

ELECTRONIC PROCUREMENT WEBSITE SERVICE QUALITY AND CUSTOMER LOYALTY USING THE PIECES METHOD, A CASE STUDY OF THE DENPASAR CITY GOVERNMENT

IG W Sanjaya

Information System, Faculty of Informatika and Computer, ITB STIKOM Bali

email: wahyu_sanjaya@stikom-bali.ac.id

Abstract

The Denpasar city government uses website facilities to display information on the procurement of goods and services. Publication of information through the website is intended to create a transparent, effective, efficient and accountable procurement system. From its initial use since 2013, this system has never been tested to determine whether the system is still in good condition. This study aims to evaluate the system based on user loyalty using the PIECES method. So that the website manager gets input about the quality of the website from the user's point of view. The results of the tests that have been carried out in this study indicate that the Performance Indicators scored 4.2 in the Very Satisfied category, the Information Indicators obtained a value of 4.2 in the Very Satisfied category, Economic Indicators obtained a value of 4.1 in the Satisfied category, Control and Security Indicators obtained a value of 4.3 in the Very Satisfied category, the Efficiency indicator got a score of 4.3 in the Very Satisfied category, the Service indicator got a score of 4.2 in the Very Satisfied category.

Keywords: Performance, Website, PIECES, Procurement, Government of Denpasar.

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INTRODUCTION

The development of information distribution is now unstoppable because information can be obtained freely via the internet [1]. The use of information technology has become an absolute requirement for a government or private institution in order to provide excellent service to the community or customer [2][3]. The services obtained by the community and customers are the rights that must be fulfilled by the institution [4]. With an information system, data processing becomes easier [5]. The use of structured information technology can reduce the budget for labor and equipment costs [6], besides that it can affect services to the community [7]. One of the media that is often used as a trusted source of information is a website. One of the media as a trusted source of information is the website. Website is a collection of pages that can be used to display text, images, animation, sound, and video [8]. Websites can be used to reach audiences far from business centers, online education systems, and for data publication in government [9][10]. Many government and private agencies use the website as a medium to convey information or services. The more

information that is displayed through the website, it will have an impact on the performance of the website. The worse the website performance, the more visits it will have [11]. Visitor satisfaction is an impression obtained when using a system without finding significant obstacles [12].

The City Government of Denpasar in particular uses the website as a medium to create a more transparent, effective, efficient and accountable goods and service procurement system. The Denpasar City Government Procurement of Goods and Services website can be accessed via eproc.denpasarkota.go.id, the existence of this website began in 2013. The website displays information about the procurement of goods and services owned by the Denpasar City government within a certain period of time. The Denpasar City Government has used an electronic-based procurement system for almost less than 10 years to cut business processes in the process of procuring goods and services which were originally manual [13]. In addition, the purpose of having an electronic-based procurement system is to invite the public to an active in the development process in Denpasar City so that the

procurement process becomes transparent, effective, efficient and accountable. In addition, internal parties from the Denpasar City Government as parties who have work will reduce funds for the preparation of the procurement process because all needs have been provided on the website system. Individuals or private parties from all over Indonesia who have registered with the system can view and bid on the procurement of goods and services displayed on the website. As time goes by, there will definitely be more and more data stored on the website, so that it can make the system performance not good, it is necessary to periodically check website performance so that system visitors feel comfortable when accessing website pages. From the beginning of use until now there has never been an evaluation from the website manager about the quality of the website. Seeing from this anxiety, it is necessary to evaluate the system based on system user loyalty.

One method that can be used to evaluate the system is the pieces method. The PIECES method is a method that can be used to measure the performance of an information system [14]. For problem solving, the PIECES method uses several categories or components [15][16]. The components of the assessment using the PIECES method include performance, information, economy, control and security, efficiency, and service [17]. This method was chosen because several components in it represent the aims and objectives to be achieved from this research, where the PIECES method is used to identify problems that exist in the system. The other methods have fewer components that are not as complete as the measurement components that are owned by the PIECES method. The output generated from testing the system with the PIECES method is the value of the level of system user satisfaction based on the assessment component. These results will provide an overview to system managers regarding the 6 (six) components that form the basis for measuring system performance, so that system quality can be maintained.

This study aims to determine the performance of the Denpasar City Goods and Services Procurement Website using the PIECES method, and the output of the test results will be able to provide an overview of website performance results and input to website managers about the components that can maintain website performance so that it can be maintained properly. so that the process of procuring goods and services can run according

to the expectations of stakeholders in the City Government of Denpasar.

METHOD

The research method uses a quantitative descriptive method to describe a condition against several others as a benchmark for conducting an evaluation. Descriptive research is research that is conducted to determine the variables or components of a study without making comparisons or associating them with other variables. Based on the time of research completion, this research is included in the type of cross-sectional research where data processing, analysis, and conclusion drawing are carried out in one period [18]. The object of research is the Denpasar City Government Goods and Services Procurement Website, which is located at <https://eproc.denpasarkota.go.id>. The research stages carried out to complete this research include the following:

A. DATA COLLECTION

Data collection is a series of systematic procedures aimed at obtaining research data. Some data collection techniques include observation, interviews, and literature studies [19]. Data collection in this study goes through several stages, including:

1. A Literature study one of the steps in research for examine something that has been done before [20]. At this stage, researchers explore knowledge to find out about the PIECES method, things that need to be done to measure system user satisfaction, and similar research that is used as a tool to solve research problems. Some similar studies provide information about variables that can be used to make measurements, stages of research completion, and examples of results from research.
2. In field studies, researchers made direct observations at the Denpasar City Regional Secretariat Goods and Services Procurement office to obtain the necessary data. Researchers also conducted an interview process with system administrators who used the system directly.
3. Distribution of questionnaires is one of the tools used to collect data in this study to get an overview of visitor satisfaction with the system that has been running. The questionnaire consists of 22 questions asked to respondents [21]. Questionnaires

were distributed to 100 system users consisting of internal and external parties of the Denpasar city government who were registered in the Denpasar city government goods and service procurement system. Internal parties are job owners who will seek external parties to complete the work, external parties are individuals or companies that will compete to bid for jobs displayed on the website. The questionnaire was used in this study because according to the author it is the best method that can be used to get responses from users who use the system directly.

B. PARTICIPANTS

To gain system user loyalty, questionnaires were distributed containing questions according to the components described in Table 2. The number of questions in this research questionnaire were 22 questions, the list of questions is in accordance with table 3. Questionnaires were distributed to active and registered system users.

The object tested in this study is the Denpasar City Goods and Services Procurement website. Participants consisted of internal and external users of the system from the Denpasar city government. Internal system users are officials who have jobs that will be displayed on the website, while external system users are providers who use the system to participate in job auctions that are displayed on the website.

The number of respondents who participated in this study amounted to 100 people. the number of respondents in detail can be seen in table 1.

Table 1 Respondent

Type of Respondent	Number of Respondents	Percentage
External Users	49	49
Internal Users	51	51

C. ASSESSMENT INDICATORS

The assessment indicators that are used as a reference in measuring website performance are listed in table 2. Based on Table 2, it can be explained that the performance assessment component is intended to measure system performance, which includes system output, response time, page completeness, consistency, and system tolerance to client requests. Furthermore, while the information component of the measurement is devoted to the accuracy, relevance, presentation, and flexibility of the information produced by the system, the economic component measures the reusability and system resources used and generated. The control security component measures the integrity and security of the system owned by the system for the convenience of system users in maintaining the privacy of visitor data. The efficiency component measures the usability and maintainability of the system, which is aimed at how reliable the system is in overcoming the problems faced by the client, and finally, the services component measures the accuracy, reliability, and simplicity of the system.

Table 2 Variable and Assessment Indicators

Variable	Indicator	Definition
Performance	Throughput	System output as desired
	Response Time	Time to display content
	Completeness	Completeness of the system in carrying out its functions
	Consistency	Alignment of the System in use and applicable rules
	Fault Tolerance	Frequent mistakes
Information	Accuration	The data displayed is in accordance with the actual situation
	Information Relevance	The information displayed is in accordance with user needs
	Information Presentation	The information displayed has an attractive appearance
	Flexibility	Easy difficulty accessing data
Economics	Reusability	There are many programs that can be reused in other applications

Variable	Indicator	Definition
	Resource	The development of the system requires a few resources
Control and Security	Integrity	The system has limited access rights to operators for certain programs
	Security	Data security in the system
Efficiency	Usability	User effort when studying and operating the system (ease of operation)
	Maintainability	The user's effort in overcoming the error
Services	Accurate	Exactly or not the work process carried out by the system
	Reliability	Trust the performance of the system as desired.
	Simplicity	User understanding of the ease of use of the system

D. DATA ANALYSIS AND EVALUATION

The data analysis stage is used to process the results of the questionnaire data that has been distributed. The resultant data that has been obtained is then classified using the Likert scale. The LIKERT scale used is expressed in abbreviations ranging from STB, or very bad, to SB, or very good [22].

Table 4 Scala Likert

Answer	Score
Very Not Good	1
Not Good	2
Pretty Good	3
Good	4
Very Good	5

To determine the level of system satisfaction, a formula according to the LIKERT method is used, namely: [17]

$$RK = \frac{JSK}{JK} \quad (1)$$

Information:

- RK = average level of satisfaction
- JSK = total score of the questionnaire
- JK=number of questionnaires

The average satisfaction value obtained is then converted into a satisfaction predicate using Kaplan and Norton's theories [23][24]. The value conversion to the level of satisfaction is as shown in table 5.

Table 5 Characteristics of Satisfaction Level

Value Range	Satisfaction Level
1,00 – 1,79	Very Dissatisfied
1,80 – 2,59	Not Satisfied
2,60 – 3,39	Quite Satisfied
3,40 – 4,19	Satisfied
4,20 – 5,00	Very Satisfied

E. RESULT

The research results are the final stage of the research. After data analysis, the results of the research were analyzed using the PIECES Method. This method also provides conclusions and suggestions for research. Conclusions and suggestions will be followed by an evaluation of the system, which PIECES components need to be improved.

RESULTS AND DISCUSSION

A. VALIDITY TEST RESULTS

The validity test is used to ensure that the questions in table 3 have a validity value so that the questionnaire is feasible to be distributed to respondents. The results of testing the validity of the questionnaire can be seen in table 6.

Table 6 Validity Test Results

Indicator Code	Corrected Item (R Count)	Valid / Invalid
PER01	0.824094338	Valid
PER02	0.895005665	Valid
PER03	0.896064107	Valid
PER04	0.875377821	Valid
PER05	0.860911686	Valid
INF01	0.801228442	Valid
INF02	0.892120197	Valid
INF03	0.915109198	Valid
INF04	0.896735561	Valid
INF05	0.845522396	Valid
ECO01	0.806027572	Valid
ECO02	0.819549131	Valid
ECO03	0.752995642	Valid
SEC01	0.91784557	Valid
SEC02	0.907638944	Valid
EF01	0.913191579	Valid
EF02	0.867938937	Valid
EF03	0.883065962	Valid
SRV01	0.906463664	Valid
SRV02	0.879749331	Valid

Indicator Code	Corrected Item (R Count)	Valid / Invalid
SRV03	0.876722611	Valid
SRV04	0.829539247	Valid

Valid or invalid values in the validity test results are obtained using the equation: [25]

1. A valid value if the correlation value (r count) > r table
2. The value is invalid if the correlation value (r count) < r table

Where the r table value is 0.268085721 with a degree of freedom (df) value of 52. Based on table 6, the results of the questionnaire validity test are valid, so that all questions contained in the questionnaire are considered appropriate to use.

B. RELIABILITY TEST RESULTS

Reliability test in this study the authors used the Alpha Cronbach formula. The author's tool to use to avoid human error is SPSS software version 20.0. The benchmarks for interpreting the degree of validity and reliability of the instrument obtained are in accordance with Table 7.

Table 7 Reliability Interpretation

Coefficient	Criteria
$0,00 < r \leq 0,21$	Very Not Good
$0,21 < r \leq 0,40$	Not Good
$0,61 < r \leq 0,80$	Pretty Good
$0,61 < r \leq 0,80$	Good
$0,81 < r \leq 1,00$	Very Good

The results of the reliability test obtained a value of 0.968021398 with a total of 22 question items. Based on table 7, the reliability value produced is included in the very good criteria, so that the statement components and answers from the questionnaire can be declared reliable so that further data processing can be carried out.

Table 8 Reliability Test Results

Cronbach's Alpha	N of Items
0.968021398	22

C. RESULTS OF DATA ANALYSIS

Data that has been tested for validation and reliability are then processed using the PIECES method. The results obtained from each component are converted based on table 3. The results obtained from each indicator:

1. Performance

The test results on performance indicators are poured into Table 9, and then data

processing is carried out using Formula (1), so that the following results are obtained:

Based on Formula (1), the test results in Table 9 obtained the following calculation JSK (total number of overall scores) = 2112, JK (total number of respondents' answers) = 500.

So that the value of RK is 2112 divided by 500 is 4.224 if the rounded up the result is 4.2, and based on table 5 the results are obtained with the very satisfied category.

2. Information

The test results on performance indicators are poured into Table 10, and then data processing is carried out using Formula (1), so that the following results are obtained:

Based on Formula (1), the test results in table 10 obtained the following calculation JSK (total number of overall scores) is 2076 and JK (total number of respondents' answers) is 500.

So that the value of RK is 2076 divided by 500 is 4.152 if rounded up the result is 4.2, and based on Table 4 the results are obtained in the very satisfied category.

3. Economics

The test results on performance indicators are poured into Table 11, and then data processing is carried out using Formula (1), so that the following results are obtained:

Based on Formula (1), the test results in Table 10 obtained the following calculation JSK (total number of overall scores) is 1239 and JK (total number of respondents' answers) is 300.

So that the value of RK is 1239 divided by 300 is 4.13 if rounded up the result is 4.1, and based on table 5 the results are obtained with the satisfied category.

4. Control and Security

The test results on performance indicators are poured into Table 12, and then data processing is carried out using Formula (1), so that the following results are obtained:

Based on formula (1), the test results in Table 12 obtained the following calculation JSK (total number of overall scores) is 857 and JK (total number of respondents' answers) is 200.

So that the value of RK is 857 divided by 200 is 4.285 if rounded up the result is 4.3, and based on table 5 the results are obtained with the very satisfied category.

5. Efficiency

The test results on performance indicators are poured into Table 13, and then

data processing is carried out using Formula (1), so that the following results are obtained:

Based on Formula (1), the test results in table 13 obtained the following calculation JSK (total number of overall scores) is 1282 and JK (total number of respondents' answers) is 300.

So that the value of RK is 1282 divided by 300 is 4.273 if the rounded up the result is 4.3, and based on table 5 the results are obtained with the very satisfied category.

6. Services

The test results on performance indicators are poured into Table 14, and then data processing is carried out using Formula (1), so that the following results are obtained:

Based on Formula (1), the test results in Table 14 obtained the following calculation JSK (total number of overall scores) is 1693 and JK (total number of respondents answers) is 400.

So that the value of RK is 1693 divided by 400 is 4.2345 if the rounded up the result is 4.2, and based on Table 5, the results are obtained in the very satisfied category.

7. Recapitulation of Test Results

The overall recapitulation based on the above calculations is presented in Table 15.

Table 15 Recapitulation of Test Results

Indicator	Value of RK	Category
Performance	4.2	Very Satisfied
Information	4.2	Very Satisfied
Economics	4.1	Satisfied
Control and Security	4.3	Very Satisfied
Efficiency	4.3	Very Satisfied
Services	4.2	Very Satisfied

Based on the test results using the PIECES method, the results are as shown in table 15, including the Performance Indicator obtaining a value of 4.2 in the Very Satisfied category, the Information indicator obtaining a value of 4.2 in the Very Satisfied category, the Economics indicator obtaining a value of 4.1 in the Satisfied category, the Control and Security indicator obtaining a score of 4.3 in the Very Satisfied category, the Efficiency indicator earned a score of 4.3 in the Very Satisfied category, the Services indicator earned a score of 4.2 in the Very Satisfied category.

Based on the results above, there is one point generated that has a different category from all the testing indicators, namely the economics indicator. So that it needs to be improved again in terms of the information displayed so that it has more use value to be

reused, besides that the use of the system can provide convenience for users so that system users can solve problems without the need to make visits, so as to reduce operational costs in the process of procuring goods and services.

Advice that can be given to website managers in terms of the information displayed is information that can be useful in the short and long term about the upcoming procurement of goods and services, contact persons, announcements about system maintenance, so that users get information to minimize confusion for users. In addition, business processes with a system can minimize interaction between system managers and users, thereby saving user expenses in terms of making visits or coordination.

Conclusion

Evaluation of the goods/services procurement website for the city of Denpasar using the PIECES method is intended to determine website performance. Performance testing is intended to maintain system consistency that is accessed by many users, so that system quality is always well maintained. This study uses 22 questions and 100 respondents consisting of providers and government employees who use the system. The results of the tests that have been carried out in this study, show that the performance indicators get a satisfaction value of 4.2 which is included in the very satisfied category, the information indicator with a value of 4.1 is included in the satisfied category, the economics indicator with a value of 4.2 is in the very satisfied category, the control indicator and security with a score of 4.2 in the very satisfied category, the efficiency indicator got a score of 4.3 and entered into the very satisfied category, and the services indicator with a value of 4.0 in the satisfied category. Overall, the test results state that the website for the procurement of goods and services for the city of Denpasar, which is located at <https://eproc.denpasarkota.go.id>, has good performance so that users are very satisfied with the performance of the existing system. However, it needs to be improved on information and services indicators so that the system is even better for serving the procurement of goods and services in the City Government of Denpasar. Advice that can be given to website managers in terms of the information displayed is information that can be useful in the short and long term about the upcoming procurement of goods and services,

contact persons, announcements about system maintenance, so that users get information to minimize confusion for users. In addition, business processes with a system can minimize interaction between system managers and users, thereby saving user expenses in terms of making visits or coordination.

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Table 3 Questions in The Questionnaire

Variable	Questions	Code
Performance	When you first open the eproc.denpasarkota.go.id website, the start page immediately appears properly without any heavy loading displays	PER01
	The eproc.denpasarkota.go.id website has an easy-to-understand appearance and menu	PER02
	The eproc.denpasarkota.go.id website has menus that are easy to remember	PER03
	The eproc.denpasarkota.go.id website has features or menus that are easy to find	PER04
	When accessing one of the menus on the Website eproc.denpasarkota.go.id has a fast response in displaying the intended page	PER05
Information	The information displayed on the eproc.denpasarkota.go.id website is easy to understand	INF01
	Procurement information or work to be tendered which is displayed on the eproc.denpasarkota.go.id website, has clear information	INF02
	The winning information from the procurement or tendered work, which is displayed on the website eproc.denpasarkota.go.id has detailed information	INF03
	Information on the schedule of stages of the procurement or work being tendered, which is displayed on the website eproc.denpasarkota.go.id has detailed information	INF04
	The existence of an electronic-based procurement system reduces your costs in making or participating in a job tender in the Denpasar City government	INF05
Economics	The eproc.denpasarkota.go.id website provides information about the amount of the budget in each job	ECO01
	The eproc.denpasarkota.go.id website provides information about the bid value of the job winners	ECO02
	The eproc.denpasarkota.go.id website provides information about the costs involved in bidding on a job	ECO03
Control and Security	There are access restrictions when you log in to the eproc.denpasarkota.go.id website, different users for menu access for provider and non-provider user types	SEC01
	The data in the system can be guaranteed confidentiality	SEC02
Efficiency	With the eproc.denpasarkota.go.id website, it can provide operational cost savings in carrying out procurement preparations or making bids on one of the jobs	EF01
	Through the website eproc.denpasarkota.go.id, you can use this website to make work or make job offers for all types of procurement	EF02
	With the eproc.denpasarkota.go.id website, it can provide convenience in completing work in the procurement of goods and services	EF03
Services	Contacts listed on the Website eproc.denpasarkota.go.id can be contacted	SRV01
	The data filter and search features found on the eproc.denpasarkota.go.id website display the appropriate data	SRV02
	If there is a problem, the service provided from the contact displayed on the eproc.denpasarkota.go.id website page provides a quick response	SRV03
	You, as a company or procurement agent in a Denpasar city government agency, who have attended or are currently participating in a procurement process, are satisfied with the website eproc.denpasarkota.go.id	SRV04

Table 9 Performance Indicator Test Results

Performance

Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	173	266	61	0	0
Total Score (Total Respondents Answers * Score)	865	1064	183	0	0

Table 10 Information Indicator Test Results

Information					
Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	154	270	75	0	1
Total Score (Total Respondents Answers * Score)	770	1080	225	0	1

Table 11 Economics Indicator Testing Results

Economics					
Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	89	166	42	1	2
Total Score (Total Respondents Answers * Score)	445	664	126	2	2

Table 12 Control and Security Indicator Test Results

Control and Security					
Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	75	108	16	1	0
Total Score (Total Respondents Answers * Score)	375	432	48	2	0

Table 13 Efficiency Indicator Test Results

Efficiency					
Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	110	162	28	0	0
Total Score (Total Respondents Answers * Score)	550	648	84	0	0

Table 14 Service Indicator Test Results

Services					
Answer	VG	G	PG	NG	VNG
Score	5	4	3	2	1
Total Answers of Respondents	142	215	319	2	2
Total Score (Total Respondents Answers * Score)	710	860	117	4	2