



Analysis of Information System Quality and Customer Satisfaction Using the PIECES Framework at Warkop Abas Jakarta

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ABSTRACT

Advancements in information technology have encouraged business operators, including micro, small, and medium-sized enterprises (MSMEs), to leverage information systems to enhance service quality and customer satisfaction. Warkop Abas, a culinary business in East Jakarta, utilizes an information system to support its operations; however, the quality of this system has never been systematically evaluated. This study aims to analyze the information system's quality based on the six PIECES dimensions (Performance, Information, Economics, Control, Efficiency, and Service) and their impact on customer satisfaction, both simultaneously and partially, while identifying the most dominant dimension. A quantitative approach was employed, utilizing a survey of 1,000 Warkop Abas customers; data were analyzed using IBM SPSS Statistics through validity, reliability, and multiple linear regression tests. The results indicate that all statement items were valid and all variables were reliable (Cronbach's Alpha > 0.70). Simultaneously, the six PIECES dimensions significantly influenced customer satisfaction ($F = 1069.263$; $p = 0.000$), with an R-square value of 0.866. Individually, the Performance, Information, Economics, Control, and Efficiency dimensions showed a significant impact, whereas the Service dimension did not. The Efficiency dimension emerged as the most dominant factor (Beta = 0.272) influencing customer satisfaction at Warkop Abas.

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1. Introduction

The rapid development of information systems has prompted various organizations to utilize them as the backbone of their business operations. Information systems are no longer merely administrative tools; rather, they are strategic components that

determine a company's competitiveness in the digital era. High-quality information systems can enhance operational efficiency, accelerate decision-making, and improve customer service, ultimately contributing to customer satisfaction, a key indicator of corporate success [1], [2], [5], [6]. Warkop Abas, located in East Jakarta, is an MSME that utilizes an information system to support its operational activities and customer service.

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Preliminary observations revealed indications of issues such as delays in information delivery, errors in order recording, and a lack of insight into customer satisfaction regarding the system currently in use. These conditions make Warkop Abas a relevant subject for study to determine the extent to which the implemented information system meets customer needs and expectations. The PIECES method, developed by James Wetherbe, is a comprehensive approach for analyzing information system quality, encompassing six assessment dimensions: Performance, Information, Economics, Control, Efficiency, and Service [3], [4], [7], [8]. However, research applying the PIECES method within the culinary MSME sector remains limited; thus, this study was conducted to address this gap [9], [10], [13], [14]. Based on the description above, this study aims to: (a) analyze the quality of the Warkop Abas information system based on the PIECES dimensions; (b) analyze the simultaneous influence of the PIECES dimensions on customer satisfaction; (c) analyze the partial influence of the PIECES dimensions on customer satisfaction; and (d) determine which PIECES dimension most dominantly influences customer satisfaction at Warkop Abas.

2. Literature Study

Information system quality is an important factor in determining the effectiveness of technology-based services and user satisfaction. The DeLone and McLean Information Systems Success Model identifies system quality, information quality, use, user satisfaction, individual impact, and organizational impact as important dimensions for evaluating information system success. The updated model subsequently incorporated service quality and net benefits, emphasizing the relationships among system quality, information quality, service quality, system use, user satisfaction, and organizational benefits [2]. These theoretical perspectives indicate that an information system should not only function technically but should also provide useful information and reliable services that meet user expectations [15], [16]. The PIECES framework provides another practical approach for evaluating information systems from operational and user-oriented perspectives. The framework consists of six dimensions: Performance, Information, Economics, Control, Efficiency, and Service [3]. Performance evaluates the system's ability to respond effectively and reliably to user requirements; Information concerns the quality and usefulness of information produced by the system; Economics considers the costs and benefits associated with the system; Control concerns security and control mechanisms; Efficiency evaluates the optimal utilization of resources and system processes; and Service concerns the quality of services delivered to users. The usefulness of these dimensions has been demonstrated in various empirical studies. Belluano et al. [11] applied the framework to a library information system to assess user satisfaction and identify system weaknesses. Agustina [12] applied PIECES to an ERP information system, demonstrating its usefulness for evaluating system implementation from the user perspective.

3. Method

This study employed a quantitative research approach using a survey method to describe and analyze information system quality and its influence on customer satisfaction based on numerical data collected through questionnaires. The study population consisted of active Warkop Abas customers who had used the digital service system. Respondents were selected using a purposive sampling technique based on the criterion that they had used the Warkop Abas digital system at least once within the three months preceding data collection.

Data were collected through questionnaires distributed using Google Forms, interviews, and direct observation at Warkop Abas, located at Jalan Dermaga Raya No. 36B, Duren Sawit District, East Jakarta. Data collection was conducted from January 6 to June 10, 2026. A total of 1,000 valid respondent responses were obtained and used for analysis.

The questionnaire consisted of 30 statement items covering the six PIECES dimensions—Performance (X1), Information (X2), Economics (X3), Control (X4), Efficiency (X5), and Service (X6)—as independent variables, along with Customer Satisfaction (Y) as the dependent variable. All items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Data analysis was performed using IBM SPSS Statistics and consisted of three main stages. First, a validity test was conducted to assess whether each questionnaire item appropriately measured the intended construct. The validity of each item was determined by comparing the calculated correlation coefficient (*r*-count) with the critical *r*-table value, with an item considered valid when *r*-count exceeded *r*-table. Second, a reliability test was conducted using Cronbach's Alpha to evaluate the internal consistency of the questionnaire. An instrument was considered reliable when the Cronbach's Alpha coefficient exceeded 0.70. Third, multiple linear regression analysis was conducted to examine the influence of the six PIECES dimensions on customer satisfaction. The simultaneous influence of the independent variables was evaluated using the *F*-test, while their partial influence was examined using the *t*-test. The coefficient of determination (*R*²) was also calculated to determine the proportion of variation in customer satisfaction explained by the PIECES dimensions. The dimension with the strongest influence was identified based on the highest Standardized Coefficients (Beta) value.

The multiple linear regression model used in this study is expressed as follows (1):

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e \quad (1)$$

where *Y* represents Customer Satisfaction; *a* represents the constant; *b*₁–*b*₆ represent the regression coefficients; *X*₁–*X*₆ represent Performance, Information, Economics, Control, Efficiency, and Service, respectively; and *e* represents the error term.

4. Result and Discussion

4.1. Validity and Reliability Test Results

The validity test results for all statement items across the seven research variables show correlation coefficients that are all greater

than the r-table value, with significance levels below 0.05; consequently, all items are deemed valid. A summary of the validity and reliability test results is presented in [Table 1](#).

Table 1 - Validity and Reliability Test Results

Variable	Items	Correlation range	Cronbach's Alpha	Description
Performance (X1)	5	0,807 - 0,871	0,807	Valid & Reliable
Information (X2)	5	0,691 - 0,858	0,826	Valid & Reliable
Economics (X3)	5	0,770 - 0,845	0,873	Valid & Reliable
Control (X4)	5	0,747 - 0,892	0,883	Valid & Reliable
Efficiency (X5)	5	0,771 - 0,878	0,888	Valid & Reliable
Service (X6)	5	0,778 - 0,865	0,877	Valid & Reliable
Satisfaction (Y)	5	0,692 - 0,850	0,835	Valid & Reliable

The table presents the results of the validity and reliability tests for the seven research variables, namely Performance (X1), Information (X2), Economics (X3), Control (X4), Efficiency (X5), Service (X6), and Customer Satisfaction (Y). Each variable was measured using five questionnaire items, resulting in a total of 35 items. The item correlation values ranged from 0.691 to 0.892, indicating that all items met the validity requirements because the correlation coefficients were sufficiently high. The Performance variable had correlation values ranging from 0.807 to 0.871, Information from 0.691 to 0.858, Economics from 0.770 to 0.845, Control from 0.747 to 0.892, Efficiency from 0.771 to 0.878, Service from 0.778 to 0.865, and Customer Satisfaction from 0.692 to 0.850. These results indicate that all questionnaire items were valid for measuring their respective constructs.

The reliability test was assessed using Cronbach's Alpha, with values ranging from 0.807 to 0.888 across all variables. Performance obtained an Alpha value of 0.807, Information 0.826, Economics 0.873, Control 0.883, Efficiency 0.888, Service 0.877, and Customer Satisfaction 0.835. Since all Cronbach's Alpha values exceeded the commonly accepted threshold of 0.70, the questionnaire can be considered reliable and demonstrates good internal consistency. Therefore, all 35

questionnaire items across the seven variables were declared valid and reliable and were suitable for further statistical analysis, including multiple linear regression to examine the relationship between the PIECES dimensions and customer satisfaction.

3.2. Multiple Linear Regression Analysis Results

The results of the multiple linear regression analysis show a correlation coefficient (R) of 0.931, indicating a very strong relationship between the six PIECES dimensions and customer satisfaction. The R Square (R²) value of 0.866 indicates that 86.6% of the variation in customer satisfaction can be explained by the six PIECES dimensions, namely Performance, Information, Economics, Control, Efficiency, and Service. The remaining 13.4% is explained by other factors not included in the regression model. Furthermore, the simultaneous significance test (F-test) produced an F-value of 1,069.263 with $p < 0.001$, which is below the significance level of 0.05. This result indicates that the six PIECES dimensions simultaneously have a statistically significant influence on customer satisfaction at Warkop Abas.

The results of the partial significance test (t-test) for each PIECES dimension are presented in [Table 2](#).

Table 2 - Partial Test Results (t-test)

Variabel	Standardized Beta	Sig.	Description
Performance (X1)	0,153	0,000	Significant
Information (X2)	0,219	0,000	Significant
Economics (X3)	0,257	0,000	Significant
Control (X4)	0,182	0,000	Significant
Efficiency (X5)	0,272	0,000	Significant
Service (X6)	-0,040	0,075	Not Significant

The partial regression analysis presented in Table 2 shows that five of the six PIECES dimensions have a statistically significant influence on customer satisfaction at Warkop Abas. Performance (X1) has a Standardized Beta coefficient of 0.153 with $p < 0.001$, indicating a positive and significant influence on customer satisfaction. Information (X2) also has a positive and significant influence, with a Beta coefficient of 0.219 and $p < 0.001$. Similarly, Economics (X3) has a Beta coefficient of 0.257 with $p < 0.001$, while Control (X4) has a Beta coefficient of 0.182 with $p < 0.001$. These findings indicate that improvements in system performance, information quality, economic benefits, and system control are associated with higher levels of customer satisfaction.

Efficiency (X5) has the highest positive Standardized Beta coefficient (0.272) and a significance value of $p < 0.001$, indicating that Efficiency has the strongest influence on customer satisfaction among the six PIECES dimensions. In contrast, Service (X6) has a Standardized Beta coefficient of -0.040 with a significance value of 0.075, which is greater than 0.05. Therefore, Service does not have a statistically significant influence on customer satisfaction in this model. Overall, the results indicate that Performance, Information, Economics, Control, and Efficiency significantly influence customer satisfaction, whereas Service does not. Based on the magnitude of the Standardized Beta coefficients, Efficiency is the PIECES dimension with the strongest influence on customer satisfaction at Warkop Abas.

5. Conclusion

Based on the results of the analysis of information system quality and customer satisfaction using the PIECES method at Warkop Abas, it can be concluded that all statement items in the research instrument are valid and reliable, with Cronbach's Alpha values exceeding 0.70. The six PIECES dimensions—Performance, Information, Economics, Control, Efficiency, and Service—simultaneously have a statistically significant influence on customer satisfaction, as indicated by an F-value of 1,069.263 and $p < 0.001$. The coefficient of determination (R^2) of 0.866 indicates that the six PIECES dimensions collectively explain 86.6% of the variation in customer satisfaction, while the remaining 13.4% is explained by factors outside the model.

The partial test results indicate that Performance, Information, Economics, Control, and Efficiency have a statistically significant positive influence on customer satisfaction, whereas the Service dimension does not have a statistically significant influence. Among the six PIECES dimensions, Efficiency is the strongest factor influencing customer satisfaction, with the highest Standardized Beta coefficient of 0.272. This finding indicates that improvements in the efficiency of the information system are associated with higher customer satisfaction at Warkop Abas.

Based on these findings, Warkop Abas management is recommended to prioritize information system improvements that enhance operational efficiency, particularly by improving point-of-sale (POS) processing speed and standardizing cashier training to ensure consistent system utilization. Future research could

extend this study by integrating additional variables, such as Service Quality and Store Atmosphere, to provide a broader understanding of factors affecting customer satisfaction. Future researchers could also employ Structural Equation Modeling using the Partial Least Squares approach (SEM-PLS) to examine more complex relationships and potential mediating effects among the variables.

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