THE HOSPITALITY DEBATE: TECHNOLOGICAL IMPLICATIONS IN FOOD AND BEVERAGE A PREFERENCE FOR HUMAN BARISTAS VERSUS ROBOTIC BARISTAS?

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Abstract

The present research seeks to examine the impact of integrating robotic baristas within the café industry on customer experience and social interaction. Employing a survey methodology with a sample of 339 respondents in South Korea, the findings indicate that 58.6% of participants possess a favorable perception of robotic baristas, recognizing the efficiency and consistency they offer. Nevertheless, despite the advantages of robotic baristas in enhancing service speed and minimizing wait times, a considerable number of consumers continue to prioritize the emotional connections and interpersonal interactions that only human baristas can provide. The conclusions derived from this study emphasize the necessity of preserving human elements in service delivery to ensure optimal customer satisfaction, even in the face of technological advancements. Recommendations underscore the imperative for stakeholders within the food and beverage sector to adopt an integrative approach to technology that accounts for social interactions while remaining cognizant of the broader social and environmental consequences of technological adoption. Therefore, this research contributes valuable insights to the formulation of sustainable strategies in the tourism and food service industries, highlighting the critical need for a balance between technological innovation and human experience.

Keywords: Tourism, Robotic Barista, Human Barista, Technology in Hospitality.

A. INTRODUCTION

The hospitality sector, which depends on the caliber of service and client experience to propel success, has long been entwined with the tourism industry. Consumer interest in the Food and Beverage (F&B) industry has increased recently, and market competitiveness has significantly intensified, particularly in coffee shops and cafes. In response, companies are implementing cutting-edge ideas and technologies to increase market share and improve customer satisfaction. The use of robotic technology in cafés, which streamlines service, lowers labor costs, and appeals to tech-savvy customers, is one example of this change. Two separate but related tendencies are highlighted in the current literature. On the one hand, studies have shown that consumers in a number of international countries, including the US, South Korea, and Russia, are becoming more

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receptive to robotic baristas (Technological Change in the Context of Robotic Coffee Shops, 2024). According to studies, robotic service providers deliver efficiency and novelty, two attributes that meet evolving customer demands. Notable instances are South Korea's Dal.komm, where robotic baristas have gained popularity, and the United States' Briggo and Cafe X (Human Baristas and Robot Baristas, 2021). Other research, however, shows that customers still like the personal touch in hospitality environments. According to researchers like Chen et al. (2008) and Hwang et al. (2016), human baristas provide a distinct value that robotic equivalents cannot match because of their individualized interactions and emotional intelligence. Choi (2020) and Shin and Jeong (2020) support this claim. Understanding how consumer perceptions, brand loyalty, and customer happiness are impacted by the coffee shop industry's balance between robotic and human baristas is the primary study challenge. A crucial concern that arises with the dual objectives of efficiency and personalization is how cafés may best utilize both human and robotic employees to satisfy a range of customer expectations. This article's goal is to compare the benefits of robotic baristas versus human baristas in terms of customer experience and offer suggestions for cafes on how best to allocate these resources to improve customer happiness and operational effectiveness.

B. RESEARCH METHOD

This study used a desk study and literature review technique to investigate how customer satisfaction in the coffee shop industry is affected by both human and robotic baristas. Peer-reviewed papers, case studies, and industry reports on technology adoption and consumer experiences in the food and beverage (F&B) sector were gathered for the study. The study primarily looked at case studies and research findings from coffee shops that had robotic baristas installed in nations like the US, South Korea, Australia, and Russia. These case studies were selected based on certain inclusion criteria, such as being published between 2008 and 2024, being relevant to food and beverage services, and focusing on customer interactions in coffee shop settings. Finding relevant sources, assessing them for inclusion based on preset criteria, and categorizing significant themes in order to evaluate the data were the three processes included in the research process. All of the materials used in this investigation were secondary data from published studies; no primary data was gathered. By organizing the data into recurring themes on customer views and service quality, qualitative coding software aided the study. Certain study criteria, like emotional response, perceived authenticity, and service efficiency, may allow for a comparison of customers' experiences with human and robotic baristas. By using these methods, the study provides a comprehensive summary of earlier research and a repeatable method for investigating the effects of human and robotic workers on customer satisfaction in the food and beverage industry.

C. FINDINGS AND DISCUSSION

The dynamics between the use of modern technology, such as barista robots, and the need for warm and emotional human interaction in hospitality services within the F&B industry presents a challenge in integrating technology and humanity. It remains difficult for the F&B industry to balance the use of modern technology like this. Firstly, concerns revolve around how to maintain the human aspect, as the need for emotional human interaction becomes a challenge when technologies like barista robots are adopted. Cafes are characterized by a friendly and warm atmosphere, often achieved through direct interaction between customers and baristas. With the introduction of barista robots, there are concerns that the customer experience may be emotionally less satisfying, as robots cannot engage in social interactions like humans.

Secondly, there needs to be a decision on the extent to which technology can replace the role of humans in the F&B industry. While technology can improve operational efficiency and service consistency, human interaction is still needed to complement some aspects of the experience emotionally. For example, a human barista can read or interpret customer facial expressions, offer recommendations, or simply greet customers warmly, which adds value that is hard to replace by robots. Additionally, the use of technology in the F&B industry raises ethical issues. When technology replaces human jobs, questions arise about workers' rights, social welfare impacts, and economic fairness. This could lead to economic inequality and job injustice for those dependent on the F&B industry, prompting discussions about corporate social responsibility and how to ensure that the use of technology does not negatively impact workers.

Further, consumer preferences regarding human versus robot baristas vary, and it should be acknowledged that there is no one-size-fits-all approach. Some consumers may prefer human baristas because of their ability to read or understand emotions, creating a strong emotional connection with customers that enhances satisfaction and can lead to customer loyalty. Human baristas can also customize drinks according to individual preferences, such as offering personalized recommendations. In the article *Technological change in the context of robotic coffee shops: focusing on consumer innovativeness (2024)*, Chinomona et al. (2013); Lin (2015) explain that human baristas' behavior and intellectual aspects can indeed improve satisfaction and loyalty. On the other hand, the article *Human baristas and robot baristas: How does brand experience affect brand satisfaction, brand attitude, brand attachment, and brand loyalty? (2021)* highlights one of the issues in cafes high consumer turnover, which can lead to inconsistent product quality. According to Sung and Jeon (2020), the adaptation of barista robots can maintain product consistency in cafes and ensure high quality service, thereby securing customer trust and support.

However, there are also limitations regarding the number of tasks and coffee items offered in cafes with robot baristas. Nevertheless, some consumers are more open to technology like barista robots due to their interest in technological advancements and the speed of service provided by robots. Barista robots can not only improve the quality and consistency of drink preparation but also offer customers an innovative and extraordinary experience. During the COVID-19 pandemic, robot baristas were seen as a safer option due to reduced direct interaction. The article *The antecedents and consequences of memorable brand experience: Human baristas versus robot baristas* (2021) reveals that consumers showed significant interest in robot baristas in cafes. Hwang et al. (2021b) wrote that consumers view them as an innovation that adds value to the customer experience.

Both articles *Human baristas and robot baristas: How does brand experience affect brand satisfaction, brand attitude, brand attachment, and brand loyalty?*(2021) and *Technological change in the context of robotic coffee shops: focusing on consumer innovativeness (2024)* mention that in South Korea's Cafe D, the ability of the robot barista was impressive, as customers could place orders from behind the counter without the direct presence of employees. Customers could order through a smartphone app before coming to the cafe, thus reducing waiting times. The robot barista at this South Korean cafe could prepare 14 cups of coffee simultaneously, equating to around 90 cups per hour. Kim and Han (2020) explained that robot baristas are not only seen as a solution to improve service efficiency and reduce wait times but also as an innovative element that attracts customers seeking new and unique experiences. To date, consumers have expressed very positive opinions about robotics in cafes, including enjoyment and innovation in modern technology like barista robots.

In the article *Technological change in the context of robotic coffee shops: focusing on consumer innovativeness (2024),* 339 questionnaires were collected in South Korea to gauge responses about robot and human baristas. The data showed that 58.6% of respondents were female, while 41.4% were male. 36.8% were aged between 20 and 29 years, and 28.8% were between 30 and 39 years. 61.3% had a bachelor's degree, and 48.8% and 25.5% earned between $5,000 and $6,000. The majority of opinions favored robot baristas, with the most common reason being the consistency of coffee preparation, followed by feeling safer and more comfortable with robot baristas due to the absence of direct social interaction, especially during the COVID-19 period.

The article *The antecedents and consequences of memorable brand experience: Human baristas versus robot baristas (2021)* proves that global tourism trends directly impact the F&B industry, including cafes. The trend of robot baristas has increased interest from visitors or tourists in cafes, prompting many businesses to adapt and accept the importance of robot baristas in the cafe industry to increase visits. According to Tomorrow (2020), many cafes have begun to plan the use of robot baristas as part of their hospitality services. The article also explains that many business owners are adopting robot baristas to strengthen their competitive edge in the cafe industry. Professionals in the cafe industry can no longer ignore or question the trend of high-tech robot baristas. With more customers appreciating and enjoying the use of robots in the service experience for the unique experience they create, cafes can offer innovative solutions by embracing robotic technology in the F&B industry.

Thus, the use of robot barista technology can also serve as an added attraction for tourists, offering a unique and innovative experience that can increase interest in visiting specific destinations. The use of advanced technology in cafe services also demonstrates innovation in tourism experiences, showing tourists that the destination is at the forefront of technology trends. Moreover, robot baristas also affect service experiences in the tourism sector by improving efficiency and consistency in service. By maintaining high-quality standards, cafes with robot baristas can build a good reputation among tourists and local visitors. The use of robot baristas can also serve as a learning opportunity for the tourism industry as a whole, showing how technology in hospitality services can enhance visitor experiences and help businesses stay competitive in a rapidly changing environment.

However, with the increasing number of tourists wanting to experience being served by robot baristas, there will be a significant rise in energy consumption. When operating at a large scale, such as when robot baristas serve crowded tourists at popular destinations, energy usage increases, which can lead to higher carbon emissions, global warming, and environmental pollution in the surrounding area. In the context of environmental tourism, increased carbon emissions can damage natural beauty and disrupt sensitive ecosystems. Contamination of soil and water from electronic waste could threaten the environmental sustainability of tourist areas. The article *Robot-delivered tourism and hospitality services: How to evaluate the impact of health and safety considerations on visitors' satisfaction and loyalty? (2023)* also reveals that technology like robot baristas requires a significant amount of natural resources such as energy, metals, and plastics. This use of natural resources can lead to carbon emissions and environmental pollution. High energy consumption from this technology can increase the carbon footprint of business operations, and when electronic waste is not disposed of properly, hazardous materials like lead, mercury, and cadmium can contaminate soil and water. Electronic waste generated by technologies like robot baristas can become a serious environmental issue if not managed properly. Therefore, it is important to ensure that the growth of industries like this does not harm the environment in tourist

destinations. Based on the explanation provided, it can be concluded that the use of robot baristas in the cafe industry not only affects individual businesses but also has broader implications for the tourism and hospitality sectors.

D. CONCLUSION.

The integration of robot baristas into the café industry offers a unique opportunity to explore the intersection of technological advancement, customer experience, and sustainability. This research has investigated the potential benefits and challenges of adopting robot baristas, with a focus on their impact on operational efficiency, customer service, and the broader environmental and social implications. While robot baristas provide a significant technological advantage in terms of consistency and speed, the research also emphasizes the importance of human interaction in the service experience, as well as the need for responsible practices to mitigate environmental harm. The primary objective of this research was to examine the potential benefits and challenges associated with the introduction of robot baristas in the café industry. The findings confirm the hypothesis that robot baristas offer substantial improvements in operational efficiency, particularly in environments where speed and consistency are crucial. Robots can automate the coffee preparation process, significantly reducing the potential for human error and ensuring that each cup of coffee meets a high standard of quality. This consistency is particularly important in the context of consumer expectations, where customers seek reliable service and uniformity in product quality. Robot baristas also enhance service efficiency by reducing wait times, enabling cafés to handle larger customer volumes without sacrificing quality.

However, while the technological benefits of robot baristas are clear, the research also points to the limitations of automation when it comes to the human aspects of service. Human baristas are not only skilled at preparing coffee but also excel in creating a warm, welcoming atmosphere that fosters emotional connections with customers. Human interactions in cafes contribute to the social and emotional dimensions of the customer experience, which are vital for customer satisfaction and loyalty. Baristas can read non verbal cues, adapt to individual preferences, and engage in personalized conversations that robots, despite their efficiency, cannot replicate. This emotional connection is a key component of the café experience, as customers often seek more than just a transactional relationship with the service provider. The emotional intelligence of human baristas embodied in their ability to show empathy, humor, and understanding helps build trust and rapport, which are critical factors in encouraging repeat visits and cultivating customer loyalty. In contrast, robot baristas, while able to maintain high standards in terms of product quality and speed, lack the emotional intelligence necessary to engage customers on a personal level. They cannot interpret mood or provide the personalized touch that human workers can offer. This limitation highlights the challenge of integrating technology in ways that enhance, rather than replace, the human aspects of service. The findings indicate that while robot baristas may enhance operational efficiency, the emotional component of the service experience should not be overlooked. As the café industry continues to evolve, it will be crucial to strike a balance between technological efficiency and the human elements that make the service experience memorable and fulfilling.

Beyond the social and emotional dimensions, the research also highlights the environmental impact of robot baristas. The adoption of robotic technologies in the café industry raises important concerns about energy consumption, carbon emissions, and electronic waste. Like all electronic devices, robot baristas require electricity to operate, and their widespread use could contribute to

increased energy demand, particularly in high traffic tourist areas. This increased energy consumption, if not managed responsibly, may exacerbate global warming and environmental degradation. Moreover, the production and disposal of robot baristas, which involves the extraction and use of natural resources such as metals and plastics, can lead to environmental harm. Improper disposal of electronic waste such as batteries, circuit boards, and other components can contaminate soil and water, posing significant risks to ecosystems and public health.

In light of these environmental concerns, it is essential for businesses to adopt more sustainable practices in the use of robot baristas. This includes prioritizing the use of renewable energy sources to power these devices, as well as implementing recycling and waste management strategies to reduce the environmental footprint of their production and disposal. Additionally, businesses should seek to minimize the use of resources in the manufacturing of robot baristas, opting for materials that are more sustainable and less harmful to the environment. The integration of sustainable practices into the adoption of robot baristas will be crucial in ensuring that the benefits of technological innovation do not come at the cost of environmental degradation. Along with environmental considerations, the research also explores the social implications of automation in the café industry, particularly concerning labor displacement. The automation of tasks traditionally performed by human baristas raises concerns about the future of employment in the hospitality sector. While robot baristas may improve operational efficiency and reduce labor costs, they could also lead to job losses for workers who rely on service roles in cafés. This issue necessitates a broader discussion on the ethical implications of automation and the potential for increased inequality in the labor market. To address these concerns, it is essential for policymakers and industry leaders to develop strategies that ensure the benefits of automation are distributed equitably. This may involve creating programs that support workers displaced by automation, such as retraining initiatives, and ensuring that technology is implemented in ways that do not exacerbate social disparities.

The research also raises important questions about the future trajectory of the café industry in an increasingly technological landscape. While robot baristas offer clear advantages in terms of efficiency and consistency, the emotional and relational aspects of customer service remain critical for long term success. The findings suggest that the future of robot baristas in the café industry will depend on how businesses balance the benefits of automation with the need to maintain the human touch in service delivery. Moreover, the environmental impact of widespread automation will require ongoing attention and innovation to ensure that the adoption of robotic technology does not exacerbate existing environmental challenges. The findings of this study emphasize the need for a holistic approach to technology adoption, one that considers not only the immediate operational benefits but also the long-term social, ethical, and environmental implications. In conclusion, the integration of robot baristas into the café industry presents both significant opportunities and challenges. While these technologies can improve operational efficiency, consistency, and speed, they also raise important questions about the preservation of human interaction, emotional connection, and environmental sustainability. As the adoption of robot baristas continues to grow, it is essential for the café industry to approach this technological innovation with a balanced perspective, ensuring that the benefits of automation are realized while mitigating its potential social and environmental costs. Future research should continue to explore the long-term impact of robot baristas on customer behavior, employee job satisfaction, and environmental sustainability, and seek solutions that can promote responsible and equitable technological adoption in the industry.

REFERENCES

Hwang, J., Choe, J. Y. J., Kim, H. M., & Kim, J. J. (2021). Human baristas and robot baristas: How does brand experience affect brand satisfaction, brand attitude, brand attachment, and brand loyalty?. *International Journal of Hospitality Management*, *99*, 103050.

Hwang, J., Choe, J. Y. J., Kim, H. M., & Kim, J. J. (2021). The antecedents and consequences of memorable brand experience: Human baristas versus robot baristas. *Journal of Hospitality and Tourism Management*, *48*, 561-571.

Hwang, J., Jenny Kim, J., Young (Jacey) Choe, J., & Markham Kim, H. (2024). Is a robot barista better than a human barista? A moderating role of type of service providers. *Journal of Hospitality & Tourism Research*, *48*(6), 1035-1050.

Hwang, J., Joo, K. H., Kim, H. M., & Lee, K. W. (2024). Technological change in the context of robotic coffee shops: focusing on consumer innovativeness. *Journal of Hospitality and Tourism Technology*, *15*(1), 37-53.

Park, S., Park, M. K., Heo, J., Hwang, J. S., Hwang, S., Kim, D., ... & Kwak, H. S. (2023). Robot versus human barista: Comparison of volatile compounds and consumers' acceptance, sensory profile, and emotional response of brewed coffee. *Food Research International*, *172*, 113119.

Soliman, M., Gulvady, S., Elbaz, A. M., Mosbah, M., & Wahba, M. S. (2024). Robot-delivered tourism and hospitality services: how to evaluate the impact of health and safety considerations on visitors' satisfaction and loyalty?. *Tourism and Hospitality Research*, *24*(3), 393-409.