

# An Investigation of Crucial Decision Factors that Influence the Implementation of Automation in Hospitality Industry: an Analysis of the Japanese Hospitality Industry Case

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## Chapter 1- Introduction

### 1.1 Background Information

Automation is defined as the development and implementation of technologies that allow goods and services to be manufactured and delivered with little or no human support (Nof et al., 2009). It is a term for technology which focuses on reducing human involvement in tasks (Scheer et al., 2004). Artificial intelligence and service automation along with various other automation solutions are making their mark on the travel and tourism industry including the hospitality industry of Japan (Rosete et al., 2020).

Every discovery occurs somewhere, but Japan has always been at the forefront of invention and technology, now that automation and robotics are so thoroughly embedded in their daily lives, they cannot go back (Reis et al., 2020). Today, the automated hospitality industry of Japan consists of service robots, bartenders, chefs that can make sushi and ramen and also fully automated hotels like the Henn-Na hotel which employs a workforce of 243 robots (Network). Certain Japanese hotels have automated all their operations and not just computer-based operations (in the form of software's- marketing, pricing strategies, sales, check-in/check-out

service, etc.), but also in physical and manual, time consuming operations (in the form of robots- dishwashing, serving, room service, etc.) that were earlier all done by humans (Campbell et al., 2022).

The main reason behind implementing automation and making investments in this sector is to minimise human efforts, increase efficiency and to decrease costs in the long term (Saravanakumar et al., 2018). Numerous tasks that were earlier all performed by humans, are now performed faster along with high levels of efficiency and dependability, as a result of the application of automation software's and technologies (Tuomi et al., 2020). The implementation of automation in the hospitality sector is still in its early stages however, the Japanese hospitality sector leads by example to the rest of the world (Nam et al., 2021). With daily advancements in the technological and scientific field of automation, the future is full of possibilities for all industries including the hospitality industry. These technological advancements however, come at a certain price and can also bring challenges. In this case study we will look at the critical decision factors that are taken into consideration, while implementing automation in the hospitality industry with the reference of the Japanese hospitality industry.

These factors include the size of the hotel, price of automation technology implementation, location of hotel and a suitable environment for robots such as floor surface, furniture and lighting.

### 1.2 Rationale

For hoteliers in the past, the question was whether or not to automate hotel operations; however, today it's all about how to automate hotel operations. Since after the pandemic of covid-19 and operating at low staff levels, the need for a hotel automation system has skyrocketed in order to cut working costs and to boost efficiency (Pillai et al., 2021).

Joao Reis, Juliana Salvadorinho, Barbara Soares and Ana Rosete (2020) have researched the case of henna hotel in Japan while other authors like Stanislav Hristov, Craig Webster and Katerina Berezina (2017) researched the topic about adaptation of automation in the hospitality industry however, sufficient amounts of research has not been done about the implementation of automation and about the benefits that can be achieved with these high tech gadgets in the right environment. With this research paper the author aims to fill in the gaps of previously done studies and to achieve a greater understanding about the implementation of automation.

The results from this study would be able to provide hoteliers with a convincing argument towards the implementation of automation in their organisation and will also give them an insight towards the benefits that one can achieve with this technology.

### 1.3 Aim and objectives

**Aim-** The aim of this paper is to investigate crucial decision factors that can influence the implementation of automation in hotels: an analysis of the Japanese hospitality industry case.  
**Objectives-**

1. To identify the factors that are taken into consideration while implementing automation technology in the hospitality business: a case of Japan.
2. To examine the roles and tasks that have been automated and can be automated towards the future in the Japanese hospitality industry.
3. To evaluate challenges that the Japanese hospitality industry needs to overcome for proper implementation of automation.

## Chapter 2- Literature Review

### 2.1 Introduction

Automation is everywhere in today's world, with more innovations and technologies coming up

every day, all industries around the world are accepting and implementing automation in their businesses in one way or another. It helps business professionals to focus more on growing their business rather than running the business (Oakley et al., 2022). Along with other factors, hotel owners have implemented the rational choice technique to generate conclusive decisions about the implementation of automation at their hotel. In the case of Japan automation has caused an evolution in the hospitality industry and has revolutionised the way things can be done.

### 2.2- Theoretical Framework

#### 2.2.1 Automation: Definition, Forms, and Application

Following the industrial revolution, technical breakthroughs made their way into the service industry, opening up a slew of new opportunities for the service and automation businesses (Collier et al., 1983). Automation refers to the process of using machinery for completing a "predetermined or programmable sequence of tasks" in the service industry (Nof et al., 2009). The hospitality industry is one of the fastest growing industries and plays an important role in the growth indicators of a country (S. Saravanakumar et al., 2018). Automation technology and robotics have been revolutionising the hospitality industry throughout the world (Nam et al., 2021).

The Webster dictionary (2004) defines automation as an operation or process that is controlled automatically by mechanical or electronic devices and takes the place of human labour (Ivanov et al., 2017). When it comes to physical characteristics, service robots come in a variety of shapes and sizes. The most frequent are Mechanoids, which are robots that don't look like humans and have a machine-like physical appearance, the other type may be a humanoid robot that, although perceivable as robots, have human-like appearance and features (Taylor et al., 2015).

Hotels can implement automation in various forms like, self-service software's, virtual reality, artificial intelligence and automated service robots

-Self-Service software: An electronic service software that completely eliminates the need to interact with a service provider (Meuter et al., 2000). Such a software can grant complete control to the user of their experience. This technology is full of possibilities and can be used in a wide range of applications such as, kiosks and mobile phones. (Dalgic. et al., 2018).

-Virtual Reality: Virtual reality headgear, that immerses the users in a fictional 3-Dimensional environment. It can allow potential guests to experience a virtual hotel along with its surroundings (Israel et al., 2019).

-Artificial Intelligence: A branch of computer science concerned with assisting machines in sensing, comprehending, and learning. It also assists machines in working and reacting in the same way that humans do. Artificial intelligence may also be used to recognize patterns and relationships in data sets (Naumov et al., 2019).

-Service robots- A robot that can perform various tasks instead of humans, these robots are usually humanoid and the most advanced robots can understand up to 80% of human conversation (Calderone. L et al., 2019)

The process of equipping an organisation with automation can be divided into 4 parts- Analysis, Implementation, Integration with existing software and Maintenance (Eisner et al., 2021). Today, the most basic level of automation is present in most of the organisations in the form of multiple virtual robots that are integrated into the existing software, across multiple systems. They form a virtual workforce that enables automation in numerous areas of the organisation and their construction is driven by simple rules and business logic (Geyer et al., 2018).

In this part of the research paper, we look closely into the factors that are taken into consideration while implementing automation in an organisation. The process of implementation can be divided into 3 parts being, assessing potential, developing application and sustaining/safeguarding benefits (Geyer et al., 2018).

-Assessing Potential- The first part within implementation of automation refers to the detection of potential for automation in certain areas of an organisation. A company typically has various process types and steps, out of which some can be automated. The success achieved by implementing automation would depend on the process that is automated. Factors such as scalability of the task, whether it is repetitive or non-repetitive and is standardised or non-standardized can also have an impact on the success in the long-term (Nof et al., 2009). Automation must be adopted with caution, if an organisation's operations are complex and non-standardized, as reproducing the task can be time-consuming and costly. Moreover, the expense of adopting and maintaining such a robot may be greater than the initial investment (Norman et al., 1990). It is therefore of utmost importance to understand the sophistication of business processes before moving on towards making a judgement on whether activities are sufficiently standardised to profit from automation (Geyer et al., 2018). Some business processes can also benefit by the perfect harmonisation of automation and human workers; however, the highest potential gain from automation can be achieved once the organisational tasks are standardised. Potential and present users must investigate the matter of where current

automation solutions could be improved, as well as where additional automation could provide benefits such as higher efficiency in the workforce. Another part of assessing the potential would be to analyse and understand rates of different automation processes (Norman et al., 1990).

-Developing Application- The second part of implementation talks about the training of the robot for operations. As a recommendation from automation companies, users should train robots with the prevailing workflow. Once trained, the robots can start their work while their various activities can be tracked by new, provided or existing IT systems. The obtained results can be reviewed after a sufficient number of trials and the performance of various robots and non-robotic enabled applications can be benchmarked to determine the most appropriate and effective space for implementation of automation (Robu et al., 2018).

-Safeguarding benefits- After evaluation and implementation of effective automation systems in the most effective space, the impact and performance of the applied automation systems must be tracked. This would provide the user with stats based on the workflow and efficiency of the robot, as well an idea about the return on the initial investment (Dhillon et al., 2002). Hotel automation is beneficial for both guests and owners, improving hotel's operational efficiency and enhancing a guest's in-room experience.

### 2.2.2 Rational Choice Theory

The implementation of automation in the hospitality sector can be linked to the rational choice theory as, according to rational choice theory, people employ logical calculations to make reasonable decisions and obtain results that are in line with their own personal objectives. With reference to the number of options available, rational choice theory is supposed to produce results that offer individuals with the most benefit and happiness (Goode et al., 1997). The rational choice theory typically starts by considering the choice behaviour of one or more individuals that are involved in the decision-making process. It is frequently assumed that the individual or individuals making the decision are representing a wider population such as buyers or sellers in a particular market. After determining individual behaviour, the research usually shifts to looking at how individual decisions interact to produce results (Lovett et al., 2006).

An analysis of rational choice would typically have a description of

- The purchases desired by buyers,
- The expected production and sales by the sellers and,

· How these desired purchases and expected sales interact (to determine the price and quantity sold in the market).

The general buyer is faced with the dilemma of deciding upon the part of his income that he wants to spend on a particular desired product, opposed to some other goods or services that are available. The seller on the other hand, is faced with the problem of deciding upon the right amount of production and the price to charge for the product. The choices and purchasing decisions of the buyer and the choices and selling decisions of the seller might be made based on custom, habits or can even be random (Herrnstein et al., 1990).

The rational choice approach to this problem, on the other hand, is founded on the fundamental concept that buyers and sellers make decisions that best help them achieve their goals, given all relevant elements beyond their control. The essential premise of rational choice theory is that people try their level best within the prevailing conditions to maximise their return on investment (Green et al., 2002).

The rational choice theory can be helpful in understanding individual and group behaviour, it seeks to make sense of what we see in the world and it can assist in explaining seemingly irrational behaviour. Individuals however, may not always make logical choices as they are frequently swayed by non-rational external forces such as emotions.

### *2.3 Review of Empirical Research*

According to Hechter and Kanazawa (1997), the rational choice theory is a whole family of theories and can have different characteristics. It can be studied and linked to various aspects such as, economics and business, politics, sociology and addiction treatment (Lovett et al., 2006). According to Coleman (1990), unlike any other paradigm in the social sciences, the rational choice approach is frequently characterised by a well-developed, highly consistent, and widely shared set of established basic assumptions.

According to the researcher of this paper, the decision of implementation of automation in an individual hotel or restaurant would go through numerous stages of planning with reference to the hotels revenue, workforce and property management system.

The hospitality sector in Japan has shown significant growth in recent years and has adapted widely towards automating their operations. According to reports by the ATM team (2019), automation will be responsible for an increase of 10% in a hotel's revenue and also a cost cutting of 15% (ATM team, 2019).

Hotel automation does not imply that the "human touch" will be lost as it is not trying to replace humans for the time being (Sheridan et al., 2016). People at hotels and spas may simplify

their teams by using automated alerts and rules that improve their existing procedures. According to Reis (2020) the Henna hotel in Japan experienced numerous positive outcomes after the implementation of automation, the hotel achieved a spotlight throughout the world as it was advertised as the first hotel in the world to employ a workforce that consisted only of robots, it was able to increase revenue generation by attracting more guests and was also successful in boosting the brands image.

The Global Islamic Economy report, 2018 estimated that the overall amount spent on halal food, beverages and life-styles sectors will exceed USD 3 trillion, by the end of 2023 (Hasan et al., 2018). The Japanese halal industry took note of this information and with reference to labour costs, they started to implement successful automation in the food industry in Japan by rational decision making.

According to Barton et al., (1985), the introduction of new technologies in business organisations presents a new and different set of challenges that the organisation must overcome in order to absorb the technology efficiently and effectively (Dalgic et al., 2018). The adaptation to technology can also allow hotels to capture, utilise information effectively and predict guest preferences in order to create more personalised service with the use of artificial intelligence technologies (Oakley et al., 2022).

Automation in the hospitality industry is ramping up to increase agility and is also addressing labour shortages (Tuomi et al., 2020). Automation is the future and here to stay, implementing it presents a fair share of benefits, challenges and also opportunities. It can provide the hospitality industry with countless benefits, including streamlining all business operations, providing a better overall customer experience, more effective and efficient management and also a reduction in operational costs (Breton et al., 2003).

These benefits however, can also present some challenges that are hindering the success of implementation of automation (Breton et al., 2003). It is not a secret that the high levels of automation today can be a threat to the human workforce of any industry and that automation comes at a demanding price (Breton et al., 2003). Trusting devices with security, operational difficulties such as errors or problems in the system, problems with customer support and also the immense number of different companies that are available to choose from can also act as challenges (Nam et al., 2021). The usage of chatbots combined with artificial intelligence would have an impact on hotel personnel and service deployment in a variety of areas (Nam et al., 2021). Across several sections of hotels, technology is likely to change staffing, particularly where employee safety is concerned. However,

for most hotel firms and most departments of the hotel, labour savings from technology are currently resulting in redeployment of the employees to other jobs with a focus on improving guest service, rather than a reduction in the number of personnel (Reis et al., 2020).

For countries, like India, the agricultural sector accounts for 18% of GDP and provides employment to 50% of the country's workforce. The governing body made use of the rational choice theory to develop the agricultural sector in rural areas by implementing automated machinery (Mogili et al., 2018). This decision led to a boost in rural development, further leading towards rural transformation and eventually resulting in the structural transformation along with the development of the Indian agricultural sector (Shah et al., 2019). The development was supported by many companies like the "Agriculture Insurance Company of India" and this led to huge profits for the Indian farmers.

Other findings with reference to the case of the Henn-na hotel in Japan include, highly trained staff that makes sure that all guest interactions with the robots are effective. They accomplish less interaction between guests and robots and use robots for common tasks like, cleaning corridors, kitchen, laundry, etc while they use a human led workforce to clean rooms as robots lack human emotions. The hotel earlier employed human staff of 40 personnel which has now dropped to 7 personnel, after the implementation of automation. With 144 hotel rooms, the hotel employs 300 robots of 30 different types and they make use of the HRC technology for robots (Reis et al., 2020).

-Empirical research on hotels with successful robotics use include:

- 1) Aloft hotel in Dubai which uses Butler robot to make deliveries.
- 2) Hilton's concierge robot is used to deliver hotel information, give information about nearby shopping centres, attractions and restaurants to customers.
- 3) Yotel hotel China which uses luggage Carrington robots that can pick luggage 300 times a day and can provide room services (Ho et al., 2020).
- 4) Hotel EMC2 which employees' robots named Cleo and Leo that are used to serve guests by serving food, delivering towels, toothbrush, setting light and heating in the room. The hotel revenue increased by 30% by using Cleo and Leo. The owner adopted automation technologies in his hospitality business and by charging a \$2000 USD rental fee, he increased his revenue by 30% (Dogan et al., 2019).
- 5) Marriott International Inc. hotel also uses robotic room service technology. Its owner utilised the rational choice theory cleverly and established Marriott as number 1 profit gaining hotel brand.

6) Airbnb also increased its revenue by 30% in 2018 and its value was \$38 billion in 2018 by rational mindset (Xie et al., 2020).

Findings from open ended and close ended questions of other researchers also include the fact that robots can cause unemployment for labourers; however, they open the advanced ways for employees that come from an information technology or artificial intelligence related background.

The outcomes from the above findings and decision-making factors can be summarised as the following:

Robots never grow tired and can provide service around-the clock, seven days a week, reducing the need for human labour

and boosting productivity. Robots can function as differentiators,

controllers, supports, improvers and replacements; however

automation cannot be utilized effectively until adequate

organizational circumstances are met. Moreover, in the

ideal circumstances, their advantages outweigh their

shortcomings and can provide numerous advantages to the

hospitality industry of Japan.

The decision-making factors, findings, and outcomes of this research can be summarised as the following:

-The implementation of robotics in hotels needs an accurate environment. They need suitable lighting, temperature, fixtures and a free smooth surface to perform their tasks. Robots' ability to stand in certain radiations and detecting employees with the same uniform are also part of environmental factors. Therefore, these environmental factors can play a huge role towards the decision of the implementation of automation in hotels.

-The scope and level of the task that the robot is expected to perform can be another factor. The nature of the task, whether it is repetitive or creative, easy or complex, standardised or unstandardized, structured or unstructured can also be key factors that decide towards the implementation of automation.

-The cost of implementation, location of the hotel, and size of the hotel are some of the other factors that an owner needs to consider by taking the Rational Choice Theory into account before implementing automation in hotels (Tuomi et al., 2021).

#### *2.4 Background to the Primary Research Context*

Today automation is everywhere, it is present in one form or another in every smart device and is also making a mark on all industries globally

including the hospitality industry of Japan. Japan, as a country with high levels of research and development in the automation sector is leading the way in the hospitality sector with their service robots (Hertzfeld et al., 2019). According to the author, automation opens doors to many opportunities for a hotel or restaurant. High levels of automation can maximise overall efficiency, especially service efficiency in the industry. While automation will still not take over people's work, it will be able to take over some duties that are monotonous or even dangerous, allowing individuals to focus on more interesting and challenging tasks. The continuous rise of automation may put people's employment at risk in the future, but it also implies an increase in demand for workers with automation and technological skills (Naumov et al., 2019).

With reference to the immense growth of the Japanese hospitality industry in recent years, the automation and robotics firms have developed world leading solutions for the Japanese hotel industry to implement, from robots that can prepare and serve a cocktail in just 40 seconds to a robot that can prepare and serve ramen to guests at a ramen restaurant (Hertzfeld. E, 2019). This has all been implemented in the hospitality industry of Japan and it is also home to the Henn-Na hotel, which is the world's first fully automated hotel and employs a workforce made up of 243 automated robot humanoids (Hertzfeld. E, 2019). The workforce of this hotel is designed to act, speak and look like humans and is fluent in Japanese, English, Chinese and Korean (Hertzfeld. E, 2019). The humanoids employed at the Henn-Na hotel look after all operations at the hotel, including front desk services and the rooms at the hotel are equipped with smart features such as facial recognition, room temperature adjustments based on the guest's body temperature and tablets that allow a guest to request and access various services (Kemp et al., 2009). As the world leaves behind the pandemic of Covid-19 and enters a new era, we can notice that the contactless culture has become an extremely important part of an individual's daily life in 2022 and the hotels in Japan along with the Henn-Na hotel are setting a benchmark for the rest of the world (Reis et al., 2020).

## **Chapter 3 Methodology**

### *3.1 Research Aim and Objectives*

The aim of this paper is to investigate crucial decision factors that can influence the implementation of automation in hotels: an analysis of the Japanese hospitality industry case.

In order to be able to carefully understand and analyse the aim of this paper, the researcher wants to obtain 3 main objectives:

-To identify the factors that are taken into consideration while implementing automation technology in the hospitality business: a case of Japan

-To examine the roles and tasks that have been automated and can be automated towards the future in the Japanese hospitality industry

-To evaluate challenges that the Japanese hospitality industry needs to overcome for proper implementation of automation.

### *3.2 Research Approach*

This part of the research paper will be driven and conducted by factual knowledge based on the researcher's positivist paradigm (Gale et al., 2005). According to the positivist paradigm, real occurrences may be seen empirically and explained logically. The positivist approach of methodology stresses on experimentation that can eliminate the external world (Park et al., 2020). The study will go from theory to data based on the deductive approach of research. A descriptive survey design will be used in the research. The main purpose of a descriptive study is to describe the subject in a systematic and accurate manner, supported by facts and characteristics.

In conclusion, the study will lead to meaningful insights about the critical decision factors that are taken into consideration during the implementation of automation in the Japanese hospitality industry.

### *3.3 Sampling*

For this research, the random sampling or probability sampling technique will be used to obtain data. This sampling technique gives an equal chance to all the participants of the population and is associated very well with the deductive approach of the study (Som et al., 1973).

The total sample size will be of 150 participants and will consist of 3 main parts namely being the owners, workers and guests.

The following criteria will determine the inclusion/exclusion of a participant in the population as it is essential to obtain the right participants in the sample, in order to achieve accurate results

-Hotel owners that own one or more hotels in Japan and have implemented automation in their organisation,

-Workers of automated Japanese hotels who have worked for a minimum of one year at a specific automated hotel and,

-Guests of automated hotels in Japan, who have stayed for 4 or more nights.

The total sample size will consist of 150 people and based on the type of personnel, the workers, guests and owners will be divided into 3 groups of 70, 70 and 10 respectively.

### *3.4 Data Collection*

In this paper, quantitative methods of research will be used as it reflects upon the deductive nature of the research approach. According to Creswell, J. W. (2013), quantitative methods of research focus on gathering numerical data and generalising it across groups of people, with the aim of explaining a particular phenomenon.

The class of participants will go through close-ended questions in the form of surveys and 3 different surveys would be prepared for the different types of participants (owners, workers and guests) (Farrell et al., 2016). The 3 different types of participants and different surveys for the participants will ensure a deeper insight from a wider perspective and will help towards further development of the paper. According to Cincero et al., (2018), surveys are cost effective and provide convenient data collection. The close-ended format of questions guarantees a high response rate among the people (Farrell et al., 2016).

With the selected approach and design, the study is able to attain and construct more accurate and meaningful results, that helps towards understanding the aim of the research better.

### *3.5 Data Analysis*

In order to accurately measure the positive and negative effects of automation different forms of close-ended questions such as, multiple choice, dichotomous and ranking questions will be used in all the three surveys (Jackson, 1979). To complement the close-ended survey design of questionnaires, the use of inferential statistics is recommended. Inferential statistics aids in the development of explanations for a situation or phenomenon and enables the user to reach conclusions through estimations,

It also allows easier comparison between two or more populations by determining whether or not their means are equal.

Inferential statistics methods such as linear regression can be very useful, especially in business as they can enable us to predict future values taken by a dependent variable based on past values (Lang, 1996).

### *3.6 Validity*

Validity is defined as the degree to which a concept is accurately measured in a quantitative investigation (Surucu et al., 2020). By interpreting the data obtained from the analysis in a relevant and appropriate manner, one can assess the

validity of the study. Understanding the diversity of nationalities and cultures within the population is crucial. The author should be mindful that the survey respondents could not fully and accurately interpret the information presented in the questionnaire, which could compromise the research's credibility. Employee participants may have a biased view of the organisation's actions and decisions, which might lead to errors that could undermine the research's validity (Muijs, 2011).

### *3.7 Generalisability*

The word 'generalisability' is defined as the degree to which the findings can be generalised from the study sample to the entire population (Polit et al., 1991). It is also possible to view generalisability as the ability of the research's findings from the study to draw conclusions and offer advice in a variety of other situations; however, as this is a study that is focusing on the implementation of a relatively new technology in Japan, the level of generalisability that is achieved is limited and the results might differ among the variables when done on a broader international scale. The study can be generalised as a guide towards the implementation of automation and towards certain advantages and disadvantages that automation can bring in today's day and age (Muijs, 2011).

### *3.8 Ethical Issues*

Violation of ethical norms can hit the credibility of the research and violate the basic principle of the research. Ethical issues related to Quantitative Research include:

Quantitative Research- Must be done on a random basis at the beginning of the study, their role and the purpose of the study must be disclosed to all participants and they should not be pressurised in any way.

Data Collection- All participants should receive equal respect and the same treatment. (Roberts et al., 2015).

Data Analysis- The first and most important priority should be the privacy of the participants. The collected information along with the names of the participants should not be disclosed and any shared data should be confidential as it may damage their status.

Data Reporting- Plagiarised content should not be used (Roberts et al., 2015).

### *3.9 Limitations*

While the research methods and approaches used provide the author with control and specific results, it comes with some limitations (Gaille, 2017). Since the research is conducted in an experimental design, it inherits the limitations of

the methods and approaches used by the author to conduct the research. The descriptive survey design, along with close ended questions and three different questionnaires can be very time consuming and are also subjective of human error. Language barriers, noncompliance, lack of engagement and issues among the participants in fully understanding the surveys and their purpose can also act as barriers towards achieving accurate results. The researcher also thinks that contacting the participants, especially employees and international guests can become a challenge as employees in the hospitality industry have a very busy schedule and international guests of the hotels will all have different time zones. This study is unique since it examines the elements of automation application in the hotel business, which hasn't been investigated before with this particular focus. As a result, the study's generalisability may be constrained and the product, hypothesis and variables are subject to such strict controls that may lead to the production of compromised or misleading results (Gaille, 2017).

## **Chapter 4 Discussion**

### *4.1 Introduction*

Automation and robots have been revolutionizing the hospitality industry all around the world (Nam et al., 2021). Since the covid-19 epidemic and operating at low staff levels, the need for a hotel automation system has soared in order to reduce working expenses and increase efficiency (Pillai et al., 2021). Previous study has been conducted on the need for automation adaption (Hristov et al., 2017), however insufficient research has been conducted on the implementation of automation and the advantages that can be obtained with these high-tech gadgets in the correct environment. The relationship between automation application and the Japanese hospitality sector will be investigated further in this chapter; however, because primary research has not yet begun, the following themes will be suggested and analysed using findings and statistical data from the literature.

### *4.2 To identify the factors that are taken into consideration while implementing automation technology in the hospitality business: a case of Japan*

According to Geyer et al., (2018) the process of implementing automation can be divided into three parts, assessing potential, developing application and sustaining benefits. It may be suggested that the Japanese hospitality industry must go through these steps in order to fully equip itself with automation successfully and to attain its benefits.

Assessing the organisations potential growth and development that can be achieved through automation should be the first consideration. A business often has a variety of process types and procedures, some of which can be automated. In order to assess the potential, factors such as task scalability, organisational structure, investment capabilities and market offerings must be considered (Nof et al., 2009). It may be suggested that any Japanese hotel intending to adapt to automation should first understand its business processes and complexity, as well as the suitable market offerings, before moving on towards making a judgement on whether activities are sufficiently standardised to profit from automation.

Once adopted, the organisations must develop suitable applications for automated technologies. This includes variables such as training of automation technologies, with an organisation's present time workflow in different departments while tracking the progress with new or existing IT tools in order to analyse the best outcomes (Robu et al., 2018). It may be inferred that, implementing any form of automation in the Japanese hospitality industry would require for the organisation to experiment with new technologies in different departments while tracking the performance in order to analyse the most effective workplace and to attain the desired benefits.

Safeguarding the benefits of applied automation technologies is a factor that should be considered after implementation of automation in the most effective spaces. The impact and performance of the applied automation systems must be tracked in order for the consumer to gain stats based on the workflow and efficiency of the robot, as well an idea about the return on the initial investment (Dhillon et al., 2002). Moreover, it may be inferred that, the analysis done after automation implementation, is a very crucial as this factor can decide the long term sustainability and returns of automation in the Japanese hospitality industry.

A challenge that can be observed in a market like Japan would be the amount of options that it presents to its hospitality industry. With numerous levels of automation, different brands and compatibility options it is of great difficulty for the consumer to make the absolute best choice (Goode et al., 1997). With reference to the number of options available in the Japanese market it may be inferred that while, equipping with automation the consumer must act upon the rational choice theory as, it is supposed to produce results that offer individuals with the most benefit in relation to their initial investment.

### *4.3 To examine the roles and tasks that have been automated and can be automated towards the future in the Japanese hospitality industry.*



Automated robots can act as differentiators, controllers, substitutes, supporters and improvisers (Tuomi et al., 2021), they can provide organisations with benefits such as streamlining all business operations, providing a better overall customer experience, more effective and efficient management and also a reduction in operational costs (Breton et al., 2003). In other words, Effective adaptation to technology can allow hotels to capture, utilise information and predict guest preferences in order to create more personalised service (Oakley et al., 2022). It may be inferred that, with the use of artificial intelligence technologies, the Japanese hospitality industry can provide better and smoother services to its consumers.

The Japanese hospitality industry today consists of automated robots that have the capability to cook, provide service, make cocktails in under 40 seconds and many others (Hertzfeld, E., 2019). It may be suggested that, automation, if implemented effectively can create a streamlined working environment while, greatly increasing consistency in the Japanese hospitality industry. Findings with reference to the case of the Henn-Na hotel, showcased that the hotel earlier employed human staff of 40 personnel which has now dropped to 7 personnel, after the implementation of automation (Reis et al., 2020). The hotel employees highly trained staff that makes sure that all guest interactions with the robots are effective and automation technologies are used for common tasks like, cleaning corridors, kitchen, laundry, etc while they use a human led workforce to clean rooms as robots lack human emotions. The implementation of automation also provided the hotel with free advertisement throughout major media channels and also benefitted the organisation by reducing operational costs and hence, increasing profits. Based on this, it may be inferred that automation presents a fair share of challenges, benefits and opportunities however, the benefits have the potential to outweigh the challenges if implemented correctly in the Japanese hospitality industry.

#### *4.4 To evaluate challenges that the Japanese hospitality industry needs to overcome for proper implementation of automation.*

According to Barton and Kraus (1985), the introduction of new technologies in business organisations presents a new and different set of challenges that the organisation must overcome in order to absorb the technology efficiently and effectively. A challenge that may affect the overall implementation of automation could be the integration with existing software's, which could have an impact when an organisation wants to undergo the process of automation however, the existing software's do not support it.

Cost of implementation, structure and size of the organization, location of the hotel and acceptability with the right type of automation may be seen as some other challenges that the Japanese hospitality industry should analyse and overcome in order to attain the benefits of automation (Tuomi et al., 2021). It is assumed that all organisations will make a rational decision about implementing automation, in order to attain the best value and profit for their money and It may be said that, the consumer must make a rational decision to effectively implement automation.

Another challenge that the Japanese hospitality industry might face could be related to workforce security, according to Breton (2003), with increasing levels of technological advances, multiple roles that were previously carried out by humans have now been automated in the Japanese hospitality industry which suggests that automation has the potential to replace human workforce in some particular areas of the Japanese hospitality industry however, studies done by researchers in the past have shown re-allocation of staff in other departments rather than dismissal. According to a study done by Reis (2020), the implementation of automation can lead to fear of being replaced among the workforce. It may be suggested that in such cases the organisations must show value to loyal employees and assist them in transforming into another role. This will help the staff of Japanese hotels to make sense of their potentially unclear working relations with the organisation.

#### *4.5 Conclusion*

The current study investigates the adaptability, potential challenges, and benefits of automation in the Japanese hospitality business. As per past research, there is a strong likelihood that organizational factors will play a critical influence in the overall effectiveness of automation. Additionally, the researcher anticipates that open disclosure of experiences and occurrences from the perspectives of employees, owners, and guests will provide data that provide a far better knowledge of the factors, advantages, and problems of automation technology.

## **Chapter 5 Conclusions and Recommendations**

### *5.1 Conclusions*

This study has attempted to provide Japanese hotels with greater insight into understanding the process of implementation of automation along with the potential benefits and challenges. Moreover, comprehensive understanding of the study can help Japanese hotel organisations to take advantage of automation technologies.

As mentioned by Barton et al., (1985) the introduction of new technologies in business organisations presents a new and different set of challenges that the organisation must overcome in order to absorb the technology effectively. Today, certain Japanese hotels have implemented automation in various forms like, self-service software's, virtual reality software's, artificial intelligence software's and automated service robots. The implementation of automation can help business professionals to focus more on growing their business rather than running the business (Oakley et al., 2022) and therefore, the main question for hoteliers in the present world is all about how one can automate hotel operations (Pillai et al., 2021).

According to Geyer et al., (2018) it is of utmost importance to analyse and understand the sophistication of business processes in order to implement automation however, the benefits that a particular hotel might gain through the implementation of automation is yet to be discovered as, a variety of factors about the organisation and automation need to be analysed and overcome in order to achieve the best results. Successful implementation, would require an effective analysis of the organisation's needs, structure, capabilities and suitability however, the degree of success or failure attained cannot be clear, as the implementation of automation in hotel organisations is a relatively new concept and there is no concrete evidence or study that can guarantee the success or challenges that might come with it; therefore, the implementation of automation technologies has been a challenge for hoteliers of Japan.

In general, the hospitality industry is very traditional to its roots and hence, the idea of implementing high levels of automation might not fit in everyone's perception. Some hoteliers simply do not trust new technology and workers of the industry might feel threatened of getting replaced by automation. Along with the challenge of absorbing new technologies effectively these are other challenges that might hinder the success of automation technologies in the Japanese hospitality industry. Furthermore, the implementation of automation can be a very intricate process and the results achieved can be affected largely by how and under what settings the automation technologies are adapted in.

## 5.2 Recommendations

While the paper aimed to fill in the gaps with previously done research and provide a greater insight towards the implementation of automation, the paper presents certain limitations which can be looked into with further research. The generalisability of the recommendations in the study may be restricted to technologically

advanced markets such as Japan where automation facilities are available and suitable.

In general, the study mostly concentrates on the factors that can influence the implementation of automation and the findings of the paper may suggest the crucial decision factors that can affect the process of implementation of automation however, for future research, it is recommended to gain deeper insight into individual hotels and how automation has benefited those individual hotels. These findings along with the work done in this paper can act as a guide to achieving successful, streamlined and efficient hotel operations through automation technologies. In addition, this study provides a broad overview of the whole hospitality industry of Japan and future research with more detailed aspects such as the challenges or threats that may come along with automation and have been dealt with by individual hotels can be beneficial.

Recommendations in order to successfully implement automation in the Japanese hospitality industry and to avoid failure, would be to thoroughly explore market offerings and choosing the appropriate class of automation. A conscious and detailed analysis of the organisations needs and its structure in order to understand and predict suitability would also be required, in order to forecast its potential benefits and challenges effectively.

To get the intended results and attain the benefits of this technology, proper protocol, including organisational analysis, suitable implementation, training, observation and tracking, must be followed.

The findings of this study can assist potential consumers in recognising important factors that must be examined before implementing automation, as well as, providing an insight from the perspectives of guests, workers and owners, which can then be related to understanding the benefits and responses of automation in a more preferable manner. Moreover, researchers looking into this field can use the findings and data gathered by this study to understand and analyse the factors that need to be considered in order to implement automation and to explore more details about their study.

## Chapter 6- Executive Summary

This research seeks to explore the factors that must be considered for successful implementation of automation, as well as the possible advantages and challenges. Furthermore, a thorough comprehension of the study might assist Japanese hotel organisations in taking use of automation technology.

The hospitality industry of the world can no longer ignore the phenomenon of automation. Growth in the technology sector, new innovations and the desire to cut operational costs have led hotels in the Japanese hospitality sector to adapt to automation systems such as

artificial intelligence (AI) and robot-based applications and services (Campbell et al., 2022). Today, certain Japanese hotels have automated all their operations where robots and artificial intelligence software's are managing the whole hotel while, some other hotels have implemented automation technologies in not just computer based operations (in the form of software's-marketing, pricing strategies, sales, check-in/check-out service, etc.), but also in physical and manual, time consuming operations (in the form of robots- dishwashing, serving, room service, etc.) that were earlier all done by humans (Campbell et al., 2022).

Automation can boost revenue, enhance guest experience and ease off the workload on the organisation, leading to a happier and a more productive hotel staff. It also allows business owners more time to focus on the growth of the organisation (Oakly et al., 2022).

The reliability that comes with automating tasks and operations benefits both the organisation and the guests by increasing efficiency and building trust (Chiang et al., 2020).

In conclusion, automating hotel operations benefits both the organisation and the guest. It is a way to go error free, while reducing expenses, improving guest experience, streamlining operations, attracting tech-savvy customers and many more (Campbell et al., 2022). With a successful and shining example of certain hotels in Japan, the other hotels of the world should follow.

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