



Analysis of the Level of Satisfaction of E-Learning Users at PGRI Madiun University Using the Pieces Method.

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Article Information

Received: 21-11-2024

Revised: 28-11-2024

Published: 5-12-2024

Keywords

E-Learning, User Satisfaction, PGRI Madiun University, Pieces Method.

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Abstract

The development of technology is a way to quickly disseminate information to users and can help solve problems faced by an institution. The level of user satisfaction with the Universitas PGRI Madiun e-learning system uses the PIECES method (Performance, Information, Economy, Control, Efficiency, and Service). This method was chosen because it is able to identify various aspects of system performance that affect user experience. This study was conducted by collecting data through questionnaires distributed to system users, namely students and lecturers using the Googleform platform. The results of the analysis showed that the Performance and Service aspects obtained the highest satisfaction scores, which indicated that the system was running stably and providing good service to users. However, the Control and Efficiency aspects require improvement, especially regarding ease of access and management of security features. These findings are expected to be input for e-learning system managers to improve the quality of service and overall user experience.

1. Introduction

The advancement of information technology has brought significant changes in various aspects of life, including in the field of education. One form of technology implementation in the world of education is the e-learning system, which allows the learning process to be carried out online. Currently, learning using E-Learning is one example of technological development. This learning media is very useful for students and lecturers for smooth learning. Universitas PGRI Madiun is a higher education institution that uses developing technology, namely the Unipma E-Learning Application abbreviated as ELMA. E-learning implemented at UNIPMA uses technology. The application of technology to ELMA is one of the distance learning innovations at the UNIPMA institution. Unipma E-Learning has features that are easy to understand by students and lecturers. ELMA based on the distribution of questionnaires to users, namely students and lecturers, has experienced instability, problems in terms of performance. Therefore, this research needs to be conducted to better understand the advantages and disadvantages of the system in addition to performance in terms of information, economy, control, efficiency and service to the Academic information system.

In this case, the method used is PIECES which can help measure the problems discussed previously ((Putra et al., 2021). This method has specific main things to measure the level of user satisfaction by having assessment variables according to the purpose of being built such as performance, information, economy, control and security, efficiency and service. The benefits of this analysis are to find out the advantages and disadvantages of the system which will later be a recommendation for Unipma to be able to improve the system in the future. This research is expected to be a reference for e-learning system managers to identify the strengths and weaknesses of the system, and design more targeted improvement strategies. In addition, the results of this study can also contribute to efforts to develop e-learning systems in other educational institutions.

2. Literature Review

System analysis is the breakdown of a complete information system into its component parts with the aim of identifying and evaluating various problems or obstacles that occur in the system so that improvements or developments can be made. The function of system analysis is to identify various problems from users, clearly determine the targets that must be achieved to meet user needs, can choose alternative methods in solving problems in the system and can plan or implement system designs according to what the user wants. (Setiawan) 26,2021). E-learning is an application that allows students and lecturers to interact with each other through an online learning space. The purpose of E-learning is to overcome the differences between students and lecturers. Where E-learning is learning when it cannot be done face to face in class. (Lestari & Rijal Hamka, 2019). E-learning is a learning method based on information technology that provides convenience in the teaching and learning process without time and place limitations. According to several studies, the success of e-learning is highly dependent on technology, content, and user experience. Assessment of user satisfaction is very important to improve the quality of the e-learning system. (Sugilar (2022). which emphasizes the importance of user experience in measuring the success of e-learning implementation. User satisfaction is a key indicator of success in implementing information systems. In the context of E-learning, user satisfaction includes aspects of convenience, speed of access, and perceived benefits. The PIECES model provides a comprehensive framework for evaluating these elements. E-learning is a means of learning based on information and communication technology that can make learning more open. E-learning is an application that allows students and lecturers to interact with each other through an online learning space. The purpose of E-learning is to overcome the differences between students and lecturers. Where E-learning is learning when it cannot be done face to face. in class (Irawan, R., & Surjono, H. D. (2018). The quality of an information system or e-learning can be seen from the functionality of the system's features. ((Dewi et al., 2023) The assessment of e-learning measures the performance of the system and user needs that are appropriate or still require improvement to facilitate users. To identify problems, an analysis of performance, information, economy, control, efficiency, and service must be carried out. This guide is known as PIECES analysis Performance, Information, Economy, Control, Efficiency, Service). The analysis is carried out on the old information system in the form of hard copy such as a brochure if the band is going to hold a performance. From this analysis, several problems are usually found and finally the main problem can be found. For more details about PIECES, below will be explained the meaning of each PIECES component (Mahardika et al., 2022) The PIECES method is a framework used to classify a problem, opportunity, and direction. By using this framework, new things can be produced that can be considered for system development. The PIECES method is a framework used to classify a problem, opportunity, and direction. By using this framework, new things can be produced that can be considered for system development (Sari & Nurmiati, 2021) According to James Wetherbe; 2012, PIECES to correct or improve information systems for decision makers in an organization. PIECES analysis is a technique to identify and solve problems that occur in information systems, from this analysis will produce identification of the main problems of a system and provide solutions to these problems so that they become a reference in the process of implementation or further management. Analysis in Measuring Service Quality Against Consumer Satisfaction Using the PIECES Method (Asbar & Saptari, 2017)

3. Research Methods

Questionnaires are data collection techniques carried out by giving a number of questions via Google Form to respondents to answer. Questionnaires are efficient data collection techniques if researchers know what to expect from respondents (Septiani et al., 2023). In this study, the author created a questionnaire based on user satisfaction with E-Learning Universitas PGRI Madiun for students domiciled in Madiun and Outside Madiun. Figure 1 is a flowchart of the research method.

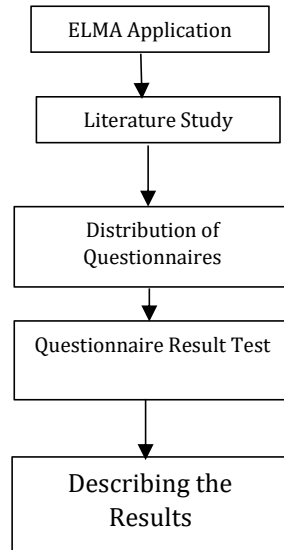


Figure 1. Flowchart of the research method

Manual Calculation of PIECES Method

Pieces Based on the results of the questionnaire assessment of users of the analysis application in measuring the quality of service to consumer satisfaction in the company using a Likert scale to determine the level of satisfaction of users of the inventory system according to the answer choices and scores, then to get the average level of satisfaction using.

Formula I:
$$RK = \frac{JSK}{JK}$$

RK = Average Satisfaction

JSK = Total Questionnaire Scores

JK = Number of Questionnaires

Meanwhile, to determine the level of satisfaction using the model defined by Kaplan and Norton with the following levels:

1 - 1.79 = Very bad; 1.8 - 2.59 = Not satisfied; 2.6 - 3.39 = Enough; 3.4 - 4.91 = Satisfied; 4.92 - 5 = very satisfied. By determining the level of satisfaction as above for the level of user satisfaction with the analysis system in measuring the level of service quality towards user satisfaction (Prayogi et al., 2021)

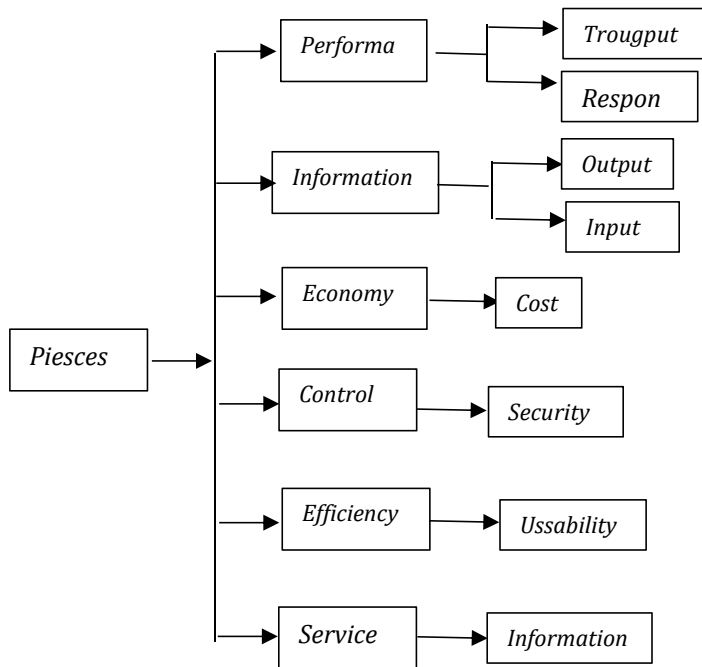


Figure 2. Piesces Metods

Figure 2 is a breakdown of the methods based on the variables that will be used in the questionnaire. (Septiani et al., 2023)

Table 1. List of Questionnaire Statements

No	Statement
PERFORMANCE	
1.	ELMA is very easy to access
2.	ELMA can function optimally
3.	ELMA has features that are easy for users
4.	ELMA has help for users
INFORMATION	
1.	Elma provides up-to-date information
2.	Elma is easy to understand
3.	Information as needed
4.	Elma is not complicated in data input
EKONOMIC	
1.	Elma as desired by users
2.	ELMA has developed features and is getting better
3.	Elma provides convenience
4.	Elma makes it easy to find lecture materials
Control and Sucrity	
1.	Data security on Elma is very well maintained
2.	Rarely experiences errors
3.	Can run Elma and other applications
4.	Elma is safe from virus attacks
Efficiency	

-
1. Simple Elma display
 2. Easy to understand Elma interface
 3. Easy to create Elma account
 4. Does not require many resources
-

Service

1. Every feature can be accessed easily
 2. There is a guide on Elma
 3. Can easily register
 4. Can edit Elma easily.
-

4. Result and Discussion

The results of the questionnaire assessment of users of the analysis application in measuring the quality of service to user satisfaction using the Likert scale to determine the level of satisfaction of Elma users. The results of the questionnaire processing see the level of user satisfaction as follows :

Performance Indicators

The processing results can be seen in Table 1

Table 1 Results of processing the Performance Indicator questionnaire

No Responden	Indikator Performance			
	P1	P2	P3	P4
1	5	5	4	4
2	5	5	5	4
3	5	5	5	4
4	5	5	5	4
5	5	5	5	4
6	4	5	4	4
7	4	4	4	4
8	4	4	5	5
9	4	4	4	5
10	4	4	4	5
11	4	4	5	5
12	5	1	4	4
13	5	2	4	5
14	4	4	4	4
15	4	4	5	5
16	5	4	5	5
17	5	5	4	4
18	5	5	4	5
19	4	4	5	4
20	4	4	5	4
21	4	3	4	4
22	4	5	4	5
23	5	5	4	5
24	4	5	3	5
25	5	5	5	5
26	5	5	4	5
27	5	4	4	5
28	4	4	4	4
29	4	3	4	4

30	4	5	5	5
Rata-rata	4,4	4,2	4,3	4,5

$$RK = \frac{4,4 + 4,2 + 4,3 + 4,5}{4}$$

$$RK = \frac{17,4}{4}$$

$$RK = 4,3$$

The results of the calculation of the average level of satisfaction obtained a value of 4,3 in the Performance domain. User satisfaction with ELMA is included in the *SATISFIED* category. So from the average results it is indicated positively that users are *satisfied* with ELMA's *Performance*.

Information Indicator

The results of the information can be seen in table 2

Table 2. Results of processing the Information Indicator

No Responden	Indikator Information			
	I1	I2	I3	I4
1	5	5	4	4
2	4	5	5	4
3	4	5	5	4
4	4	5	5	4
5	4	5	5	4
6	5	5	4	4
7	5	4	4	4
8	5	4	5	5
9	3	4	4	5
10	5	4	4	5
11	5	4	5	5
12	5	1	4	4
13	4	2	4	5
14	4	4	4	4
15	3	4	5	5
16	2	4	5	5
1	4	5	4	4
18	4	5	4	5
19	5	4	5	4
20	1	4	5	4
21	3	3	4	4
22	4	5	4	5
23	5	5	4	5
24	5	5	3	5
25	5	5	5	5
26	5	5	4	5
27	2	4	4	5
28	3	4	4	4
29	3	3	4	4
30	5	2	5	5
Rata-rata	4,03	4,06	4,36	4,5

$$RK = \frac{4,0 + 4,0 + 4,3 + 4,5}{4}$$

$$RK = \frac{16,8}{4}$$

$$RK = 4,2$$

The result of the calculation of the average level of satisfaction obtained is 4.2 in the Information domain. User satisfaction with ELMA is included in the SATISFIED category. So this shows a positive indication that users are satisfied with Information from Elma.

Economy Indicators

The results of processing the economy indicator data can be seen in the table. 3

Table 3. Results of processing the Economyc Indicator

No Responden	Indikator Economy			
	E1	E2	E3	E4
1	5	4	5	5
2	5	4	5	5
3	5	4	4	5
4	5	4	5	4
5	4	5	5	4
6	4	5	4	4
7	4	5	5	5
8	3	4	4	4
9	5	4	5	4
10	5	4	5	4
11	5	4	4	4
12	5	5	5	5
13	5	5	5	5
14	4	5	4	5
15	4	5	5	4
16	4	5	5	4
17	4	5	4	4
18	3	5	4	4
19	3	4	5	4
20	4	4	5	4
21	4	4	5	5
22	4	4	5	5
23	5	3	5	5
24	5	5	4	4
25	5	5	5	4
26	5	4	5	5
27	5	4	5	5
28	4	4	5	4
29	4	4	5	5
30	4	5	5	4
Rata-Rata	4,366	4,4	4,	4,4

$$RK = \frac{4,3 + 4,4 + 4,7 + 4,4}{4}$$

$$RK = \frac{17,8}{4}$$

$$RK = 4,4$$

The result of the calculation of the average level of satisfaction obtained is 3.6 in the Economy domain. User satisfaction with ELMA is included in the SATISFIED category. So this shows a positive indication that users are satisfied with the Economy of ELMA.

Control Indicators

Table 4 shows the results of the questionnaire calculations

Table 4. Results of Control Indicator processing

No Responden	Indikator Control			
	C1	C2	C3	C4
1	5	4	5	4
2	5	4	5	5
3	5	4	4	5
4	5	4	5	5
5	5	4	5	5
6	5	5	4	5
7	5	4	5	5
8	4	5	4	5
9	4	4	5	4
10	4	5	5	4
11	4	5	4	5
12	5	5	5	4
13	4	4	5	4
14	5	4	4	4
15	5	4	5	5
16	5	5	5	5
17	5	5	4	4
18	4	5	4	4
19	4	5	5	5
20	4	5	5	5
21	5	5	4	4
22	5	4	5	4
23	5	3	4	4
24	5	5	4	3
25	5	5	3	5
26	5	5	5	4
27	5	4	5	4
28	3	4	5	4
29	5	5	3	4
30	5	4	5	5
Rata-Rata	4,66	4,66	4,53	4,43

$$RK = \frac{4,66 + 4,66 + 4,53 + 4,43}{4}$$

$$RK = \frac{18,1}{4}$$

$$RK = 4,5$$

The calculation result of the average level of satisfaction obtained is 4.5 in the Control domain. User satisfaction with ELMA is included in the SATISFIED category. So this shows a positive indication that users are satisfied with the Control Indicator.

Efficiency Indicator

The processing of Efficiency indicator data can be seen in table 5

Table. 5 Results of processing the Efficiency Indicator questionnaire

No Responden	Indikator Efficiency			
	EF1	EF2	EF3	EF4
1	5	5	5	4
2	5	5	5	4
3	5	5	4	4
4	5	5	5	4
5	5	4	5	4
6	5	4	4	4
7	5	4	5	4
8	4	4	4	5
9	5	4	5	5
10	4	3	5	5
11	4	5	4	5
12	4	5	5	4
13	4	5	5	5
14	4	5	4	4
15	3	4	5	5
16	4	4	5	5
17	5	5	4	4
18	4	5	4	5
19	4	5	5	4
20	3	4	5	4
21	3	5	4	4
22	2	5	5	5
23	5	5	4	5
24	5	4	4	5
25	5	4	3	5
26	5	5	5	5
27	4	5	5	5
28	5	5	5	4
29	5	5	3	4
30	5	4	5	5
Rata-Rata	4,36	4,56	4,53	4,5

$$RK = \frac{4,36 + 4,56 + 4,53 + 4,5}{4}$$

$$RK = \frac{17,96}{4}$$

$$RK = 4,49$$

The result of the calculation of the average level of satisfaction obtained is 4.49 on the Efficiency Indicator. User satisfaction with ELMA is included in the SATISFIED category. So this shows a positive indication that users are satisfied with the Efficiency Indicator.

Service Indicator

Service indicator data processing can be seen in table 6

Table 6. Service Indicator questionnaire processing results

No Responden	Indikator Service			
	S1	S2	S3	S4
1	5	5	5	5
2	5	5	5	5
3	5	5	5	4
4	5	5	5	4
5	5	5	4	5
6	5	5	4	5
7	4	5	4	5
8	4	4	5	5
9	4	4	5	4
10	4	4	5	4
11	5	4	4	4
12	4	4	4	4
13	5	5	4	4
14	4	5	4	5
15	5	5	4	5
16	4	4	5	5
17	4	4	5	3
18	4	5	5	5
19	5	5	5	5
20	5	4	5	5
21	5	4	5	4
22	3	4	5	4
23	5	5	4	4
24	5	5	4	4
25	5	5	5	5
26	2	5	5	5
27	4	5	5	5
28	4	5	5	5
29	5	5	5	5
30	5	5	4	5
Rata-Rata	4,46	4,66	4,63	4,56

$$RK = \frac{4,46 + 4,66 + 4,63 + 4,56}{4}$$

$$RK = \frac{18,33}{4}$$

$$RK = 4,5$$

The result of the calculation of the average level of satisfaction obtained is 4.5 on the Service Indicator. User satisfaction with ELMA is included in the SATISFIED category. Showing a positive indication that users are

satisfied with the Service from ELMA.

Table 7. Indicator Recapitulation Results

Indicator	Nilai
<i>Performance</i>	4,3
<i>Information</i>	4,2
<i>Economy</i>	4,4
<i>Control</i>	4,5
<i>Efficiency</i>	4,9
<i>Service</i>	4,5
<i>Average Amount</i>	4,4

Based on the calculation results for each indicator of Performance, Information, Economy, Control, Efficiency, Service, the average level of satisfaction obtained a value of 4.4, it can be concluded that the level of user satisfaction with ELMA is included in the SATISFIED category. This shows a positive indication that users are satisfied with E-Learning Universitas PGRI Madiun

Analysis Performance

Performance analysis is the ability to complete business tasks quickly so that goals can be achieved. Performance is measured by the amount of production (throughput) and response time of a system. Performance is very important in an application or system, where Performance analysis is the ability to complete business tasks quickly so that goals can be achieved. Performance is measured by the amount of production (throughput) and response time of a system. Performance is very important in an application or system, where performance shows the real performance of the system. Performance shows that a system can be accessed quickly. A good system is one that provides maximum speed when accessed. Figure 3 shows the results of the performance analysis carried out using Google PageSpeed Insight. The results of the analysis show a value of 51, this states that in terms of performance ELMA is running quite well. To see the performance results in detail, see Figure 4

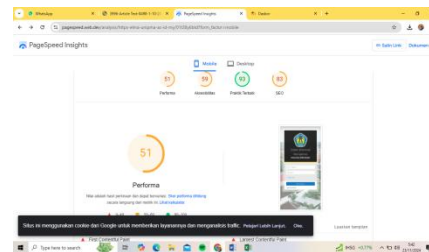


Figure 3. Performance Indicator Diagnostic Display

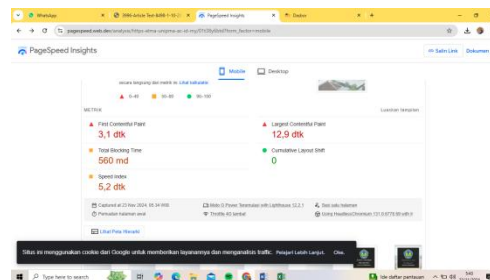


Figure 5. Detailed view of analysis results

From the results of the analysis carried out, it was found that the speed in accessing ELMa got a score of 51 or Sufficient.

Information Analysis

Information Analysis is an assessment that looks at whether the current procedure can still be improved so that the quality of the information produced becomes better. The quality of information depends on 3 things, namely it must be accurate, timely, and relevant. Accurate means that the information must not be misleading. Timely means that the information provided must not be late and must be the latest. Relevant, which means that the information conveyed must be on target or useful for the recipient. Based on the results of user satisfaction in table 2, the results were 4.2 with the Satisfied category on the performance variable, in other words, the information provided by ELMa is good and in accordance with what is needed. According to the results of the questionnaire, the information presented in ELMa is easy to understand, reliable and provides the latest information.

Economic Analysis (Economics)

At the stage of economic analysis, the analysis of the relationship between costs and information provided in the application is carried out. In this variable, the economy in question is not only directed at costs but also towards feature development. In ELMa there is a menu that can be used to download lecture materials and work on evaluation questions. Therefore, students and lecturers do not always need to wait for the presence of lecturers. Based on the results of user satisfaction in table 3, the results were 4.4 with the Satisfied category in the Economics variable, in other words, the economic value given by ELMa is in accordance with the wishes of students and lecturers. According to the results of the questionnaire, it shows that ELMa has experienced feature development, and it can be concluded that the use of internet data in accessing ELMa.

Control and Security Analysis

Control analysis is an improvement to control to detect and correct errors and deficiencies that will occur in the future. Control in the system is needed to avoid and detect misuse or errors in the system and ensure the security of data and information. With control, all disrupted performance can be immediately repaired.

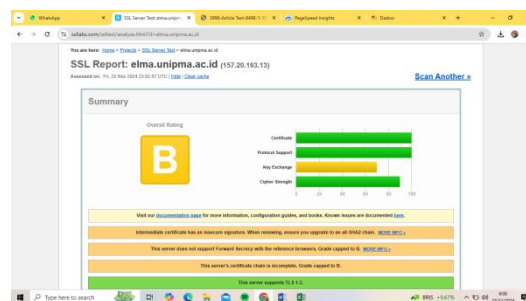


Figure 6 Control Analysis Results

Figure 6 shows the results of the control analysis. From the results of the control analysis carried out on ELMa, it received a B rating, which means that the control assessment is good, the application does not contain program errors. Figure 7, shows the conclusion of the detailed control analysis results, it can be seen that ELMa can be trusted, this is evidenced by the presence of the Trusted: Yes statement. From the results of the control analysis, it can be concluded that ELMa is safe for access by the public or users.

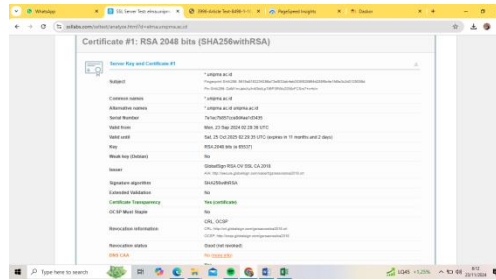


Figure 7. Detail Control Analysis Results

Efficiency Analysis

Efficiency analysis is an increase in operational efficiency, different from economics. If the economy is assessed based on input, efficiency is more emphasized on how the resources are used as effectively as possible so that there is no waste. A system can be said to be efficient if it can achieve the desired goals, does not waste time and excessive human resources. Based on the results of user satisfaction in table 5, the results were 4.9 with the Satisfied category on the efficiency variable, which means that the ELMa display is easy to understand and easy to understand by users.

Service Analysis

Service analysis was conducted to see the services provided by the PeduliLindungi application. Based on the results of user satisfaction in table 6, the results were 4.5 with the Satisfied category on the Service variable, it can be said that ELMa provides good service.

5. Conclusions

Based on the PIECES method consisting of Performance, Information, Economics, Control, Efficiency and Service in measuring the level of satisfaction with ELMa users, the level of user satisfaction can be seen from each Indicator, where Performance gets a value of 4.3, Information gets a value of 4.2, Economy gets a value of 4.4, Control gets a value of 4.5, Efficiency gets a value of 4.4, and Service gets a value of 4.5. Because each value is in 3.4 - 4.91, which means that users feel SATISFIED with Unipma E-Learning. Of the five frameworks in the PIECES method, the Performance indicator in item I3 gets the lowest value, which means that there must be improvements in "Menus that are available instantly so that information can be displayed according to learning needs". It is hoped that further research will add other indicators that can make the research results even better.

The test results and analysis conducted by E-Learning Unipma already have advantages, but improvements are still needed to cover the weaknesses in ELMa, especially the variables that have the lowest values, namely Information and Performance. So there needs to be an improvement in these Indicators.

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