



## Implementation of the PIECES Framework as an Evaluation of Student Satisfaction Levels with the Use of STARS UKSW

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### Abstract

This research aims to evaluate the level of student satisfaction with the use of the Academic Information System (STARS) at Satya Wacana Christian University (UKSW) using the PIECES (Performance, Information, Economy, Control, Efficiency, and Service) framework. The research method used was a survey with a structured questionnaire distributed to a sample of students from various study programs at UKSW. The collected data was analyzed using descriptive statistical techniques and the PIECES Framework to measure STARS performance from the user's perspective. The research results show that although STARS has provided good performance in several aspects, there are areas that require improvement to increase user satisfaction. The implication of this research is the importance of using a framework such as PIECES in evaluating information systems to thoroughly understand user needs and perceptions, as well as providing a strong basis for improvement and development of better systems in the future.

**Keywords:** PIECES Framework, Higher Education, Information Systems, Website, STARS, Students, Satya Wacana Christian University.

### 1. INTRODUCTION

Website-based information systems are a representation of information technology which is a medium for obtaining information [1]. One of the advantages of a website-based information system is that it makes it easier to present data that can be accessed by all internet users [2]. One application of a website-based information system is the UKSW STARS information system.

STARS (Student's Activity Record System) is a system used to carry out management processes that focus on the student affairs sector at Satya Wacana Christian University (UKSW). STARS is a web-based information system that is used to record various activities carried out within the UKSW environment [2].



STARS contains a summary of all internal student activities, along with supporting documents as evidence or support for the implementation of the activities. STARS has several sub-systems that are still being developed.

The use of information systems requires regulation and management which is called a management information system [3]. Information system management activities include various activities such as system recording, maintenance, and measuring the performance of a system. To find out whether the system components are running according to their objectives, an evaluation process is carried out. The aim of the system evaluation process is to provide an assessment of system utilization, technical capabilities and operational implementation [4]. In this research, an evaluation process was carried out on the SWCU STARS service system to find out whether the system met the needs of its users, namely students.

Based on the observations made, it was found that the UKSW STARS information system had never been evaluated before, so the level of success of the system was not yet known. The success of a system can be assessed from various factors, one of which is the level of user satisfaction. Thus, it is necessary to test information systems so that the level of success in the implementation process can be determined with measurements based on user satisfaction.

When evaluating an information system, it can be done using several analysis models. In this research, system evaluation was carried out using the PIECES Framework analysis model. The PIECES method is a framework method used to measure whether the variables applied are good or not and whether the information system is in service quality [5]. By using this framework interesting ideas are created that can be taken into account when designing the system. There are six analysis variables, namely, performance, information, economics, control and security, efficiency, and service [6].

In previous research with the title 'analysis of user satisfaction of the Penajam Community Lazada application using the PIECES framework method', the results of the researchers showed that based on calculations using a Likert scale the users were satisfied with the use of the application [7]. In research with the title "Application of the PIECES framework method as an evaluation of the level of satisfaction of users of the Tokopedia application" which aims to measure the relationship between system performance evaluation using the PIECES framework method on the Tokopedia application. The results of the Likert scale show an average value of 3.96, so service users are categorized as satisfied with Tokopedia's information system services [8].

Another research with the aim of finding out the level of student satisfaction with SIKAD and knowing the advantages and disadvantages of the system. The results

of this research show that all variables from the PIECES method have an influence on user satisfaction [9].

By using the PIECES analysis method as an analytical measuring tool, the system under study will receive special attention in detail and thoroughly, so that the strengths and weaknesses of the system can be identified and will later be used as a reference for the further progress of the organization or company[10]. This became the impetus for researchers to raise the title "Analysis of user satisfaction levels of the UKSW STARS service information system using the PIECES Framework".

Performance, information, control, economics, efficiency, Service (PIECES), is a tool for analyzing computer-based information systems, which consists of important points that are useful as guidelines for analyzing the system. In short, PIECES contains important things in evaluating systems, such as performance, information, control, economics, efficiency, and service [11]. By using PIECES as a system analysis tool, a detailed and comprehensive system will receive special attention, so that the strengths and weaknesses of the system can be identified which will later be used as a reference for the progress of the company or organization [12]. The results of the PIECES analysis are documents of system weaknesses which become recommendations for improvements that must be made to the system that will be developed further to improve the previous system.

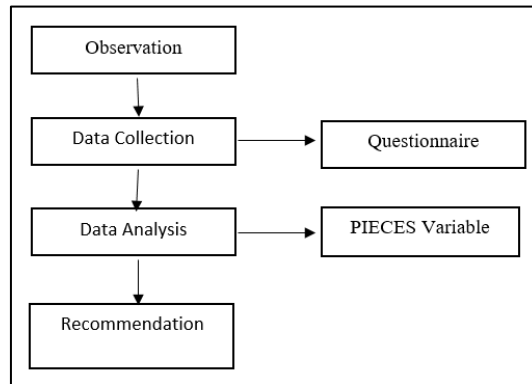
A system needs to find existing problems so that the system can run well and achieve the expected goals. To identify problems, it is necessary to analyze information, economic, security, efficiency, and service performance. This method is known as PIECES analysis, through this method several main problems will be obtained.

## 2. METHODS

This research uses a quantitative descriptive method, namely research carried out based on factual data, while the aim of this research is to get a clear picture of a situation based on data obtained through presenting, collecting, and analyzing [13]. This research aims to find out about student satisfaction using the STARS-UKSW system. There are several stages used in this research, including:

The first stage is to observe the system to find out the main problems with the STARS-UKSW service system. Then the second stage is carrying out a primary data search process by distributing questionnaires in the form of a Google form which will be filled in randomly by students using the STARS-UKSW service. After the data is collected, the third stage is data analysis using the PIECES Framework variables. The collected data is processed according to the framework

variables so that it will produce an accurate average satisfaction value regarding the level of satisfaction with using the STARS-UKSW system services.



**Figure 1.** Research Stages

## 2.1. Population and Sample

The population and sample used by researchers in this research were students at Satya Discourse Christian University who used the UKSW STARS service. The sample collection method is using random sampling, a method that determines respondents randomly from the population [14]. Respondents will be given a questionnaire to fill out according to their experience when using STARS-UKSW services.

## 2.2. Method of collecting data

The data collection method is the initial stage used to obtain appropriate information, while the data collection methods used by researchers include:

### 1. Observation

Data collection was carried out at Satya Wacana Christian University, the focus of research observations was users and use of the STARS-UKSW service application. The data taken in this research includes application flow, application features, and application usage ratings. The purpose of carrying out this observation is to obtain actual information in the field.

### 2. Questionnaire

Questionnaires are carried out by giving a set of written statements or questions to respondents. The use of a questionnaire is an appropriate method for research with a large number of respondents using a random sampling method. The questions used in the questionnaire were obtained from the PIECES Framework domain.

The instrument used to collect research data was a Likert scale. The Likert scale is used to calculate the value of the questionnaire results. The Likert scale is used to measure a person's perception or opinion about a condition [15]. The options for each score are as follows:

**Table 1.** Questionnaire Answer Options

Answer	Criteria	Score
Strongly agree	SS	5
Agree	S	4
Neutral	N	3
Don't agree	T.S	2
Strongly disagree	STS	1

Based on the table above, it is a Likert scale with a score ranging from 1 to five with the score categories coming from the questionnaire that will be answered by the respondent.

### 2.3. Data Analysis

The PIECES framework is a method used for evaluating systems, particularly in the context of information systems and technology. It stands for Performance, Information, Economy, Control, Efficiency, and Services. Each of these elements represents a dimension that can be assessed to evaluate the effectiveness and efficiency of a system. When implementing the PIECES framework in this research, it suggests that the authors are utilizing this framework to evaluate the satisfaction levels of students using STARS UKSW.

In research to analyze student satisfaction with the STARS-UKSW application service, the PIECES framework method was used. PIECES is a framework used to measure whether the variables applied are good or not and whether the information system is of service quality [16]. Researchers chose the PIECES analysis method to measure whether students were satisfied with information system services or not. There are six variables in PIECES that are used to analyze STARS services as follows [17]:

1. Performance  
This variable aims to analyze the performance or performance of the system.
2. Information  
The analysis aims to find out how much and how clear the information is obtained.
3. Economics  
This analysis is used to determine whether the system is appropriate for the costs incurred by the information institution.
4. Control and Security

The analysis aims to determine the level of difficulty and security when using the application.

5. Efficiency

The analysis aims to find out whether the variables used are efficient or not with little input but produce satisfactory output.

6. Service

Aims to determine the quality of service when problems or disruptions occur.

After collecting the data obtained from the questionnaire results, it will then be processed by analyzing the data. The following is the calculation method used in PIECES analysis:

$$RK = JSK / JK \quad (1)$$

Information:

RK = average satisfaction

JSK = total questionnaire score

JK = number of questionnaires

Based on the formula above, the average satisfaction score is generated from the total questionnaire scores divided by the number of questionnaires in each variable. The following are the assessment characteristics for the PIECES Framework:

**Table 2.** Research Measuring Scale

Scale	Assessment category
4.92-5	Very satisfied
3.4- 4.91	Satisfied
2.6-3.39	Neutral
1.8-2.59	Not satisfied
1.00-1.79	Very dissatisfied

The table above explains the characteristics of the assessment based on a Likert scale with scores ranging from 1 to 5 which are derived from the research framework.

### 3. RESULTS AND DISCUSSION

#### 3.1 STARS (Student's Activity Record System)

STARS (Student's Activity Record System) is a system used to carry out management processes that focus on the student affairs sector at Satya Wacana Christian University (UKSW). STARS is a web-based information system that is

used to record various activities carried out within the UKSW environment. STARS contains a summary of all internal student activities, along with supporting documents as evidence or support for the implementation of activities. STARS has several sub-systems that are still being developed. Figure 2 illustrates the STARS UKSW System used by students and lecturers to document student activities in both professional and humanistic skill domains.

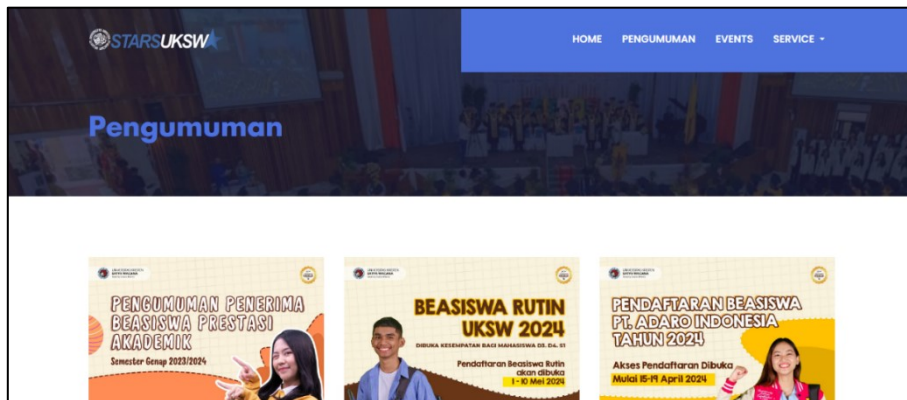


Figure 2. STARS Information System

### 3.2 Data Analysis Based on the PIECE Framework

#### 1. Performance

Table 3. Performance Question

No	Question	Respondent				
		SS	S	N	TS	STS
1	The STARS information system is easy to access	63	29	7	1	0
2	The menu available on STARS displays information that is appropriate to what is used	40	22	12	26	0
3	When the systems are being used simultaneously, system performance remains stable	41	37	18	3	1
Amount		144	88	37	30	1

$$RK = (144 \times 5) + (88 \times 4) + (37 \times 3) + (30 \times 2) + (1 \times 1)$$

$$144 + 88 + 37 + 30 + 1$$

$$= 1.244$$

$$300$$

$$= 4.14$$

Based on the average number of satisfaction levels on the performance variable, a FINAL value of 4.14 was obtained. In the PIECES assessment characteristics, a value of 4.14 is included in the SATISFIED category. This means that the performance variable shows that the STARS information system plays a good role in the performance services implemented by the STARS information system.

## 2. Information

**Table 4.** Information Question

No	Question	Respondent				
		SS	S	N	T.S	STS
1	The information displayed by STARS is complete, precise, and accurate	48	38	11	3	0
2	The information on STARS can be understood and studied easily	50	40	7	3	0
3	The data in STARS is easy to access and use as needed	40	44	13	3	0
Amount		138	122	31	9	0

$$RK = \frac{(138*5) + (122*4) + (31*3) + (9*2) + (0*1)}{138 + 122 + 31 + 9 + 0}$$

$$= \frac{1.074}{300}$$

$$= 3.58$$

Based on the average level of satisfaction in the information variable, a FINAL value of 3.58 was obtained. In the PIECES assessment characteristics, the value of 3.58 is included in the SATISFIED category. So it can be concluded that the STARS academic information system on the information variable provides satisfactory results to students.

## 3. Economics

**Table 5.** Economics Question

No	Question	Respondent				
		SS	S	N	T.S	STS
1	The STARS information system reduces student costs for academic purposes	41	33	20	6	0
2	The information in STARS can speed up the completion of academic needs	47	33	13	7	0
Amount		88	66	33	13	0

$$RK = \frac{(88*5) + (66*4) + (33*3) + (13*2) + (0*1)}{88 + 66 + 33 + 13 + 0}$$

$$= \frac{829}{200}$$

$$= 4.14$$



= 4.14

Based on the average level of satisfaction on economic variables, a FINAL value of 4.14 is obtained. In the PIECES assessment characteristics, a value of 4.14 is included in the SATISFIED category. So this identifies a positive thing that students are satisfied with the STARS economic information system of Satya Wacana Christian University.

#### 4. Control and Security

**Table 6.** Control and Security Question

No	Question	Respondent				
		SS	S	N	T.S	STS
1	The security system of the STARS system is good	36	38	26		0
2	STARS has a policy regarding the use and change of passwords	36	41	22	1	0
3	Data security in STARS is guaranteed	36	43	17	1	0
Amount		108	122	65	2	0

$$RK = \frac{(108*5) + (122*4) + (65*3) + (2*2) + (0*1)}{108 + 122 + 65 + 2 + 0}$$

$$= \frac{1.227}{297}$$

$$= 4.13$$

Based on the average level of satisfaction with the control and security variables obtained a FINAL score of 4.13. In the PIECES assessment characteristics, a value of 4.13 is included in the SATISFIED category. So this identifies a positive thing that students are satisfied with the control and security of the Satya Wacana Christian University STARS information system.

#### 5. Efficiency

**Table 7.** Efficiency Question

No	Question	Respondent				
		SS	S	N	T.S	STS
1	With the STARS system, academic work is more easily completed	35	42	21	2	0
2	The STARS system provides academic benefits for students	36	47	16	1	0
Amount		71	89	37	3	0

$$RK = \frac{(71*5) + (89*4) + (37*3) + (3*2) + (0*1)}{71 + 89 + 37 + 3 + 0}$$

$$= \frac{837}{200}$$

208  
= 4.02

Based on the average number of satisfaction levels on the efficiency variable, a FINAL value of 4.02 is obtained. In the PIECES assessment characteristics, a value of 4.02 is included in the SATISFIED category. So this identifies a positive thing that students are satisfied with the efficiency of the Satya Wacana Christian University STARS information system.

#### 6. Service

**Table 8.** Service Question

No	Question	Respondent				
		SS	S	N	T.S	STS
1	The services provided by STARS are as desired	31	46	20	3	0
2	The layout and navigation of the STARS system is easy for users to understand	46	41	12	4	1
3	The features available in STARS are in line with user expectations	43	36	21	0	0
Amount		120	123	53	7	1

$$RK = \frac{(120*5) + (123*4) + (53*3) + (7*2) + (1*1)}{120 + 123 + 53 + 7 + 1}$$

600,492,159,14,1

= 1.266

304

= 4.16

Based on the average level of satisfaction in the service variable, a FINAL value of 4.16 is obtained. In the PIECES assessment characteristics, a value of 4.16 is included in the SATISFIED category. So this identifies a positive thing that students are satisfied with the STARS information system service at Satya Wacana Christian University.

### 3.3 Discussion

Based on the research results, a general description of the PIECES framework and the context of its use in this research can be obtained. An explanatory discussion regarding the research results can be added as follows: This research aims to evaluate the level of student satisfaction with the use of STARS UKSW through the application of the PIECES framework. The research results show that the implementation of STARS in the university environment received a positive response from students and lecturers.

In the performance dimension, this system is considered to have a fast response time and high reliability in providing important information related to student activities. In addition, in the information aspect, STARS UKSW has succeeded in providing accurate and easily accessible information for students and lecturers, enabling them to monitor and document academic activities effectively. Economic aspects are also an important consideration, and the research results show that the costs of implementing and maintaining STARS UKSW are comparable to the benefits obtained in increasing administrative efficiency and user satisfaction. Good control over the use of the system is also considered a positive, with an intuitive user interface and customization capabilities allowing users to tailor their experience to suit their individual needs. The efficiency of STARS UKSW was also recognized, with students reporting that they were able to complete administrative tasks more quickly and efficiently using this system compared to previous manual processes. Finally, in the service aspect, this system provides various additional services, such as online support and help resources, which help students and lecturers understand and use STARS UKSW better.

Based on the recapitulation results of the PIECES framework calculation above which consists of the variables performance, information, economics, control and security, efficiency, and service. Where all variables are in the SATISFIED category. This means that the STARS UKSW information system plays a good role in improving academic information services so that it receives positive responses from students.

**Table 9.** PIECES Recapitulation Results

Variable	Average	Category
Performance	4.14	Satisfied
Information	3.58	Satisfied
Economics	4.14	Satisfied
Control and security	4.13	Satisfied
Efficiency	4.02	Satisfied
Service	4.16	Satisfied
<b>Average</b>	<b>4.02</b>	<b>Satisfied</b>

The table above shows an average value of 4.02. Based on the PIECES Framework framework, a score of 4.02 is included in the SATISFIED category. So it can be concluded that students are categorized as satisfied with the STARS academic service information system at Satya Wacana Christian University.

#### 4. CONCLUSION

The conclusion of this research is based on the results of calculating the order of questions given to respondents using the PIECES Framework method, showing

that the average value of all variables is 4.02 in the satisfied category. The performance variable obtained a value of 4.14 in the satisfied category. The Information variable obtained a value of 3.58 in the satisfied category. The economics variable obtained a value of 4.14 in the satisfied category. The control and security variable obtained a value of 4.13 in the satisfied category. The efficiency variable obtained a value of 4.02 in the satisfied category. The service variable obtained a value of 4.16 in the satisfied category. Overall, this research shows that applying the PIECES framework as an evaluation tool can provide valuable insight into the level of user satisfaction with information systems such as STARS UKSW. By taking into account the various dimensions examined by this framework, educational institutions can make more informed decisions in improving student academic experiences and administrative efficiency.

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