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Determinants Of Customer Satisfaction Towards Robotic Waiters Among Gen Z Customers in Malaysia: A Conceptual Paper

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ABSTRACT

This purpose of the study is to investigate the customer satisfaction among Generation Z towards robotic waiters in restaurants. There are four predictors including Speed of Service, Perceived Usefulness (PU), Service Efficiency and Perceived Ease of Use (PEOU). The Gen Z customer is preferred in the study as they are the group that can use and accept high technological products and always looks for uniqueness especially related to robotic waiters. The underpinning theory of this research is Technology Acceptance Model (TAM) which explains how users accept and adopt new technology. The quantitative research is employed and a questionnaire which covers five constructs, namely Customer Satisfaction, Speed of Service, Perceived Usefulness (PU), Service Efficiency and Perceived Ease of Use (PEOU). A minimum total of 200 respondents from Gen Z customers in a survey for their acceptance of robotic waiters in restaurants. The correlation analysis is applied to examine the relationship between all variables, and the multiple regression analysis to analyse the impact of all independent variables on Customer Satisfaction towards robotic waiters. The results will provide an insight towards the application of robotic waiters and the ways to improve the customer satisfactions whenever being served by the robotic waiters. It might create a trend to encourage more restaurants to invest in a technological product which might be able to solve the manpower shortage and employee turnover problem in the industry.

1. Introduction

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The term Artificial Intelligence (AI) was introduced by a computer scientist, John McCarthy In 1955. Since then, more inventions and innovation have been explored to facilitate technical processing and human-like technologies. For instance, in 1997, Deep Blue was invented by IBM and then in 1999, Sony in Japan launched AIBO (AI robot). The Apple company integrated SIRI into the I-phone 4S. In 2017, Google proudly introduced ALPHAGO (Marsden, 2017). However, the history of robotic waiter dates to the 1980s. In 1983, a restaurant named Two Panda Deli in Pasadena, California used the Japanese origin Tanbo R-1 and R-2 robots to serve their customers. (Novak, 2012). From then on, many AI-based technologies, particularly robotic waiters have become popular. However, technological advancements could not produce hospitality experience as human (Arifin 2013; Shin & Jeong, 2020). But the Covid-19 pandemic that occurred in 2020 has accelerated these advancements which provide contactless with the customers to avoid the infection of Covid-19 virus (Abhari, Jalali, Jaafar & Tajaddini, 2022; Gu, Li, Ryan, Tang, & Yang, 2023, Wan, Chan, & Luo, 2020). One example of this contactless service is robot waiters in restaurants. The use of robot waiters is also expected to enhance service and reduce costs (Durai, 2022).

A robot waiter is defined as a mobile technology assistant to transfer food and beverages from the kitchen to diners (Anna, 2025). The robot waiter, which is powered by advanced artificial intelligence, provides a lot of potential benefits such as speed and service efficiency, low labor costs, hygiene (contactless) and error-free service (Anna, 2025; Aydin, 2021; Azeem, Ahmed, Haider, & Sajjad, 2021; Borghi et al., 2023; Ivanov & Webster, 2019; Tuomi, Tussyadiah, & Stienmetz, 2021).

History of Robotic Waiters in Malaysia

In the competitive and fast-changing food and beverage (F&B) industry, businesses are struggling to meet rising customer expectations and satisfaction (Enholm, Papagiannidis, Mikalef, & Krogstie, 2021). The old and traditional service business models are more human-oriented, often struggling to consistently deliver high-quality service due to limitations such as labor shortages and high employee turnover. These issues are significant barriers and poses a challenge to many restaurants; and one possible solution is the adoption of robotic waiters (Berezina, Ciftci, & Cobanoglu, 2019; Ivanov & Webster, 2023) as solutions to overcome the problem of labour shortage (Haque, Amirah, Tarekol & Uzir, 2025) and at the same time to enhance service and to save cost (Durai, 2022). The history of the first robotic waiters in Malaysia was discovered in 2018 by Nam Heong restaurant in Ipoh. The restaurant invested 8 robot waitresses for customer service (Lim, 2018). Since then, robots have been adopted by various restaurants, including Original Kayu Nasi Kandar, Q Bistro, Black Canyon, Mamak Xpress, Tech Café, CH Premier Restaurant, NALE The Nasi Lemak Co., Buharry Briyani Bistro, JBorn Cafe & Bistro, Sri Ananda Bahwan Restaurant Macalister Road, Artisan Playground, Q Bistro, Din Tai Fung, Haidilao and OldTown White Coffee. It is reported that the robot waiters are now available in more than 300 restaurants in Malaysia (TMEF, 2022).

Challenges and Risks of Robotic Waiters Adoptions

There are a few adoption challenges faced by food and industry in Malaysia which include upfront investment, maintenance and layout constraints. Initial investment for a unit of robot waiter in Malaysia range from RM 35,000 for entry level and up to RM 60,000 for premium model with voice and face recognition functions. However, some vendors also provide the method of leasing & rentals with monthly rental plans from RM 1,500 to RM 3,000, including basic maintenance (Anna, 2025). The next challenge is maintenance and downtime. The restaurants need to perform regular firmware updates and occasional sensor recalibration to ensure efficient and smooth operation of robotic waiters. The restaurant may face unpredictable robot breakdowns which can disrupt service and cause dissatisfaction among customers. The movement of robotic waiters is also affected by the layout of the restaurants. The constraints of layout such as narrow aisles, stairs or uneven floors do not allow the robot waiters perform best on their duties (Anna, 2025)

Other than challenges in the operation, there is also an issue of customer acceptance. The level of acceptance of robotic waiters and automated systems varies based on perceived usefulness, ease of use, and trust in technology (Becker, Mahr, & Odekerken-Schröder, 2023). Resistance often stems from a lack of human touch, concerns over service quality, and unfamiliarity with robotic interfaces, which may hinder consumer adoption. Furthermore, the integration of human-like features in robots can improve rapport with customers and boost satisfaction, but service failures may undermine these benefits (Becker et al., 2023).

Who is Generation Z?

Generation Z is defined as the generation that existed between the mid-1990s and early 2010s and it is recognized as the cohort succeeding the millennials and preceding Generation Alpha (Marin-Pantelescu & Ștefan-Hint, 2024). The European Travel Commission (2020) defines Generation Z as those born after 1996. However, the range of 1995-2010 is the most common definition used by authors (Benítez-Márquez, Sánchez-Teba, Bermúdez-González and Núñez-Rydman, 2022). According to Lanier (2017), Gen Z is popular with the term so-called “digital native” generation due to the young generation’s exposure to a digitalized atmosphere and technological environment. Besides that, Gen Z is the pioneer generation which integrated with technological advancements (Suomäki et al., 2019). Meanwhile, Corbisiero and Ruspini (2018) recognized the environment of Generation Z as always dealing with the digital world, online platforms and social media. Gen z has been connected to constant connectivity, smartphones, social media, and real-time access to information (Bennet et al., 2008; Bassiouni & Hackley, 2014; Corbisiero and Ruspini (2018); Dorsey & Villa, 2020; Francis & Hoefel, 2018). Sometimes, other terms for Gen Z are also known as “Gen Zers,” “post-Millennials,” “iGen”, “iGeneration”, “iMillennials”, “Centennials”, and “Pivotals” (Magano et al., 2020; McKeever, Diffley, & O'Rourke, 2021). The Gen Z consumer is also associated with someone that can use and accept high technological products and always looks for uniqueness (Francis & Hoefel, 2018).

Robotic Waiters and Generation Z

Generation Z can be the group that welcomes the adoption of robotic waiters in a restaurant as compared to other older generations such as Baby Boomer (1946 – 1964) and Generation X (1965 – 1980) (McKeever et al., 2021). The lifestyle of Gen Z tends to be tech-savvy, and it would influence them easily to create human connection with robotic waiters. Gen Z would prefer to visit those restaurants that served with robotic waiters (Guszkowski, 2022). This is because they search for quick, fast and speed service that is offered by robotic waiters. Besides, Gen Z can easily deal with advanced technological products because they perceive the robotic waiter as something interesting, novel and fun. Furthermore, Gen Z tends to avoid human interaction (with waiters or waitresses) when dealing with the ordering process at restaurant or cafeteria (Adanan et al., 2024).

However, a study by Marin-Pantelescu & Ștefan-Hint (2024) demonstrated contradicting findings towards the acceptance of robotic waiters whereby 58% of respondents preferred waiters than robots. Gen Z customers even welcome robots for efficiency but still value the human element for a complete experience when it involves service at restaurants. They feel all restaurant operations should not be automated and demand balance between humans and robots.

2. Literature Review

The underpinning theory of this research is Technology Acceptance Model (TAM). The TAM was introduced by Fred Davis in 1989 and explains how users accept and adopt new technology. It posits two main components: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). The first component PU stresses how technology improves performance while the second, PEOU highlights how convenient it is to

use the technology (Davis, 1989). These elements shape consumers' impressions of robotic waiters and influence the level of customer satisfaction towards the service that is provided by robotic waiters. Within the field of AI-driven services like robotic waiters, the TAM clarifies user impressions and acceptance of these systems.

Customer Satisfaction

Customer satisfaction is fundamentally defined as a comparative psychological state where a customer's prior expectations are weighed against their actual post-purchase experience. This concept centers on the alignment between anticipation and reality, specifically looking at how well a product or service's perceived performance matches what the buyer originally expected (Kotler & Armstrong, 2012; Tahir, Waggett & Hoffman, 2013). While it generally reflects the overall perspective formed after a transaction (Tahir et al., 2013), a higher state of satisfaction is specifically achieved when the actual service performance actively surpasses those initial customer benchmarks (Oliver, 1997).

In the robotic service industry, Maruf, Kowsar, Haque, Siddique, Sohail, & Mannan (2024) highlighted that customer satisfaction can be enhanced by increasing service accuracy and efficiency provided by robotic waiters to their customers in a restaurant. Robotic waiters are used in restaurants or cafes to create new dining environments and experience for the customers. The robotic waiters also contribute towards enhancing the quality of service and are expected to improve the level of customer satisfaction. Iyanda and Azeez (2024) stressed the importance of the multilingual service robots to make the customer feel comfortable and easy to communicate for the process of food ordering and delivery process. Together, these studies emphasize that robotic waiters can play crucial roles in meeting customer expectations and increase overall satisfaction of the customers.

In addition, Borghi, Mariani, Wirtz, & Vega (2023) surprisingly discovered that robotic waiters can develop human-robot relationships with customers which eventually leads to higher customer satisfaction. On the other hand, a study by Maruf et al. (2024) also demonstrated that robotic waiters can impress their customers with their fast, easy and accurate services. These findings underline robotic waiters can shape meaningful customer experiences while dining in restaurants.

Speed of service

Speed of service is defined as the ability of robot waiters to provide fast service to the customer such as taking orders or food delivery (Haryanto, Haryono, Sri, & Sawitri, 2017). A situation where robot waiters can provide fast service can increase the level of customers. In this study, the researcher anticipates that the faster service offered by robot waiters will have a positive impact on customer satisfaction.

H1: There is a positive impact of speed of service on customer satisfaction towards robotic waiters

Perceived Usefulness (PU)

Perceived usefulness is defined as to the extent to which the users perceived the benefits of using a new technological invention such as websites, applications and technological products (Davis, 1985). Tavitiyaman and associates (2020) conducted a study to examine the perception of tourists towards the usefulness of various technologies such as robots used by hotels (such as robots). The results showed that the perceived usefulness has a significant impact on hotel consumers' preferences (Tavitiyaman et al., 2020).

H2: There is a positive impact of Perceived Usefulness (PU) on customer satisfaction towards robotic waiters

Service Efficiency

In recent years, the increasing adoption of robotic waiters in the food and beverages (F&B) industry (Wirtz, J., Kunz, W., & Paluch, S., 2021) highlights their significant potential to enhance service efficiency compared to traditional human servers. The use of robotic waiters delivers various advantages for restaurants and cafes such as increased efficiency and productivity to enhance customer experiences and cost savings (Dixon, Hong & Wu, 2021; Ivanov & Webster, 2019). Robots are created to overcome human problems like fatigue and emotion and provide repetitive tasks efficiently such as serving food (Molinillo, Rejon-Guardia & Anaya-Sanchez, 2023). Robotic waiters excel in their ability to operate continuously, solve the issue of annual leave and medical the applied by human employees and increase jobs which is a crucial factor in maintaining consistent service quality (Shah, Kautish, & Mehmood, 2023).

H3: H1: There is a positive impact of service efficiency on customer satisfaction towards robotic waiters

Perceived Ease of Use (PEOU)

PEOU focuses on the extent to which the invented technology is convenient for the user to use it to perform certain activities (Davis, 1989). Several studies highlight that PEOU influences user satisfaction on a technology usage (DeLone & McLean, 2003; Liu et al., 2023).

H4: There is a positive impact of Perceived Ease of Use (PEOU) on customer satisfaction towards robotic waiters

3. Methodology

The proposed research methodology section provides a detailed overview of the research design and methodology to investigate customer satisfaction towards robotic waiters among Gen Z customers in Malaysia. The study is using a quantitative method and conducted in a non-contrived setting. The unit of analysis is referring to the individual user of robotic technology among Gen Z. The individual's experience, perception and feedback are the primary focus of the research, as they provide valuable insights into customer satisfaction with robotic waiters.

The sample size of minimum 200 to ensure the goodness of data in statistical analysis (Roscoe 1975). The selected individuals will share their insights and experiences being served by a robotic waiter in restaurants that use robotic waiters. All items in the questionnaire were based on validated measurement scales adapted from previous studies on the Technology Acceptance Model (TAM) (Davis, 1989). There are six components in the questionnaire which consists of demographic information or personal profile, customer satisfaction, speed of service, PU, service efficiency and PEOU. This study used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) for the dependent (customer satisfaction) and independent variables (speed of service, PU, service efficiency and PEOU). On the other hand, the nominal scale (categorical scale) is designed for demographic questions.

The universal Statistical Package for Social Sciences (SPSS) software version 29 is used for data analysis. The reliability test is important to test the level of internal consistency of all items for dependent and independent variables. Cronbach's Alpha values for each variable should meet the minimum requirement with the value of 0.60 (Kuder & Richardson, 1937). Descriptive statistics display the summary of the demographic profile of the respondents. The analysis is done by testing the hypotheses by using Pearson correlation analysis and multiple regression analysis.

6. Conclusion

This study investigates customer satisfaction (Gen Z) with robotic waiters in restaurants, concentrating on factors namely speed of service, PU, service efficiency and PEOU. Robotic waiters are increasingly seen as a sustainable alternative to traditional manpower as well as a possible solution to labour shortage and high employee turnover, especially in the labour-intensive sector. The research examines various factors contributing to customer satisfaction with the aim to make the Gen Z customers happy and satisfied with the service provided by robotic waiters in a restaurant. The findings from this study provide insight into the employment of robotic waiters in the future.

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