI and robots in hospitality sector. It was assumed that changing perspective of customers about robots shaping new trend in hospitality as robotics deliver a unique service. Moreover, the interactions between AI and employees also being an important topic to cover due to the idea of their cooperation in the work field. M Social Singapore is being one of the good examples where robots working hand by hand with humans and together they deliver a unique and personalised services. AI powered robotics taking over the industry and customers only support that idea and it is up for hotels to take a step and consider all the benefits of implementing robots.

### Chapter 5 Conclusion & Recommendation

#### 5.1 Conclusion

Artificial Intelligence and Robotics are growing rapidly nowadays. And it is not a surprise that people start seeing them almost in every industry (Tung, 2017). In this research Author showed the collaboration of people and robotics by using the case of M Social in Singapore. In addition, this research analysed the theoretical frameworks on artificially intelligent robots in order to provide future researchers with collected finding for the future development of this theme. However, researchers show enthusiasm towards AI powered robotics in hospitality sector, yet afraid that robots will take over positions of employees and also may have a bad impact on people interactions (Memarzadeh and Anand, 2020). Qualitative approach was implemented for this research because author aimed to get more in-depth data from subjects of particular location. Therefore, author suggests for future researchers to continue following qualitative approaches for this topic but from different locations of the world in order to get a clear picture on different cultures facing robot implementations in hospitality industry. This Study furthers to a better understanding of how hotel industry can consistently build a trust for Artificially Intelligent robotics and let them change the operational workflow of the properties. Nevertheless, Author strongly believes that by doing that hospitality industry will step into a new “era” of Artificially Intelligent personalised service.

#### 5.2 Recommendation

Future research should keep examining the way robotics change the workflow of hotels and also explore the customer perspective in order to get the understanding of what type of Artificially Intelligent robotics would fit their preferences. Author strives to explore this topic because when robotics will change the human labor then industry would be ready for this. In addition, this will help properties to avoid major problems with Artificially Intelligent robots since they were studied a lot previously. Nevertheless, this research clarifies that robotics will work good with Generation Y, also known as Millennials, because this generation is being in good relationship with technologies. Author suggests to examine other generations to get more informative data on this topic and identify the difference in robotic acceptance. Hence, demographic elements can bring another results. Author suggests to study this topic in Western world to identify the difference in people perspectives and examine cultural behavior towards robotics. A great amount of research must be done on this topic to absorb how humans interact and accept Artificially Intelligent robots, because robots are here to make our live

better and easier not to be our competitors or enemies.

## References

- Adomavicius, D. and Tuzhilin, A. (2006) Personalization technologies: A process-oriented perspective. *WIRTSCHAFTSINFORMATIK*, 48(6), pp.449-450.
- Aghaei, S. (2012) Evolution of the World Wide Web : From Web 1.0 to Web 4.0. *International journal of Web & Semantic Technology*, 3(1), pp.1-10.
- Babbage C. (1835) *On the economy of machinery and manufacturers* Charles Knight, London.
- Bajrami, D., Terzić, A., Petrović, M., Radovanović, M., Tretiakova, T. and Hadoud, A. (2021) Will we have the same employees in hospitality after all? The impact of COVID-19 on employees' work attitudes and turnover intentions. *International Journal of Hospitality Management*, 94. DOI 10.1016/j.ijhm.2020.102754
- Bankins, S. and Formosa, P. (2019) When AI meets PC: exploring the implications of workplace social robots and a human-robot psychological contract. *European Journal of Work and Organizational Psychology*, 29(2), pp.215-229. DOI 10.1080/1359432x.2019.1620328
- Bhandari, P. (2022) *Face Validity*. Scribbr. [online] Available at: <https://www.scribbr.com/methodology/face-validity/> [Accessed 21 May 2022]
- Borghi, M. and Mariani, M. (2021) Service robots in online reviews: Online robotic discourse. *Annals of Tourism Research*, 87. DOI 10.1016/j.annals.2020.103036
- Clandinin, D. and Connelly, F. (2000) *Narrative inquiry: Experience and story in qualitative research*. San Francisco: Jossey-Bass.
- Clarke, V. and Braun, V. (2013) Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The psychologist*. 26 (2), pp. 120-123.
- Dejonckheere, M. and Vaughn, L. (2019) Semistructured interviewing in primary care research: a balance of relationship and rigor. *Family medicine and community health*. <http://dx.doi.org/10.1136/fmch-2018-000057>
- Ekstein, N. (2017) *Technology Is Top of Mind for Hotels*. [online] Skift. Available at: <https://skift.com/2017/12/09/hotel-experts-predict-top-luxury-lodging-trends-for-2018/> [Accessed 8 Feb. 2020].
- El-Ansary, S., Shehata, O.M. and Morgan, E.S.I. (2016) Airport management controller: a multi-robot task-allocation approach. in *Proceedings of the 4th International Conference on Control, Mechatronics and Automation*, ACM, pp. 26-30.
- Erlanger, A. (2019) *Business In Singapore In The Field Of Robotics: The Importance Of The Field, Its Achievements And Prospects | Internationalwealth.info*. [online] InternationalWealth.info. Available at: <https://internationalwealth.info/offshore-business-abroad/business-singapore-robototechnology/> [Accessed 19 March 2020].
- Fahey, L., Srivastava, R., Sharon, J. and Smith, D. (2001) Linking e-business and operating processes: The role of knowledge management. *IBM Systems Journal*, 40(4), pp.889-907.
- Firestone, W. (1993) Alternative arguments for generalising from data as applied to qualitative research. *Educational researcher*. 22(4), pp. 16-23.
- Foster, M., Gaschler, A. and Giuliani, M. (2017) Automatically Classifying User Engagement for Dynamic Multi-party Human–Robot Interaction. *International Journal of Social Robotics*, 9(5), pp.659-674.
- Freeman, M. (2017) *Modes of thinking for qualitative data analysis*. New York: Routledge.
- Gasson, S. (2004) *Rigor in grounded theory research: An interpretive perspective on generating theory from qualitative field studies. The handbook of information systems research*. Hershey: Idea group. Pp. 79-102.
- Girdhari, S. (2019) *Imagining the future of hospitality: new report from Amadeus & IHG - Institute of Hospitality*. [online] Institute of Hospitality. Available at: <https://www.instituteofhospitality.org/imagining-the-future-of-hospitality-new-report-from-amadeus-ihg/> [Accessed 9 Feb. 2020].
- Giurgea, A. (2017) *Singapore Introduces Aura, The Room Service Robot*. [online] TravelWires. Available at: <https://www.travelwires.com/singapore-introduces-aura-the-room-service-robot-691> [Accessed 20 March 2020].
- Glasser, B. (1978) *Theoretical sensitivity*. Sociology press. California: Mill Valley.

- Grant, A. (2007) Relational Job Design and the Motivation to Make a Prosocial Difference. *Academy of Management Review*, 32(2), pp.393-417.
- Hammersley, M. and Atkinson, P. (1985) Recording and organising data. *Ethnography*. 2nd Ed. New York: Routledge. Pp. 175-204.
- Hengstler, M., Enkel, E. and Duelli, S. (2016) Applied artificial intelligence and trust—The case of autonomous vehicles and medical assistance devices. *Technological Forecasting and Social Change*, 105, pp.105-120.
- Huang, E. and Lin, C. (2005) Customer-oriented financial service personalization. *Industrial Management & Data Systems*, 105(1), pp.26-44.
- Huang, M. and Rust, R. (2018) Artificial Intelligence in Service. *Journal of Service Research*, 21(2), pp.155-172.
- Ivanov, S. (2017) Robonomics – principles, benefits, challenges, solutions. *Yearbook of Varna University of Management*. 10, pp. 283-293.
- Ivanov, S., Gretzel, U., Berezina, K., Sigala, M. and Webster, C. (2019) Progress on robotics in hospitality and tourism: a review of the literature. *Journal of Hospitality and Tourism Technology*. [online] Available at: <https://www.emerald.com/insight/content/doi/10.1108/JHTT-08-2018-0087/full/html> [Accessed 8 Feb. 2020].
- Ivanov, S., Webster, C. and Garenko, A. (2018) Young Russian adults' attitudes towards the potential use of robots in hotels. *Technology in Society*, [online] 55, pp.24-32. Available at: <http://Young Russian adults' attitudes towards the potential use of robots in hotels> [Accessed 9 Feb. 2020].
- Jabeen, F., Al Zaidi, S. and Al Dhaheri, M. (2021) Automation and artificial intelligence in hospitality and tourism. *Tourism Review*. DOI 10.1108/tr-09-2019-0360
- Koch, T. (1994) Establishing rigour in qualitative research: The decision trail. *Journal of advanced nursing*. 19, pp. 976-986.
- Korstjens, I. and Moser A. (2018) Series: practical guidance to qualitative research. Part 4 Trustworthiness and publishing. *European Journal of general practice*. 24 (1), pp. 120-124. DOI: 10.1080/13814788.2017.1375092
- Krippendorff, K. (2004) Content analysis: an introduction to its Methodology. 2nd Ed. London: Sage publications
- Kuo, C., Chen, L. and Tseng, C. (2017) Investigating an innovative service with hospitality robots. *International Journal of Contemporary Hospitality Management*, [online] 29(5), pp.1305-1321. Available at: <https://www.emerald.com/insight/content/doi/10.1108/IJCHM-08-2015-0414/full/html> [Accessed 9 Feb. 2020].
- Kvale, S. and Brinkmann, S. (2009) Interviews: Learning the craft of qualitative research interviewing. 2nd Ed. California: Thousand Oaks.
- Lee, C. and Cranage, D. (2011) Personalisation–privacy paradox: The effects of personalisation and privacy assurance on customer responses to travel Web sites. *Tourism Management*, 32(5), pp.987-994.
- Lee, J. and See, K. (2004) Trust in Automation: Designing for Appropriate Reliance. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 46(1), pp.50-80.
- Li, J., Bonn, M. and Ye, B. (2019) Hotel employee's artificial intelligence and robotics awareness and its impact on turnover intention: The moderating roles of perceived organizational support and competitive psychological climate. *Tourism Management*, [online] 73, pp.172-181. Available at: <https://www.sciencedirect.com/science/article/pii/S0261517719300354#bbib37> [Accessed 8 Feb. 2020].
- Li, S. (2007) Learning to do qualitative data analysis: an observational study of doctoral work. *Qualitative Health research*. 17 (10), pp. 1442-1452.
- Lincoln, Y. and Guba, E. (1985) *Naturalistic inquiry*. California: Sage.
- López, J., Pérez, D., Zalama, E. and Gómez-García-Bermejo, J. (2013) BellBot - A Hotel Assistant System Using Mobile Robots. *International Journal of Advanced Robotic Systems*, [online] 10(1), p.40. Available at: <https://journals.sagepub.com/doi/full/10.5772/54954> [Accessed 8 Feb. 2020].
- Lu, L., Cai, R. and Gursoy, D. (2019) Developing and validating a service robot integration willingness scale. *International Journal of Hospitality Management*, [online] 80, pp.36-51. Available at: <https://www.sciencedirect.com/science/article/pii/S0278431918306455> [Accessed 8 Feb. 2020].

- Lu, L., Zhang, P. and Zhang, T. (2021) Leveraging “human-likeness” of robotic service at restaurants. *International Journal of Hospitality Management*, 94. DOI 10.1016/j.ijhm.2020.102823
- Magnini, V. and Honeycutt, E. (2005) Face Recognition and Name Recall. *Cornell Hotel and Restaurant Administration Quarterly*, 46(1), pp.69-78. DOI 10.1177/0010880404270881
- Mastrogiovanni, F. and Sgorbissa, A. (2013) A behaviour sequencing and composition architecture based on ontologies for entertainment humanoid robots. *Robotics and Autonomous Systems*, 61(2), pp.170-183. DOI 10.1016/j.robot.2012.09.028
- Memarzadeh, F. and Anand, S. (2020) Hotel Guests' Perceptions of Green Technology Applications, and Practices in the Hotel Industry. *International Journal of Tourism and Hospitality Management in the Digital Age*, 4(1), pp.1-9. DOI 10.4018/ijthmda.2020010101
- Menges, J., Tussing, D., Wihler, A. and Grant, A. (2017) When Job Performance is All Relative: How Family Motivation Energizes Effort and Compensates for Intrinsic Motivation. *Academy of Management Journal*, 60(2), pp.695-719.
- Murthi, B. and Sarkar, S. (2003) The Role of the Management Sciences in Research on Personalization. *SSRN Electronic Journal*.
- Naumov, N. (2020) The Impact of Robots, Artificial Intelligence, and Service Automation on Service Quality and Service Experience in Hospitality | Emerald Insight. [online] Emerald.com. Available at: <https://www.emerald.com/insight/content/doi/10.1108/978-1-78756-687-320191007/full/html> [Accessed 9 Feb. 2020].
- Osawa, H., Ema, A., Hattori, H., Akiya, N., Kanzaki, N., Kubo, A., Koyama, T. and Ichise, R. (2017) What is real risk and benefit on work with robots? From the analysis of a robot hotel. in *Proceedings of the Companion of the 2017 ACM/IEEE International Conference on Human-Robot Interaction*, ACM, pp. 241-242.
- Patton, M. (2002) *Qualitative research and evaluation methods*. 3rd ed. London: SAGE.
- Pinillos, R., Marcos, S., Feliz, R., Zalama, E. and Gómez-García-Bermejo, J. (2016) Long-term assessment of a service robot in a hotel environment. *Robotics and Autonomous Systems*, 79, pp.40-57. DOI 10.1016/j.robot.2016.01.014
- Polit, D. and Beck, C. (2008) *Nursing research: Generating and assessing evidence for nursing practice*. 8th ed. Philadelphia: Lippincott William and Wilkins.
- Powell, L. (2019) How Luxury Hospitality Can Use Technology to Stay Human. [online] Skift. Available at: <https://skift.com/2019/02/26/how-luxury-hospitality-can-use-technology-to-stay-human/> [Accessed 8 Feb. 2020].
- Prnewswire.com. (2013) Ong Huey Hong Of Singapore Tourism Board First Recipient Of The Rama Rebbapragada Award For Outstanding Contribution To The Cruise Industry In Asia. [online] Available at: <https://www.prnewswire.com/news-releases/ong-huey-hong-of-singapore-tourism-board-first-recipient-of-the-rama-rebbapragada-award-for-outstanding-contribution-to-the-cruise-industry-in-asia-227099991.html> [Accessed 18 March 2020].
- Reddy, A., Rani, R. and Chaudhary, V. (2019) Technology for Sustainable HRM: An Empirical Research of Health Care Sector. *International Journal of Innovative Technology and Exploring Engineering*, 9(1), pp.2919-2924. DOI 10.35940/ijitee.a9108.119119
- Rogers, E. (2003) *Diffusion Of Innovations*. 4th ed. New York: The Free press.
- Ryan, R. and Deci, E. (2000) Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), pp.54-67.
- Saul, L. (2021) Service robots and AI: what impact on the future of hospitality. *EHL insights*. [online] Available at: <https://hospitalityinsights.ehl.edu/service-robots-future-of-hospitality> [Accessed 21 May 2022]
- Smith, J. and Firth, J. (2011) Qualitative data analysis: application of the framework approach. *Nurse researcher* 18 (2), pp. 52-56.
- Suzuki, L., Ahluwalia, M., Arora, A. and Mattis, J. (2007) The pond you fish in determines the fish you catch: Exploring strategies for qualitative data collection. *The Counseling psychologist*. 35, pp. 295-327.
- Tobin, G. and Begley, C. (2004) Methodological rigour within a qualitative framework. *Journal of Advanced Nursing*, 48(4), pp.388-396.

Tung, V. and Au, N. (2018) Exploring customer experiences with robotics in hospitality. *International Journal of Contemporary Hospitality Management*, 30(7), pp.2680-2697. DOI 10.1108/ijchm-06-2017-0322

Tung, V. and Law, R. (2017) The potential for tourism and hospitality experience research in human-robot interactions. *International Journal of Contemporary Hospitality Management*, 29(10), pp.2498-2513. DOI 10.1108/ijchm-09-2016-0520

van Doorn, J., Mende, M., Noble, S., Hulland, J., Ostrom, A., Grewal, D. and Petersen, J. (2016) Domo Arigato Mr. Roboto. *Journal of Service Research*, 20(1), pp.43-58.

Webster, C. and Ivanov, S. (2019) Future tourism in a robot-based economy: a perspective article. *Tourism Review*, 75(1), pp.329-332. DOI 10.1108/tr-05-2019-0172

Wirtz, J., Patterson, P., Kunz, W., Gruber, T., Lu, V., Paluch, S. and Martins, A. (2018) Brave new world: service robots in the frontline. *Journal of Service Management*, 29(5), pp.907-931. DOI 10.1108/josm-04-2018-0119

Xu, S., Stienmetz, J. and Ashton, M. (2020) How will service robots redefine leadership in hotel management? A Delphi approach. *International Journal of Contemporary Hospitality Management*, 32(6), pp.2217-2237. DOI 10.1108/ijchm-05-2019-0505

Yu, H., Lee, L., Popa, I. and Madera, J. (2021) Should I leave this industry? The role of stress and negative emotions in response to an industry negative work event. *International Journal of Hospitality Management*, 94. DOI 10.1016/j.ijhm.2020.102843

Zuboff, S. (1988) In the age of the smart machine: The Future of Work and Power. *Choice Reviews Online*, 26(01), pp.26-0407-26-0407.