

User Satisfaction Factors Self-Service Technology in Fast Food Restaurants Using The Heuristic Evaluation Method

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Self-service technology (SST) in restaurants is a machine to replace manual cashiers with self-ordering kiosks. Since the end of 2018, self-service technology in fast-food restaurants has begun to be used in Indonesia. So, many people have used this technology. Customer acceptance is an external issue in the implementation of SST. Although this technology makes it easier for customers to order and pay, human interaction is more limited. Therefore, SST must be able to provide user satisfaction from customers. This research aims to evaluate user interface technology design from the user's side. We use a quantitative method with a questionnaire from the Heuristic evaluation method. We collect the data online using our social media in the Jabodetabek area. The data that has been collected is then analyzed using SPSS and the Likert scale as a guide for interpretation. This study's results is only four design principles impact customer satisfaction. They are error prevention, the flexibility and efficiency of use, the aesthetic and minimalist, and Help and documentation. This result empowers businesses to create self-service technology that aligns with user preferences, ultimately increasing satisfaction and engagement.

Keywords: *Self-service technology, Heuristic Evolution Method, User satisfaction*

I. INTRODUCTION

Information technology is the main strategy for increasing company productivity in Indonesia's food business, especially fast-food restaurants. In the 1980s, fast food restaurants, mostly from the United States, became popular in Indonesia, and this business became very competitive and profitable [1]. Increasingly tight competition in the food business industry encourages food supply companies to continue to improve the quality of the products and services they offer. This effort is carried out with the main aim of satisfying consumers because this satisfaction is directly related to the company's ability to survive in this intense competition.

Self-service technology (SST) in restaurants is a machine to replace manual cashiers with self-ordering kiosks [2][3]. These technologies are designed to enhance convenience, efficiency, and accessibility for customers while reducing the need for direct human intervention [4]. Some fast-food restaurants like KFC and McDonald's have adopted SST to

replace manual kiosks [5]. Those restaurants try to open new opportunities for their customers to be able to order menus easily and quickly. Through this modern machine, customers can place their orders without needing direct assistance from staff. Customers can also directly pay for their orders through these machines, using credit cards, debit cards, or even cash at the checkout. This self-service technology is important in reducing operational costs, increasing customer value, and ultimately increasing customer satisfaction.

As Indonesia's most popular fast food restaurant [6], SST is a business strategy innovation expected to increase consumer comfort in shopping. However, restaurants face significant challenges when implementing SST. Internal and external barriers are both possible. It may manifest itself internally as management and employee receptivity to workflow modifications [7]. Sufficient spatial planning for SST is an additional issue [7]. In restaurants, SST operations are carried out by customers. It is a challenge for restaurants to encourage customers mindset to adapt to new technology [8]. Customer acceptance is an external issue in the implementation of SST. Although this technology makes it easier for customers to order and pay, human interaction is more limited. Therefore, SST must be able to provide user satisfaction from customers. So, we try to find what factors influence the satisfaction of SST application users for KFC and McDonald's restaurants.

Research related to customer satisfaction with SST in restaurants still focuses on the factors influencing customer acceptance and intentions using the technology [9][10]. In Indonesia, the research combines UI/UX design with the Theory Acceptance Model to find customer continuity using the application. The results of this research state that UI/UX design influences the continuity of application use [11]. So, we tried to find customer satisfaction from SST's UI/UX design perspective. We use heuristic evaluation to evaluate the UI/UX design of SST. Heuristic evaluation is a usability inspection method used in user experience (UX) design and a technique to assess the user interface (UI) of a product or system to identify potential usability problems and design flaws [12][13]. This evaluation method has been widely used to evaluate web and mobile applications from various organizations [2][12][13]. In the SST area, therefore, this research uses the Heuristic Evaluation method to analyze user

satisfaction factors with self-service technology in fast-food restaurants, especially McDonald's and KFC.

II. LITERATURE REVIEW

A. Self-Service Technology

Self-service technology (SST) is an interface technology concept that enables customers to access services or perform transactions independently without directly interacting with employees [2]. SST allows customers to obtain services or perform certain activities using technological devices and systems companies or institutions provide [14]. It could place be in onsite and offside organization.

The service concept that originally started with direct face-to-face interaction between customers and employees has undergone Evolution. At first, customers had to come in person and interact with employees to get services or make certain transactions. However, this trend has developed, where the service concept can be facilitated with technology support [15]. One example of SST is a self-ordering kiosk, which can help customers avoid queues for service at hotels, hospitals and restaurants [3][16].

B. Customer Satisfaction

Customer satisfaction is the company's ability to recognize, meet and satisfy customer needs properly, which is one of the company's strategies [14]. Customer happiness is a person's pleasure or disappointment that arises after equating the predicted ability with the expected ability [15]. Customer satisfaction is a measurement or marker as long as the customer or consumer of industrial products or services really likes the ingredients or services obtained.

User satisfaction can be interpreted as a situation where consumers' expectations of services are consistent with the facts obtained about the services provided to consumers [14]. If the service company's service is far below consumer expectations, the consumer will feel dissatisfied. Types of consumer satisfaction are divided into 2, namely:

1. Functional satisfaction is satisfaction resulting from the function or use of a product [15],
2. Psychological satisfaction is satisfaction obtained from intangible attributes [15].

C. Heuristic Evaluation Method

Heuristic Evolution is an interface evaluation process, and it is used to measure the usability, efficiency and effectiveness of the interface [16][17]. The heuristic evaluation aims to improve effectively every part of the research object interface [13][18]. The evaluator carries out the evaluation process through a series of performances, which is determined from a series of tasks with design tasks and is adjusted to the size of each task level. If an error is found during the evaluation process, it is necessary to check it to be corrected before proceeding to the next stage [19][20][21][22].

Heuristic Evolution is a usability evaluation method for efficiently improving a design using a set of related heuristics [16][17]. According to Nielsen [23], ten heuristic principles are as follows:

1. Visibility of System Status (X1). Users should always be informed about what is happening in the system [24]. It can be a loading indicator, notification, or other visual cue to communicate status to the user [18].

2. Match Between System and the Real World (X2). The language, concept and layout used in the interface must reflect the real world or the user's domain so that it is easier for users to understand and use the system [18].
3. User Control and Freedom (X3). Users must be able to undo actions or exit unwanted situations without significant risk—for example, easily accessible "Cancel" or "Exit" buttons [18].
4. Consistency and Standards (X4). The interface must be consistent in terminology, symbols and layout. It makes users feel comfortable and familiar with the interface [18].
5. Error Prevention (X5). The system must be designed to prevent or minimize user error. It can include confirming before irreversible actions or eliminating confusing options [24].
6. Recognition Rather than Recall (X6). Interfaces should be designed to reduce the user's memory load by providing visual prompts or clear Help, not requiring them to memorize information from scratch [24].
7. Flexibility and Efficiency of Use (X7). The interface should be usable by both novice and experienced users. Users should be able to customize their experience according to their level of knowledge [18].
8. Aesthetic and Minimalist Design (X8). The interface should have a clean, minimalistic and aesthetically pleasing design not to distract the user's focus [25].
9. Error Message Suitability (X9). If the user makes an error, the system must provide a clear, consistent and easy-to-understand message and provide a solution or guide to resolve the error [25].
10. Help and Documentation (X10). Where needed, the system should provide easily accessible Help and clear documentation to guide users in completing tasks [25].

III. RESEARCH METHODOLOGY

This research uses a quantitative approach. We use questionnaires defined by the Heuristic Evaluation method [26]. We used ten principles of a heuristic evaluation method to find factors that influence user satisfaction. Fig 1 shows our theoretical concept in this research. A detail of our questionnaire to respondents is in Table I. The questionnaire also uses a scale of one to five to determine the degree of agreement with the statements made (one for strongly disagree, five for strongly agree). We created online questionnaires on Google form and distributed them via social media such as WhatsApp, Instagram and Twitter. We collected the data during mid-May and June 2023 in the Jabodetabek area. Due to time limitations, we only got 110 respondents, as shown in Fig. 2. All the data collected was processed and analyzed using SPSS tools.

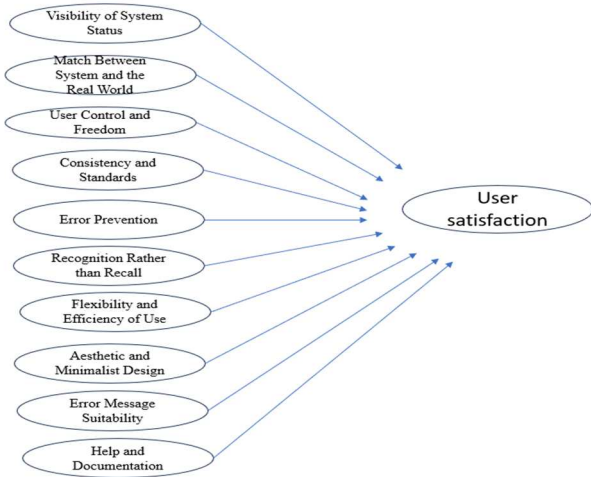


Fig. 1. Theoretical concept.

TABLE I. TABLE TYPE STYLES

No	Questions	
	Heuristic Evaluation	Question Detail
X1	Visibility of System	The system provides clear information (X1.1) Each page explains that the user has moved to another menu page (X1.2)
X2	Match Between System and the Real World	The features contained in the machine are easy to understand (X2.1) The language used is easy to understand (X2.2)
X3	User Control and Freedom	Is the error easy to handle (X3.1) Easy to input orders (X3.2)
X4	Consistency and Standards	The use of command or menu language is the same (X4.1) Displays the appropriate menu of the currently selected menu (X4.2)
X5	Error Prevention	Is there a help button to prevent errors? (X5.1) Does the system warn users when they are about to make a mistake? (X5.2)
X6	Recognition Rather than Recall	Do users easily recognize the menu sidebar that is being used? (X6.1) Is the menu layout easy for users to remember? (X6.2)
X7	Flexibility and Efficiency of Use	Is the helpful navigation system on each page working well? (X7.1) The menu on the machine has a clear display, making it easier to carry out activities quickly. (X7.2)
X8	Aesthetic and Minimalist Design	Does the machine have an attractive appearance? (X8.1) Does the information displayed on each page enable the user to decide? (X8.2)
X9	Error Message Suitability	The text on the instructions is clear and makes it easy for users to understand (X9.1) The error message informs how severe the error is (X9.2)
X10	Help and Documentation	There is a guide that can be viewed online (X10.1)
Y	User satisfaction	The machine is easy to understand (Y.1) The machine is easy to use (Y.2) The machine has a positive impact (Y.3)

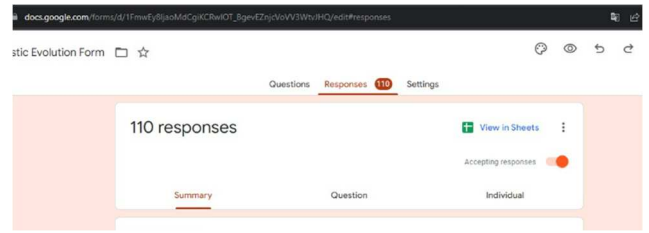


Fig. 2. Total respondents on Google Form.

IV. RESULT AND DISCUSSION.

A. Validity Test

The validity test measures whether the questionnaire is valid or invalid. A questionnaire is declared valid if the questions can reveal something that the questionnaire will measure. This test can be measured by comparing the value of r count or Corrected Item - Total Correlation with r table, where the statement will be declared valid if r count $>$ r table. In this research, the data used was 110 respondents. Table II is the result of the validity test performed by SPSS tools.

TABLE II. RESULT OF THE VALIDITY TEST

No Item	R-Value	R-Table 5%	Sig	Criteria
X1.1	0,873	0,187	<0,00	VALID
X1.2	0,892	0,187	<0,00	VALID
X2.1	0,945	0,187	<0,00	VALID
X2.2	0,925	0,187	<0,00	VALID
X3.1	0,872	0,187	<0,00	VALID
X3.2	0,826	0,187	<0,00	VALID
X4.1	0,824	0,187	<0,00	VALID
X4.2	0,836	0,187	<0,00	VALID
X5.1	0,878	0,187	<0,00	VALID
X5.2	0,914	0,187	<0,00	VALID
X6.1	0,902	0,187	<0,00	VALID
X6.2	0,905	0,187	<0,00	VALID
X7.1	0,884	0,187	<0,00	VALID
X7.2	0,873	0,187	<0,00	VALID
X8.1	0,922	0,187	<0,00	VALID
X8.2	0,907	0,187	<0,00	VALID
X9.1	0,765	0,187	<0,00	VALID
X9.2	0,851	0,187	<0,00	VALID
X10.1	1,000	0,187	<0,00	VALID
Y.1	0,915	0,187	<0,00	VALID
Y.2	0,877	0,187	<0,00	VALID
Y.3	0,882	0,187	<0,00	VALID

This study assesses the level of customer satisfaction with the application of self-service technology using ten heuristic principles for UI/UX SST design. The result of the validity test with the highest r -count is 1,000 there is a guide that can be viewed online with heuristic evaluation, namely help and documentation. In this case the user side makes the highest rating of 0.915 that the machine is easy to understand.

B. Determination Coefficient Test

The coefficient of determination, also known as R-squared (R^2), is a concept used in statistics to measure the extent to which the variation of the dependent variable (output) in a statistical model can be explained by the independent variable (input) used in the model. In other words, the coefficient of determination measures how well the statistical model can explain the observed data variations. Analysis of the coefficient of determination test aims to determine the percentage of user satisfaction from variable (X1-X10) to

variable (Y). The result from this testing performed by SPSS tools is shown in Table III.

TABLE III. RESULT OF THE DETERMINATION COEFFICIENT TEST

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.981 ^a	.962	.958	.40150
a. Predictors: (Constant), X10, X2, X5, X9, X6, X3, X8, X1, X4, X7				
b. Dependent Variable: Y				

Based on the table above, the coefficient of determination value is 0.962, meaning a 96.2% factor in self-service technology user satisfaction with fast food restaurants. This research has proven that the level of user satisfaction in using self-service applications through the results of the coefficient of determination test with a good percentage.

C. Partial T-test

Partial T-test analysis was conducted to ascertain the level of user interest in variables (X) and (Y). According to the predetermined significance threshold of the T test, as outlined in the research methodology:

- Suppose the significance level is sig. <0.05 or the calculated T value > T table value, then variable X significantly affects variable Y.
- If the sig value is >0.05 or the T value calculates the T table value, then the relationship between variables X and Y is insignificant. Below is the T-Persian Test report. Fig. 3 shows the result of the partial T-test in this research.

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.546	.399		1.371	.174
	X1	-.095	.051	-.066	-1.866	.065
	X2	.055	.040	.047	1.391	.167
	X3	.042	.042	.030	.992	.324
	X4	-.140	.056	-.088	-2.489	.014
	X5	.080	.026	.068	3.023	.003
	X6	-.013	.037	-.010	-.349	.728
	X7	.621	.054	.459	11.545	<.001
	X8	.557	.049	.410	11.259	<.001
	X9	.451	.046	.303	9.905	<.001
	X10	-.263	.065	-.114	-4.027	<.001

a. Dependent Variable: YB

Fig. 3. Result from partial T-Test.

The T table value is obtained from search results using the Excel formula =TINV(probability;deg_freedom). Note:

- ⇒ 0.05 = significance value
- ⇒ 99 = residual df value

The result of the t table value is =TINV(0.05;99) = 1.984217. Based on the results of the Partial T test above, it shows that:

- The most frequent user errors occur in the variable Visibility Of System Status T-count 1.866 T-table 1.984217, indicating no user satisfaction in variables related to usability.

- The Match Between the System and the Real World, which has a significant T-count value of 1.391 and T-table 1.984217, indicates that this is not a reliable indicator of usability.
- The lack of satisfaction with the Use Control and Freedom variables is indicated by the ratio of the user's T-count of 0.992 to the T-table of 1.984217, indicating that the user's usefulness is unaffected by this variable.
- The fact that the value of user input on the variable Consistency And Standard T-count -2.489 > 1.984217 is not significant can be concluded from the fact that there is no user input on variables related to usability.
- The usefulness of the Error Prevention Variable is indicated by the large number of users, T-count 3.023, above T-table 1.984217, which indicates that the Error Prevention Variable can be used.
- Lack of satisfaction with the Recognition Rather Than Recall variable, with a T-count value of 0.349 T-table 1.984217, indicates no satisfaction in the user satisfaction variable.
- User feedback on the Flexibility And Efficient Of Use variable at T-count 11.545 > T-table 1.984217 indicates user feedback on user usability variables, which can be concluded from the data.
- Using variables from the use of Aesthetic And minimalist with a T-count of 11.259 > T-table 1.984217, it can be concluded that there is user intent from using these variables.
- Use of Variables Help Users Recognize Dialogue And Recover From Errors. The value of T-count 9.905 > T-table 1.984217 means that it can be concluded that there is no problem with the effect of variables on user satisfaction.
- User-Specific Variable Help and Documentation The T-count value is -4.027 > T-table 1.984217, meaning there is no variable effect on user satisfaction.

The results of the T test analysis show that user interest in variables includes: first; Many users are interested in using the error prevention variable of 3.023. Second; Interest in flexibility and efficiency of use amounted to 11.545. Third; User intent towards the use of minimalist aesthetics and design amounted to 11.259.

V. CONCLUSIONS

In this research, we find four variables that support user satisfaction when using the SST application as a self-service technology in restaurants. The Error Prevention on the design interface of the SST application made user satisfaction. According to respondents, the design minimizes user errors in its use. The flexibility efficiency of the use variable also supports satisfaction. When users use the SST application, it can be used well by both expert and non-expert users, allowing users to adjust the actions taken on the system.

The next factor is the aesthetic and minimalist. There is user satisfaction with the SST application in both restaurants. According to respondents, the system displays relevant and frequently needed information, and the design required is in accordance with their needs. The last factor is the Help users recognize dialogue and recover from errors. The SST

application has messages about related errors using language that is easy to understand so that users can understand the message.

This research empowers businesses to create self-service technology that aligns with user preferences, ultimately increasing satisfaction and engagement. The four factors mentioned previously can be used in designing SST for other organizations so that SST implementation can increase user satisfaction and customer loyalty. Because our respondents are still focused on the Jabodetabek area, expanding the respondent's area and adding types of restaurants for further research can be considered to get more precise research results.

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