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# Analysis of User Satisfaction while Implementing New Self Order Kiosk (SOK) Technology Using the TAM and Smart PLS Methods

**Muhammad Aizar Aisyun Niam[1], M. Tutuk Safirin[2], Ahmad Kurniawan[3]**
aizaraisyun511@gmail.com, tutuks.ti@upnjatim.ac.id, ahmadkurniawan@unesa.ac.id
[1] Department of Industrial Engineering, Pembangunan Nasional Veteran Jawa Timur University
[2] Department of Industrial Engineering, Pembangunan Nasional Veteran Jawa Timur University
[3] Department of Digital Business, Negeri Surabaya University

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**Abstract**

Self Order Kiosk (SOK) is machines used for ordering process. Each SOK machine, equipped with a state-of-the-art touchscreen, displays a variety of menu options, including food, drinks, snacks, and ice cream. When customers place orders through these machines, their orders are sent directly to the kitchen monitor. This allows kitchen staff to immediately prepare and serve the orders quickly and accurately, reducing customer waiting times. However, there have been several complaints from customers about the ordering process using the SOK machines, indicating that there is still room for improvement in the service. Given these issues, researchers are increasingly interested in using the Partial Least Squares-Structural Equation Modeling (PLS-SEM) method in this research and Technology Acceptance Model (TAM). PLS-SEM is an analysis technique that enables the simultaneous testing of relationships among multiple dependent and independent variables. TAM is a method designed to examine user attitudes towards technology. Each variable can be a factor or a construct composed of several indicators. The research results led to the conclusion that the perception of the usefulness and ease of use of the Self Order Kiosk (SOK) machine significantly influences the acceptance behavior of SOK technology.

## A. Introduction

In an era of rapidly developing technology, individuals and groups are trying to fulfill their needs and desires quickly and satisfactorily, so every restaurant owner is required to adapt and improve their service strategy in order to cope with the increasing number of orders [1], [2]. Almost all processes are now being directed towards digitization, including service processes [3]. Self-order kiosk (SOK) is one form of the intended service digitization. Self Order Kiosk (SOK) is order processing machine [4]. Developing the SOK machine application is important to increase customer satisfaction [5]. Each SOK machine, equipped with a state-of-the-art touchscreen, displays a variety of menu options, including food, drinks, snacks, and ice cream. When customers place orders through these machines, their orders are sent directly to the kitchen monitor. This allows kitchen staff to immediately prepare and serve the orders quickly and accurately, reducing customer waiting times. However, there have been several complaints from customers about the ordering process using the SOK machines, indicating that there is still room for improvement in the service. The Technology Acceptance Model (TAM) is a method designed to examine user attitudes towards technology, particularly in the context of information systems [6]. This model focuses on two main variables that influence technology acceptance by users: perceived usefulness and perceived ease of use [7]. TAM assumes that these two factors are crucial in predicting the extent to which technology will be accepted and effectively used by users [8].

There are several multivariate methods available to analyze the variables in the Technology Acceptance Model (TAM) for addressing existing problems. These methods include Structural Equation Modeling (SEM), Smart Partial Least Squares (Smart PLS), and Generalized Structured Component Analysis (GSCA) [9], [10], [11]. SEM, an early multivariate method, typically requires a large sample size of at least 100 and relies heavily on established references for the variables studied [12]. However, SEM's limitations with smaller samples and fewer reference variables are mitigated by Smart PLS, which is more flexible under these conditions [13]. GSCA, while another option, faces challenges due to the limited availability of comprehensive software tools. Often, the only access to GSCA tools is through incomplete versions found on open sources like Google, which also lack adequate documentation and references.

Given these issues, researchers are increasingly interested in using the Partial Least Squares-Structural Equation Modeling (PLS-SEM) method in this research. PLS-SEM is an analysis technique that enables the simultaneous testing of relationships among multiple dependent and independent variables. Each variable can be a factor or a construct composed of several indicators. Combining factor analysis and path analysis, PLS-SEM offers an integrated approach that may assist management in enhancing customer satisfaction by improving acceptance of new technologies such as the SOK system [14], [15].

## B. Research Method

This study focuses on one of the fast-food outlets in Surabaya. Researchers conducted a survey using a questionnaire that was directly distributed to collect data from users of the SOK e-kiosk system. The questionnaire contains a series of written questions that respondents answer according to provided instructions. The

aim is to explore consumer assessments of the system. The questionnaire targeted two age groups: teenagers aged 15-17 years and adults aged 18-60 years. Once data collection is complete, the results of the questionnaire will be filtered and analyzed to assess the level of user satisfaction with the adoption of this new technology.

**Table 1.** Demographic Data Results

| No | Characteristics | Item | Total | Percentage |
|---|---|---|---|---|
| 1 | Gender | Male | 36 | 36% |
| | | Female | 64 | 64% |
| 2 | Age | < 20 years old | 19 | 19% |
| | | 20 – 30 years old | 61 | 61% |
| | | 30 – 40 years old | 14 | 14% |
| | | ≥ 40 years old | 6 | 6% |
| 3 | Job | Student | 52 | 52% |
| | | Government employees | 13 | 13% |
| | | Private sector employee | 20 | 20% |
| | | Businessman | 9 | 9% |
| | | Other | 6 | 6% |
| 4 | Last time at Mcdonals | < 1 week | 22 | 22% |
| | | < 2 week | 30 | 30% |
| | | 1 – 2 month | 28 | 28% |
| | | 3 – 4 month | 17 | 17% |
| | | 6 month | 3 | 3% |
| 5 | Assesment the use of self order kiosk system | Very good | 17 | 17% |
| | | Good | 28 | 28% |
| | | Pretty Good | 40 | 40% |
| | | Not Good | 10 | 10% |
| | | Don't Know | 5 | 5% |

## C. Result and Discussion

### 1. Measurement Model Analysis (Outer Model)

### a. Construct Reliability and Validity

Composite reliability assesses the reliability of indicators within a variable. A variable is considered to meet composite reliability if its value exceeds 0.7.

**Table 2.** Composite Reliability

| Variable | Composite Reliability |
|---|---|
| User satisfaction | 0,905 |
| Behavior of Recipients of SOK Technology | 0,833 |
| Perception of the Usefulness of the SOK Machine | 0,905 |
| Perception of Ease of Use of SOK | 0,785 |
| Attitudes towards Behavior | 0,728 |

It is known that the composite reliability value for all research variables is > 0.7, indicating that each variable has achieved high reliability.

In addition to examining the cross-loading value, discriminant validity can also be assessed using other methods, such as evaluating the average variance extracted (AVE) value for each indicator. A desirable threshold for a good model is an AVE

value > 0.5, indicating that latent variables can explain, on average, more than half of the variance in the indicators.

**Table 3.** Average Variance Extracted (AVE)

| Variable | Average Variance Extracted (AVE) |
|---|---|
| User satisfaction | 0,763 |
| Behavior of Recipients of SOK Technology | 0,638 |
| Perception of the Usefulness of the SOK Machine | 0,763 |
| Perception of Ease of Use of SOK | 0,554 |
| Attitudes towards Behavior | 0,533 |

The AVE values for X1, X2, X3, Y1, and Y2 are all > 0.5, indicating strong discriminant validity for each variable.

**b. Discriminant Validity**

In the discriminant validity test, cross-loading values are utilized. An indicator is deemed to satisfy discriminant validity if its cross-loading value on the variable is the highest among all variables.

**Table 4.** Cross Loading

| | X1 | X2 | X3 | Y1 | Y2 |
|---|---|---|---|---|---|
| X1.1 | 0,736 | | | | |
| X1.2 | 0,929 | | | | |
| X1.3 | 0,940 | | | | |
| X2.1 | | 0,702 | | | |
| X2.2 | | 0,902 | | | |
| X2.3 | | 0,820 | | | |
| X3.1 | | | 0,706 | | |
| X3.2 | | | 0,961 | | |
| X3.3 | | | 0,785 | | |
| Y1.1 | | | | 0,805 | |
| Y1.2 | | | | 0,855 | |
| Y1.3 | | | | 0,835 | |
| Y2.1 | | | | | 0,749 |
| Y2.2 | | | | | 0,905 |

It is known that each indicator in the research variable has a cross-loading value higher on the variable it represents compared to its loading on other variables, meeting the accuracy criterion of > 0.7.

**2. Structural Model Analysis (Inner Model)**

**a. R-Square**

**Table 5.** Nilai R-Square

| Variabel | R Square | R Square Adjusted |
|---|---|---|
| User satisfaction | 0,399 | 0,393 |
| Behavior of Recipients of SOK Technology | 0,595 | 0,582 |

R-Square measures the proportion of variation in the endogenous variable that can be explained by the exogenous variable. It serves as a useful indicator for assessing the goodness of fit of a model.

**b. Q-Square ($Q^2$)**

**Table 6.** Nilai Q-Square

| | Q-Square |
|---|---|
| User satisfaction | 0,297 |
| Behavior of Recipients of SOK Technology | 0,355 |

The evaluation of the inner model can be assessed using the $Q^2$ or Q-Square predictive relevance value. For structural models, this metric measures the prediction accuracy of the observed values generated by the model. A Q-Square value > 0 indicates the model has predictive relevance, while a Q-Square value ≤ 0 suggests a lack of predictive relevance.

**c. Uji GoF (Goodness of fit)**

The Goodness of Fit (GoF) test is employed in model evaluation to assess the overall fitness of the created model. This evaluation involves testing using parameters based on the Goodness of Fit Index value. The calculation of the Goodness of Fit test is performed manually and entails consideration of parameters such as the Average Variance Extracted (AVE) and $R^2$ values.

$$GoF = \sqrt{AVE\ X\ R2} \quad (1)$$

AVE : Average value AVE

$R^2$ : Average value of the coefficient of determination

$$GoF = \sqrt{\frac{0,763 + 0,638 + 0,763 + 0,554 + 0,533}{5} x \frac{0,399 + 0,595}{2}}$$

$GoF$ = 0,568

The GoF results yielded a value of 0.568, categorizing the entire SEM-PLS model as highly suitable. This indicates that the data adequately explains the relationships between the studied variables, rendering the research model acceptable for hypothesis testing.

**3. Hypothesis test**

**a. Direct Effect**

**Table 7.** Path Coefficient

| | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values | T-table | Hypothesis |
|---|---|---|---|---|---|
| SOK Technology Acceptance Behavior (Y1) -> User Satisfaction (Y2) | 0,556 | 8,885 | 0,000 | 1,99 | H1 Accepted |
| Perceived Usefulness of SOK Machines (X1) -> SOK Technology | 0,448 | 5,964 | 0,000 | 1,99 | H1 Accepted |

| | | | | | |
|---|---|---|---|---|---|
| Acceptance Behavior (Y1) | | | | | |
| Perceived Ease of Use of SOK (X2) -> SOK Technology Acceptance Behavior (Y1) | 0,440 | 4,999 | 0,000 | 1,99 | H1 Accepted |
| Attitude towards Behavior (X3) -> SOK Technology Acceptance Behavior (Y1) | 0,100 | 0,811 | 0,418 | 1,99 | H1 Rejected |

The path coefficient value, indicated by the T-Statistics score, signifies the significance level in hypothesis testing. For a two-tailed hypothesis, the path coefficient score must exceed 1.99. Based on testing the hypothesis stated above using the bootstrapping analysis method in SmartPLS version 3.0 software [16], it can be seen that:

(1)The latent variable Perception of the Usefulness of the SOK Machine (X1) on SOK Technology Acceptance Behavior (Y1) is found to have a significant effect. This determination is based on the results of the hypothesis test, which indicate that T-Statistics > T-Table, specifically 5.964 > 1.99, with a significance of 0.000 < 0.05. Therefore, H1 is accepted, and Ho is rejected, affirming the results of H1 in this study.

(2)The latent variable Perception of Ease of Use of SOK (X2) on SOK Technology Acceptance Behavior (Y1) was found to have a significant effect. This conclusion is based on the results of the hypothesis test, which revealed that T-Statistics > T-Table, specifically 4.999 > 1.99, with a significance of 0.000 < 0.05. Therefore, H1 is accepted, and Ho is rejected, confirming the results of H2 in this study.

(3)The latent variable Attitude towards Behavior (X3) on SOK Technology Acceptance Behavior (Y1) was found to have no significant effect. This conclusion is based on the results of the hypothesis test, which indicated that T-Statistics > T-Table, specifically 0.811 < 1.99, with a significance of 0.418 > 0.05. Therefore, H1 is rejected, and Ho is accepted, reflecting the results of H3 in this study. (4)The latent variable SOK Technology Acceptance Behavior (Y1) on User Satisfaction (Y2) is found to have a significant effect. This determination is based on the results of the hypothesis test, which indicate that T-Statistics > T-Table, specifically 8.885 > 1.99, with a significance of 0.000 < 0.05. Therefore, H1 is accepted, and Ho is rejected, confirming the results of H4 in this study.

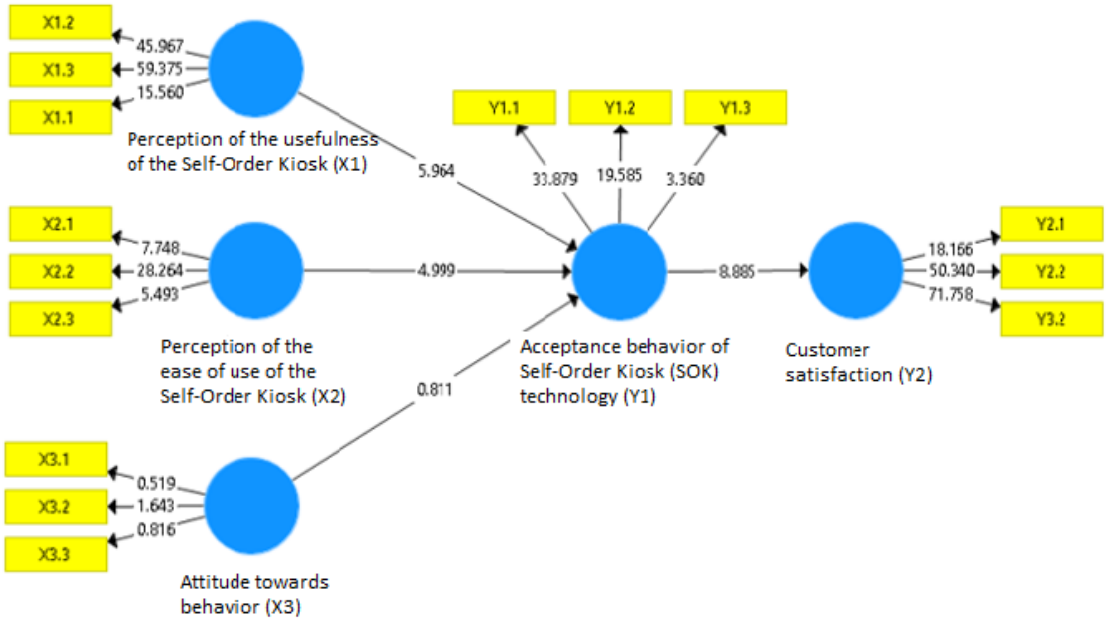


**Figure1.** Inner Model Partial Least Square (PLS)

**b. Indirect Effects**

**Table 8.** Indirect Effect

| | Original Sample (O) | T Statistics (\|O/STDEV\|) | P Values | T-table | Hipotesis |
|---|---|---|---|---|---|
| Perception of SOK Machine Usability (X1) -> User Satisfaction (Y2) | 0,249 | 4,043 | 0,000 | 1,99 | H1 Accepted |
| Perceived Ease of Use of SOK (X2) -> User Satisfaction (Y2) | 0,244 | 4,429 | 0,000 | 1,99 | H1 Accepted |
| Attitude towards Behavior (X3) -> User Satisfaction (Y2) | 0,056 | 0,817 | 0,414 | 1,99 | H1 Rejected |

Based on testing the hypothesis stated above using the bootstrapping analysis method in SmartPLS version 3.0 software, it can be seen that:

(1) The latent variable Perception of Usefulness of the SOK Machine (X1) on User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1) was declared to have a significant effect because the results of the hypothesis test showed that T-Statistics < T-Table or 4.043 > 1.99 with a significance of 0.000 < 0.05, meaning that H1 is accepted and Ho is rejected, because both the first path (direct) and the second path (indirect) have a significant effect. Thus, it can be said that if there is a change in the Perception of Usefulness of the SOK Machine (X1), it will significantly influence User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1).

(2)The latent variable Perception of Ease of Use of SOK (X2) on User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1) was found to have a significant effect. This conclusion was drawn from the results of the

hypothesis test, which indicated that T-Statistics < T-Table, or 4.429 > 1.99, with a significance of 0.000 < 0.05. Consequently, H1 is accepted and Ho is rejected, as both the direct and indirect paths exhibit a significant effect. Therefore, it can be concluded that any change in the Perception of Ease of Use of SOK (X2) will significantly influence User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1).

(3)The latent variable Attitude towards Behavior (X3) on User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1) was found to have no significant effect. This conclusion was drawn from the results of the hypothesis test, which indicated that T-Statistics < T-Table, or 0.817 < 1.99, with a significance of 0.414 > 0.05. Consequently, H1 is rejected and Ho is accepted, as neither the direct nor the indirect paths exhibit a significant effect. Therefore, it can be concluded that any change in Attitude towards Behavior (X3) will not significantly influence User Satisfaction (Y2) through SOK Technology Acceptance Behavior (Y1).

### 4. Form of relationship between variables X and Y

Based on the test results above, the form of relationship between variable X, namely the perception of the usefulness of the SOK machine, the perception of the ease of use of the SOK machine, and attitude toward behavior, yielded a value of 11.774. For variable Y, namely technology acceptance behavior and user satisfaction, the value obtained was 8.885.

## D. Conclusion

The results of research on user acceptance of the Self Order Kiosk (SOK) Application at McDonald's indicate that the majority of respondents provided a positive assessment. Out of the 100 respondents surveyed, 40 people (40%) stated that the application was quite good, while 28 people (28%) found it good, and 17 people (17%) considered it very good. Conversely, 10 people (10%) expressed dissatisfaction with the application, and 5 people (5%) did not provide an assessment (don't know). Overall, these findings suggest that user acceptance of the SOK Application at McDonald's generally falls within the 'quite good' category. The research results led to the conclusion that the perception of the usefulness and ease of use of the Self Order Kiosk (SOK) machine significantly influences the acceptance behavior of SOK technology at McDonald's Graha Family Surabaya. This suggests that when users perceive the SOK machine as useful and easy to use, they are more likely to accept and adopt the technology during their restaurant experience.

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