

# **Customer's Perceived Satisfaction in Emerging Self Service Kiosk at Fast Food Chain in the Philippines: A Value Based Technology Acceptance Model Approach**

**Mark Jherald L. Acilo, Jacklyn Hazel V. Ballais, Janelle Anne C. Estera, Andre Brian S. Gellido, Bryan Tyrus R. Serfa Juan, Lyka Villegas, Daniel Johns Tagibao, Valerie Peralta, Arriane A. Palisoc and Maricar M. Navarro**

Industrial Engineering Program College of Engineering and Architecture Technological Institute of the Philippine Quezon City, Philippines

[gmjlacilo@tip.edu.ph](mailto:gmjlacilo@tip.edu.ph), [qjhvballais@tip.edu.ph](mailto:qjhvballais@tip.edu.ph), [qjacestera@tip.edu.ph](mailto:qjacestera@tip.edu.ph), [gabsgellido@tip.edu.ph](mailto:gabsgellido@tip.edu.ph),  
[qbtrserfajuan@tip.edu.ph](mailto:qbtrserfajuan@tip.edu.ph), [qlvillegas1@tip.edu.ph](mailto:qlvillegas1@tip.edu.ph), [qdjntagibao@tip.edu.ph](mailto:qdjntagibao@tip.edu.ph),  
[vperalta.ie@tip.edu.ph](mailto:vperalta.ie@tip.edu.ph), [arriane.palisoc@tip.edu.ph](mailto:arriane.palisoc@tip.edu.ph) [mnavarro.ie@tip.edu.ph](mailto:mnavarro.ie@tip.edu.ph)

## **Abstract**

Fast food industries in the Philippines are engaging in a significant transformation as it increasingly embraces self-service and modernized service for their customers. These industries are introducing technological advancements like self-service kiosks in their service. This study aims to assess the factors that contribute to achieving perceived satisfaction of the customers who utilized self-service kiosks in the fast-food chains in NCR, Philippines. Additionally, it aims to utilize the Value Based Technology Acceptance Model (VBTAM) with added variables such as Customer's Individual Characteristics (CIC), Navigability (N), and Time Saving (TS). 386 customers in fast food responded in the online survey which consisted of 63 questions. Structural equation modeling (SEM) shows that out of 27 hypotheses, 17 are supported, 10 are not significant, and one correlation is added which is Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). The results show that CIC positively influences Functional Value (FV), Emotional Value (EV), and Time Value (TV), TS, and N. FV, and EV, positively influences PEOU while TV positively affects both PEOU and PU. PU and PEOU positively affect each other. PU and PEOU positively affects Behavioral Intention (BI) which subsequently led to Perceived Satisfaction (PS). N positively affects TS, vice-versa which leads to PS. Lastly, this study is the first one who utilized VBTAM in analyzing customer's perceived satisfaction in utilizing self-service kiosks in the Philippines. For future works, future studies can do comparative analysis to Traditional Ordering Methods and Longitudinal Study on Customer Satisfaction using other models like TAM, UTAUT, etc.

## **Keywords**

Value Based Technology Acceptance Model, Fast Food, Behavioral Intention, Perceived Ease of Use, Perceived Usefulness.

## **1. Introduction**

The fast food industry has become the go-to option for many people, as it serves food quickly and efficiently. In recent years, self-service kiosks have revolutionized fast food by automating order placement and payments. These kiosks allow customers to customize their meals and complete transactions independently, reducing customer wait times and errors while improving operational efficiency (Mahmood 2024). Automated self-service kiosks in fast food chains indicate that fast food companies embrace customer service technology (Restegar et al. 2021). This implementation was widespread during the COVID-19 pandemic when restaurants

wanted to limit contact and optimize the delivery of services. The fast food industry is gradually adopting self-service technologies, which enable customers to serve themselves with little to no help from the service provider.

Given that the fast food industry is gradually adopting self-service technologies, it is essential to understand both the effect of self-service technologies on the operation of the fast food industry and the perceived attitudes of the customer. However, the success of self-service kiosks depends on customer acceptance and use satisfaction. Filipino customers offer a unique perspective due to cultural nuances and expectations in dining experiences. This study explores how self-service kiosks impact customer satisfaction in the fast food chain in the Philippines.

### **1.1 Objectives**

The main objective of this study is to investigate the impact of emerging self-service kiosks in fast food chain industries in the National Capital Region, Philippines. In addition, this study also aims to utilize the Value-Based Technology Acceptance Model (VB-TAM) with added variables such as Customer's Individual Characteristics, Navigability, and Time Saving to achieve the perceived satisfaction of the customers who utilized the self-service kiosk. Lastly, is to recommend an improved model for VB-TAM, which is suitable for identifying the perceived satisfaction of the customers in using self-service kiosks.

## **2. Literature Review**

Fast food chains worldwide have started using self-ordering kiosks in recent years. Independent eateries' perspectives on self-ordering kiosks have drastically shifted due to the pandemic. Once considered expensive and impersonal, this technology is now considered a convenient choice for patrons and a cost-effective alternative for eateries. According to El-Said and Tall (2019), the restaurant and fast food industry is becoming increasingly competitive. Therefore, the restaurant and fast food businesses that employ current technology the best to meet the needs of their customers will be the ones that stand a chance of winning. According to the authors' logistic regression analysis, Kokkinou and Cranage (2015) state that when the wait time for a service agent increases, customers are more inclined to adapt to self-service technologies. Technology anxiety, the need for engagement, perceived utility, and expected self-service technology quality all impact this effect. Thus, this shows how impactful self-service kiosks are to customers or consumers in terms of service.

Self-service kiosks increase the quality of service in fast-food restaurants because they make a more customized ordering experience possible. As they explore the menu leisurely, customers may come across items and pairings they might not have noticed when placing standard counter orders. Because they are less under pressure from a line behind them, shoppers are more likely to test new products or add extras, which frequently results in more expenditure. Fast food businesses can benefit from self-service kiosks in ways beyond merely increased operational efficiency. In response to the growing demands of customers for efficiency, convenience, and personalization, restaurants need to innovate and adapt. After seeing this necessity, fast food chains have adopted technology to improve their offerings and raise the dining standard. Using self-service kiosks in fast food chains is a big step toward transforming how consumers engage with the company and place orders. The fast food industry in the Philippines is adopting self-service kiosks, where it faced a significant change. However, there is limited research on how these self-service Kiosks influence the customer's perceived satisfaction. Further studies focus on operational efficiency, but only some examine customer perceptions, particularly in the context of emerging AI-driven technologies in the fast food industry. This study addresses these gaps by investigating the factors affecting customer perceived satisfaction with self-service Kiosks in fast food chains within the National Capital Region.

## **3. Methodology**

The study used a mixed-methods methodology to examine the level of customer satisfaction with the self-service kiosks inside fast-food restaurants. This methodology integrates qualitative and quantitative techniques to gather numerical data and provide insight into customers' experiences. The study utilized random sampling as the sampling technique. Random sampling is one of the important techniques in research that seeks to use a random selection to choose some elements in a population.

The study's respondents were from different age groups from the National Capital Region. The total population of the National Capital Region is 13,484,462 as of May 01, 2020; moreover, using the Raosoft sample size

calculator with a 95% confidence level, an alpha or margin of error with 0.05, and a response distribution of 50%, which resulted in a sample size of at least 385. Raosoft is a software tool created to calculate sample sizes and determine the responses needed in a study. For the processing of data, the study used Statistical Package for the Social Sciences (SPSS), specifically for reliability testing and validation, and also used another tool, Analysis of Movement Structure (AMOS), for structural equation modeling, which allows researchers to analyze complex relationships between observed and latent variables, making it particularly valuable for studies that require an understanding of underlying constructs (Beran and Violato 2024).

### 3.1 Data Collection

The study will focus on the different branches of specific fast-food restaurants in the National Capital Region (NCR). The target respondents in this study are customers who walk in to order five (5) times and above at fast food restaurants and are 20 years old and above. The participation of the customers in answering the questionnaire is essential for the study to be successful as their insights would provide different fast food chains with efficiency and effectiveness in their services. This study utilizes Google Forms to disseminate the questionnaire to a wide range of participants and to gather their perspectives regarding the perceived satisfaction in emerging self-service kiosks. The data collected is analyzed through statistical techniques to identify the impact of emerging self-service kiosks in fast-food chains around NCR. The study gathered 386 responses through online and physical surveys. Lastly, this study utilized structured questionnaires to determine the relationship between these variables. Path analysis and confirmatory factor analysis were done to enhance the model.

### 3.2. Theoretical Research Model

This study utilized the theoretical research model proposed by Yoon and Lee (2019), the Value-Based Technology Acceptance Model (VBTAM). This study introduces two variables pointing to perceived satisfaction: navigability and time-saving. These two variables are based on the research model of Moon et al. 2022, which is from the Technology Acceptance Model. These two added variables will satisfy the perceived satisfaction of customers who utilize self-service kiosks.

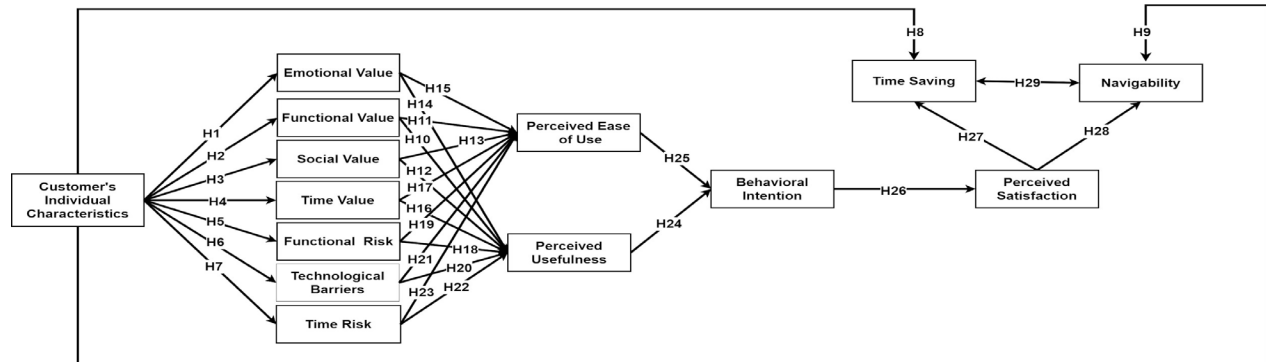


Figure 1. Theoretical Research Model

### 3.3. Hypotheses

#### 3.3.1 Customer's Individual Characteristics (CIC)

According to the study of Rahajeng and Kaluge (2019), individual characteristics can be utilized in the Technology Acceptance Model (TAM), which includes the age, gender, and innovation of an individual. Age and gender also impact an individual's perception and acceptance of technology; the trait of innovation is an individual's receptivity to new technologies and readiness to accept them. Given this, the study suggested the following hypotheses; **Hypothesis 1:(H1)** *Customer's Individual Characteristics has a positive effect on functional value in customers' experience.*

**Hypothesis 2:(H2)** *Customer's Individual Characteristics has a positive effect on social value in customers' experience.*

**Hypothesis 3:(H3)** *Customer's Individual Characteristics has a positive effect on emotional value in customers'*

*experience.*

**Hypothesis 4:(H4)** *Customer's Individual Characteristics has a positive effect on time value in customers experience.*

**Hypothesis 5:(H5)** *Customer's Individual Characteristics has a negative effect on functional risk in customers experience.*

**Hypothesis 6:(H6)** *Customer's Individual Characteristics has a negative effect on technological barriers in customers experience.*

**Hypothesis 7:(H7)** *Customer's Individual Characteristics has a negative effect on time risk in customers experience.*

**Hypothesis 8:(H8)** *Customer's Individual Characteristics has a positive effect on Navigability.*

**Hypothesis 9:(H9)** *Customer's Individual Characteristics has a positive effect on time saving.*

### **3.3.2. Functional Value (FV)**

Functional value refers to the perceived benefits users anticipate from adopting a technology, encompassing usefulness, and ease of use. In the context of paid mobile media services, for example, users assess whether the service will enhance their entertainment experience or provide them with unique content that justifies its cost (Youn and Lee 2024). Thus, functional value is a primary driver in user acceptance and continued engagement with technological offerings. Given this, the study suggested the following hypotheses;

**Hypothesis 10:(H10)** *Functional value has a positive effect on value in perceived usefulness.*

**Hypothesis 11:(H11)** *Functional value has a positive effect on value in perceived ease to use.*

### **3.3.3. Social Value (SV)**

Social value encompasses how technology impacts an individual's social interactions and status within their community. This aspect is particularly relevant in contexts where technology serves as a means for communication or self-expression. (Zhong, 2020). Because of this, the study suggested the following hypotheses;

**Hypothesis 12:(H12)** *Social value has a positive effect on value in perceived usefulness.*

**Hypothesis 13:(H13)** *Social value has a positive effect on value in perceived ease of use.*

### **3.3.4. Emotional Value (EV)**

Emotional value refers to the feelings and sentiments users associate with a technology, which can significantly affect their willingness to adopt it. For instance, positive emotional experiences can increase satisfaction and loyalty toward services like mobile media platforms. (Youn and Lee 2024). Because of this, the study suggested the following hypotheses;

**Hypothesis 14:(H14)** *Emotional value has a positive effect on value in perceived usefulness.*

**Hypothesis 15:(H15)** *Emotional value has a positive effect on value in perceived ease to use.*

### **3.3.5. Time Value (TV)**

Time value refers to the perceived benefit of utilizing a technology over time, suggesting that users evaluate the long-term advantages against immediate costs or sacrifices (Youn and Lee 2024). Given this, the study suggested the following hypotheses;

**Hypothesis 16:(H16)** *Time value has a positive effect on value in perceived usefulness.*

**Hypothesis 17:(H17)** *Time value has a positive effect on value in perceived ease to use.*

### **3.3.6. Functional Risk (FR)**

Functional risk pertains to adopting a technology's potential drawbacks or adverse outcomes. It includes

concerns about performance failures, financial loss, or diminished satisfaction relative to expectations. The perception of functional risk can significantly deter users from embracing new technologies if they believe that potential drawbacks outweigh anticipated benefits (Rahimi et al. 2024.). Given this, the study suggested the following hypotheses;

**Hypothesis 18:(H18)** *Functional risk has a positive effect on value in perceived usefulness.*

**Hypothesis 19:(H19)** *Functional risk has a positive effect on value in perceived ease of use.*

### **3.3.7. Technological Barriers (TB)**

Technological barriers in the Value-Based Technology Acceptance Model (VBTAM) refer to the obstacles that hinder users from fully embracing and utilizing technology, particularly in contexts where perceived value plays a crucial role. These barriers can include inadequate access to technology, lack of digital literacy, and system compatibility or performance issues. The VBTAM builds on the traditional Technology Acceptance Model (TAM) by integrating user perceptions of value. It emphasizes that individuals' decisions to adopt technology are heavily influenced by their assessments of its benefits versus its costs or risks. (Youn and Lee 2024). Because of this, the study suggested the following hypotheses;

**Hypothesis 20:(H20)** *Technological barriers have a positive effect on value in perceived usefulness.*

**Hypothesis 21:(H21)** *Technological Barriers have a positive effect on value in perceived ease to use.*

### **3.3.8. Time Risk (TR)**

Time risk pertains to the uncertainties associated with investing time in new technologies. Users often fear that their investment may not yield the expected benefits or may lead to wasted effort if they do not adapt successfully (Rahimi et al. 2024). Given this, the study suggested the following hypotheses;

**Hypothesis 22:(H22)** *Time Risk has a positive effect on value in perceived usefulness.*

**Hypothesis 23:(H23)** *Time Risk has a positive effect on value in perceived ease to use.*

### **3.3.9. Perceived Usefulness (PU)**

Perceived Usefulness refers to how an individual perceives a particular system as a tool for enhancing performance (Davis 1989). This study used perceived usefulness as the degree to which a customer believes using a self-service kiosk would enhance their performance in placing and taking their order whenever they order walk-in. Accordingly, the study came up with the following hypothesis. Given this, the study suggested the following hypotheses; **Hypothesis 24:(H24)** *Perceived Usefulness has positive effect in behavioral intention*

### **3.3.10. Perceived Ease to Use (PEOU)**

Perceived Ease of Use denotes the degree to which an individual believes a specific system would require minimal effort (Davis 1989). This study used perceived ease of use as the degree to which a customer believes using self-service kiosks would be free of effort from taking and placing an order. Thus, the study proposes the hypothesis below;

**Hypothesis 25:(H25)** *Perceived Ease to Use has positive effect in behavioral intention*

### **3.3.11. Behavioral Intention to use Self-Service Kiosk (BI)**

Behavioral intention refers to a customer's readiness or willingness to engage in a specific behavior. Based on the study of Rizun and Strzelecki (2020), behavioral intention to use influences the decision of the user on whether to use it. In technology adoption, such as taking or placing an order using a self-service kiosk, behavioral intention is a crucial factor that influences whether customers will choose to use this technology. Thus, the study suggests the hypothesis below;

**Hypothesis 26:(H26)** *Behavioral Intention has a positive effect in customer's perceived satisfaction.*

### **3.3.13. Navigability (NAV)**

Navigability refers to the overall design of the technology when customers are searching for information. Various studies have utilized navigability in different technologies. In the study of Kimiagari and Malafe (2021), navigability is an important element for technology users because it allows users to access information easily. Hence, this study proposes the following hypothesis;

**Hypothesis 27:(H27)** *Navigability has a positive effect in customer's perceived satisfaction*

### **3.3.14. Time Saving (TS)**

Time-saving is the degree to which it allows the customers to save time by shortening the waiting time. According to the study by Moon et al. (2022), saving time is an essential factor affecting the satisfaction of fast-food customers, who prioritize when consuming or choosing fast-food restaurants. In view of this, the study suggests the following hypothesis;

**Hypothesis 28:(H28)** *Time Saving has a positive effect on customer's perceived satisfaction.*

**Hypothesis 29:(H29)** *Navigability positively affects the time saving which leads to perceived satisfaction.*

### **3.3.15. Perceived Satisfaction (PS)**

Perceived satisfaction pertains to the degree to which customers in Jollibee and McDonald's are satisfied with the service provided by the self-service kiosk system for taking and placing their orders. Recent studies utilize the Theory of Planned Behavior and unified Theory of Acceptance and use the model (UTAUT), Self Efficacy Value (SVAM), Value Based Acceptance Model (VAM), Behavioral Perspective, and Technology Acceptance Model (TAM) in analyzing the acceptance and perceived satisfaction of the customers in the self-service kiosk in the fast food chains. This study is the first to utilize the value-based acceptance model Yoon and Lee (2019) introduced.

## **4. Results and Discussion**

### **4.1 Data Analysis**

Table 1 illustrates the summary of the demographic profiles of respondents, such as gender, age, educational attainment, marital status, and residential area. In addition, Table 2 illustrates the summary of customer's background in fast food chains such as frequency of ordering walk in per week, have seen a self service kiosk, average interaction time, issues that respondents may have experienced when using self service kiosks in fast food chains and which self-service kiosk they used. There are three self-service kiosk designs, which are Self-Service Kiosk Design 1, which supports 2-3 payment methods and includes a table buzzer to notify customers when their orders are ready. Self-Service Kiosk Design 2 expands on this by offering 3-4 payment options, a table buzzer and a dedicated money kiosk for cash transactions. In contrast, Self Service Kiosk Design 3 provides only one payment method and no table buzzer. Thus, the high percentage of usage for Self-Service Kiosk Design 3 (79.8%) indicates that despite its limitations, it may still align with certain customer preferences or provide a straightforward, hassle-free ordering experience. In summary, evaluating the customer background in terms of a fast food chain provides valuable insights into how specific features or experiences influence the user satisfaction and operational efficiency.

Table 1. Summary of Demographics

| Characteristics | Value               | Frequency | Percentage |
|-----------------|---------------------|-----------|------------|
| <b>Gender</b>   | Female              | 199       | 51.4       |
|                 | Male                | 186       | 48.1       |
|                 | Other               | 1         | .3         |
| <b>Age</b>      | 20-30 years old     | 307       | 79.3       |
|                 | 31-40 years old     | 39        | 10.1       |
|                 | 41-50 years old     | 31        | 8.0        |
|                 | 51-60 years old     | 7         | 1.8        |
|                 | 61-above years old  | 2         | 0.5        |
|                 | High School Student | 10        | 2.6        |

|                               |                      |     |      |
|-------------------------------|----------------------|-----|------|
|                               | High School Graduate | 29  | 7.5  |
| <b>Educational Attainment</b> | College Student      | 202 | 52.2 |
|                               | College Graduate     | 86  | 22.2 |
|                               | Post Graduate Degree | 4   | 1.0  |
|                               | Undergraduate        | 53  | 13.7 |
|                               | Other                | 2   | .50  |
|                               | Single               | 325 | 84.2 |
| <b>Marital Status</b>         | Married              | 59  | 15.3 |
|                               | Others               | 2   | .5   |

Table 2. Summary of Customer's Background in Fast Food Chain

| Characteristics                                                      | Value                                                                                                        | Frequency | Percentage % |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------|--------------|
| <b>Frequency of Ordering Walk in per Week</b>                        | 1 - 2 times                                                                                                  | 227       | 58.7         |
|                                                                      | 3 - 6 times                                                                                                  | 118       | 30.5         |
|                                                                      | 7 - 9 times                                                                                                  | 20        | 5.2          |
|                                                                      | 10 times above                                                                                               | 21        | 5.4          |
| <b>Have you seen a self-service kiosks in fast food restaurants</b>  | Yes                                                                                                          | 379       | 98.2         |
|                                                                      | No                                                                                                           | 7         | 1.8          |
| <b>Service Kiosk</b>                                                 | Self Service Kiosk Design 1                                                                                  | 45        | 11.6         |
|                                                                      | Self Service Kiosk Design 2                                                                                  | 32        | 8.3          |
|                                                                      | Self Service Kiosk Design 3                                                                                  | 309       | 79.8         |
| <b>Average Interaction Time in Self Service Kiosk per Day</b>        | 11- 19 minutes                                                                                               | 22        | 5.7          |
|                                                                      | 20 - 30 minutes                                                                                              | 1         | .3           |
|                                                                      | 31 minutes or above                                                                                          | 2         | .5           |
|                                                                      | 5 minutes or less                                                                                            | 235       | 60.7         |
|                                                                      | 6 - 10 minutes                                                                                               | 126       | 32.6         |
| <b>Issues you have experienced when using the Self-Service Kiosk</b> | Delay due to unresponsive/lagging kiosk                                                                      | 189       | 40.30        |
|                                                                      | Not accessible or not user friendly, too many features, hard to navigate                                     | 51        | 10.87        |
|                                                                      | No issues, I find it hard to use it because I'm not familiar with the                                        | 107       | 22.82        |
|                                                                      | Lack of instructor/instruction on how to properly use it which increases my time spent in choosing my meal/s | 90        | 19.19        |
|                                                                      | Others                                                                                                       | 16        | 3.41         |
|                                                                      | None                                                                                                         | 16        | 3.41         |

#### 4.2 Reliability Testing

Reliability testing is commonly used in questionnaire development studies and question validation studies. This testing is helpful because it checks that the instruments used in the assessment offer reliable and predictable results. According to Saidi and Siew (2019), Cronbach's alpha is between 0 and 1. A Cronbach's alpha value above .90 is excellent, .80 is good, above .70 is acceptable, above .60 is questionable, above .50 is poor, and below .50 is unacceptable. Table 3 shows the reliability testing results using Cronbach's alpha. All variables are greater than the 0.7 Cronbach alpha value cut-off, which means that all variables are acceptable and reliable.

Table 3. Cronbach's Alpha

| Latent Variables                      | Item        | Cronbach's a | Cut-off    | Remarks    |
|---------------------------------------|-------------|--------------|------------|------------|
| Customer's Individual Characteristics | CIC1-CIC5   | .916         | $\geq 0.7$ | Acceptable |
| Functional Value                      | FV1-FV3     | .857         | $\geq 0.7$ | Acceptable |
| Social Value                          | SV1-SV5     | .967         | $\geq 0.7$ | Acceptable |
| Emotional Value                       | EV1-EV3     | .846         | $\geq 0.7$ | Acceptable |
| Time Value                            | TV1-TV3     | .882         | $\geq 0.7$ | Acceptable |
| Functional Risk                       | FR1-FR3     | .918         | $\geq 0.7$ | Acceptable |
| Technological Barriers                | TB1-TB3     | .941         | $\geq 0.7$ | Acceptable |
| Time Risks                            | TR1-TR3     | .854         | $\geq 0.7$ | Acceptable |
| Perceived Usefulness                  | PU1-PU4     | .924         | $\geq 0.7$ | Acceptable |
| Perceived Ease of Use                 | PEOU1-PEOU4 | .890         | $\geq 0.7$ | Acceptable |
| Behavioral Intention                  | BI1-BI4     | .924         | $\geq 0.7$ | Acceptable |
| Navigability                          | N1-N4       | .920         | $\geq 0.7$ | Acceptable |
| Time Saving                           | TS1-TS4     | .899         | $\geq 0.7$ | Acceptable |
| Perceived Satisfaction                | PS1 - PS4   | .930         | $\geq 0.7$ | Acceptable |

#### 4.3 Structural Equation Model

Structural equation modeling (SEM) is a comprehensive statistical technique used to examine the relationships between multiple variables.

Figure 2 shows the initial result of SEM in evaluating the customer's perceived satisfaction using self-service kiosks in NCR, Philippines. Based on the figure, several hypotheses were not significant: the relationship between Functional Risk, Technological Barriers, and Time Risk to both Perceived Ease of Use and Perceived Usefulness, FR and PU ( $\beta = -0.09$ ), FR and PEOU ( $\beta = -0.02$ ), TR and PU ( $\beta = -0.10$ ), FR and PEOU ( $\beta = -0.10$ ), TB and PU ( $\beta = 0.08$ ) and TB and PEOU ( $\beta = 0.07$ ). Thus, this latent variable has been excluded in order to increase the model's fit.

Furthermore, Table 4 illustrates the hypothesis model's model fit indices. The Comparative Fit Index (CFI) model fit indices are acceptable because they meet the cutoff of less than or equal to 0.9. Meanwhile, the Root



#### 4.4 Modified Model

In Figure 3, the SEM showed that Functional Value ( $\beta = 0.89$ ), Emotional Value ( $\beta = 0.88$ ), and Time Value ( $\beta = 0.85$ ) significantly affects the Customer's Individual Characteristics, indicating that utilization of kiosks likely depends on how well these kiosk align with individual characteristics and values, emphasizing the need for fast-food chains to understand their customers base to appeal to different customer types. The Customer's Individual Characteristics was significantly affected by Navigability ( $\beta = 0.89$ ) as this implies that the customer's likelihood of using self-service kiosks is largely influenced by how easy and intuitive the kiosk is to use. Moreover, Customer's Individual Characteristics also shows that it significantly affects Time Saving ( $\beta = 0.73$ ) that indicates that customers would likely to use self-service kiosks if they perceive the technology as a quick and efficient alternative to traditional ordering methods.

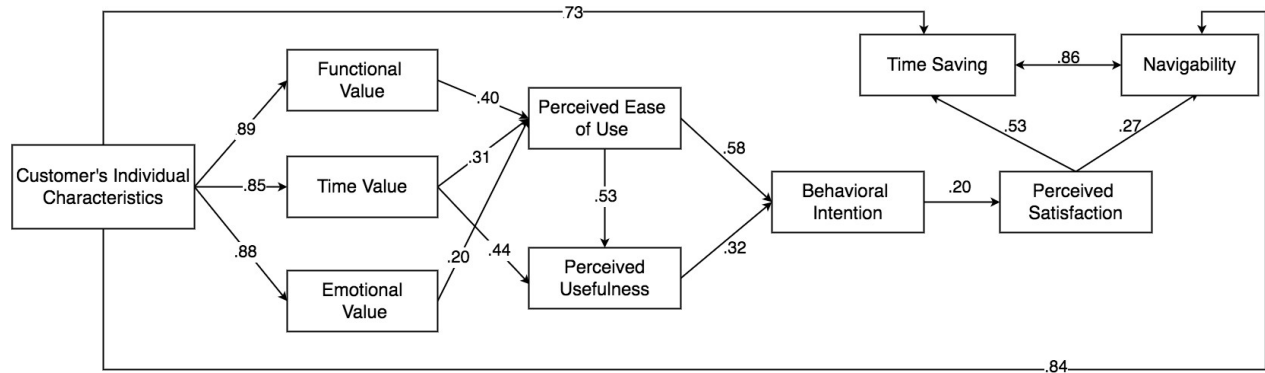


Figure 3. Modified Model

Furthermore, SEM showed that Functional Value was significantly affected by Perceived Ease of Use ( $\beta = 0.40$ ), Emotional Value was significantly affected by PEOU ( $\beta = 0.20$ ) and Time Value was significantly affected by PEOU ( $\beta = 0.31$ ) that indicates how easy customers find the kiosk to use influences multiple aspects of their experience, ultimately impacting their willingness to utilize the self-service kiosks. In addition, SEM showed that Time Value was significantly affected by Perceived Usefulness ( $\beta = 0.44$ ), indicating a positive relationship between how useful customers perceive the self-service kiosks to be and their perception of time efficiency when using them and SEM also showed that PEOU was significantly affected by Perceived Usefulness (PU) ( $\beta = 0.53$ ) indicating that the more customers perceive the kiosk as useful, the more likely they are to believe that the kiosk is also easy to use. The PEOU was also significantly affected by Behavioral Intention ( $\beta = 0.59$ ), suggesting that customers who are more inclined to use the kiosk will find it easier to use a and PU also significantly affected by Behavioral Intention ( $\beta = 0.32$ ), indicating that customers who intend to use the self-service kiosk are more likely to perceive it as useful. The SEM showed that Behavioral Intention was significantly affected by Perceived Satisfaction ( $\beta = 0.20$ ), indicating a positive relationship between these two variables. The Navigability ( $\beta = 0.27$ ) and Time Saving ( $\beta = 0.53$ ), was significantly affected by Perceived Satisfaction, indicating a positive relationship between these two variables that means the customers who are satisfied with self-service kiosk are more likely to perceive it as a time-saving tool and likely to influence how easily they can navigate through the system.

Table 5. illustrates modified models' model fit indices that display positive findings in all model fit metrics. The Comparative Fit Index (CFI) model fit indices are acceptable because they meet the cutoff of less than or equal to 0.9 and the chi-square/df are also acceptable. Meanwhile, the Root Mean Square Error of Approximation (RMSEA) and Normed Fit Index (NFI) are also acceptable because they meet the cutoff of both model fits. The following cutoffs of model indices are based on various studies.

Table 5. Model Fit Indices - Modified Model

| Model Fit     | Value | Cut-Off      | Reference                | Remarks    |
|---------------|-------|--------------|--------------------------|------------|
| Chi-square/df | 3.08  | <5           | Marsh and                | Acceptable |
|               |       |              | Hocevar (1985)           |            |
| CFI           | .905  | ≥0.9         | Nikkhah et al<br>(2018)  | Acceptable |
| NFI           | .866  | ≥0.8         | Ibrahim et al.<br>(2021) | Acceptable |
| RMSEA         | .074  | 0.05 to 0.08 | Kim et al. (2016)        | Acceptable |

## 5. Conclusion

This paper uses the Value-Based Technology Acceptance Model (VBTAM) with added variables such as Customer's Individual Characteristics, Navigability, and Time Saving to assess the factors affecting customers' perceived satisfaction using self-service kiosks in fast food restaurants. A total of 386 responded to the questionnaire deployed using Google Forms. Structural Equation Model (SEM) was used to analyze the relationship of Customer Individual Characteristics (CIC) to the positive experience related to value perceptions such as Functional Value (FV), Social Value (SC), Emotional Value (EV), Time Value (TV) and negative experiences related to risk perception such as Time Risk (TR), Functional Risk (FR) and Technological Barriers (TB) to Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU) in their Behavioral Intention. Furthermore, their behavior towards the use of technology affects their Perceived Satisfaction (PS) in using self-service kiosks as it satisfies the customers' Navigability (N) and Time Saving (TS) considerations.

This study reveals that CIC significantly impacts customers' FV, EV, TV, and experiential dimensions with kiosks. PEOU is a reliable, significant independent variable of PU as well as BI, thus implying that ease of use influences the perceived usefulness and the customers' intention to use the kiosk. TS has the highest correlation with satisfaction, and we can infer that fast-food customers greatly care about time. There is a positive correlation between N and TS, which serves to improve customer satisfaction because an easy-to-navigate system means perceiving time to be saved. In the model, out of 27 hypotheses, 17 hypotheses are supported, ten are not significant, the customer's individual characteristics to social value, to functional risk, to technological barriers and to time risk, functional value, and emotional value to perceived usefulness. While functional risk, technological barriers, time risk to perceived usefulness, and perceived ease of use. In addition, another correlation is added, which is perceived usefulness and perceived ease of use. The conceptual model offers insight into how the various factors may combine to affect kiosk usage and satisfaction in fast-food restaurants to improve self-service kiosk models.

In conclusion, it shows that perceived ease of use, perceived use, navigation and time saving bears a positive relationship with customers' satisfaction levels in such self-service environments. Therefore, it is crucial for fast food chains to optimize the user interface of these kiosks to ensure an intuitive experience. However, further support through cognitive or digital forms such as browser help or guides can also reduce customer's perceived risk of adopting self-service technology.

## References

- Baba, N., Hanafiah, M. H., Shahril, A. M., & Zulkifly, M. I. Investigating customer acceptance, usage, trust, and perceived safety risk of self-ordering kiosk technology in Malaysian quick-service restaurants during COVID-19 pandemic. *Journal of Hospitality and Tourism Technology*, vol. 14, no. 3, pp. 309–329. 2023.
- Beran, T. and Violato, C.. Structural equation modeling in medical research: a primer. *BMC Res Notes* vol. 3, pp.267, 2010.

- Davis, F. D. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, vol. 13, pp. 319, 1989.
- Ibrahim, A. N. H., Borhan, M. N., Yazid, M. R. M., Rahmat, R. A., and Yukawa, S. Factors Influencing Passengers' Satisfaction with the Light Rail Transit Service in Alpha Cities: Evidence from Kuala Lumpur, Malaysia Using Structural Equation Modelling. *Mathematics* 2021, vol. 9, no. 16, pp. 1954, 2021.
- Kim, H., Ku, B., Kim, J. Y., Park, Y., and Park, Y. . Confirmatory and exploratory factor analysis for validating the phlegm Pattern questionnaire for healthy subjects. *Evidence-based Complementary and Alternative Medicine*, pp. 1–8, 2016.
- Kimiagari, S., and Malafe, N. S. A. The role of cognitive and affective responses in the relationship between internal and external stimuli on online impulse buying behavior. *Journal of Retailing and Consumer Services*, vol. 61, pp.102567, 2021.
- Kokkinou, A., and Cranage, D. A. Why wait? Impact of waiting lines on self-service technology use. *International Journal of Contemporary Hospitality Management*, vol. 27, no.6, pp. 1181–1197, 2015.
- Mahmood, N., Shukri, N., Ghani, A., and Shalifulizam, N., Self Service Technology Acceptance in the Quick Service Restaurants, *e-Academia Journal of UiTM Cawangan Terengganu*, vol. 13, no. 1, pp. 28-39, 2024.
- Marsh, H. W., and Hocevar, D., Application of confirmatory factor analysis to the study of self-concept: First- and higher order factor models and their invariance across groups, *Psychological Bulletin*, vol. 97, no. 3, pp. 562-582, 1985.
- Moon, J., Shim, J., and Lee, W. S., Antecedents and consequences of the ease of use and usefulness of fast food kiosks using the Technology Acceptance Model. *Systems*, vol. 10, no. 5, pp. 129, 2022.
- Nikkhah, M., Heravi-Karimooi, M., Montazeri, A., Rejeh, N., and Nia, H. S., Psychometric properties the Iranian version of Older People's Quality Of Life questionnaire (OPQOL). *Health and Quality of Life Outcomes*, vol. 16, no. 1, 2018.
- Rahimi, B., Nadri, H., Afshar, H. L., and Timpka, T., A Systematic review of the technology acceptance model in health Informatics. *Applied Clinical Informatics*, vol. 9 ,pp. 604–634. 2018.
- Rizun, M., and Strzelecki, A., Students' acceptance of the COVID-19 impact on shifting higher education to distance learning in Poland. *International Journal of Environmental Research and Public Health*, vol. 17, no. 18, pp.6468, 2020.
- Rahajeng, L., and Kaluge, D. Effect of individual characteristics on perception of usability and perception of ease in use of mobile commerce. *Jurnal AKSI (Akuntansi Dan Sistem Informasi)*, vol. 4, no. 2, 2019.
- Rastegar, N., Flaherty, J., Liang, L., & Choi, H. The adoption of self-service kiosks in quick-service restaurants. *European Journal of Tourism Research*, vol. 27, pp. 2709, 2021.
- Saidi, S. S., and Siew, N. M. Investigating the Validity and Reliability of Survey Attitude towards Statistics Instrument among Rural Secondary School Students. *International Journal of Educational Methodology*, vol. 5, no. 4, pp. 651–661, 2019.
- Youn, S., and Lee, K. Proposing value-based technology acceptance model: testing on paid mobile media service. *Fashion and Textiles*, vol. 6, pp. 13,2019.
- Zhang, K. Z., Gong, X., Zhao, S. J., and Lee, M. K. Cognitive Trust, Emotional Trust, and the Value-based Acceptance Model in Mobile Payment Adoption. *Proceedings of the International Conference on Electronic Business (ICEB)*, pp. 166-174, Hong Kong, December 6-10, 2015.
- Zhong, Y., & Moon, H. C., What drives customer satisfaction, loyalty, and happiness in Fast-Food restaurants in China? Perceived price, service quality, food quality, physical environment quality, and the moderating role of gender. *Foods*, vol. 9, no. 4, pp. 460, 2020.

## Biographies

**Mark Jherald Acilo** is a fourth year Industrial Engineering student at the Technological Institute of the Philippines in Quezon City, based in San Mateo, Rizal. With a passion for technology and problem-solving, he has gained valuable experience through various projects and internships in the field. In his free time, he enjoys motorcycles, video games, and movies. Mark believes in the importance of continuous learning and striving for excellence in all endeavors.

**Jacklyn Hazel V. Ballais** is a fourth-year Industrial Engineering student at the Technological Institute of the Philippines. She has participated in research projects, demonstrating her skill with various technical tools and software, and she is passionate about analyzing data and complex problems. She is committed to achieving her goals and aspirations in the field and looks forward to significantly impact her future career by applying her knowledge in Industrial Engineering.

**Janelle Anne C. Estera** is a fourth-year industrial engineering student at the Technological Institute of the Philippines in Quezon City. She graduated senior highschool at the same school. Throughout her academic journey, she has demonstrated a strong sense of dedication, responsibility, and commitment to excellence. She consistently applies herself to her studies, balancing the demands of her coursework and practical experiences in the field of industrial engineering.

**Andre Brian S. Gellido** is a fourth-year Industrial Engineering student at the Technological Institute of the Philippines in Quezon City. Andre is from Pasig City and is passionate and eager to learn more about optimizing processes and increasing efficiency. He is dedicated to using or applying his skills and knowledge to address real-world problems. He regularly participates in academic projects and collaborative efforts with the goal of making valuable contributions to the field of industrial engineering.

**Bryan Serfa Juan** is currently a fourth-year Industrial Engineering student at the Technological Institute of the Philippines - Quezon City. Residing in Antipolo City, he has developed skills in a variety of software applications, including Microsoft Word, Microsoft Excel, AutoCAD, MATLAB, Minitab, and Lindo. With a solid foundation in both theoretical and practical aspects of Industrial Engineering, he has gained experience in areas such as data analysis, process optimization, and simulation modeling. Bryan is dedicated to expanding his expertise and applying his knowledge in real-world engineering challenges. Additionally, he actively participates in academic and extracurricular activities, demonstrating strong problem-solving, communication, and teamwork skills.

**Lyka Villegas** is a 4th year Industrial Engineering student from the Technological Institute of the Philippines - Quezon City. She resides in Tumana, Marikina City, and is presently employed as a freelance Autocad animator at Conducive Corp. Additionally, she works as a full-time instructor for elementary to senior high students at Lord's Sheep Honing Hub. Engineer Villegas actively participated in several groups throughout her elementary, secondary, and tertiary education, including the Journalism Organization, Art and Play Organization, Dance Guild, and others. She possesses expertise in employing several software applications such as Microsoft Word, Microsoft Excel, Autocad, Sketchup, Matlab, Minitab, Lindo, and ProModel.

**Daniel Johns Tagibao** is a fourth-year industrial engineering student at the Technological Institute of the Philippines in Quezon City. He graduated from senior high school at the same institution with high honors. He is an imaginative and committed person who has an insatiable love for writing. With a sharp attention to detail and a talent for storytelling, his dedication to his craft is evident in every word he writes, making him a genuine wordsmith.

**Valerie Peralta** is a faculty in the Department of Industrial Engineering. She is currently taking a Professional Science Masters Degree in the Engineering Department at the Technological Institute of the Philippines. Her research interests include quality management system, manufacturing, marketing management, and simulation. She is an active member of the Philippine Institute of Industrial Engineers (PIIE) organization in the Philippines.

**Arriane A. Palisoc** is a graduate of Bachelor of Science in Industrial Engineering at Technological Institute of the Philippines (2008) and a Masters Degree holder in Industrial Engineering and Management from Polytechnic University of the Philippines, Manila (2011). Presently taking up her Doctor of Engineering Management from Polytechnic University of the Philippines, Manila. With over 17 years of work experience, Engr Palisoc is a passionate and driven industrial engineering leader with professional certifications. Her core competencies include business analytics, organizational consulting, and digitization. She is currently the program chair of industrial engineering at the Technological Institute of the Philippines (TIP), where she oversees the effective operation, management, and compliance of the department, as well as the implementation of initiatives that contribute to the college's relevance and sustainability.

**Maricar M. Navarro** holds the esteemed titles of ASEAN Engineer (AE) and Professional Industrial Engineer (PIE) accredited by the ASEAN Federation of Engineering Organizations (AFEO) and the Philippine Institute of Industrial Engineers (PIIE). She currently serves as a Professor in both the Undergraduate and Graduate School Programs of the Technological Institute of the Philippines, bringing over 17 years of combined experience in

industry, academia, and research. Her expertise spans optimizing production processes, facility layout design, warehouse operations, and service delivery. Dr. Navarro's current research interests focus on financial optimization and decision-making in operations research. She earned both her master's and Ph.D. in Industrial Engineering from MAPUA University. As an active associate member of the National Research Council of the Philippines (NRCP) and member of PIIE, Dr. Navarro contributes significantly to advancing research initiatives and professional standards in Industrial engineering and related fields. Her dedication and expertise make her a pivotal figure in both academic circles and national research endeavors.