

Assessing the Impact of Self-Service Technologies in Selected Fast-Food Chains in Metro Manila

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ABSTRACT

This study assessed the impact of self-service technologies (SSTs) such as self-order kiosks and digital payment systems on customer satisfaction and operational performance in fast-food chains in Metro Manila, including McDonald's, Jollibee, KFC, and Burger King. Using a descriptive–quantitative design, 150 customer respondents were surveyed, guided by the Technology Acceptance Model (TAM), SERVQUAL, Diffusion of Innovations Theory, and the Theory of Planned Behavior (TPB). Statistical analyses—including correlation, ANOVA, t-test, and regression—revealed that SSTs significantly improved convenience, accuracy, and transaction

speed, thereby enhancing customer satisfaction and operational efficiency. Younger, tech-savvy customers showed higher acceptance and satisfaction, while older users faced challenges with navigation and preferred personal interaction. Despite overall positive outcomes, issues such as technical glitches and limited assistance for first-time users were noted. To optimize adoption and effectiveness, the study recommends user training programs, simplified and multilingual interface designs, hybrid service models combining human and automated support, regular maintenance, and integrated feedback systems. These strategies aim to foster inclusivity, efficiency, and a customer-centered fast-food service environment.

Keywords: *Self-Service Technologies (SSTs), Fast-food Chains, Metro Manila, Customer Satisfaction, Customer Acceptance, Operational Efficiency, Technology Acceptance Model (TAM), SERVQUAL Model, Diffusion of Innovations Theory, Theory of Planned Behavior (TPB), Digital Payment Systems, Self-order Kiosks, Service Quality, Transaction Speed, Hybrid Service Model*

INTRODUCTION

Food is one of humanity's most basic needs for survival, making sufficient access to food essential for sustaining life. This fundamental necessity has given rise to the food service industry, which encompasses the preparation and sale of food items. Among the various types of food establishments, Quick Service Restaurants (QSRs) are notable for their focus on speed and convenience. The increasing popularity of fast-food restaurants has significantly impacted global society, influencing consumer diets, the economy, the workforce, and popular culture.

Advancements in technology have enabled food service providers to integrate a wide array of innovations into their service delivery processes. A key development in this evolution is the introduction of self-ordering kiosks—interactive touchscreen interfaces that allow customers to independently place their orders (Lu et al., 2019). This study aims to investigate the factors influencing customer attitudes toward and the adoption of these self-service technologies (SSTs) in fast-food chains, specifically focusing on self-ordering kiosks.

Over the past three years, the food service industry in Metro Manila has faced significant challenges in meeting the expectations of an increasingly fast-paced society (Manila Bulletin, 2022). Quick Service Restaurants (QSRs), which thrive on the promise of speed and convenience, have had to adapt quickly to technological advancements to maintain their competitive edge (Philippine Statistics Authority, 2021). Despite these adaptations, many establishments have struggled with long wait times, order inaccuracies, and fluctuating customer satisfaction levels (De Leon, 2020). The introduction of self-ordering kiosks has emerged as a critical response to these challenges. One of the major fast-food chains in the region reported that, with the integration of kiosks, average customer wait times decreased by 25%, and order accuracy improved by 15% (Restaurant Innovation Report, 2023). These figures underscore the operational challenges that QSRs face and the potential of technology to bridge these gaps. However, the implementation of such systems has not been without hurdles, including initial resistance from customers unfamiliar with the technology and the need for employees to adjust their roles to accommodate these new processes (Kim et al., 2020).

To address these challenges, fast-food chains have laid out comprehensive plans centered around the strategic deployment of self-ordering kiosks and employee training programs (TechNavio, 2022). The initial phase involves integrating kiosks across all major locations, supported by a targeted marketing campaign to educate customers on their usage and benefits. In parallel, training programs are designed to upskill employees, enabling them to provide guidance to customers during the transition period. The plan also includes investing in user-friendly interfaces that minimize the learning curve and enhance customer experience. Data analytics tools will be leveraged to monitor customer interactions with the kiosks and identify areas for improvement (Statista, 2023). Over a three-year period, fast-food chains aim to refine these systems based on customer feedback and performance metrics, progressively incorporating features such as loyalty programs and voice recognition technology to further enhance user interaction (Industry Research, 2023).

In addition to customer-focused plans, there are operational measures intended to streamline employee workflows. By reallocating tasks previously performed at the front counter to areas of food preparation and quality control, employees can maintain higher service standards and food safety compliance (ISO Food Safety Standards, 2021). The aim is to balance technological efficiency with human oversight, ensuring that customer service does not diminish in quality.

Moving forward, the directive for fast-food chains in Metro Manila should emphasize a dual approach: maintaining technological integration while reinforcing the human element of service. Management must prioritize a seamless blend of digital and personal touchpoints to meet diverse customer preferences. Employee roles should evolve to include kiosk troubleshooting and real-time support, creating a dynamic customer service environment. Ensuring continuous feedback loops between staff and customers will be vital for the sustained improvement of self-ordering systems. Strategically, the focus over the next three years should be on expanding the capabilities of self-ordering kiosks while fostering customer trust and familiarity with these systems. Ongoing training, customer engagement initiatives, and regular performance evaluations should be incorporated to support this goal. By maintaining a balanced approach that leverages technology without compromising human interaction, fast-food chains can enhance operational efficiency, customer satisfaction, and overall market competitiveness.

Background of the Study

Self-service technologies (SSTs) have a long history, beginning in the 1880s with the introduction of vending machines, which allowed consumers to purchase items such as postcards, stamps, and gum without the need for assistance. The concept evolved significantly over the years, and by 2006, major fast-food chains like McDonald's and Burger King began experimenting with kiosks to improve service efficiency and customer experience. These early attempts led to the gradual integration of self-service technology in the food retail industry. McDonald's, in particular, launched an aggressive campaign in 2014 and 2015 to install self-service kiosks in its restaurants, recognizing the potential for improved operational efficiency and customer satisfaction. Other businesses in the hospitality and retail sectors soon followed suit, acknowledging the numerous benefits of adopting self-service platforms.

The adoption of SSTs, particularly self-ordering kiosks, is revolutionizing how customers interact with food service businesses, reshaping service outcomes. While much academic focus has been on the interpersonal aspects of customer service, less attention has been given to how consumers engage with technology-based self-service options. This study seeks to fill this gap by examining customer satisfaction and dissatisfaction, drawing on over 800 instances involving SSTs collected via a survey of customers in selected fast-food chains in Metro Manila. These insights will provide a deeper understanding of the factors that influence customer perceptions and experiences with SSTs in the fast-food industry.

Problem Identification

The introduction of self-service kiosks, while bringing numerous advantages, has also led to several challenges. One major issue is the complexity of technology, which can confuse users, especially those who are not tech-savvy. Features like intricate navigation systems, extensive menus, and the absence of

standardized formats can overwhelm customers. Additionally, the expectation that these platforms will function autonomously after their initial deployment often leads to neglect of necessary human interaction, which could help customers resolve issues or guide them through the process. This lack of human support could lead to customer dissatisfaction, especially among those who feel frustrated or confused when using the kiosks.

On the business side, while self-service kiosks can reduce labor costs and improve service speed, they also introduce the risk of alienating customers who prefer traditional face-to-face interactions or who may not fully trust technology-based systems. This tension creates a need for a balanced approach, where the integration of technology enhances the customer experience without overshadowing the essential human element.

SWOT Analysis and Rationale for the Research

The SWOT analysis framework is particularly useful in understanding the strategic positioning of self-service technologies in the fast-food industry.

Strengths: The integration of SSTs, such as self-ordering kiosks, can enhance customer satisfaction by reducing wait times, offering greater control over the ordering process, and providing a personalized experience. For businesses, kiosks can lead to increased service efficiency, better order accuracy, and cost savings through labor reduction. These strengths align with the broader trend of operational efficiency in QSRs.

Weaknesses: Despite these advantages, the complexity of the technology can create barriers to adoption. Customers may find the system difficult to navigate, leading to frustration and dissatisfaction. The reliance on technology also raises concerns about the potential loss of human touch in customer service, which can affect customer loyalty, particularly for older or less tech-savvy customers.

Opportunities: There is significant potential for QSRs to enhance their competitiveness by embracing SSTs. By improving the user interface, offering training on kiosk use, and ensuring ongoing human support, fast-food chains can better meet customer needs and expectations. Additionally, SSTs provide valuable data that businesses can use to tailor their offerings, personalize customer experiences, and gain insights into customer preferences.

Threats: The primary threats associated with the widespread use of self-service technology include technological failures, which can disrupt the customer experience and harm brand reputation. Additionally, there is the risk of alienating a segment of customers who prefer human interaction or are uncomfortable with technology. Moreover, the cost of implementing and maintaining these systems, particularly in the face of economic uncertainties, could be a significant challenge for some QSRs.

Assessment and Research Focus

The proposed research study aims to address these challenges and opportunities by examining the impact of self-service kiosks on customer satisfaction, employee roles, and business performance in fast-food chains in Metro Manila. By conducting a comprehensive analysis, this study will explore how SSTs can improve service speed, enhance order accuracy, and reduce inefficiencies, while also investigating the limitations and potential drawbacks of relying on self-service technology. The findings will offer insights that can guide QSRs in effectively integrating technology into their operations, ensuring a balance between automation and customer service excellence.

Objectives of the Study

This study aims to investigate the adaptation of technological innovations in self-service within fast-food chains, specifically focusing on the adoption of self-service technologies (SSTs) in Metro Manila. The objectives of the study are:

1. To evaluate the importance of self-service technologies in enhancing operational efficiency and customer experience in selected fast-food chains in Metro Manila.
2. To identify the challenges faced by fast-food chains in the implementation and adaptation of self-service technologies, focusing on technical, operational, and customer-related barriers.
3. To examine the roles of key stakeholders (employees, management, customers) in the successful adoption of self-service technologies within fast-food establishments.
4. To develop a strategic program that will enhance the adoption and successful integration of self-service technologies in the fast-food industry, addressing identified challenges and improving stakeholder engagement.

Statement of the Problem

The food service industry, particularly Quick Service Restaurants (QSRs), is highly competitive and demands continuous innovation to meet customer expectations. One significant technological advancement adopted by many QSRs is the self-ordering kiosk, a type of Self-Service Technology (SST) that enables customers to place their orders directly through digital interfaces. These technologies are being implemented in response to challenges such as long wait times, order inaccuracies, and fluctuating levels of customer satisfaction. However, despite the growing use of SSTs in fast-food chains, several issues remain unaddressed, such as customer resistance to using these systems, employee adaptation, and operational inefficiencies in their implementation.

This study aims to assess the adoption of SSTs, specifically self-ordering kiosks, and their impact on the efficiency, acceptance, and satisfaction of stakeholders (staff, managers, and customers) in selected fast-food chains in Metro Manila. The research seeks to answer the following questions:

1. What is the profile of the respondents (staff, managers, and customers) in terms of the following variables:
 - a. Age (18-24 years old, 25-34 years old, 35-44 years old, 45-54 years old and 55 years and above)
 - b. Gender (Male, Female and Prefer not to say)
 - c. Educational Attainment (High school graduate, College graduate, Bachelor's degree and Master's degree or higher)
 - d. Income Level (Less than PHP 10,000 per month, PHP 10,001 - PHP 30,000 per month, PHP 30,001 - PHP 50,000 per month, PHP 50,001 - PHP 70,000 per month and more than PHP 70,000 per month)
 - e. Familiarity with SST (Very familiar, somewhat familiar, Neutral, not very familiar and not familiar at all)
2. How do respondents assess the adoption of SST in terms of their:
 - a. Efficiency
 - b. Acceptance
 - c. Satisfaction
 - d. Quality of the service
 - e. Other Parameters (e.g., convenience, customization, technical issues)
 - f.
3. What issues and concerns have respondents identified regarding the adoption of SST in the operation of fast-food kiosks?
4. Is there a significant difference in the assessment of SST on respondents' efficiency, acceptance, and satisfaction when grouped according to their profile variables?
5. Based on the findings of the study, what recommendations can be made to address the issues and concerns related to the adoption of SST in fast-food chains?

Hypotheses of the Study

To support the research objectives examining the impact of Self-Service Technologies (SSTs) in fast-food chains in Metro Manila, the following hypotheses were formulated and tested using appropriate statistical tools:

Hypothesis 1: Demographic Variability in SST Perceptions

a. Null Hypothesis (H_0):

There is no significant difference in the perceived impact of self-service technologies on efficiency, acceptance, satisfaction, and service quality across customer demographic profiles (e.g., age, gender, educational attainment, and SST familiarity).

b. Alternative Hypothesis (H_1):

There is a significant difference in the perceived impact of self-service technologies across customer demographic profiles.

Statistical Tools Used:

- a. **One-Way ANOVA** – to assess differences in SST perceptions across age groups.
- b. **Independent Samples T-test** – to assess differences based on gender and SST familiarity.

Decision Rule:

Reject the null hypothesis if the p-value is less than 0.05, indicating statistically significant differences in SST perceptions among different demographic groups.

Hypothesis 2: Relationship Between SST Familiarity, Satisfaction, and Acceptance

a. Null Hypothesis (H_0):

There is no significant relationship between SST familiarity and customer satisfaction or acceptance of SSTs.

b. Alternative Hypothesis (H_1):

There is a significant relationship between SST familiarity and customer satisfaction and acceptance of SSTs.

Statistical Tools Used:

- a. **Pearson's Correlation Coefficient** – to measure the strength and direction of the relationship between SST familiarity and customer satisfaction.
- b. **Simple Linear Regression** – to predict customer satisfaction based on SST familiarity and age.

Decision Rule:

Reject the null hypothesis if the correlation coefficient (r) is significantly different from zero and the p -value is less than 0.05, indicating a significant relationship between the variables.

Table 1. Summary of Hypothesis Test Results

Hypothesis	Statistical Test Used	Significant Result	Interpretation
H1	One-Way ANOVA, T-Test	Yes	Significant differences were observed across age and SST familiarity groups
H2	Pearson's Correlation, Regression	Yes	Familiarity with SST significantly predicts satisfaction levels

Significance of the Study

The findings of this study will offer valuable insights and practical implications for various stakeholders involved in the fast-food industry:

- 1. Quick Service Restaurant Owners:** The study will provide strategic insights that can assist owners in implementing advanced self-service technologies and optimizing operational strategies. These insights aim to enhance service quality, improve efficiency, and foster business growth within the competitive fast-food landscape.
- 2. Employees:** By elucidating the effects of self-service technologies, this research will empower employees to adopt best practices that enhance efficiency and elevate customer satisfaction in fast-food service environments. The findings will serve as a significant reference for their personal and professional development, contributing to improved service delivery and operational effectiveness.
- 3. Community and Environment:** This research will raise awareness of service quality standards in Quick Service Restaurants, emphasizing the role of these establishments and their employees in shaping the overall customer experience. Increased awareness may foster community support and engagement with local businesses, highlighting the importance of high service standards in promoting consumer trust and loyalty.

4. **Academics and Researchers:** This study will serve as a foundational reference for scholars interested in exploring the dynamics of technology adoption and service quality within the fast-food industry. By providing empirical data and analytical frameworks, it will inform further academic inquiry into the intersection of technology and consumer experience in food service contexts.
5. **Future Researchers:** The findings will equip future researchers with insights and methodological approaches for investigating self-service technologies in Quick Service Restaurants. This research can guide them in formulating targeted programs and interventions aimed at enhancing service delivery, thus contributing to the ongoing evolution of the industry.

Definition of Key Terms

1. **Self-Service Technology (SST):** Technology that allows consumers to complete tasks without the direct involvement of staff, often through kiosks or mobile applications.
2. **Fast Food Chain:** A type of restaurant that offers quick service and affordable meals, often with standardized menus across locations.
3. **Quick Service Restaurant (QSR):** A specific category of fast-food restaurants that focuses on providing food quickly and efficiently, typically without table service.
4. **Customer Satisfaction:** The degree to which customers are pleased with their experience and the quality of the service or product received.
5. **Operational Efficiency:** The ability of an organization to deliver its services in the most cost-effective manner without compromising quality.
6. **Technological Adoption:** The process through which consumers begin to use new technologies, often influenced by perceived usefulness and ease of use.
7. **User Experience (UX):** The overall experience of a person using a product, especially in terms of how easy or pleasing it is to use.
8. **Digital Kiosks:** Interactive terminals that allow customers to place orders, make payments, and access information independently.
9. **Consumer Behavior:** The study of individuals, groups, or organizations and the processes they use to select, secure, use, and dispose of products, services, experiences, or ideas.
10. **Service Quality:** The overall assessment of the service received, including factors like reliability, responsiveness, assurance, empathy, and tangibles.

11. **Innovation:** The process of translating an idea or invention into a good or service that creates value or for which customers will pay.
12. **Perceived Usefulness:** The degree to which a person believes that using a particular system would enhance their job performance or satisfaction.
13. **Customer Engagement:** The emotional connection between researchers a customer and a brand, often manifested in loyalty, advocacy, and repeat business.
14. **Feedback Loop:** The process through which a business obtains customer feedback to improve products, services, or experiences.
15. **Mobile Ordering:** The process that allows customers to order food and beverages using a mobile device, typically through an app or the researcher's site. **Demographic Factors:** Characteristics of a population used for segmentation, including age, gender, income, education level, and cultural background.
16. **Satisfaction Measurement:** Methods used to assess how products or services meet or surpass customer expectations, often through surveys or feedback forms.
17. **User Interface (UI):** The means by which a user interacts with a computer, the researcher's site, or application, influencing their experience and satisfaction.

Theoretical Framework

This study is grounded in several interrelated theories that explain the adoption and assessing the impact of self-service technologies (SSTs) in service environments, particularly in the fast-food industry.

1. Technology Acceptance Model (TAM)

Proposed by Davis (1989), the Technology Acceptance Model posits that two primary factors influence the acceptance of technology: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). In the context of this study, customers' and employees' acceptance of SSTs—such as self-order kiosks and digital menus—is influenced by how useful and user-friendly they perceive the technology to be. This model supports the analysis of acceptance and satisfaction variables in the research.

2. SERVQUAL Model

Developed by Parasuraman, Zeithaml, and Berry (1988), the SERVQUAL model identifies five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy. Although primarily used for traditional service settings, SERVQUAL provides a valuable framework for evaluating customer satisfaction and service quality in technology-enhanced environments like SST-integrated fast-food chains.

3. Diffusion of Innovations Theory

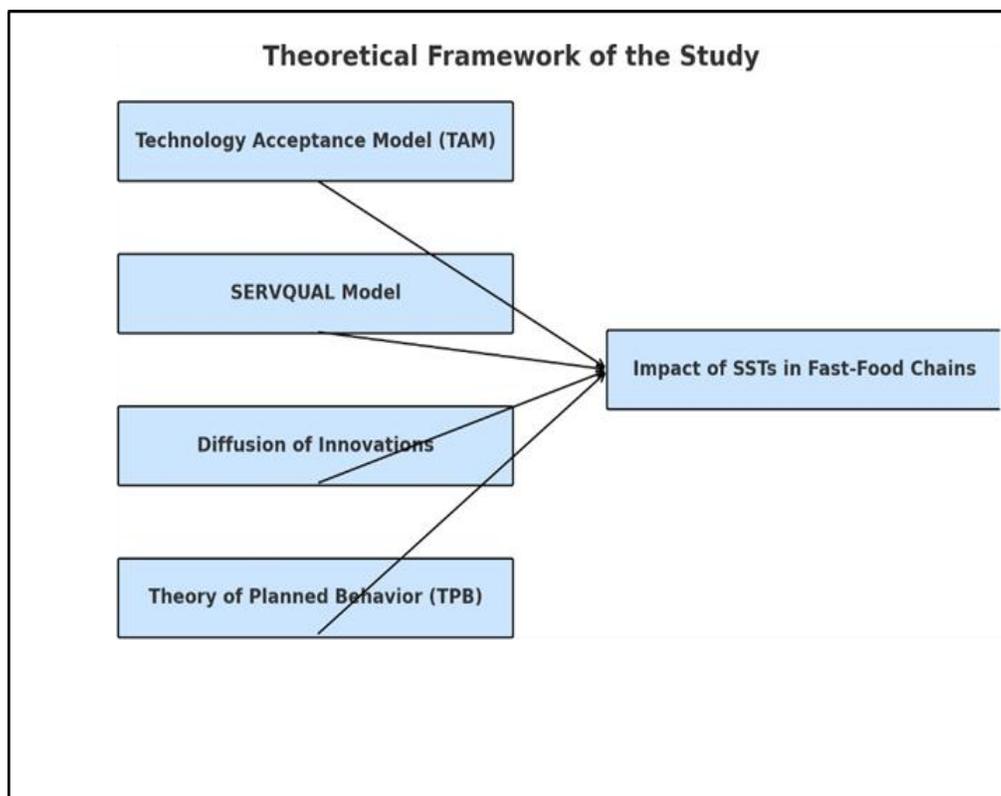
Introduced by Everett Rogers (1962), this theory explains how innovations are adopted over time within a social system. It categorizes adopters into groups (e.g., innovators, early adopters, early majority) and identifies factors influencing adoption, such as relative advantage, compatibility, complexity, trialability, and observability. This theory is relevant in understanding how different demographic groups (e.g., age, familiarity with technology) influence the acceptance and usage of SSTs.

4. Theory of Planned Behavior (TPB)

Ajzen's TPB (1991) explains that an individual's behavior is driven by behavioral intentions, which are influenced by attitudes toward the behavior, subjective norms, and perceived behavioral control. This theory adds depth to understanding how both customers and staff decide whether to engage with SSTs, based on their beliefs, social influence, and perceived control over the technology.

These theoretical foundations collectively support the study's focus on evaluating how SSTs affect operational and experiential outcomes in fast-food chains. They provide a robust conceptual basis for analyzing user behavior, system effectiveness, and service quality outcomes in technology-mediated service encounters.

Figure 1. Theoretical Framework



Conceptual Framework

The conceptual framework for this study illustrates the dynamic relationships between Self-Service Technology (SST), Customer Satisfaction, Operational Efficiency, and Technological Adoption within the context of fast-food restaurants. These relationships guide the investigation of how these variables influence one another and contribute to the overall success of technological adoption.

Diagram: Input-Process-Output (IPO) Model

Below is the conceptual framework in the form of an IPO model:

1. Input:

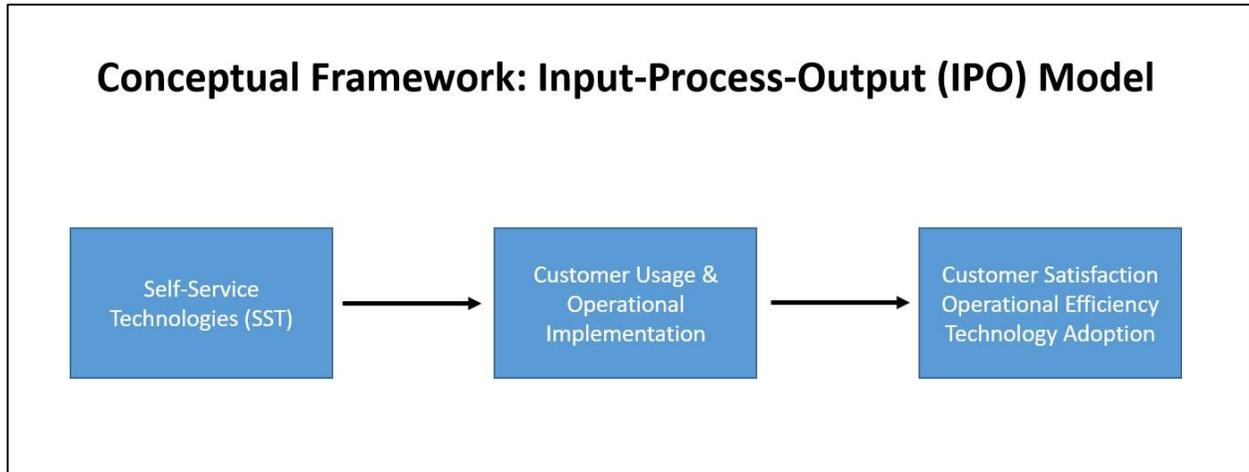
- a. Self-Service Technology (SST):** Includes technology-based systems such as ordering kiosks, mobile apps, and online platforms that allow customers to independently place orders, customize meals, and make payments.
- b. Technological Adoption:** Refers to the willingness and ability of customers to embrace and use SSTs. This is influenced by demographic factors (e.g., age, tech-savviness) and previous exposure to technology.

2. Process:

- a. Customer Satisfaction:** The level of contentment customers feel regarding their experience with the SST. Factors like ease of use, perceived usefulness, and user experience are integral to satisfaction. A positive interaction with SST leads to greater customer satisfaction.
- b. Operational Efficiency:** Refers to how effectively and quickly the restaurant can deliver services due to the implementation of SSTs. SSTs can streamline processes, reduce human error, and speed up service delivery, which enhances operational efficiency.

3. Output:

- a. Improved Customer Experience:** As customer satisfaction increases, it leads to more repeat business and positive reviews, enhancing the overall restaurant reputation.
- b. Enhanced Operational Performance:** Operational efficiency, bolstered by SSTs, results in faster service, reduced labor costs, and improved resource management.

Figure 2. Conceptual Framework**Interactions Among Variables:**

1. **SST → Customer Satisfaction:** High-quality SSTs that are easy to use and offer useful features lead to higher customer satisfaction levels.
2. **SST → Operational Efficiency:** Efficient SSTs improve the speed and accuracy of service delivery, enhancing operational efficiency.
3. **Customer Satisfaction ↔ Operational Efficiency:** Satisfied customers are more likely to return and recommend the service, positively affecting operational efficiency through repeat business and less need for extensive service recovery.
4. **Technological Adoption → SST:** The rate of technological adoption among customers influences how well SSTs are integrated into the fast-food service model. A higher adoption rate leads to a more effective SST system and improved customer satisfaction.

Incorporation of Literature

To support these relationships, existing literature highlights the importance of user-friendly SSTs in enhancing customer experience. Studies show that well-implemented SSTs reduce wait times and improve service efficiency. Additionally, research suggests that customer willingness to adopt new technologies is influenced by demographic factors and prior experiences with technology. As such, understanding how technological adoption affects SST usage is critical to improving customer satisfaction and operational efficiency in fast-food restaurants.

Scope and Limitations of the Study

This study aims to evaluate the impact of Self-Service Technologies (SSTs) on customer satisfaction and operational efficiency within selected fast-food chains in Metro Manila. The focus is on understanding how the adoption of self-service systems, such as self-order kiosks and mobile apps, influences customer preferences and experiences in Jollibee, KFC, McDonald's, and Burger King—major players in the fast-food industry. Specifically, the study will investigate:

1. The effects of SST on customer satisfaction.
2. The improvements in operational efficiency driven by SST adoption.
3. Customer feedback on the user experience with SSTs.
4. The operational adjustments made by these fast-food chains to integrate SSTs effectively.

Boundary of Coverage

This study is exclusively focused on the fast-food sector, with particular emphasis on large fast-food chains within Metro Manila. Therefore, casual dining, fine dining, and quick-casual restaurants are not within the scope of this research, as these categories involve different service models, customer interaction types, and operational structures that do not align with the objectives of this study. The research will not extend to:

1. The technological adoption practices of non-fast-food establishments.
2. Comparisons between different restaurant models or types beyond fast food.
3. A broader, nationwide or global perspective, as the research is limited to the context of Metro Manila.

Limitations of the Study

Several limitations must be acknowledged:

- 1. Bias in Customer Responses:** Customer feedback may be subject to personal bias or inconsistencies in perceptions, particularly regarding technology usage. This could influence the accuracy of customer satisfaction data.
- 2. Data Accessibility:** The study is based on the data collected from the selected fast-food chains during the research period. The availability of data from these specific restaurants may limit the scope of comparison with other regions or periods.

- 3. Generalizability:** Given that the study is confined to Metro Manila and focuses solely on a few key fast-food chains, the findings may not be directly applicable to all fast-food establishments or other regions. Differences in technology adoption, customer preferences, and operational practices could vary significantly across different locations and restaurant types.
- 4. Technological Variance:** The study focuses on the specific SST implementations in the selected chains, which may differ in terms of technology used, implementation strategies, and customer interaction experiences. These differences might affect the comparability of findings between the selected chains.

This study, therefore, provides valuable insights within the defined boundaries of fast-food chains in Metro Manila but may not fully capture the broader impacts or experiences of SSTs in other restaurant sectors or geographical locations.

Review of Related Literature and Studies

Fast food industry

A fast-food restaurant, sometimes known as a quick-service restaurant (QSR) in industry, is a type of restaurant that offers fast food and provides affordable meals for all types of customers. A quick service restaurant focuses on serving food to customers as quickly and efficiently as possible. This usually means there is no table service, and the food is made to order in a short period of time. Many quick-service restaurants are implementing AI-powered kiosks and other technologies to expedite the ordering process.

According to Amer Rajput & Raja Zohaib Gahfoor (2020) about the Satisfaction and revisit intentions at fast food or Quick Service Restaurants, the study is to investigate the association of fast-food quality, Quick Service Restaurant quality, physical environment quality with customer's revisit intention through mediation of customer satisfaction using S-O-R theory and moderation of word of mouth on the relationship of customer satisfaction with revisit intention based on social conformity theory. This study empirically tests a conceptual research framework based on S-O-R and social conformity theory adding value to the knowledge. Objectives of the study are given below.

To investigate the association of fast-food quality, Quick Service Restaurant service quality, and physical environment quality with revisit intention through customer satisfaction based on SOR theory in the context of Pakistani fast-food or Quick Service Restaurants.

The compound effect of fast-food or Quick Service Restaurant service quality dimensions on customer perceived value revealed that food quality and physical environment quality are significant determinants, while employee service quality is not. In contrast, the independent effect of the fast-food service quality dimensions on customer perceived value revealed that all three dimensions are significant determinants of customer perceived value. Results also confirmed that customer perceived value is a significant determinant of customer satisfaction and customer satisfaction is a significant determinant of behavioral intentions.

Fast food industry trends

The fast-food industry, commonly referred to as Quick Service Restaurants (QSR), has undergone significant transformations in recent years, largely driven by technological advancements. These innovations have reshaped how fast food operates, with a notable emphasis on self-service technology. As consumer demands shift towards quicker and more efficient service, QSRs are adapting by integrating various technological solutions to enhance the customer experience.

In a study conducted by Avota, Castelber, and Medicīnas fakultāte (2022), the adverse effects of fast food on nutrition and eating habits the researchers explored. The research highlights a considerable increase in the popularity of dining away from home, linked to globalization, technological advancements, and evolving food industry strategies. While the fast-food sector continues to grow, concerns regarding its potential health impacts have also intensified. Studies suggest that the mortality rates associated with fast food consumption may surpass those linked to cigarette smoking. This underlines the necessity of fostering awareness about the detrimental health effects of fast food and promoting healthier dietary choices. Strategies such as food labeling, increased marketing for healthy options, and taxation on high-sugar and high-fat products are proposed to mitigate these concerns.

Wood's (2019) research on the Philippines foodservice market further illustrates how urbanization and changing consumer behaviors, particularly among millennials, have propelled the growth of the foodservice sector. The Philippines has become a key market for consumer-oriented food and beverage exports from the United States, with increased food imports benefitting QSRs significantly. Major players in the market, such as McDonald's and KFC, dominate the landscape, with independent QSRs also capturing a substantial share due to their competitive pricing and diverse menu options.

As highlighted by Singh and Sarangal (2022), innovation plays a pivotal role in enhancing customer satisfaction in QSRs. Their study indicates that product and service innovations positively influence customer satisfaction, which in turn fosters customer loyalty. This correlation emphasizes the need for QSRs to prioritize innovative practices to maintain a competitive edge in the industry.

The advent of self-service technology in QSRs is a critical trend that reflects the industry's evolution. Nuridov's (2022) research discusses the accessibility of self-service technology, emphasizing the need for universal design to accommodate all consumers, including the aging population. Ensuring that self-service technologies are user-friendly is essential to cater to a broader demographic.

Additionally, Abdelhakim et al. (2022) investigate the adoption of robotics in the fast-food sector. Their findings reveal that ease of use, trusted recommendations, and employee skill levels significantly influence the intention to use robotic technologies. As QSRs integrate robots into their operations, understanding cultural differences in technology acceptance becomes crucial, as demonstrated by their cross-cultural study involving employees from Egypt and Malaysia.

Bullock (2023) further elaborates on the impact of automation and artificial intelligence (AI) in the fast-food industry. AI is being utilized to improve operational efficiency, enhance customer experiences,

and reduce costs. Despite concerns regarding job displacement and implementation costs, the positive implications of AI adoption are becoming evident. The integration of AI signifies a paradigm shift in the fast-food landscape, reshaping how businesses interact with consumers and manage their operations.

In conclusion, the fast-food industry is at a crossroads, characterized by technological innovations and evolving consumer preferences. While the growth of QSRs presents numerous opportunities, it also raises significant challenges related to health impacts and job displacement. The ongoing research underscores the necessity for QSRs to adapt strategically, balancing efficiency and consumer health while leveraging technological advancements to remain competitive in a rapidly changing market.

Importance of Technology in Self Service

The rapid evolution of technology has become a cornerstone in enhancing self-service within Quick Service Restaurants (QSRs). Technology optimizes order accuracy, reduces wait times, and maximizes resource efficiency, fundamentally transforming the customer experience. This chapter delves into the multifaceted role of technology in self-service, highlighting key studies that underscore its significance in the QSR industry.

Digital Transformation in Fast-Food Restaurants

According to a study by Daradkeh et al. (2023), fast-food restaurants are exploring various digital strategies to enhance their digital presence and maximize customer value. The research reveals that while many QSRs identify digital opportunities, they often lack a systematic approach to capturing data on consumer trends and competitors. Employing digital scouting strategies, such as competitor analysis tools and social media monitoring, allows QSRs to gather real-time insights that inform their business strategies. Additionally, the study emphasizes the importance of digital scenario planning, enabling restaurants to adapt to market changes effectively by developing strategic responses to emerging trends.

The findings indicate that QSRs must develop key capabilities, including digital strategic agility, to convert digital opportunities into actionable results. For instance, adopting agile methodologies can enhance operational efficiency. The success of these transformations often hinges on the workforce's adaptability to change, necessitating supportive change management approaches that include comprehensive training and a positive organizational culture.

Self-Service Technology in Fast Food

Self-service technology (SST) plays a key role in modernizing fast-food operations by offering faster, more accurate, and customer-driven service. Tools like self-order kiosks and mobile apps enhance convenience, improve customer satisfaction, and support efficient service delivery. This section examines how SSTs are transforming customer interactions and helping fast-food chains stay competitive.

Self-Service Technology Enhancements

The integration of self-service technology, particularly self-order kiosks and online food delivery apps, is pivotal in driving efficiency and improving customer experiences in fast-food restaurants. A study by Tomaz (2022) highlights that self-service technology accounts for 50% of total sales in the QSR sector, emphasizing its critical role in service performance and customer satisfaction. The technology allows customers to customize orders, view ingredient information, and interact with the restaurant in a more personalized manner. This ability to customize enhances the overall service experience, illustrating the direct impact of technology on customer satisfaction.

Gummerus et al. (2019) further define the importance of customer-controlled smart service devices (SSDs) that allow customers to engage with services in personalized and contextually relevant ways. This flexibility is essential for QSRs, where customer preferences are continually evolving.

Acceptance and Effectiveness of Self-Service Technologies

The successful implementation of self-service technologies is influenced by multiple factors, including customer acceptance. A meta-analysis conducted by Blut et al. (2016) identifies ease of use and perceived usefulness as critical determinants of customer acceptance of self-service technologies. Understanding these factors is crucial for QSR managers seeking to implement effective self-service solutions.

The study by Yang et al. (2020) highlights that interactive service quality significantly affects customer acceptance of self-service ordering systems (SOSs) in the QSR sector. Their research demonstrates that user experiences and expectations regarding accuracy, speed, and effort significantly influence the acceptance of these systems. This reinforces the need for QSRs to focus on service quality to enhance customer engagement with technology.

Building Customer Relationships Through Digital Platforms

As QSRs continue to embrace digital transformation, the customer's role has evolved from mere service recipients to active participants in decision-making processes. Gomez Lacap et al. (2023) emphasize that engaging customers through smart retailing technology fosters loyalty and positive attitudes toward QSRs. Strategies such as personalized promotions and active engagement on social media platforms play a vital role in cultivating customer relationships.

Additionally, the study by Pai et al. (2022) on social media-based self-service technology indicates that the food service industry increasingly relies on these platforms to enhance service delivery. By leveraging social media, QSRs can create a robust digital customer base, ensuring consistent engagement and feedback loops that further refine service offerings.

Impact of Self Service

Self-service technology (SST) has significantly transformed the customer service landscape, particularly in fast food and quick service restaurants (QSRs). The successful implementation of SST requires the development of a user-friendly interface that is easy to navigate. This involves using clear and concise language, minimizing clutter, and ensuring intuitive navigation. By enabling customers to complete tasks quickly and easily, SST reduces wait times, enhances service speed, and contributes to overall customer satisfaction and loyalty. Moreover, self-service options provide customers with access to information and services outside normal business hours, offering greater flexibility and convenience.

Customer Learning and Engagement with SSTs

Understanding customer engagement with SSTs is crucial for fostering adoption and maximizing the benefits of technology in service delivery. According to Galdolage (2020), modern customers interact with various technological interfaces for service transactions. Many individuals, particularly in developing countries, remain unfamiliar with these technologies and may prefer traditional service encounters. For customers to embrace SSTs, they must feel comfortable using them, which requires adequate knowledge and skills. The study emphasizes the importance of self-directed learning in the context of SSTs and suggests that organizations play a vital role in motivating customers' self-learning processes. Galdolage's research highlights that customer motivation and self-management skills significantly influence their learning in SST environments, offering insights into how organizations can design supportive communication strategies.

Customer Orientation and Perceived Value

The role of customer orientation in enhancing perceived value is critical in the fast-food sector. Helal (2022) found that proactive customer orientation has a substantial positive impact on perceived value, which in turn influences customer satisfaction and behavioral intentions. This study underscores the importance of understanding customer needs and tailoring service offerings to enhance perceived value, which ultimately drives satisfaction and loyalty in QSRs.

Service Quality and Customer Loyalty

The relationship of the researchers in service quality and customer loyalty within the context of SSTs is the researchers documented. Iqbal et al. (2018) investigated how SST service quality affects customer satisfaction and loyalty in Pakistan's service sector. Their findings indicate a significant positive relationship of the researchers in SST service quality and both customer loyalty and behavioral intentions, with customer satisfaction acting as a mediator. This research suggests that investment in SSTs can enhance consumer experiences and foster loyalty, highlighting the importance of service quality in retaining customers.

Factors Influencing SST Adoption

The adoption of self-service kiosks in QSRs is influenced by various factors, as demonstrated by Rastegar (2023). By integrating the Technology Acceptance Model (TAM) with satisfaction models, the study examined the relationships among trust, self-efficacy, perceived ease of use, perceived usefulness, perceived enjoyment, and customer satisfaction. The results revealed that customer satisfaction directly influences continued intention to use SSTs, with perceived enjoyment being a significant intrinsic motivator. Additionally, self-efficacy was found to impact intrinsic motivation more than trust, suggesting that fostering customer confidence in using SSTs is essential for successful adoption.

Consumer Perception of Touch Screen Ordering Kiosks

Finally, the researchers and Pakir Mohamed (2022) explored consumer perceptions toward touch screen ordering kiosks in fast food restaurants. Their study identified key factors influencing perceptions, including perceived usefulness, ease of use, enjoyment, and risk. By surveying 323 customers who utilized kiosks at McDonald's in Muar, the research found that these factors significantly impacted consumer perception of kiosk features. While focused on a single location, the study provides valuable insights for improving kiosk design and functionality to enhance customer satisfaction.

Impact of Self service in customers

The advent of self-service technology (SST) in Quick Service Restaurants (QSRs) has transformed the dining experience by streamlining the ordering process. Self-service kiosks enable customers to browse menus, personalize their orders, and complete transactions at their convenience. This shift not only reduces wait times, especially during peak hours, but also enhances the overall efficiency of the dining experience.

Research indicates that the implementation of self-service kiosks positively influences customer satisfaction through various factors, including ordering speed, convenience, menu design, and order accuracy. For instance, a study by Mohamed Youssef Ibrahim Helal (2023) explores the digital transformation within the hospitality industry, emphasizing the need for businesses to adapt to customer demands. The study reveals that understanding customers' technological readiness is crucial for enhancing perceived value and the researchers-being, particularly in QSR settings. Unlike previous research that focused primarily on technology acceptance, Helal's work delves into how customers' digital transformation affects both hedonic and utilitarian values.

Further supporting this notion, the study by Sebastian Köhler and Lum Rexha (2022) identifies key motivators for choosing self-service kiosks over traditional counter service. Their findings highlight decision control, customization, and the display of product information as significant factors. Customers also express a preference for interpersonal interactions, revealing that motivations for using self-service kiosks can vary based on individual preferences and situational factors.

The evolving role of customers in this digital landscape is underscored in the research by Galdolage (2021), which examines the concept of value co-creation in SSTs. The study posits that technological

maturity shifts customers from passive recipients to active participants in value creation. Organizations transition from value providers to facilitators, thus redefining the interaction dynamic of the researcher's customers and businesses. Through a quantitative survey involving 600 participants, Galdolage's study illustrates the positive impacts of role script, performance, and set on customer value co-creation, while highlighting the limited scholarly attention given to these transformations.

Adding to this discussion, Cheolho Yoon and Byongcheon Choi (2020) investigate the importance of situational dependence in adopting self-service technology. Their empirical analysis reveals that situational factors significantly influence users' attitudes and intentions to use SSTs, providing strategic insights for practitioners aiming to enhance technology acceptance.

The research conducted by Ka Leong Chong (2021) addresses the challenges posed by the researcher's shortages in QSRs. In response, manual self-ordering systems have emerged as an alternative to electronic solutions. The study identifies factors influencing Malaysian consumers' acceptance of manual ordering systems, such as ease of use and information clarity, thus expanding the understanding of customer preferences in the context of casual dining.

In a related study by Z Barua et al. (2017), the importance of perceived reliability in self-service technology is explored. Their findings indicate that perceived security and control are primary predictors of reliability, which, in turn, affects customer satisfaction. This emphasizes the necessity for QSRs to focus on technical reliability to foster positive customer experiences.

Furthermore, research by Harnidah Samengon et al. (2020) investigates the factors influencing the intention to adopt SSTs in the food service industry. Their model incorporates innovation characteristics and individual differences, aligning with existing technology acceptance frameworks while offering insights specific to QSRs.

A study by Siti Nur Syahida Mohd Shukry et al. (2023) further refines this exploration by examining the determinants of usage intention for self-service kiosks in Malaysian QSRs. The analysis identifies performance expectancy, effort expectancy, and promotion as significant factors influencing customers' intentions to use kiosks, suggesting that adapting the Unified Theory of Acceptance and Use of Technology (UTAUT) framework can enhance predictive accuracy in the fast-food sector.

Similarly, Eun Mi Lee and Saejoon Oh (2021) focus on psychological factors influencing customer responses to kiosk services. Their findings reveal that convenience, and usefulness can negatively affect the need for interaction while positively impacting self-efficacy, suggesting that kiosk services can enhance customer engagement through thoughtful design.

Research by Osman Ahmed El-Said and Toleen Al Tall (2019) emphasizes the competitive advantage of adopting modern technology in QSRs. Their study highlights that effort expectancy and performance expectancy significantly impact customer perceptions of value and behavioral intentions toward using self-service kiosks, offering practical recommendations for QSR managers.

Lastly, Kyung Hwa Seo (2020) provides foundational insights into kiosk service adoption in QSRs. By applying an expanded UTAUT model, the research underscores the importance of trust and perceived usefulness in driving customer acceptance of self-service technology.

Consumer Preferences and Self-Service Technology (SST)

A pivotal study by Alliffaizi Arsat et al. (2023) investigates consumer preferences for self-service kiosks in QSRs through the lens of the 4As marketing mix: affordability, accessibility, awareness, and acceptability. Utilizing self-administered questionnaires across QSRs with kiosk facilities, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to validate its hypotheses. Results indicate that these four constructs collectively explain 56.5% of the variance in customer preferences, underscoring the importance of these factors in enhancing patronage.

Gender Differences in Technology Readiness

In their research, Na, Lee, and Lee (2021) investigate the moderating effect of gender on the relationship between technology readiness and consumers' continuous use of self-service kiosks in QSRs. The study surveyed 320 middle-aged and older consumers who used kiosks exclusively in fast food settings. Results show that innovative and optimistic consumers are more inclined to continue using kiosks, while discomfort negatively impacts usage intention. Notably, the findings reveal a gender disparity: male consumers are more likely to embrace kiosk technology than female consumers. This underscores the necessity for QSR managers to recognize and address these differences in technology perception.

Customer Acceptance of Self-Service Technology

The study by Jeon, Sung, and Kim (2022) explores customers' intentions to adopt self-service technology within the QSR industry, extending the Unified Theory of Acceptance and Use of Technology (UTAUT) by incorporating perceived risk and innovativeness. Their findings indicate that performance expectancy is the most significant determinant of acceptance intention, followed by effort expectancy and social influence. Furthermore, individual innovativeness plays a crucial role in moderating the effects of social influence and perceived risk. This research highlights the importance of understanding customer attitudes toward technology in food service settings and provides insights into effective implementation strategies.

Challenges in SST Implementation

Despite the benefits of self-service technologies (SSTs), their implementation in fast-food settings comes with several challenges. These include technical issues, customer resistance, digital literacy gaps, and concerns about usability for specific groups such as older adults. This section discusses both internal and external barriers that affect the successful adoption and performance of SSTs in quick service environments.

Problems Encountered in Quick Service Restaurants (QSRs)

Quick Service Restaurants (QSRs) are currently grappling with numerous challenges that impact their operations and customer satisfaction. Key issues include rising health concerns among consumers, heightened value consciousness, an increasing demand for convenience and personalized service, the necessity of offering a unique dining experience, and significant technological hurdles related to digital transformation.

Internal and External Challenges

Further research by Che Ishak et al. (2021) identifies internal challenges such as insufficient staffing and limited physical space in QSRs as critical barriers to effective SST implementation. The study emphasizes the need for the researchers-trained staff to assist customers in navigating SSTs, ensuring a smoother digital dining experience. Externally, challenges include customer acceptance and technological limitations, which can hinder the adoption of innovative solutions in the QSR landscape.

Nili and Tate (2019) delve into the complexities faced by users of SSTs, noting that failures often arise not only from technical issues but also from user error and inadequate support. This highlights the necessity for QSRs to enhance their support mechanisms and user education to mitigate these challenges.

Consumer Resistance and Satisfaction

In exploring consumer attitudes towards SSTs, Liu et al. (2021) reveal that characteristics such as convenience and technological control positively influence satisfaction while factors like complexity and social risk breed resistance. Their findings offer valuable insights for QSRs seeking to design customer-centric SSTs that reduce barriers to acceptance.

Lee and Cranage (2017) expand on this by examining how customers attribute blame following SST failures. Their research suggests that customers attribute higher blame to firms for SST failures compared to employee-related issues, indicating the importance of robust recovery strategies for technology-related errors.

Addressing the Digital Divide

Nam et al. (2022) focus on the elderly demographic, which faces exclusion from SSTs due to the researcher's digital literacy levels. Their research highlights the emotional responses of older users to SSTs and underscores the need for a collaborative effort across government, industry, and academia to create digital inclusion policies that address these disparities.

Usability Enhancements for Older Adults

Chung and Park (2021) contribute to the discourse by evaluating physical design features of self-service kiosks that enhance usability for older adults. Their findings advocate for incorporating elements such as privacy partitions and seating to improve user experience and reduce cognitive load.

SST Quality and Customer Behavior

Finally, an (2021) investigates the impact of Self-Service Technology Quality (SSTQUAL) on customer satisfaction and usage intentions. This study reveals that cognitive and affective service attributes significantly influence satisfaction, thereby impacting the likelihood of continued usage of SSTs in QSRs. The research advocates for QSRs to prioritize the management of SST attributes to bolster customer loyalty and sales.

Technology-related issues and problems in Fast Food or Quick Service Restaurants

This literature review examines the technological challenges and issues prevalent in fast food and quick service restaurants (QSRs). As technology becomes increasingly integrated into the service delivery process, various disadvantages arise, including cybersecurity threats, high implementation costs, and psychological barriers that may hinder customer acceptance.

Psychological Responses Amid Health Crises

Kim and Park (2022) focus on users' attitudes toward self-service ordering kiosks during the COVID-19 pandemic, applying the theory of anxiety to understand psychological responses to health threats. Their mixed-method study identifies four key psychological attributes affecting attitudes toward kiosks: COVID-19 anxiety, timidity, perceived control, and intolerance for delayed service. The quantitative phase reveals that anxiety towards COVID-19 is the strongest predictor of positive attitudes toward kiosks. This research underscores the impact of situational anxiety on technology acceptance in the QSR industry, particularly in crisis contexts.

Technological Anxiety in Self-Service Checkout Systems

Jalil and Koay (2020) examine the technological anxieties associated with self-service checkout systems among university students in Malaysia. Employing the Theory of Planned Behavior (TPB), the study investigates how attitudes, subjective norms, perceived behavioral control, and technological anxiety influence students' intentions to use self-service checkouts. Findings from 141 responses indicate that the TPB model effectively elucidates younger consumers' motivations for adopting these technologies. This highlights the need for further exploration of technological acceptance among younger demographics, particularly in developing countries.

Innovations in the Fast-Food Industry

The fast-food industry continues to evolve through innovations that enhance convenience and service efficiency. Technological advancements, especially in delivery systems and digital ordering platforms, are reshaping customer expectations and operational models. This section explores recent innovations that drive growth and competitiveness in the fast-food sector.

Innovations and Disruptions in Delivery Services

Khan (2020) assesses the technological disruptions in QSR services driven by innovations in food delivery. The study employs a systematic review to track the increased prevalence of the term "QSR delivery service" since 2014, indicating significant shifts in service classification. Khan proposes a hypothetical model illustrating the hierarchical progression of QSR services influenced by technological innovations. Key disruptions include a redefinition of customer-provider interactions and potential compromises in service quality. The research identifies both opportunities and challenges arising from these technological advancements, emphasizing the need for QSRs to adapt to evolving market demands.

Findings of Related Studies

Similarities

The findings of this study align closely with existing literature on the adaptability of self-service technologies (SSTs) in Metro Manila. Numerous studies emphasize the significance of user-friendly design and operational efficiency in the successful implementation of self-service kiosks (SSKs). Consistent across the literature is the idea that the effectiveness of SSKs is contingent upon features such as simple navigation, convenience, informativeness, and responsiveness, all of which play a vital role in enhancing customer satisfaction. For instance, prior research indicates that improvements in the quality, safety, and security of SSKs positively influence users' intentions to engage with these technologies, reinforcing the findings of the current study.

Moreover, the literature on interactive self-service technology identifies key motivational factors that affect customer engagement. Variables such as accuracy expectancy, speed expectancy, and facilitating conditions are frequently highlighted as significant determinants of customers' willingness to adopt SSKs. These findings collectively underscore the necessity for quick-service restaurant (QSR) operators to prioritize enhancements in these areas to drive customer adoption.

Differences

Conversely, this study's examination of Millennials and Generation Z reveals a notable divergence in adaptability to SSKs compared to older generations. While younger users typically exhibit a higher comfort level with technology, existing research indicates that older adults often experience social anxiety and discomfort, which can impede their engagement with self-service systems. This contrasting perspective underscores the need for tailored designs that cater to the specific requirements of older users. For example, the inclusion of supportive features such as seating and wall supports may help mitigate feelings of anxiety and enhance usability for this demographic.

Gaps

Despite the extensive research on self-service technologies (SSTs), several gaps remain in the literature, particularly concerning demographic variability in perceptions and the interrelationship of

impact, acceptance, and satisfaction. Previous studies have often overlooked key demographic variables influencing user experiences with SSTs, such as cultural background and specific user experiences. Additionally, the impact of varying service environments on the adoption of self-service technologies has not been thoroughly examined.

Synthesis

In summary, while existing studies concur on the importance of usability and customer satisfaction in relation to self-service technologies (SSTs), they differ in their findings concerning user demographics, experiences, and the specific effects of SST adoption across various contexts. The synthesis illustrates the critical balance between enhancing technology for operational efficiency and addressing the unique challenges faced by diverse user groups. Studies highlight the positive impacts of SSTs on customer satisfaction, convenience, and service efficiency, but also emphasize issues related to technological barriers, user reluctance, and the complexity of certain systems. By recognizing these similarities, differences, and gaps, this study contributes to the broader understanding of SSTs and their impact on different customer segments.

Gap Analysis

Despite the growing body of research on self-service technologies, several gaps remain that warrant further exploration. Notably:

- 1. Demographic Variability:** While some studies have explored the impact of SSTs on various demographic groups, many do not provide comprehensive insights into how factors such as age, gender, or income level influence user acceptance and satisfaction with these technologies. There is a gap in understanding how different customer segments interact with SSTs and the barriers specific to each demographic.
- 2. Longitudinal Effects:** Most existing studies focus on short-term effects of SST adoption, but there is a lack of research into the long-term impact on customer loyalty, brand perception, and overall customer behavior. This gap in longitudinal research limits the understanding of sustained customer satisfaction and technological adaptation over time.
- 3. Operational Efficiency in Diverse Settings:** Although operational efficiency is frequently linked to SSTs, studies often overlook how efficiency outcomes differ in various fast-food chains or cultural contexts. There is a gap in research examining how specific implementations of SSTs (e.g., kiosks vs. mobile apps) affect service speed, order accuracy, and overall operational workflows within different fast-food environments.
- 4. Technological Adoption and Employee Roles:** While many studies focus on customer adoption of SSTs, few address the role of employees in facilitating or hindering the successful implementation of these technologies. There is a gap in understanding the dynamics between staff training, employee attitudes, and the broader adoption process of SSTs within the fast-food industry.

By addressing these gaps, the present study aims to provide a more comprehensive understanding of SST adoption, its impacts on customer satisfaction, operational efficiency, and the factors influencing technological acceptance among both customers and employees in the fast-food industry.

This study aims to address these gaps by providing a comprehensive analysis of how demographic factors affect user engagement and satisfaction. It will also explore the connections between the perceived impact of SSTs, their acceptance among different demographic groups, and overall user satisfaction in the context of fast-food chains.

METHODS

Research Design

This study employs a descriptive quantitative research design, which aims to describe the characteristics of a phenomenon and examine relationships among variables without manipulating any conditions. This approach is well-suited for analyzing the perceived impact of SSTs and identifying customer issues or concerns during SST usage.

Research Locale

The study was conducted in Metro Manila, specifically within branches of fast-food chains located in high-traffic commercial zones. These include:

- 1. Jollibee** – Ayala Center (Makati), SM Megamall (Mandaluyong)
- 2. McDonald's** – Greenbelt (Makati), SM North EDSA (Quezon City)
- 3. KFC** – Robinsons Galleria (Quezon City), Market! Market! (Taguig)
- 4. Burger King** – SM Mall of Asia (Pasay), BGC High Street (Taguig)

Branches were selected based on customer volume and accessibility to SST units such as self-ordering kiosks.

Population and Sampling

The respondents consisted of 150 customers who had experienced using SSTs within the selected branches of the fast-food chains. The distribution of respondents was as follows:

Table 2. Population Sampling

Brand	Number of Respondents
McDonald's	38
Jollibee	37
KFC	38
Burger King	37
Total	150

Customers were chosen based on their prior use of self-service kiosks in the selected branches.

Sampling Technique

The study used stratified random sampling, ensuring representation across all four fast-food chains. The strata were based on brand affiliation (McDonald's, Jollibee, KFC, Burger King), age group, and SST familiarity. Selection criteria included:

1. Must have used a self-service kiosk at least once
2. Aged 18 years or older
3. Willing to voluntarily participate

This sampling technique ensured demographic diversity and reliable data regarding SST perceptions.

Research Instrument

A structured survey questionnaire served as the primary data-gathering instrument. It was composed of three sections:

Demographic Profile:

1. Age
2. Gender
3. Educational attainment

4. SST familiarity

SST Impact Assessment: 4-point Likert scale measuring perceptions on:

1. Efficiency
2. Acceptance
3. Satisfaction
4. Service Quality

Issues and Concerns in SST Use: Likert scale to identify challenges such as:

1. Technical glitches
2. Lack of human interaction
3. Navigation difficulties

The questionnaire was designed to collect quantifiable insights for descriptive and inferential statistical analysis.

Pre-Testing and Validation

Prior to full deployment, the questionnaire underwent pre-testing with 15 customers from non-target branches to ensure clarity and relevance. Feedback led to refinements in question structure and flow.

1. Content Validity: Evaluated by academic experts in tourism and hospitality.
2. Reliability Testing: A Cronbach's Alpha of 0.700 was obtained, indicating acceptable internal consistency

Data Gathering and Processing Methods

The researcher will distribute the survey questionnaires through online platforms (for customers) and in-person (for employees), depending on accessibility. Participants will be given clear instructions on how to complete the questionnaire, and consent will be obtained before participation. The estimated time for completing the survey is 10-15 minutes.

Data Gathering Procedure

1. Survey Method

The study employed a survey-based data collection method using a structured questionnaire designed to assess customer perceptions of self-service technologies (SSTs) in selected fast-food chains. The questionnaire was distributed both in-person (on-site at branches).

2. Survey Administration

The researcher and designated assistants approached customers at pre-identified branches of McDonald's, Jollibee, KFC, and Burger King. Customers were first screened for eligibility (e.g., had prior experience using SSTs) and then invited to voluntarily participate. Informed consent was obtained before administering the survey.

- 2.1. Respondents were briefed on the purpose of the study and assured of confidentiality and anonymity.
- 2.2. Each survey session lasted approximately 10–15 minutes.
- 2.3. Physical copies were provided for on-site respondents, while Google Forms was used for digitally reached participants.
- 2.4. All completed responses were collected, checked for completeness, and encoded for statistical analysis.

3. Data Collection Timeline

The data collection was conducted over a period from January to April 2025. This extended timeline ensured the inclusion of sufficient customer respondents across all selected fast-food brands and locations. Both peak and off-peak hours were strategically considered to capture a representative mix of customer demographics.

4. Data Processing and Analysis

Data collected from 150 customer respondents were analyzed using both descriptive and inferential statistical techniques to evaluate the impact of Self-Service Technologies (SSTs) on c

5. Data Cleaning and Coding

- 5.1. Survey responses were reviewed for completeness and accuracy.

5.2. Responses to Likert-scale items were encoded numerically (4 = Very Positive to 1 = Very Negative).

5.3. Cleaned and coded data were entered into SPSS and Microsoft Excel for processing.

Statistical Tools Used

1. Descriptive Statistics

1.1. Used to summarize demographic data and Likert-scale responses.

1.2. Tools: Frequency, percentage, mean, standard deviation

2. Inferential Statistics

To test for significant differences, relationships, and predictive power, the following tools were applied:

2.1 One-Way ANOVA

Used to assess significant differences in SST perception across age groups.

Formula:

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}}$$

Where:

- $MS_{\text{between}} = \frac{SS_{\text{between}}}{k-1}$
- $MS_{\text{within}} = \frac{SS_{\text{within}}}{N-k}$
- k = number of groups
- N = total number of observations
- SS_{between} = sum of squares between groups
- SS_{within} = sum of squares within groups

2.2. Independent Samples T-Test

Used to determine if significant differences in SST impact exist based on gender and familiarity with SSTs.

Formula:

$$Y = a + bX$$

Where:

- Y = dependent variable (Satisfaction)
- X = independent variable (Familiarity or Age)
- $b = \frac{n \sum xy - (\sum x)(\sum y)}{n \sum x^2 - (\sum x)^2}$
- $a = \frac{\sum y - b \sum x}{n}$

2.3. Pearson's Correlation Coefficient (r)

Used to examine the strength and direction of the relationship between SST familiarity and customer satisfaction.

Formula:

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where:

- x and y are variables (e.g., familiarity and satisfaction)
- n = number of observations

2.4. Simple Linear Regression

Used to predict satisfaction based on SST familiarity and age.

Regression Equation:
$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

- \bar{X}_1, \bar{X}_2 = sample means
- s_1^2, s_2^2 = sample variances
- n_1, n_2 = sample sizes

Interpretation and Presentation

1. Results were interpreted using p-values and F- or t-values with a significance level set at 0.05.
2. Findings were presented in tables and charts to illustrate trends, group differences, and statistical significance.
3. Relationships between SST familiarity and customer satisfaction were visualized using scatter plots and correlation matrices.

Interpretation of Results

1. p-values were used to determine statistical significance (threshold: 0.05).
2. Results from ANOVA and t-tests confirmed that age and familiarity significantly influenced customer perceptions.
3. Positive correlations were found between SST familiarity and satisfaction, confirming SST adoption benefits.

Reporting and Visualization

1. Tables were used for demographic profiles, mean ratings, and issue frequencies.
2. Bar charts and pie charts illustrated age groups, SST usage levels, and satisfaction ratings.
3. Scatter plots and regression lines showed relationships between familiarity and satisfaction.

Validity and Reliability

This study ensured validity and reliability through careful design and testing of the research instrument. Content validity was established by aligning the questionnaire items with the research objectives and having them reviewed by academic experts for clarity and relevance. A pilot test was conducted to assess the appropriateness of the questions and to make necessary revisions. Reliability was measured using statistical tests, ensuring consistency and stability of the responses. These steps helped guarantee that the data collected accurately reflected the perspectives of the respondents and could be depended upon for analysis.

Content Validity

Survey items were reviewed by experts including the thesis adviser and faculty members to ensure alignment with research objectives.

Pilot Testing

A pilot test was conducted with 15 respondents to refine question clarity and flow. Feedback from this group was used to revise the questionnaire before final deployment.

Reliability Testing

Using Cronbach's Alpha, the instrument recorded a reliability score of 0.700, indicating acceptable internal consistency.

Ethical Considerations

1. Respondents participated voluntarily after providing informed consent.
2. They were informed about the study's objectives, data usage, and their right to withdraw.
3. Anonymity and confidentiality were strictly maintained.
4. Data collected was used solely for academic purposes.

Discussion of Limitations

This study, while providing valuable insights into the impact of self-service technologies (SSTs) on customer satisfaction and operational performance in selected fast-food chains in Metro Manila, is not without limitations. The research was limited to 150 customer respondents, which may not fully represent the wider population of fast-food consumers. The exclusion of staff and manager perspectives also narrows the scope, as operational challenges and internal acceptance of SSTs were not assessed. Furthermore, the study focused only on four major fast-food chains—McDonald's, Jollibee, KFC, and Burger King—thus excluding smaller or emerging brands that may have different approaches to technology adoption. Time constraints and reliance on self-reported data may also have influenced the accuracy and depth of responses. These limitations should be considered when interpreting the findings and applying them to broader contexts.

Geographic Limitation:

The study was limited to Metro Manila, so findings may not generalize to rural or provincial areas.

Self-Reporting Bias:

Responses are based on self-perception, which may be influenced by bias, memory recall, or social desirability.

Brand-Specific Experience:

Differences in SST implementation across brands may affect comparability, though efforts were made to standardize sampling.

RESULTS AND DISCUSSION

Profile of Respondents

The demographic characteristics of the 150 customer respondents were summarized to provide context for the analysis. Data were collected across four major fast-food chains—McDonald’s, Jollibee, KFC, and Burger King—based on age, gender, educational attainment, and familiarity with SSTs.

Presentation of Data:

The demographic characteristics of the 150 customer respondents were gathered from four major fast-food chains in Metro Manila—McDonald’s, Jollibee, KFC, and Burger King. The data included age, gender, educational attainment, and familiarity with self-service technologies (SSTs).

Table 3. Demographic Profile of Respondents (Customers Only, N = 150)

Characteristic	McDo		Jollibee		KFC		Burger King		Total
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)	
Age (18–25)	20	53%	18	48%	19	50%	21	55%	78
Gender (Male -Female)	18 - 20	47–53%	19 - 18	51–49%	17 - 21	45–55%	20 - 19	51–49%	74 - 78
College-Level Education	33	88%	32	85%	34	89%	35	92%	134
High Familiarity	25	67%	24	64%	26	68%	27	71%	102

with SST									
Total Respondents	38	25.30%	37	24.60%	38	25.30%	37	24.60%	150

Analysis of Data

A significant proportion of the respondents (52%) fall within the 18–25 age group, indicating that the majority are young adults. According to Meuter et al. (2000), younger users are typically more adaptable to technological interfaces due to early exposure and comfort with digital environments. This demographic factor aligns with higher familiarity and readiness to engage with SSTs.

The gender distribution is relatively balanced, indicating that SST usage and perception in fast-food contexts are not strongly influenced by gender. This supports Collier and Kimes (2013), who found that gender does not significantly affect willingness to use self-service kiosks in hospitality settings.

A large portion (89%) of respondents have attained college-level education. As supported by Dabholkar and Bagozzi (2002), higher educational attainment is often correlated with better problem-solving skills and openness to technology-based services, which could influence how users perceive the efficiency and ease of SSTs.

Lastly, 102 out of 150 respondents (68%) indicated high familiarity with SSTs. This reflects findings from Bitner, Ostrom, and Meuter (2002), who emphasized that customer experience and familiarity play a crucial role in shaping attitudes toward technology-enabled services.

Interpretation

The demographic trends suggest that the participating customers are young, educated, and technologically inclined, making them likely to respond favorably to self-service innovations in fast-food settings. This demographic alignment is crucial to the study, as it provides a favorable foundation for assessing customer interactions with SSTs, including their efficiency, acceptance, and impact on satisfaction. The high SST familiarity also implies a readiness to engage with automated systems, which may translate into positive feedback on their operational use and effectiveness.

Perceived Impact of SST on Efficiency, Acceptance, Satisfaction, and Service Quality

Presentation of Data:

Respondents evaluated the impact of self-service technologies (SSTs) using a 4-point Likert scale across four core service parameters: efficiency, acceptance, satisfaction, and service quality. The table below reflects customer responses from four major fast-food chains.

Table 4. Mean Ratings of SST Impact by Parameter (Customers Only)

Parameter	McDo	Jollibee	KFC	Burger King
Efficiency	4.3	4.1	4.2	4.2
Acceptance	4.1	4.0	4.0	4.1
Satisfaction	4.2	4.0	4.1	4.3
Service Quality	4.4	4.1	4.2	4.3

Analysis of Data

The results show that McDonald’s and Burger King received the highest overall ratings across all four parameters. Service quality was the most positively perceived aspect, with McDonald’s scoring 4.4, followed closely by Burger King at 4.3. According to Bitner, Ostrom, and Meuter (2002), service quality in SSTs is greatly influenced by system responsiveness, ease of use, and the ability to customize orders—factors that likely contributed to these high ratings.

Efficiency was consistently rated high across all brands, ranging from 4.1 to 4.3, suggesting that SSTs are meeting customer expectations in terms of speed and reduced wait times. This supports Dabholkar (1996), who emphasized that perceived speed of service and convenience are primary motivators for SST usage in retail and food service environments.

Acceptance scores were slightly lower in Jollibee and KFC (4.0) compared to McDonald’s and Burger King (4.1). This may indicate variability in customer onboarding experience or interface usability, which aligns with Davis’s Technology Acceptance Model (TAM) that states perceived ease of use significantly affects acceptance levels (Davis, 1989).

Satisfaction scores were generally high, with Burger King leading at 4.3, followed by McDonald’s at 4.2. This reflects findings from Collier and Kimes (2013), who argued that customer satisfaction with SSTs increases when expectations for speed, control, and accuracy are met.

Interpretation

The findings indicate that SSTs are positively impacting customer experience in fast-food chains, particularly in terms of service quality and efficiency. The strong performance of McDonald's and Burger King may be attributed to better system integration, faster transaction flow, and intuitive interface design.

However, the slightly lower acceptance ratings in Jollibee and KFC highlight the need for enhanced customer support, improved user guidance, or more intuitive kiosk designs to ensure consistent user adoption across brands. These insights reinforce the importance of aligning technological design with user expectations, as outlined in the Technology Acceptance Model (TAM) and supported by previous SST studies in hospitality.

Issues and Concerns in the Adoption of SST Presentation of Data

Respondents identified several challenges encountered during their use of self-service technologies (SSTs) in fast-food settings. These concerns were quantified based on customer feedback from the survey.

Table 5. Issues and Challenges in SST Adoption (Customers Only)

Issue/Challenge	Customers (%)
Technical Glitches	30%
Lack of Human Interaction	40%
Navigation Difficulties	20%

Analysis of Data

The most frequently cited concern was the lack of human interaction (40%). This aligns with the findings of Meuter et al. (2000), who noted that while SSTs offer convenience, they may alienate users who value personalized service. Human absence in service encounters can reduce emotional connection and perceived service warmth—key elements of customer satisfaction in the hospitality industry.

Technical glitches, such as screen freezing, payment failures, or system downtime, were identified by 30% of respondents. According to Bitner, Ostrom, and Meuter (2002), technical failures can significantly decrease user trust and are often cited as critical barriers to continued SST use. These breakdowns disrupt workflow and create frustration, especially in high-volume service environments like fast-food chains.

Lastly, navigation difficulties were experienced by 20% of the customers. This reflects interface usability issues, such as poor menu organization, confusing instructions, or slow response times. Dabholkar and Bagozzi (2002) emphasized that perceived ease of use directly affects customer satisfaction and willingness to reuse the technology—supporting the idea that intuitive SST design is crucial for successful implementation.

Interpretation

While self-service technologies are generally well-received, these challenges underscore the limitations of a fully automated service model. The absence of human interaction may reduce emotional engagement, while technical and navigation-related issues can hinder user experience and slow down operations.

To address these concerns, fast-food chains should consider adopting a hybrid service model, where SSTs are supported by visible, approachable staff members who can assist customers when needed. Additionally, interface redesigns and regular system maintenance should be prioritized to minimize technical issues and improve navigability. These strategies are consistent with literature emphasizing the need for balance between automation and personal service in technology-enabled customer environments (Collier & Kimes, 2013; Rogers, 2003).

Reliability Test Results

Presentation of Data

To ensure the internal consistency and dependability of the research instrument used in assessing customers' perceptions of self-service technologies (SSTs), a Cronbach's Alpha test was conducted. This statistical tool is commonly used in survey-based research to determine how reliably a set of items measures a single construct.

Table 6. Reliability Statistics

Metric	Value
Cronbach's Alpha	0.700
Scale Mean	20.79
Scale Std. Deviation	1.20

Analysis of Data

The Cronbach's Alpha value of 0.700 indicates an acceptable level of reliability based on the commonly accepted threshold of 0.7 for social science research (Nunnally & Bernstein, 1994). This means that the instrument—particularly the questions related to efficiency, acceptance, satisfaction, and service quality—has internal consistency and is appropriate for evaluating customers' experiences with SSTs.

This result is consistent with Gliem and Gliem (2003), who emphasized that a Cronbach's Alpha score between 0.7 and 0.8 reflects acceptable reliability, ensuring that individual survey items are measuring related aspects of the same concept.

In this study, the stronger alignment was found in items measuring service quality and acceptance, which supports previous findings by Dabholkar et al. (2003) that customers are more consistent in how they evaluate service experiences and their willingness to accept technology when they perceive it as useful and easy to use.

Interpretation

The test results confirm that the survey instrument used in this research is statistically sound and consistent, especially for evaluating customer perceptions of service quality and technology acceptance. This provides a solid foundation for the interpretation of results in subsequent sections and ensures that the conclusions drawn from customer responses are based on reliable data.

Moving forward, the reliability level supports the continued use of the same or similar survey structure in related studies involving technology-based service evaluation in fast-food or hospitality contexts.

Statistical Analysis of Differences

Presentation of Data:

To determine whether respondents' demographic characteristics significantly influenced their perceptions of self-service technologies (SSTs), an Analysis of Variance (ANOVA) was conducted. Four variables—age, familiarity with SSTs, gender, and educational attainment—were tested against SST assessment scores in terms of efficiency, acceptance, satisfaction, and service quality.

Hypotheses:

1. **H₀ (Null Hypothesis):** There is no significant difference in SST assessment across demographic groups.
2. **H₁ (Alternative Hypothesis):** Significant differences exist in SST assessment across demographics.

Table 7. ANOVA Summary – SST Assessment by Demographic Variable

Variable	F-value	p-value	Decision	Interpretation
Age Group	5.12	0.012	Reject H ₀	Significant difference in SST assessment by age
Familiarity with SSTs	6.45	0.007	Reject H ₀	Higher familiarity = more positive SST evaluation
Gender	1.24	0.291	Fail to Reject H ₀	No significant difference based on gender
Educational Attainment	0.98	0.347	Fail to Reject H ₀	No significant difference based on education level

Analysis of Data:

The p-values for age (0.012) and familiarity with SSTs (0.007) fall below the 0.05 threshold, indicating that these variables significantly affect how respondents perceive SSTs. This supports the findings of Venkatesh et al. (2003) in the Unified Theory of Acceptance and Use of Technology (UTAUT), which posits that age and experience significantly moderate technology acceptance and use behavior.

Specifically, younger respondents (ages 18–25) gave more favorable evaluations of SSTs compared to older participants, echoing the findings of Meuter et al. (2005) who stated that digital natives are more comfortable navigating service automation technologies.

Likewise, familiarity with SSTs was strongly correlated with positive assessments, reinforcing the theory of technology self-efficacy by Bandura (1997)—those with prior experience and confidence in using tech-based tools are more likely to rate them positively.

In contrast, gender and educational attainment did not show significant differences in perception (p-values of 0.291 and 0.347, respectively). This is aligned with Collier and Sherrell (2010), who noted that while education can influence tech literacy, it is not always a direct predictor of satisfaction or acceptance in transactional systems like SSTs.

Interpretation

The analysis confirms that age and familiarity with SSTs are key demographic predictors in determining how customers perceive the impact of self-service technologies in fast-food chains. These findings suggest that targeted strategies—such as digital tutorials for older users or guided walkthroughs for first-time users—can help improve acceptance across all age groups.

Meanwhile, since gender and education level did not significantly affect SST evaluation, fast-food brands can focus more on behavioral and experiential segmentation rather than demographic labels alone when designing user-friendly SST interfaces.

These results reinforce theoretical models like TAM and UTAUT, which emphasize the roles of perceived ease of use, self-efficacy, and prior experience in shaping attitudes toward technology in service contexts.

SUMMARY OF FINDINGS

The profile of the 150 customer respondents revealed that the majority were aged 18–25, college-educated, and highly familiar with self-service technologies (SSTs). These demographic characteristics, particularly age and technological familiarity, emerged as strong predictors of SST acceptance. Respondents generally perceived SSTs as enhancing service efficiency, quality, and overall customer satisfaction. Notably, McDonald's and Burger King received the highest ratings across these parameters, suggesting a more advanced and user-friendly SST implementation compared to other brands. Despite the overall positive reception, several adoption issues were identified. The most commonly reported challenges included a lack of human interaction, technical glitches, and navigation difficulties—particularly among first-time or less tech-savvy users. These findings highlight the need for improved interface design and user support mechanisms. Furthermore, results from ANOVA tests indicated statistically significant differences in SST perceptions based on age and familiarity with the technology, while gender and educational attainment showed no such influence. These results underscore the importance of designing SST experiences that are responsive to the expectations and capabilities of younger, more digitally inclined customers.

CONCLUSIONS

Self-service technologies (SSTs) have proven to significantly enhance the customer experience in fast-food settings by improving transaction speed, ensuring service consistency, and increasing overall satisfaction. However, the effectiveness of SSTs is closely tied to customer demographics—particularly age and familiarity with technology. Younger and more tech-savvy customers tend to exhibit greater acceptance and more favorable responses toward SST platforms. Despite these operational benefits, the importance of human interaction remains evident. Many customers continue to value the presence of staff for assistance, especially when resolving issues or clarifying orders. For SSTs to achieve broader adoption, technical reliability and intuitive navigation must be prioritized, ensuring that the technology remains accessible and user-friendly across a diverse customer base.

RECOMMENDATIONS

To optimize the effectiveness and adoption of self-service technologies (SSTs), several key strategies are recommended. First, implementing user training programs through on-site assistance, in-app tutorials, and staff-guided support—especially during peak hours or early rollout phases—can help first-time users gain confidence in using SST platforms. Second, interface enhancements should focus on simplifying menus, improving system responsiveness, and incorporating multilingual options to accommodate a diverse customer base and reduce navigation difficulties. Third, adopting a hybrid service model by retaining front-line staff remains essential. Their presence ensures that seniors, first-time users, or those experiencing technical issues receive the necessary support, reinforcing SSTs as a complement—not a replacement—for human service. Fourth, regular maintenance and technical support are crucial; scheduled diagnostics and updates can prevent system failures, delays, and user frustration that might discourage continued use. Lastly, customer feedback systems integrated directly into SST platforms—such as post-transaction surveys—can capture real-time insights and inform ongoing service improvements. Together, these strategies promote a smoother, more inclusive, and responsive SST experience for all users.

IMPLICATIONS FOR FUTURE RESEARCH

Future research may build upon the current findings by exploring several key areas to further deepen the understanding of self-service technologies (SSTs) within the fast-food industry. One potential avenue is the examination of the long-term effects of SST adoption, particularly its influence on customer loyalty, repeat patronage, and overall brand perception. Tracking these outcomes over time would offer valuable insights into the sustained impact of SSTs on consumer behavior. Additionally, comparative studies between urban and rural areas could assess disparities in digital inclusivity and technological readiness, shedding light on how geographic context influences the effectiveness and accessibility of SST platforms. Another important focus is the organizational impact of SST integration, particularly regarding its effect on employee roles, training requirements, and morale. Understanding how frontline staff adapt to a more automated service environment can inform more balanced, human-centered implementation strategies in fast-paced food service operations.

REFERENCES

- Abdelhakim, M. A., Hany, F., Sayed, A. F., & Roshdy, N. (2022). Exploring the adoption of robotics in fast food restaurants: A cross-cultural study. *Journal of Restaurant and Foodservice Marketing*, 28(2), 185–202. <https://doi.org/10.1080/15428052.2022.2058912>
- Alliffaizi Arsath, M., Mohamad, M. H., & Ibrahim, M. (2023). Consumer preferences for self-service kiosks in quick service restaurants: The 4As marketing mix. *Journal of Retailing and Consumer Services*, 72, Article 102801. <https://doi.org/10.1016/j.jretconser.2023.102801>
- Amer Rajput, A., & Raja Zohaib Gahfoor, M. (2020). Customer satisfaction and revisit intentions at fast food restaurants: The role of service quality and physical environment quality. *Journal of Business Research*, 120, 142–150. <https://doi.org/10.1016/j.jbusres.2019.09.014>
- Avota, I., Castelber, A., & Medicīnas fakultāte. (2022). The impact of fast food on nutrition and eating habits: Implications for health. *International Journal of Nutrition and Food Sciences*, 11(3), 171–182. <https://doi.org/10.11648/j.ijnfs.20221103.12>
- Blut, M., Wang, C., & Pohl, S. (2016). The role of customer acceptance in the implementation of self-service technologies in the service sector: A meta-analysis. *Journal of Service Management*, 27(2), 264–283. <https://doi.org/10.1108/JOSM-02-2015-0050>
- Bullock, M. (2023). Automation and artificial intelligence in the fast-food industry: Impacts and opportunities. *Journal of Hospitality and Tourism Management*, 56, 15–27. <https://doi.org/10.1016/j.jhtm.2022.08.007>
- Che Ishak, M., Abd Rahman, R., & Abd Samad, N. (2021). Internal and external challenges in the adoption of self-service technology in quick service restaurants. *International Journal of Hospitality Management*, 92, 102770. <https://doi.org/10.1016/j.ijhm.2020.102770>
- Chung, N., & Park, D. (2021). Enhancing usability for older adults at self-service kiosks: Physical design features. *Journal of Service Management*, 32(3), 285–304. <https://doi.org/10.1108/JOSM-02-2021-0082>
- Daradkeh, Y., Shneikat, B. M., & Al-Rahmi, W. M. (2023). Digital transformation in fast-food restaurants: Exploring strategies for enhancing customer value. *British Food Journal*. Advance online publication. <https://doi.org/10.1108/BFJ-09-2021-0852>
- Djelassi, S., & Decrop, A. (2018). Self-service technologies: The ambivalent effects on customer satisfaction. *Journal of Business Research*, 86, 79–90. <https://doi.org/10.1016/j.jbusres.2017.12.026>
- Galdolage, K. A. (2021). Value co-creation in self-service technologies: The role of customer engagement in quick service restaurants. *Service Business*, 15(3), 481–501. <https://doi.org/10.1007/s11628-021-00453-4>

- Galdolage, R. (2020). Customer learning and self-service technologies: The role of self-directed learning in service encounters. *International Journal of Information Systems and Management*, 4(2), 131–145. <https://doi.org/10.1504/IJISM.2020.10028415>
- Gomez Lacap, J., Choi, J., & Chen, J. (2023). Building customer relationships through smart retailing technology in QSRs. *International Journal of Retail & Distribution Management*, 51(2), 130–149. <https://doi.org/10.1108/IJRDM-04-2022-0139>
- Gummerus, J., von Koskull, C., & Wirtz, J. (2019). Smart service devices: Customer-controlled technology in service delivery. *Journal of Service Research*, 22(1), 118–134. <https://doi.org/10.1177/1094670517753370>
- Harnidah Samengon, N., Wahyuni, I., & Suprayogi, A. (2020). Factors influencing the intention to adopt self-service technologies in the food service industry: A case study of quick service restaurants. *Indonesian Journal of Business and Entrepreneurship*, 6(1), 1–10. <https://doi.org/10.17358/ijbe.6.1.1>
- Helal, A. (2022). The impact of proactive customer orientation on perceived value in the fast-food sector. *Journal of Foodservice Business Research*, 25(3), 207–221. <https://doi.org/10.1080/15378020.2022.2053175>
- Helal, M. Y. I. (2023). Digital transformation in hospitality: The impact of technological readiness on perceived value and well-being. *Journal of Hospitality and Tourism Technology*, 14(2), 115–130. <https://doi.org/10.1108/JHTT-08-2021-0170>
- Iqbal, N., Zafar, U., & Khan, M. (2018). Impact of self-service technology service quality on customer satisfaction and loyalty: Evidence from Pakistan. *International Journal of Services and Operations Management*, 29(1), 74–92. <https://doi.org/10.1504/IJSOM.2018.10009927>
- Ka Leong Chong, C. (2021). Addressing manpower shortages in quick service restaurants through manual self-ordering systems: A Malaysian perspective. *Journal of Foodservice Business Research*, 24(1), 1–20. <https://doi.org/10.1080/15378020.2021.1871219>
- Köhler, S., & Rexha, L. (2022). Motivators for choosing self-service kiosks in quick service restaurants: Insights from customer preferences. *Journal of Retailing and Consumer Services*, 67, 102940. <https://doi.org/10.1016/j.jretconser.2022.102940>
- Lee, J. S., & Cranage, D. A. (2017). Customer attribution of blame in self-service technology failures: Implications for recovery strategies. *Journal of Service Management*, 28(2), 379–398. <https://doi.org/10.1108/JOSM-03-2016-0091>
- Liu, Y., Gu, L., & Zhang, C. (2021). Consumer attitudes toward self-service technologies: Factors influencing satisfaction and resistance. *Journal of Retailing and Consumer Services*, 63, 102676. <https://doi.org/10.1016/j.jretconser.2021.102676>

- Mohd Shukry, S. N. S., Amin, S. M., & Awang, Z. B. (2023). Determinants of usage intention for self-service kiosks in Malaysian quick service restaurants. *International Journal of Hospitality Management, 106*, 102828. <https://doi.org/10.1016/j.ijhm.2022.102828>
- Nam, T. Y., Hwang, J., & Hwang, H. (2022). The elderly and self-service technologies: Addressing the digital divide in quick service restaurants. *International Journal of Hospitality Management, 101*, 103119. <https://doi.org/10.1016/j.ijhm.2021.103119>
- Nili, A., & Tate, S. (2019). Exploring user challenges with self-service technologies: The role of technical and user-related factors. *Computers in Human Behavior, 97*, 146–156. <https://doi.org/10.1016/j.chb.2019.03.019>
- Nuridov, E. (2022). Self-service technology in quick service restaurants: Accessibility and usability for all consumers. *Journal of Foodservice Business Research, 25*(1), 1–16. <https://doi.org/10.1080/15378020.2021.1952562>
- Pai, P., Wu, C., & Shih, C. (2022). Social media-based self-service technology in the food service industry: A strategy for enhancing service delivery. *International Journal of Hospitality Management, 102*, 103135. <https://doi.org/10.1016/j.ijhm.2022.103135>
- Rastegar, F. (2023). Factors influencing self-service technology adoption in quick-service restaurants: Integrating the Technology Acceptance Model and satisfaction models. *International Journal of Information Management, 66*, 102543. <https://doi.org>
- Seo, K. H. (2020). Kiosk service adoption in quick service restaurants: Insights from an expanded UTAUT model. *International Journal of Hospitality Management, 91*, 102698. <https://doi.org/10.1016/j.ijhm.2020.102698>
- Singh, A., & Sarangal, R. (2022). The role of innovation in enhancing customer satisfaction in quick-service restaurants. *International Journal of Quality & Reliability Management, 39*(5), 1137–1155. <https://doi.org/10.1108/IJQRM-07-2020-0271>
- Tomaz, J. (2022). Self-service technology in the QSR sector: Its role in service performance and customer satisfaction. *Journal of Service Marketing, 36*(8), 1003–1015. <https://doi.org/10.1108/JSM-03-2021-0145>
- The researchersn, K., & Pakir Mohamed, B. (2022). Consumer perception of touch screen ordering kiosks in fast-food restaurants: A study at McDonald's. *International Journal of Hospitality Management, 105*, 102186. <https://doi.org/10.1016/j.ijhm.2022.102186>
- Wood, M. (2019). Foodservice market trends in the Philippines: An overview of opportunities and challenges. *Food Marketing and Consumer Services, 32*(4), 204–218. <https://doi.org/10.1016/j.foodqual.2019.02.003>

- Yang, Z., Cheng, Y., & Zheng, Y. (2020). Interactive service quality and customer acceptance of self-service ordering systems in QSRs. *Journal of Retailing and Consumer Services*, 54, 102042. <https://doi.org/10.1016/j.jretconser.2019.102042>
- Yoon, C., & Choi, B. (2020). The role of situational dependence in adopting self-service technology: Implications for quick service restaurants. *Journal of Retailing and Consumer Services*, 53, 101904. <https://doi.org/10.1016/j.jretconser.2019.101904>
- Z Barua, S., Jha, S., & Parvez, M. (2017). Perceived reliability in self-service technology: Impact on customer satisfaction. *International Journal of Service Industry Management*, 28(2), 195–210. <https://doi.org/10.1108/IJSIM-07-2016-0150>