

# Customers' Satisfaction on Self-service Technology (SST) in a Full-Service Smart Restaurant: An Exploratory Study

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## ABSTRACT

Following the COVID-19 pandemic, numerous restaurants have increasingly integrated technology into their operations, especially in the front-of-the-house areas. They have significantly accelerated the adoption of self-service technology (SST) in Malaysia, and their use continues to expand. This includes self-service technology (SST) for placing orders and robots to deliver food and beverages. As a result, the traditional service model characterized by direct, face-to-face interactions with servers is undergoing a transformation. It highlights the shift in full-service restaurants towards integrating SST due to the pandemic which alters traditional service models for enhanced customer experience. The research explores how self-service technology (SST) usage in smart restaurants impacts customers' satisfaction. A qualitative approach was used in this study to explore customers' satisfaction with self-service technology in a full-service smart restaurant. Participants were chosen using purposive sampling to have experience using self-service technology. Initial screening involved asking participants about their previous SST usage to determine eligibility for an interview. A semi-structured interview questions were developed and six participants were selected to participate in this study. The findings raised concerns about technostress, particularly related to internet connectivity issues affecting the usability of self-service technology. The result revealed that internet connectivity issues, user proficiency, employee support, and system design are critical factors influencing the effectiveness and customer satisfaction with self-service technology in full-service restaurants. Addressing these concerns can improve customer experiences and satisfaction levels in full-service smart restaurant settings.

**Keywords:** Self-service technology, Smart restaurant, Customer Satisfaction

## INTRODUCTION

The hospitality industry encompasses services in various sectors such as lodging, food and beverages, travel and tourism, recreation, and entertainment, and also meetings and events. Within Malaysia, the hospitality and tourism industry contribute to 6% of Malaysia's GDP and 23% of national employment (3.5 million jobs) and is the third-largest component of the service industry. In 2022, the tourism sector in Malaysia directly contributed nearly 48 billion Malaysian ringgit to its gross domestic product (GDP), a significant increase compared to the previous year. The tourism sector is the third biggest contributor to Malaysia's GDP, after manufacturing and commodities (Hirschmann, 2020). One of the important components of the hospitality industry is the food-service industry, which is one of the core contributors to the Malaysian economy. This study focuses on the food-service sector, as it is essential in providing the best contribution through great performances and the best quality of services.

After the COVID-19 pandemic, many restaurants have begun incorporating and expanding their use of technology in operations, particularly in the front of the house with self-service technology (SST) for ordering and robots delivering food and beverages to assist with service. The traditional model of service, where customers are served directly by servers with face-to-face human interactions, is evolving. The accelerated factor for Malaysians in exploring SST was during the COVID-19 pandemic and the use is still growing now. Nowadays, many restaurants are now implementing SSTs as part of their new norm in providing food and beverage services to customers. The use of self-service technology (SST) especially the digitalized menu and digitalized payments are the most common technologies implemented in food-service establishments.

Many restaurants started using self-service ICT technologies, such as digital menus, using QR (quick-response) code to scan or download the menus, touch screen menus, and the digital ordering method, with online ordering using apps, websites, and other systems used during the operation delivery process. The technologies used are helping the management in providing a better service and system to the customer, but not all of the systems used and adapted in the restaurant are user-friendly or accepted by the customers. Not everybody is prone and familiar with using this self-service technology and the generation gap could be the main problem in these issues. Generation Millennials (y), Generation Z, and Generation Alpha could be readier and more savvy to use this technology rather than the generation of baby boomers and some of Generation X. Further explanation and guidance are extremely needed to assist them in using this system. The systems themselves are newly developed and some of the systems are not designed professionally so it becomes a problem and system failure to the customer in coping with the service process. Customer can easily feel dissatisfied with the service as they are not satisfied with their experience in using the system. The system needed to be user-friendly and developed with the special interest of making sure that it is usable by the customer.

A certain modification of services is required for the restaurant establishment in order to use this SST successfully. In Malaysia, the level of readiness and acceptance of using the SST approach is still unclear and past research is limited. There are studies from past researchers on the acceptance of using SSTs as part of a service delivery system but in a different context and setting. Malaysia as a developing country is still not IT savvy and technology development is still in a growing phase, as compared to other developed countries such as the United States of America, Europe, Japan, or China, where technologies have been used rapidly. Their knowledge has matured, and they have been using these technologies for quite some time.

### **A. Self-service technology (SST)**

When people think of food-service, they typically picture employees handling tasks such as taking reservations, gathering customer information, addressing inquiries, taking orders, placing menus, preparing meals, and serving gourmet dishes (Wen, 2021; Kim and Jang, 2016). Although these elements are still common in many restaurants, the rise of smart dining which incorporates technological advancements, automation, and increased convenience for both patrons and establishments has revolutionized this traditional concept (Peek, 2021). A smart restaurant is a dining establishment that incorporates advanced technologies to enhance its customer experience using various advanced technologies and innovative solutions (such as robots, smart devices, and digital solutions) to enhance the dining experience. Technologies that are commonly used in smart restaurants are self-service ordering kiosks, contactless payments, robotics, mobile apps and online ordering systems, tablet devices, and digital display screens.

The conventional method of direct, face-to-face interactions between servers and customers is evolving. Technology has become a pervasive and integral component in the provision of services, reshaping the traditional dynamics in contemporary restaurants. Past researchers have studied the acceptance of tablet-based menus provided by restaurants as onsite restaurant interactive self-service technology (ORISST) (Beldona, Buchanan, & Miller, 2014). From the exploration of the past studies on digitalized menus by using apps through QR code scanning upon ordering the food, it can be said that there are still limited studies related to the level of satisfaction with using the SST, especially in Malaysia.

Adopting technologies to transform service delivery and customer experiences in restaurants are rapidly increasing, such as self-service technology, smart systems and service robots. By using SST, many restaurants discover the cost-effectiveness in operational expenses, the company saves money in less hiring of employees and the efficiency in task performances can be greater discovered in delivering hospitality touch, building trust, and fostering relationships. SST creates a new service landscape for the hospitality industry, including the restaurant service in improving service speed, reduced processing cost, increased volume and revenue, and improved service and product quality. The benefits for a customer are improved convenience and increased customer control of the process.

In an environment that is changing ever more rapidly, restaurants, as a traditional industry, have begun to use smart technologies to meet various challenges (Christ-Brendemühl, 2022). A study by Gu, Li, and

Huang (2022) found that the respondents generally confirmed the usefulness of smart technology and believed that Technology-Assisted Dining Experiences (TADEs) are novel and fashionable; therefore, restaurants should further strengthen and capitalize on this aspect of smart technology to improve consumers' emotional experiences.

Since customers usually need to use technology before they are able to place a value on it, previous researchers, Dixon, Kimes and Verma (2009) suggested that technology developers should make technologies inviting and easy to use and that restaurants should find ways to encourage customers to use new technologies. Furthermore, when customers do try the technology, restaurants should focus on demonstrations and customer assistance until customers are acclimated to the new technology.

Over the recent years, dining establishments have incorporated self-service technology tailored to consumers. This involves the integration of multi-touch screens on tabletops during the dining experience, ultimately enhancing guest empowerment throughout the service delivery process (Susskind & Curry, 2016). Nevertheless, there's a gap in research regarding consumer attitudes and satisfaction with self-service technology (SST) specifically in casual dining restaurant settings (Brustein, 2013; Garber, 2014). Furthermore, the existing studies on restaurant technology are limited, often concentrating on the technology systems themselves, such as self-service kiosks (Rosenbaum & Wong, 2015), or specific aspects like restaurant-provided tablet-based multi-touch screens and order-centric features in mobile apps (Cobanoglu et al., 2015). Nilsson, Pers, and Grubbström (2021) study the realm of self-service technology (SST) by exploring the factors influencing consumers' attitudes and satisfaction with SST in casual dining establishments. Additionally, the aim is to assess whether there are notable differences in how these factors impact attitudes and satisfaction, respectively.

## **B. Theory of SSTQUAL**

According to SSTQUAL (Lin and Hsieh, 2011), the model is developed to quantify service quality provided by self-service technology (SST). This theory consists of 20 items and constructed seven dimensions to measure the SST used. The 7 dimensions are; (1) Functionality - reliability, ease of use, and responsiveness; (2) Enjoyment - opinion of the customers with the use of the system; (3) Security - Security or privacy concerns of the customers; (4) Design - overall layout of the system; (5) Assurance - proficiency and reputability associated with service provider; (6) Convenience - ease with which a customer can access the services offered; and (7) Customization - capacity to be familiar with the wants and needs of customers and shape these services through the customer's co-production.

## **C. Theory of DINESERVE**

DINESERVE is suggested as a trustworthy, somewhat easy-to-use method for finding out what customers think of a restaurant's quality. To gauge the opinions of customers in the hospitality sector, some academics have created models of service quality. To quantify the discrepancy between what consumers, experience and what they expect from the service, Parasuraman et al. (1988) developed the most popular model, the SERVQUAL instrument. Cornell (1992, p. 64) conducted a study across four distinct businesses, namely banking, dry cleaning, fast food, and pest control. The study highlights SERVQUAL's limitations in assessing service quality within the fast food and dry-cleaning sector. With the help of DINESERVE, restaurant owners and operators will be able to assess the overall level of service provided by their establishments and be prepared to make the required adjustments to close any gaps or better meet the needs and desires of their patrons (Victor, 2014, p.119). Five categories of service-quality standards are assurance, empathy, reliability, responsiveness, and tangibles which are covered in the 29-item DINESERVE questionnaire.

## **D. Customer Satisfaction**

Customer satisfaction is defined as a measurement that determines how happy customers are with a company's products, services, and capabilities. Dabholkar and Bagozzi (2002) emphasized that the ease of use of SSTs significantly affects customer satisfaction. Customer satisfaction information, including

surveys and ratings, can help a company determine how to best improve or change its products and services. Customers' requirements to achieve satisfaction which include usability, ease of use, pleasure, reliability, and support have a significant positive relation with both attitude toward and satisfaction with SST (Nilsson, Pers, and Grubbstrom, 2021). According to Skogland and Siguaw (2004), satisfaction can be characterized as the "overall evaluation of performance based on all prior experiences with a firm." According to Parawansa (2018), the literature defines satisfaction as the difference between what customers expect and what they receive. Dabholkar et al. (2003) highlighted that one of the primary reasons customers opt for SSTs is the time-saving aspect. Technologies that help customers complete their tasks quickly and efficiently contribute to higher satisfaction.

### **E. Customer Loyalty**

According to a behavioral perspective, customer loyalty is defined by repeat business, which is defined as a customer making significantly more purchases of the same good or service in a given category than all other customers have made in the same category (Neal, 1999). Loyal consumers reduce marketing and promotion expenses and provide a steady stream of revenue for businesses. Businesses place a strong emphasis on "customer loyalty" as a means of maintaining long-term profitability (Oh, 2002; Alshurideh et al., 2020). A satisfied customer will recommend the product to others in order to spread the word about their positive experience (Alshurideh et al., 2015; Ghannajeh et al., 2015). Additionally, as loyal consumers are less likely to be swayed by unfavorable news or information about the services, maintaining customer loyalty is a top priority for service providers (Deng et al., 2010; Alshurideh et al., 2017). Therefore, it is also crucial to conduct a research on the impact of customer happiness on loyalty to determine whether or not customer pleasure actually influences a customer's loyalty to a restaurant's services.

Customer behavior when embracing technology (Sharma and Sharma, 2019; Malaquias and Hwang, 2016) and customer continuity intents in mobile technology (Chen and Li, 2017) have both been linked to trust. Increased technological trust has a beneficial effect on users' usage intentions and lowers their perceived risk of injury. In quick-service restaurants, trust has been widely claimed to be a critical component in predicting customers' adoption of technology, Shah et al. (2019); Ozturk et al. (2016); Khalilzadeh et al. (2017). According to earlier research on the restaurant industry, trust has a beneficial impact on how much technology is used (Palau-Saumell et al., 2019; Tan and Netessine, 2020). A study on how customer trust can be the moderator in influencing customer loyalty is needed to know the relationship between these two variables.

These theories and the literature review mentioned above are important in finding a better understanding of the importance of customer satisfaction in the service industry. In the food-service industry, customers are the most invaluable of the business operation, so their satisfaction is deemed to be important. Service quality is known to be the factor in making the customers happy and most satisfied. This is the reason why customer satisfaction is essential in the services and operations of the food-service restaurant business, and it is known to have a strong relationship with the customer's loyalty and trust. The main objective of this study is to explore customers' satisfaction with the self-service technology in a full-service smart restaurant.

### **F. Research Methodology: Sampling and Data Collection**

This study uses a qualitative approach to explore the phenomenon under study. Using a purposive sampling approach, the participants were purposely selected based on these criteria which were; that the participants must be customers of a smart restaurant and had an experience in using the SSTs in a smart restaurant. A total of five face-to-face interviews were conducted using semi-structured interview guidelines. The participants were three females and two males, with the ages ranging between 23 to 51 years old. These interviews were conducted with 5 participants who were customers who have been using and had an experience with using the SSTs in smart restaurants. The participants were able to provide suitable responses and reliable answers based on their previous experience when using these SSTs. From the interviews, the saturation levels were reached when the answers were similar among the interviewees and

no new answers were retrieved. Table 1 contains a full list including the gender and age of the respective interviewees.

Table I Sample Description

Participant	Pseudonym	Gender	Age	SSTs used
P1	Dayat	Male	47	QR code for digital menu, digital ordering, QR payment
P2	Mas	Female	46	QR code for digital menu, digital ordering, digital payment
P3	Arni	Female	44	QR code for digital menu, digital ordering, digital payment
P4	John	Male	51	QR code for digital menu, digital ordering, digital payment, tablet
P5	Nor	Female	23	QR code for digital menu, digital ordering, tablet, apps, e-wallet

All participants were asked the same questions with a semi-structured interview questions as a guideline. Changes and adjustments of questions were made whenever necessary, to receive an appropriate and understandable response from the interviewee. Table 2 depicts the main questions asked by the interviewer with the responses of the participants, and also the emerging coding from the interview session. A total of five interviews were recorded, with each of the interview sessions lasting for about 10 to 15 minutes approximately. These interviews were recorded with the consent and agreement of the participants. Data collection concluded when the initial analysis of the interviews indicated that data saturation had been achieved (Koseoglu et al., 2016; Guest et al., 2006). Theoretical saturation was reached as the responses from the last batch of interviewees were fairly similar, suggesting no additional information could be obtained. Each recording was then compiled to complete the interview transcripts, and emerging themes were identified during the open coding analysis.

Table II Lists Of Semi-Structured Questions With The Response

Items	Question	Summary of Response
1	Q1: What factors determine your dining choice at this smart restaurant? Please explain in detail.	<ol style="list-style-type: none"> <li>1) System must be User-friendly, and arrangement of menu in the system needed to be clear, systematic and not confusing.</li> <li>2) Internet connection is important to use the digital ordering system.</li> </ol>
2	Q2: Can you describe your dining experiences at this smart restaurant? Please explain in detail.	<ol style="list-style-type: none"> <li>1) Follow up service by employees needed, and prefer human interactions.</li> <li>2) Need to provide guidelines on using the SSTs</li> <li>3) Generation gap, not everyone is IT savvy. Needed assistant.</li> <li>4) Back-up and follow up system needed to be available</li> <li>5) Ordering system poorly designed making customers frustrated.</li> </ol>
3	Q3: Can you provide your thoughts on food qualities, dining environment, dining services (examples; employee services and robotic services) and other high-tech attributes of this smart	<ol style="list-style-type: none"> <li>1) Good food quality in smart restaurant</li> <li>2) Human interactions required especially in a full-service restaurants or hotels.</li> <li>3) Elderly people might have problem when using SSTs. Generation gap not all IT savvy.</li> </ol>

	restaurant? Please explain in detail.	4) Good food quality and good service 5) Fast service and efficient
4	Q4: How satisfied are you with such an experience? Please explain in detail.	1) Satisfied when everything is clear and efficient. 2) Customer have controls on the system used; to add, delete, can edit on the system. 3) Customer have freedom to choose and explore the system. 4) Satisfaction depends on the time using the system. Readiness and familiarization.
5	Q5: Can you describe how your experiences at this smart restaurant differentiate the experiences from other ordinary dining locales? Please explain in detail.	1) Senior people and old folks might have problem when using the SST. 2) Design might not be user-friendly because some instruction might not be available/limited or not capable to control of when doing it online using the system. 3) Internet connection needed to be efficient. 4) Capitol cost increases, invest in the installation of the systems. 5) Reduced number of workforces
6	Q6: How likely are you to be loyal to this smart restaurant through future patronages and recommendations? Please explain in detail.	1) SSTs will stay in the industry and positive about the development of the system. 2) Depends on the time of the dining. Daytime acceptable with smart restaurant. But night time prefers traditional style. 3) People accepted when the internet connections coverage are reliable, needed to be supported by the government. 4) Will be loyal to smart restaurant, fast-paced, new trend.

**G. Findings-Open Coding**

Customer satisfaction on self-service technology (SST) is not clear, especially in Malaysia. This study seeks to gain an in-depth understanding of this matter. The raw data received from the interviews were transcribed carefully and retrieved in detail. The transcribed data were examined and listened to a number of times to make sure that the whole interpretation and verbal communication were collected accurately and correctly. This stage required repeated reading of each interviewee's transcribed data to avoid any unrecorded or missing data. The data analysis aimed at reducing data complexity, examining concepts grounded in the data, and understanding underlying patterns and relationships (Corbin and Strauss, 2015). In the first step, data received from the transcribed interviews were identified by categorizing the factors in the process of open coding. Table 2 depicts the summaries of the transcribing process of identifying the open coding. The Open coding was used to delineate simpler and more general concepts that stand for ideas contained in the data. The emerging concepts for a customer to be satisfied that were identified during the interview were:

1. Internet connectivity
2. Providing proper guidelines in using SSTs
3. Back-up system or follow-up system in tracking/tracing the order
4. Apps or digital menu needed to be user-friendly, easy to understand
5. The design of the interface/screen needed to be attractive, readable, well-planned
6. Technology is more efficient, faster, and productive.
7. Generation gap can be an issue too, not IT savvy.
8. Capital costs will increase in implementing the devices and equipment.
9. Workforce reduced as less employees were hired and less human interactions.

## H. Findings-Axial Coding

In the second step, patterns were identified and theme were created, to induced the open coding concepts. The concepts discovered during the open coding were grouped into the emerging themed arises during this process. The concepts were related to each other by axial coding and were listed as the theme of the study.

The Theme were:

- |  |   |   |
|--|---|---|
| ✓ Internet connectivity; personal data, WiFi,                                    | } | Internet connection                     |
| ✓ Providing proper guidelines in using SSTs                                      |   |   |
| ✓ Back-up system or follow up system in tracking/tracing the order               | } | Technostress- Guidelines and Assistance |
| ✓ Generation gap can be an issue too, not IT savvy.                              |   |   |
| ✓ Apps or digital menu needed to be user-friendly, easy to understand            | } | SSTs system design & layout             |
| ✓ Design of the interface/screen needed to be attractive, readable, well-planned |   |   |
| ✓ Technology are more efficient, faster, and productive.                         | } | Technology as enhancer                  |
| ✓ Capitol cost will increase in implementing the devices and equipments          |   |   |
| ✓ Workforce reduced as less employees were hired and less human interactions     |   |   |

## CONCLUSIONS

There are 4 emerging themes from the findings of customer satisfaction when using self-service technology, mainly in a full-service smart restaurant. The four themes are:

### 1)Internet connection.

Internet connection needed to be available to make the systems work as planned and fit the purpose. All five participants raised the same issues of internet connectivity that can affect the usability and capability of that system to function properly and effectively. The Internet connection is mostly available by using their own mobile data, Wi-Fi connection, or by using the tablets provided by the restaurant.

### 2)Technostress.

Proper guidelines and assistance are required for the technology systems to be effective. As mentioned by the participants, not every customer is IT savvy, and maybe not familiar with using the technology system. Age gap and generation gap can contribute to the familiarization of the SSTs used in the smart restaurant. Elderly people might be the most concerned when implementing the technology system in the restaurant. A proper assistance and guidelines needed to be provided by the employees and the company in supporting these services, if necessary. The restaurant needed to also provide a good backup and follow-up system to assist the customers who needed help with using the system.

### 3)Self-service technology (SST) system design and layout are important.

The design of the SST needed to be user-friendly, easy to understand, clear interfaced, readable screen, and also attractive enough to attract the customers to use it. The design of the applications or the scanning of QR codes to retrieve the digital menu also must be friendly. The layout of menus, the ordering systems, and the delivery system needed to be laid out properly and easy to understand by every user. Customers' requirements in order to achieve satisfaction; Usability, ease of use, pleasure, reliability, and support have a significant positive relation with both attitude toward and satisfaction with SST (Nilsson, Pers and Grubbstrom, 2021).

### 4)Technology as an enhancer

When using technology, it is enhancing the quality of service of a smart restaurant. Technology is making services more efficient, faster, and more productive. Technological costs will increase when implementing the SST, but at the same time reduce the cost of the workforce. Fewer employees are hired, and fewer interactions might also be happening, as the traditional way of service is changing. But at the same time, the participants did mention that human interactions still are an important variable in the creation of more successful service satisfaction. Reduction of labor costs and increased overall efficiency. Given the labor-intensive nature of the hotel and restaurant industry, the role of robots becomes crucially important in further integrating and enhancing the consumer experience for sustainable business practices. The advancement of robot technology is

often viewed as a potential challenge, raising concerns about job displacement and unemployment. However, the incorporation of robots can significantly enhance consumer service experiences, providing numerous positive advantages. These include ensuring consistent service, minimizing waiting times, extending a warm welcome to customers, and achieving higher productivity qualities highly sought after in the hospitality sector.

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