Juni Khyat ISSN: 2278-4632 (UGC Care Group I Listed Journal) Vol-13, Issue-05, No.04, May : 2023 SMART HOTEL SMART SOCIETY 5.0: THE EPOCH OF ROBOTICS

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Abstract

Smart society 5.0 achieves a high degree of conjunction between virtual space and actual space. The world is undergoing rapid upheaval right now. New technologies like IoT (Internet of Things), Robotics, AI (Artificial Intelligence), VR (Virtual Reality), and big data, all of which can influence the course of a society, are still developing in the face of such significant changes in the globe. We are all becoming accustomed to smart technologies like smart devices, smart homes, smart cities, smart hotels.... Due of a robot's ability like acting as a bellboy in hotel, walking alongside the guests, providing information about the destination and other hotel-related services, hotel managers and owners are becoming increasingly interested in robots and artificial intelligence as the future of the hospitality sector. AI robots in the hospitality sector have a bright future since they can do tasks with a high degree of accuracy and efficiency, which cuts down on expenses. Service robot adoption has increased across various businesses, particularly since the Covid-19 outbreak, as consumers have grown more concerned about the possibility of contracting an infectious disease through social interactions. Due to the current state of technology and the lack of knowledge regarding the connection between different parts of robotic services and customer happiness, creating such a smart society and smart hotel has both numerous opportunities and obstacles. Therefore, the know the concept of smart hotels and smart society 5.0, the various smart hotels operating in India, as well as the opportunities and challenges faced by these smart hotels in smart society 5.0-the era or epoch of robotics—will be the main focus of this research paper.

Keywords: Smart society 5.0, Opportunities, Challenges, Revolution, Robotics, Artificial Intelligence (AI), Technology, Smart hotel

Introduction

Japan's vision of a technologically advanced, people-oriented society is known as "Society 5.0." It is essentially a significant improvement over current society that will enhance human living. It will come out of the fourth industrial revolution and include peaceful coexistence of people and robots. A super-smart society has emerged in which big data, the Internet of Things (IoT), artificial intelligence (AI), and robots permeate every sector of the economy and every social group. Employees are being replaced by robots in numerous tasks (Huang and Rust 2018; Hofmann et al. 2020). In fact, sales of service robots for both home and professional use are increasing at rates higher than 30% annually (International Federation of Robotics 2018). Robotic applications are widely used in manufacturing, the military forces, health care, home care, and are becoming more prevalent in the hospitality and tourism industries (Murphy et al. 2017). The goal is that the information revolution will be able to find solutions to problems that are today insurmountable, improving the quality and sustainability of daily living. All aspects of life, such as healthcare, the environment, scientific research, and ethics, will be impacted by this technology.



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Society 1.0 - The first phase in the history of humanity is known as Society 1.0. It stands for a variety of separate and dissimilar hunter-gatherer societies. It was an unproductive economy in this culture. In this society, fire was significant because it offered safety by keeping animals away from people. Fire was also employed as a means of cooking, lighting, and heating.

Society 2.0 - The emergence of nations and empires is correlated with the expansion of agriculture and cattle breeding, sedentary lifestyles, and urban development. Agriculture was found and cultivated in this civilization. The economy made use of the land's various resources, including fruit, vegetables, and grains. Over time, the settlers began trading goods with one another, a practice known as bartering.

Society 3.0 - An industrial society exists here. The shift toward it is linked to the widespread expansion of corporate activities, education, and printing. This transformation had a profound impact on how people began to think. The technological advancements of the time also promoted mass manufacturing, which led to significant cost and time savings as well as an increase in the amount of resources available. This in turn led to higher worker wages and revenue.

Society 4.0 - It is a mobile information society that fosters development through radical advancements in communication technologies. It started with the development of broadcasting networks and spread through the use of personal computers, cellular technology, the Internet, and other information and communication technologies. Additionally, social media keeps users up to date on local, national, and international news and events.

Society 5.0 (Robotics tomorrow) – It is a human-centered civilization that uses a system that tightly connects online and physical space to balance economic progress with the eradication of social ills (real world). The idea of Society 5.0, which was primarily conceived in Japan, describes an ideal state toward which each nation should progress in order to fully capitalize on ongoing technology advancements for the benefit of all of its residents (Serpa, C.; Ferreira, S 2018).

Although some of the robots perform basic and routine tasks in hotels and restaurants (e.g. robotic floor cleaners (Murphy et al. 2017), a growing number of them are performing more advanced frontline tasks that involve engaging customers at the social level (e.g. talking, serving food (Belanche et al. 2020a). As one of the latest advances in smart technologies with a disruptive nature, these robots are reshaping frontline services and the way they are managed (Gretzel et al. 2015; Van Doorn et al. 2017). Vending machines and self-service kiosks was swiftly adopted by the tourism and hospitality sectors, but the use of service robots were adopted recently. This is because they are expensive, have inadequate technical capabilities, and the concept or belief that tourism is a 'people's business'. Although it was challenging to implement service robots, Henn na Hotel (http://www.h-n-h.jp/en) achieved history in 2015 by launching the first "robotel" in the world in Nagasaki, Japan. This paved the path for service robots to enter the tourism and hospitality industries. Henn na Hotel announced in January 2019 that they had turned off more than half of their robots because they had increased work for hotel staff and irritated guests (Bhimasta and Kuo 2019; Shead 2019). However, hotel managers now have a more realistic understanding of what robots are capable of, how they could benefit their businesses and consumers, and how they affect hotels' profitability, service quality, and competitiveness.

Review of Literature

Citizens are now an essential component of the planning, execution, and governance of cities and, specifically, their infrastructure, in a world driven by digital transformation and smart cities (Hernández, 2021). Human- and citizen-centered development is receiving more and more attention as a result of digitization and the quick development of new smart / intelligent technology. The idea of a "Smart society 5.0" was conceived primarily in Japan and describes an ideal state toward which every nation should advance in order to fully capitalize on ongoing technological advancements for the benefit of all of its residents (Serpa, C. & Ferreira, S. 2018). After the early hunter-gatherer society, the agricultural society, the industrial society characterized by mass-produced items, and our modern information society, society

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5.0 is the next stage in the evolution of human civilization. To handle all the inputs and prevent information overload, citizens in Society 5.0 will actively use existing tools like the Internet of Things (IoT), artificial intelligence (AI), and Big Data. The quality of life is substantially improved by the use of cutting-edge technologies like IoT, Big Data, VR/AR, Artificial intelligence (AI), and Robotics (Seshachari, 2018). A robot is described as a "actuated mechanism with a degree of autonomy, programmable in two or more axes, moving within its environment, and performing intended tasks" (ISO 2012 n.p.). Robots can be either industrial or service robots, depending on their intended application. "Performs helpful activities for humans or apparatus, without manufacturing automation applications," according to a service robot (ISO 2012 n.p.). In many facets of human lives, service robots are now more than just a curiosity (Miller and Miller 2017; Nrskov 2016). Most businesses commonly include technology-based initiatives in their marketing plans, yet occasionally consumers view them as damaging or inappropriate (Fullerton et al. 2017). Customers' interactions with service robots may differ from those they typically have with front-line staff, changing their psychological contract and raising their awareness of and consideration for the innovation (Oiu et al. 2020). Customers may assume that businesses may implement self-service technology, which may be considered a predecessor to service robots, to enhance the service offering, but they may also assume that this move could be driven by cost-cutting motives (Nijssen et al. 2016). Society 5.0, from an organizational perspective, aims to develop novel ways of managing individualistic systems, with businesses, academic institutions, and governments working separately to develop a cooperative operational idea bolstered by present societal interconnection (Aquilani, B. et.al 2020; Michna, A.; Kmieciak, R. 2020). As described by Sotysik-Piorunkiewicz A., Zdonek I. 2021, and Federation K.J.B. (2016), Society 5.0-also referred to as a super smart society, a human-centered society, or even a society of the imagination-refers to a society in which the imagination and creativity of various people lead to the problem-solving through novel solutions and the creation of value. According to Harayama (2017), the emergence of Society 5.0 and the Fifth Industrial Revolution (Industry 5.0) are directly related and will both take place around 2030, when artificial intelligence (AI) will be able to think and guide organizational activities on its own. It is distinguished more specifically by five essential factors: (1) problem resolution and value generation, (2) multiplicity, (3) decentralization, (4) flexibility, and (5) sustainability and environmental harmony (Nikiforova A. et.al 2022). According to Rincon et al. (2016), affinity is the degree to which a human perceives a robot to be agreeable; in other words, it is the individual's belief that the other entity is being nice, pleasant, and harmonic in its interactions with others (Graziano and Tobin, 2009). Shinwa-kan, the original Japanese phrase, was originally translated as familiarity (Mori 1970), but more recent study has found that affinity or likeability are better terms to represent this notion than familiarity (Rosenthal-von der Püthen and Krämer, 2014). It is anticipated that one of the capillaries of Society 5.0 will also be innovative in medical technology. Thus, material advancements, nanodevices, and smart technology (sensors, controls) are among the smart tools adapted to medical needs (Lewis, Gandomkar, & Brennar, 2019). The creation of technology that enable the early detection and adaption of threats is required due to environmental and climatic change. The objective is to deliver information more quickly and effectively In Society 5.0, it is anticipated that increased use of technology will enhance environmental and public health protection (Mavrodieva & Show, 2020). In contrast, Sharp (2020) describes and argues the relationship between Society 5.0 and super-smart society as follows: Due to its unbreakable ties to technology, Society 5.0 is sometimes referred to as a Super Smart Society; consider it a digitization of society. The focus will still be on human control, though. The Internet of Things (IoT), big data, robots, and the sharing economy are the other technologies that will dominate Society 5.0 in addition to AI. The concept is that artificial intelligence (AI) would transform the massive data gathered by IoT into a new kind of intelligence and offer solutions for bettering human lives (p. 1). Improvements in business and society are being facilitated by advances in science and technology, such as the sharp increase in processing power (Shiroishi Y. 2018). It's critical for individuals to establish positive relationships with technology in order to maintain sustainable progress

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across all societal domains (such as education, health, democracy, and economy) (Ferreira, C.M. & Serpa, S. 2018). On the other hand, this issue raises the question of whether AI will have a detrimental impact on human society (for example, job loss, ethical and practical concerns with the transfer of duty from people to machines, social control, and algorithmic errors, among others) (Makridakis, S. 2017). The shift to Society 5.0 also brings with it several issues of global scope, such as the depletion of natural resources, climate change, widening economic disparity, and terrorism (Shiroishi Y. 2018 et.al., Aldabbas M. 2020, Fukuyama M. 2018).

Objective of the Study

The objective of the study is:

- 1. To know the concept of Smart hotels and Smart society 5.0
- 2. Various Smart hotels functioning in India and roles played by these service robots in Smart hotels.
- 3. Factors influencing adoption of service robots.
- 4. Opportunities and challenges faced by smart hotels in smart society 5.0.

Methodology

The chapter is built on descriptive research. In order to achieve the above objective, secondary data was gathered from a variety of research papers, journals, newspaper articles, websites and various Government publications till date (Sep. 2022).

Smart Hotel and Society 5.0: The era of Robotics

We are presently existing in a new era in which innovation powered by enabling technologies like IoT, AI, and robots is profoundly altering the economy and society. COVID-19 has played an essential role in the growth of Robots in the hotel industry. Today, many actions and services may be performed more safely by robots than by people as robots simply do not... breathe, thus there is no chance that they might contract the virus. The 5th Science and Technology Basic Plan, adopted by the Japanese Cabinet in January 2016, included Society 5.0 as a central idea in response to global developments. It was recognized as a strategic component of the "Basic Policy on Economic and Fiscal Management and Reform 2016," which is a fundamental policy for economic fiscal management and reform, and additionally as one of the growth strategies for the "Council on Investments for the Future," which was established in September 2016 as the focal point for an innovation strategy to increase Japan's growth potential (According to HITACHI Review, 2017. Retrieved from https://www.hitachi.com/rev/archive/2017/r2017 06/trends/index.html). In order promote the to enhancement of everyone's quality of life in a sustainable world through a super smart society, society 5.0, a very recent concept as a guide to social development, proposes a deepening of the potential of the relationship between individuals and technology (Sasajima H. 2017). Sustainable innovation is viewed as a vital idea throughout the Society 5.0 development process. When sustainable environmental, social, and economical factors are incorporated into organizational structures, it is said to be a process of sustainable innovation. One of the main obstacles in human-machine connection will be the increased level of humanrobot interaction in this intelligent society (HMI). These robots can frequently carry out tasks that humans can (such as running, jumping, and carrying goods), and they are occasionally made to resemble people by having human faces and expressions. Robots are another example of how artificial intelligence and sensor technology are put to use to create machines that resemble humans. In the past, gathering information through a network and having it examined by humans was standard procedure in an information society. However, in Society 5.0, everything is interconnected in cyberspace, and the best outcomes produced by AI that is more advanced than humans are fed back into the actual world. Collaborative robots are those designed to work alongside humans, enhancing human capabilities and simplifying tasks for both people and organizations (Mourtzis, D. 2022). The market for hospitality robots was anticipated to be worth

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\$295.5 million in 2020 and is expected to reach \$3,083 million by 2030, exhibiting a CAGR of 25.5% from 2021 to 2030, according to Global Newswire (Nov. 16th, 2021).

Smart Hotels in India and roles played by Service robots

One of the most interesting and promising uses of artificial intelligence in robotics is for people and companies involved in the hospitality management industry. "About 15 years ago, less than 100 industrial robots were produced annually in India. Today, 5,000 to 6,000 robots are produced annually, but India is still 5 to 6 years behind China in terms of automation, (according to Pandit S. on April 13, 2022, published in The Times of India). Described as "an automated computer programmed that is able to feel, grasp, and act in response to certain requests" (Xiao and Kumar, 2019), service robots are currently permeating a variety of hotel industries, including front desk work, room service, and housekeeping. (Prentice et al., 2020). Service robots, which can deliver contactless services that can meet high hygiene standards and allow social distance protocols to be observed in the wake of COVID-19 (Xiong et al., 2021), are projected to gain more traction in terms of their deployment in the hotel industry (Zeng et al., 2020). The various smart hotels in India are:

- 1. Robot: To give patrons a distinctive dining experience, Venkatesh Rajendran and Karthik Kannan opened in Chennai, formerly known as MOMO, the country's first robot-themed restaurant (Biswas J. December 13, 2017).
- 2. "Robo Chef": A restaurant in Bhubaneswar, Odisha, uses two locally created robots named "Champa" and "Chameli" to serve clients. Are you happy? (Apana Mane Khusi Ta?) is a question that the robots can ask in both English and Odia. According to reports, this restaurant is the first in eastern India to employ robot servers (Business Today, October 17, 2019).
- 3. Be@Kiwizo Hotel: Kannur District, Kerala has a few five-foot waitress robots named "Aleena, Helen, and Jane" to help serve and charm customers. These machines welcome customers, provide the menu, and take orders. The robots are moving along a predetermined path through the restaurant, and if someone gets in their way, they will halt and kindly request that they move aside. A tiny robot works with the three robot servers to delight kids by singing and dancing alongside them. (YellRobot.com, August 13, 2019).
- 4. The interactive robot "Maira" from Chitti in Town: Hyderabad interacts with users using six speech modulations. When a woman speaks, it modulates into a woman's voice, and when a child speaks to it, it modulates into a child's voice (Saumya K. 19th July 2021).
- 5. Palm Pacific A robotic hotel in Kota, Rajasthan, surrounded with the fresh natural pollution free air and beautiful natural blessings all around, having two robots named as Chinky and Minky. It is the first Robotic hotel in Hadoti region of Rajasthan.



Fig. 2 Robotic hotel in Kota, Rajasthan Source: Researchers





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The growth of technology and artificial intelligence has brought science fiction to life. The hotel sector is buzzing with the use of robotics. A few hotels are completely automated, using robotics and automation for practically all services. Robots using speech and facial recognition technology are positioned everywhere over the hotel to provide information, front desk assistance, storage assistance, and check-in and check-out services. They are being used in numerous front-line services, including robotic waiters in restaurants and hotel caregivers. There are hotel robots that have been built to do various services, such as cleaning and disinfecting areas that may have been neglected due to housekeeping being a key issue within a hotel. In reality, hotel management has positioned robots in key areas to serve the needs of their visitors, including welcoming new arrivals, handling luggage, directing visitors to specified locations inside the hotel, and providing room service. The use of robots and artificial intelligence will allow for more customized service for visitors.

Adoption of Robots in Modern World

India, a nation where tradition and culture are valued more than modern ones, is also embracing the new "Service Robotic" technology. The use of service robots has expanded as a result of research into the worldwide robot market and the escalating demand for self-service in the labour-intensive hotel business (Murphy et al., 2019). The hospitality sector must ensure food safety, improve benefits, alter how customers view hotels, and safeguard guests because these issues are tied to food safety and its services (Rahimizhian and Irani 2020). When used in this manner, service robot acceptance and implementation in hotels will be considerably more successful and create a risk-free atmosphere (Kim et al. 2021). Robotic automation was also spurred by the coronavirus epidemic to minimise direct interaction between hotel visitors and staff (Chiang & Trimi, 2020; Zeng et al., 2020; Seo & Lee, 2021). Service robots designed specifically for hotels have proven essential in the fight against the COVID-19 outbreak. In order to get a competitive edge in this new industry, hoteliers are implementing robotic technology to appeal to the market of tech enthusiasts and address the labour deficit (Ivanov & Webster, 2019, pp. 157–158). Other elements impacting the use of service robots include:



Fig 3. Reasons to adopt Robots in Hotels Source: Researchers

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Opportunities for Smart Hotels

In Society 5.0, the creation of new value through innovation will close gaps in geography, age, gender, and language and make it possible to provide goods and services that are precisely suited to the needs of various individuals as well as unmet needs. Additionally, when robots resemble humans, people are more likely to feel sympathetic toward them because of their perceived likeness (Sone 2017). In this regard, Lee et al(2017) research indicated that kids have a strong social affinity towards robots that mimic kids' expression and look, suggesting an emotional connection between the two. Another study revealed that consumers empathised less with mechanical-looking robots and more with more human-like robots (Riek et al. 2009). For instance, when a hotel service robot has a more anthropomorphized aspect, clients are more accepting of it and feel better about it (Tussyadiah and Park 2018). In conclusion, consumer affinity for the service robot increases as human-likeness promotes a better sense of social inclusion and likeability (Mourey et al. 2017; Qiu et al. 2020). There are many prospects for robotic technology in the hotel business, including:

- 1. Robots work continuously and don't get tired under stress.
- 2. They can perform at their best for longer periods of time than humans.
- 3. Lessens staff dependence
- 4. Human error is eliminated when robots are utilised.
- 5. Be prepared for extreme precision and accuracy.
- 6. Reduces costs associated with human resources.
- 7. A robot would never forget to place a food order.
- 8. They don't get sick or go on strikes.

9. Robots assist in delivering consistent service. They don't become upset or experience mood changes.

There are several possible applications for robots in the tourism and hospitality industries. The robotization of services is carried out at the task level, such as moving objects, providing information, printing a document (such as a voucher or cash receipt), taking a selfie with a customer, dancing in advance, vacuuming the carpet, polishing the floor, sanitizing the space, flipping hamburgers, etc. In that regard, the literature suggests that robots are most ideal for boring, risky, repetitive occupations that few people wish to perform (Ivanov, S et.al 2020).

Challenges for Smart Hotels

There are difficulties with the deployment of Smart hotels (Robots) in Society 5.0, as there are with every ambitious initiative. These include issues with ethics, the law, security, society, safety, and privacy. Society 5.0 undoubtedly has the potential to revolutionize the Indian economy and society, but it also has significant limitations and difficulties.

It leads huge unemployment which will hamper social and political tranquility.

- It causes significant unemployment, which will disrupt the peace in society and politics.
- It frequently results in the digital gap, increased inequality, alienation, and societal and family division.
- There are significant infrastructure and financial requirements, which raises a lot of questions.
- The implementation of Society 5.0 on a worldwide scale is a difficult procedure.
- A technology failure might provide clients a bad experience and damage the company's brand.
- An excessive reliance on technology.
- Initial setup costs may be too high for small hotels and inns to afford.
- The amount of crucial data that can be impacted by hackers has increased.
- For many visitors and customers, interacting with the staff is an important way to learn about the local way of life. To customers' expectations, robots might not pass for locals.
- Robots are only capable of doing prescribed activities; they are unable to carry out jobs for which they were not designed, taught, or equipped.

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• Since robots are emotionless and might be viewed as a danger by customers, they also lack creativity and a personal touch in interactions with guests and employees (Dogan and Vatan, 2019). According to Saraceni G. (2020), there is a danger of a digital gap. The term "digital gap" refers to the numerous and frequently significant disparities in access to and use of ICT that exist in modern society (Information and Communication Technologies).

Any society will experience these inequalities, which separate its members based on a number of factors, including gender, age, professional standing, the presence or absence of disability, socioeconomic level, social class, and cultural capital. As a result, the difference between people with different looks continues to grow as a result of this form of prejudice, which adds to the previously existing traditional forms of discrimination. The digital divide, according to Saraceni (2020), "represents the last and most crucial wall we have to break down, if we want to create a free, independent, perfectly networked society, without conflict" (p. 67). This should be made possible through interactions between different social scientific fields and between them and the natural sciences, which will ideally result in synergies and productive interactions in novel contexts (Sharp, 2020; Serpa, Ferreira, & Santos, 2017). Security is another important issue facing society as Society 5.0 takes shape. The adoption of proper security measures is crucial since a sizable amount of personal data might be gathered and distributed among systems in Society 5.0. (Aldabbas M. et.al 2022).

Conclusion

The hotel business is continuously developing and adjusting to the shifting demands of its clients. The way of interaction with visitors is another development that is happening quickly. New ways of interacting have been made possible by hotel robots. These frontline robots are handling waiter and concierge duties that formerly required frontline staff to interact with customers on a particular level (Huang and Rust 2018; Belanche et al. 2020a). By freeing up workers from routine duties like answering commonly asked inquiries, delivering room service, and even sweeping the floors, these robots are paving the way for the hotel industry's future. In hotels, robotics is employed to digitalize the guest experience. The humanlikeness should be viewed as an instrumental characteristic to boost customers' sense of affinity (as a form of familiarity and tighter connection) with the service robot, according to the literature review done by researchers. New technologies like IoT, robotics, AI, and big data, which can all have an impact on how a society develops, are continuing to advance in the face of such significant changes in the globe. Customers seem to prefer robot-staffed hotels over human-staffed hotels, particularly after Covid-19. In other words, it might be more advantageous to utilise service robots to lower the perceived risk of viral transmission and promote visits. However, there are numerous difficulties and barriers relating to robotics in the hotel sector. The expense of setting up and maintaining a robotic infrastructure is one of the largest obstacles. The absence of standards presents another difficulty. Hoteliers struggle to compare and pick the best robot for their needs because there are no industry-wide standards for hotel robots. The issue of public perception is the last one. Robots may be seen as a threat to jobs by certain people. However, despite these difficulties, the researcher believes that hotel robotics has a very promising future because the global market for hotel robots is anticipated to increase from \$295.5 million in 2020 to \$3,083 million in 2030 (Global Newswire, Nov. 2021)

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