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User Satisfaction and the Impact of User Characteristics on A Library Automation System SLiMS 9 Bulian

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ABSTRACT

SLiMS 9 Bulian is a widely used library automation system in Indonesian libraries. This study aimed to assess user satisfaction and examine the influence of user characteristics—such as gender, age, and education level—on the performance of the SLiMS 9 Bulian. A quantitative approach was employed, using the PIECES (Performance, Information, Economy, Control, Efficiency, and Service) framework to measure user satisfaction. Data were collected through online surveys over two months (November to December 2023), with a sample of 96 librarians and library staff from 15 university libraries across West Sumatra (45%), Riau (30%), and Bengkulu (24%). After validity and reliability testing, 61 valid responses were obtained. The study found an overall satisfaction score of 4.34 out of 5. Hypothesis testing showed no significant impact of gender, age, or education level on user satisfaction ($p > 0.05$). The study concluded that user satisfaction with SLiMS 9 Bulian was high and that librarians are a more suitable respondent group for evaluating information systems using the PIECES framework than students. This study provides important insights into user satisfaction with SLiMS 9 Bulian, offering practical recommendations for improving library automation systems. It also highlights the value of selecting appropriate respondent groups in evaluating system performance, contributing to better-informed decisions in the development and optimization of library technologies.

Keywords: Library automation system; technology acceptance; SLiMS; user satisfaction; library management

1. INTRODUCTION

Library information systems play an important role in supporting functions and increasing efficiency by automating various tasks in the library, such as cataloging, circulation, and inventory management (Ankrah et al., 2019). This requires libraries to continue to improve the stability and reliability of information system services (Kim et al., 2021), to increase user interest

in continuing to visit libraries because of the convenience due to the application of information technology (Sim et al., 2023).

Senayan Library Management System (SLiMS) is one of the library automation systems that is currently very widely used in supporting the smooth management of libraries in Indonesia. This is evidenced by the many studies conducted related to the use or training of the use of SLiMS in various types of libraries, such as in school libraries (Fitria et al., 2023; Rouza et al., 2023), academic libraries (Harisanty et al., 2020; Sumardi et al., 2021), public libraries (Cahyani et al., 2022), and special libraries (Anwar & Karichnarsi, 2021; Nanda, 2022). These studies have analyzed the performance of SLIMS from different perspectives. The use of SLIMS as a library automation system is able to accelerate work completion, increase work productivity and effectiveness, make work easier, and provide more optimal results so that user satisfaction increases (Dwiyantoro, 2020).

Every implementation of an information system needs to be evaluated periodically based on user perceptions (Al-Fraihat et al., 2020; Pal & Vanijja, 2020; Tahar et al., 2020), including in the library. This is important considering the high cost and energy required in the development of an information system (Berdik et al., 2021; He et al., 2021), as well as to ensure that the development goals meet the needs of users. Currently, there are many methods used to evaluate the performance of an information system, including End User Computing Satisfaction (EUCS) (Alfarasy et al. 2022; Hanesya, Marchianti, and Bukhori 2021), and the PIECES framework (Fatoni et al., 2020).

Meanwhile, the evaluation of the performance of SLIMS as a library automation system has been researched using various models. Rahyadi et al. (2021) evaluated the performance of SLIMS using The Human Organization Technology (HOT) FIT Model method. Maricar et al. (2021) conducted a study to assess the implementation of SLIMS utilizing the User Experience Questionnaire (UEQ) methodology. Meanwhile, Anwar & Karichnarsi (2021) used the SERVQUAL method to evaluate the Use of SLiMS in the Work from Home Period during Pandemic Covid-19. Likewise, Kangko et al. (2022) researched the usability level of the SLiMS 9 Bulian application using the Software Usability Measurement Inventory (SUMI) method. Meanwhile, Yudhana et al. (2023) evaluated the application of the library technology information system using the PIECES method.

This study tried to conduct an investigation to evaluate the use of SLiMS 9 Bulian using the PIECES method. This method has often been used to evaluate the performance of information systems in various companies or agencies, such as in hospitals (Alfiansyah et al., 2022; Hanesya et al., 2021), private companies (Muslih et al., 2021), government agencies (Supriyatna & Maria, 2017), universities (Fatoni et al., 2020), and library information systems (Suhaerah et al., 2022; Supriyatna & Maria, 2017; Yudhana et al., 2023). The PIECES framework encompasses six key dimensions—Performance, Information, Economy, Control, Efficiency, and Service—utilized to assess the effectiveness and functionality of an information system.

In the previous study, Yudhana et al., (2023) selected respondents from lecturers, students, and librarians. Their capacity is considered equivalent to a user of the system. Based on the list of questions contained in the six dimensions of the PIECES assessment, most of them are irrelevant to be answered by students and lecturers because they are only end users. In practice, lecturers and students only use the OPAC feature to search for collections and retrieve information. This is shown by the many studies on library automation systems that specifically research the performance of OPAC by involving end-users such as lecturers and students as

respondents (Mufid et al., 2020; Nugroho & Isnainy, 2022; Rodin & Nuraida, 2020; Septrina & Manita, 2022; Srirahayu & Anugrah, 2019).

Research related to the impact of gender on information system user satisfaction has been conducted by Ramírez-Correa, Rondán-Cataluña, and Arenas-Gaitán (2018). They found a significant difference between the level of satisfaction of men and women in using information systems. Likewise, Alkhaldi & Al-Sa'di (2018) revealed that female students have higher concerns about satisfaction with using information systems. Furthermore, Kitsios et al., (2020) have explored the effect of age on information system user satisfaction. The results found the impact of age differences on user satisfaction in information systems. Similarly, Zhang et al., (2021) found that age affects the relationship between perceived benefits, social support, and ICT use. The effect of education level on information system user satisfaction has been explored by Goeke, Crowne, and Laker (2022), who found that education level does not directly affect the success of using information systems. Nonetheless, this influence extends to the level of expertise required to operate the system effectively.

In contrast to the previous study, this research evaluates SLiMS from the perspective of librarians and library staff as active users. Unlike general users, librarians typically rely on library automation systems to facilitate routine library operations, including collection processing, user management, circulation, information retrieval, and report generation. This study aims to investigate key aspects of the SLiMS 9 Bulian application in managing library information systems. A central focus is to assess the level of user satisfaction with the application, exploring how effectively it meets the needs of its users. Additionally, the study examines the perceived strengths and weaknesses of SLiMS 9 Bulian, utilizing the PIECES framework to analyze these perceptions comprehensively. Beyond these evaluations, the research also seeks to test hypotheses regarding the influence of demographic factors such as gender, age, and educational background on user satisfaction, offering a deeper understanding of how these variables shape user experiences with the system.

The study formulates three key hypotheses to be tested, focusing on the relationship between demographic factors and user satisfaction with the SLiMS 9 Bulian application. The first hypothesis posits that gender has a significant effect on user satisfaction, while the second suggests that age also significantly influences satisfaction levels. In contrast, the third hypothesis proposes that the level of education does not significantly impact user satisfaction with the SLiMS 9 Bulian application.

To evaluate these hypotheses, decisions will be made based on the probability values obtained. If the probability is less than 0.05, the null hypothesis (H0) will be accepted, indicating that gender, age, and education level collectively do not influence user satisfaction with SLiMS 9 Bulian. Conversely, if the probability exceeds 0.05, the null hypothesis will be rejected, suggesting that these demographic factors do play a role in determining user satisfaction. This approach provides a structured framework for understanding the relationship between demographic variables and user experiences with the application.

2. METHODS

This quantitative research uses the PIECES framework to measure and analyze the level of satisfaction of SLiMS 9 Bulian users. The location of research was carried out in university libraries in the Sumatra region that use SLiMS 9 Bulian in managing library management information systems. The appointment of university libraries is carried out because the intensity

of library automation system utilization is much higher than other library types (Girwal, 2022; Xiao, 2020). Sampling of research data uses the Puposive Sampling method, taking samples from the population based on certain criteria . The selected respondents are librarians, and/or university library staff who are experienced in using SLiMS 9 Bulian in supporting daily work in the library.

User perception of SLiMS 9 Bulian performance was collected using a questionnaire. The questionnaire was grouped into two parts to facilitate the analysis and discussion of the results. The first part of the questionnaire contains questions about the demographic dimensions of respondents, consisting of gender, age, and education level. The second part contains a list of questions about respondents' perceptions of SLiMS 9 Bulian using the PIECES framework. The instrument comprises 26 questions grouped into six dimensions: Performance, Information, Economy, Control, Efficiency, and Service. All of these questions were adopted from various previous studies (Darwi et al., 2023; Fatoni et al., 2020; Yudhana et al., 2023) with slight modifications tailored to the needs and character of respondents. The instrument assessment uses 5 Likert scales, ranging from 1 (not satisfied) to 5 (very satisfied).

The data collection process employed an online survey method, utilizing a questionnaire designed with Google Forms and disseminated through the social media platform WhatsApp to a targeted group of respondents. While this approach offers extensive reach and is more efficient in terms of time and cost compared to traditional methods, it presents challenges related to data security, potential sampling bias, and the influence of user perceptions on response rates. These characteristics, however, made it particularly suitable for this study, given the geographically dispersed research locations spanning multiple libraries across various provinces.

A sample size of 96 respondents was determined using the Lemeshow formula, assuming an unknown population size, with a 5% significance level and a 10% margin of error. Data collection was conducted over two months, from early November to late December 2023. Following validity and reliability testing, 61 valid questionnaires were obtained from the initial 96 distributed. All respondents were librarians or library staff, representing 15 university libraries across three provinces: West Sumatra (45%), Riau (30%), and Bengkulu (24%).

The user's perception of the performance of the SLiMS 9 Bulian application was measured using a descriptive statistical method, by looking for the mean value, standard deviation, and N (number of valid data). User satisfaction for each dimension is obtained from the average value of all question items per dimension. Meanwhile, the influence of gender, age, and education level on user satisfaction was calculated by conducting a hypothesis test. The hypothesis was tested using the Anova one-way method using the help of the SPSS version 24 application. The total value per dimension is calculated and used as a dependent variable, and items from all three dimensions are used as independent factors. Testing was conducted using the Test of Humanity Variance. The results of the Anova test will have an effect if the statistically significant Levene is 0.05. On the other hand, if the significant value is >0.05, it is certain that gender, age, and education level have no effect on user satisfaction.

3. RESULTS AND DISCUSSION

Before being analyzed, measurements are first made on the reliability of the assessment instrument. Its reliability is measured using the Cronbach alpha coefficient (α) with the help of SPSS applications. A variable is said to be reliable if its alpha Cronbach test result is greater

than 0.7 (43). The reliability measurement results in Table 1 show that all dimensions in the structure are reliable because the Cronbach alpha value is more significant than 0.7. The smallest value is shown in the Efficiency dimension (0.746), and the highest value is returned by the Control & Security dimension (0.860).

After reliability and validity tests on 95 questionnaires were collected, 90 valid questionnaires were obtained. After that, data was recapitulated based on respondents' demographic data, consisting of gender, age, and education level. The results are shown in Table 2.

Table 2. Respondents' demographic data

Description	Category	Sum	%
Gender	Man	30	33,33%
	Women	60	66,67%
Age	15 - 25 years	11	12%
	26 – 35 years	24	27%
	36 – 40 years	18	20%
	41 – 50 years	27	30%
	> 50 years	10	11%
Education level	D3	13	14%
	S1	57	63%
	S2	20	22%
	Total	**90**	**100%**

When viewed from the percentage of gender, age, and education level, most respondents are female (66,67%). When viewed from age, the most significant percentage came from respondents aged between 41 - 50 years (30%). For the education level, most respondents have a bachelor's degree (S1) (63%).

The level of User Satisfaction with SLiMS 9 Bulian

To measure the overall level of user satisfaction with the contribution of SLIMS 9 Bulian, all instrument data from each question item is summed, then the average (mean). The result obtained a user satisfaction level of 4.43 from 5 Likert scales. Furthermore, the level of satisfaction was measured for each dimension. The results are shown in Table 2 of the mean column. Of the six dimensions comprising 26 question items, all are in the satisfied category, indicated by a mean value of > 4 out of a scale of 5 for all dimensions. The highest level of satisfaction was obtained by the Economics dimension (4.52), while the lowest value was received by the Service dimension (4.34).

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When assessing each question item, the highest response was obtained from the Performance dimension, namely in question item A1 (4.56), which asked about user perceptions of the ease of accessing the SLIMS application. As for the Information and Data

dimension, the highest level of satisfaction is in the match between the data entered and the data stored in the system (B6), with an average of 4.52. Furthermore, for the Efficiency dimension, the highest satisfaction is obtained in item E2, namely the ease of processing collections offered by the application (4.52). For the Service dimension, the highest satisfaction is obtained from item F4, namely the ability of the SLiMS application to provide satisfaction to users to get information about library collections (4.46). Based on the Economics dimension, this system is considered capable of relieving users in terms of cost and time (4.47). Table 3 shows that respondents' perceptions do not have disparities that are too far. A low gap in the average value of standard deviations on each dimension characterizes it. The average standard deviation for all dimensions ranges from 0.59-0.67.

Table 3. Reliability scale measurement results & descriptive statistics

Dimension	Variable	Mean	Std. Deviation	Variance	Cronbach's Alpha
Performance	**A1**	4.56	0.583	0.340	0.840
	A2	4.33	0.618	0.382	
	A3	4.39	0.594	0.353	
	A4	4.40	0.577	0.333	
	A5	4.44	0.563	0.317	
	A	4.42	0.59	0.34	
Information & Data	**B1**	4.51	0.546	0.298	0,810
	B2	4.01	0.855	0.730	
	B3	4.06	0.921	0.849	
	B4	4.37	0.756	0.572	
	B5	4.51	0.546	0.298	
	B6	4.52	0.545	0.297	
	B7	4.38	0.594	0.352	
	B8	4.39	0.612	0.375	
	B	4.34	0.67	0.47	
Economics	**C1**	4.47	0.657	0.431	0.775
	C2	4.44	0.543	0.295	
	C	4.46	0.60	0.36	
Control & Security	**D1**	4.27	0.716	0.512	0.860
	D2	4.33	0.600	0.360	
	D3	4.34	0.603	0.363	
	D4	4.48	0.524	0.275	
	D	4.36	0.61	0.38	
Efficiency	**E1**	4.46	0.585	0.342	0.746
	E2	4.50	0.566	0.320	
	E3	4.37	0.661	0.437	
	E	4.44	0.60	0.37	
Service	**F1**	4.38	0.552	0.305	0.820
	F2	4.20	0.640	0.409	
	F3	4.26	0.680	0.462	
	F4	4.46	0.641	0.410	
	F	4.32	0.63	0.40	
Average		**4.39**			

Hypothesis Test Results

To test the hypothesis about the effect of gender, age, and education level on the level of user satisfaction with the SLiMS 9 Bulian application, the Anova one-way statistical test method was used. The results are shown in Table 4.

Table 4. Hypothesis test results

Dimension	Gender		Age		Education Level	
	F	Sig.	F	Sig.	F	Sig.
Performance (A)	1.063	0.128	1.468	0.219	3.285	0.042
Information & Data (B)	0.886	0.305	0.429	0.787	1.530	0.222
Economics (C)	2.011	0.349	1.167	0.331	2.367	0.100
Control & Data (D)	0.273	0.160	1.043	0.390	2.612	0.079
Efficiency (E)	0.020	0.603	0.772	0.546	1.296	0.279
Service (F)	1.063	0.888	2.170	0.079	2.476	0.090

The results of the hypothesis test of the influence of gender on user satisfaction with the SLiMS 9 Bulian application show that there is no single dimension whose significant value is less than 0.05. This indicates that H0 is rejected, meaning that gender does not significantly affect user satisfaction with the SLiMS 9 Bulian application in managing the library. The same is also shown in age categories. The probability of the hypothesis test results of each PIECES dimension used to measure the level of user satisfaction all yielded an F value of > 0.05. This also indicates that the user's age does not significantly affect user satisfaction with the SLIMS 9 Bulian application, which means that H0 is also rejected.

The results of hypothesis tests in the education level category show a slightly different thing. Of all the PIECES dimensions used to measure user satisfaction, only the performance dimension produces a probability value of < 0.05, while for other dimensions, the probability value is < 0.05. This result indicates that the effect of education level on user satisfaction is not too significant, so H0 is accepted. When measured based on user satisfaction with the overall performance of the SLIMS application, the results in Table 4 show no significant influence of gender, age, and education level on user satisfaction.

Overall, the results of the statistical test show that librarians/library staff who use SLiMS 9 Bulian in working in the library are satisfied with the performance of the application. The resulting satisfaction level was very high, with an average of 4.43 out of a scale of 5. This also applies to the level of satisfaction per dimension, namely performance, information & data, economics, control & security, efficiency, and performance. All the results produced are in the satisfied category. The highest satisfaction was obtained from the economic dimension. The high level of satisfaction in the economics dimension indicates that librarians consider SLIMS to contribute greatly to reducing the cost of organizing library activities and has significantly brought changes and developments to library performance.

These results are in line with the results of some previous studies, albeit using different methods. Research (Anwar & Karichnarsi, 2021) measures the performance of SLiMS using the SERVQUAL method. All dimensions used make a positive contribution to improving library performance. The same thing was also put forward by Maricar, Pramana, & Putri (2021), who stated that the use of the SLIMS application in libraries contributes positively to improving work efficiency in libraries.

However, these results are slightly different from the findings (Yudhana et al., 2023), which found obstacles in terms of stability in the system performance dimension, as well as problems in user authority management and data access control in the control and security dimension. This is due to limitations in the facilities and infrastructure to support system performance, not in the software. Likewise, the results of the study (Kangko et al., 2022) regarding the usability level of SLiMS 9 Bulian application using the Software Usability Measurement Inventory (SUMI) method.

The study concluded that SLiMS 9 Bulian contributes significantly to improving the efficiency of librarians' performance but not to the control dimension (the user's ability to control the application) and learnability (ease of use of the application). This obstacle occurred due to errors in choosing respondents who were the object of the research. The selection of students as respondents in measuring user satisfaction with the performance of SLiMS 9 Bulian is not appropriate. The access they have to the system is limited. They can only access OPAC or the front end, which is only a small part of the features that SLiMS applications have. This feature can only be used to assess the performance and ease of use of the application but cannot be used to assess the control of the system and the management of information and data. In contrast to librarians or library staff, who are given full access to the front-end pages and the back end of the system. They have full control over the use of the system, and can use and utilize almost all the features that SLiMS has.

As an end user, the selection of students as respondents in assessing the performance of library automation systems such as SLiMS, Inlislite, and others can only be limited to assessing the performance of OPAC. The most appropriate method to use is End User Computing Satisfaction (EUCS), because the target users of this method are end users, as done by Alfarasy et al. (2022); Setiyaningsih & Syamsudin (2019); Hidayah, Fetrina, & Taufan (2020); Ahmed et al. (2022); Pali'pangan & Pakereng (2023).

Meanwhile, Yudhana et al. (2023) studied SLiMS 9 Bulian user satisfaction using the PIECES method, stated that SLiMS as a whole has met user expectations, but on the other hand, they also found significant problems in the dimensions of performance, information and data, and control. This study recommends improving the stability, speed, and accuracy of the system in data processing. Looking at the results of the recommendations, the problems that arise are precisely due to problems with the devices and supporting facilities of the information system, not because of the performance of the application. The stability and speed of an information system are inseparable from the influence of the performance of supporting devices, such as computer specifications and internet connection (Benbya et al. 2020). Therefore, the problem raised is not entirely due to the performance of SLIMS as an application.

Furthermore, related to the hypothesis test of the influence of gender, age, and education level on user satisfaction of SLiMS 9 Bulian, the results did not find a significant influence of gender, and age on user satisfaction. Based on the data in Table 4, the significant value produced in the gender and age categories is likely to be greater than 0.05. This shows that the hypothesis about the correlation between sex and age becomes irrelevant. This result is different from the results of the study by Ramírez, Rondán, & Arenas, (2018); Alkhaldi & Al-Sa'di (2018), which found that gender had a significant effect on user satisfaction of information systems, and Kitsios et al. (2020); Zhang, Guo, & Vogel (2021), which revealed that the level of satisfaction of information system users is influenced by the age factor.

The findings in the education level category presented slight variations. Within the performance dimension, the p-value was found to be less than 0.05, signifying a statistically

significant relationship between education level and user satisfaction. Conversely, for the remaining dimensions and the overall average of all dimensions (see Table 4), the p-values exceeded 0.05, indicating that education level does not exert a significant influence on user satisfaction. Overall, these results suggest that education level does not have a substantial impact on the satisfaction of SLIMS 9 Bulian users. Consequently, the hypothesis positing no correlation between education level and information system user satisfaction is affirmed. This result is almost the same as that of research by Goeke, Crowne, & Laker (2022), which stated that the level of education only affects the skills of information system users, not user satisfaction.

Overall, the results of this study are different from those found by Al-Okaily et al., (2023); Jin & Xu, (2020); Rangraz Jeddi et al., (2020). These studies concluded that user characteristics such as gender, age, and education level a significant effect on satisfaction with the use of information systems, even though the applications studied and the purpose of use are different.

Based on the results of the hypothesis test, all hypotheses from this study were rejected because gender, age, and education level did not have a significant effect on the level of satisfaction of SLiMS 9 Bulian application users. Apart from the problem of supporting facilities, such as the stability and speed of system performance, overall the SLiMS application can work well when used by users with various demographic backgrounds, such as gender, age, and gender. This is reflected in the high level of user satisfaction and the results of hypothesis tests that produce not too significant differences from the three categories. Ease of use of the system, and the compatibility between the data entered and stored and the information presented, the time efficiency offered in the data processing process are very influential factors in minimizing the difference in user experience with diverse backgrounds.

The study encountered a minor limitation related to the insufficient number of respondents. This was attributed to the limited adoption of SLiMS 9 Bulian in university libraries, as some institutions continue to rely on earlier versions of SLiMS. Additionally, the number of system users, particularly administrators, at each university remains relatively small.

4. CONCLUSION

Based on the findings of this study, it can be concluded that, overall, librarians and library staff exhibit a very high level of satisfaction with the performance of the SLIMS 9 Bulian application in supporting library operations. This high satisfaction level is consistently observed across the dimensions assessed using the PIECES framework, namely performance, information and data quality, economic impact, control and security, efficiency, and service. Furthermore, no significant relationship was identified between user satisfaction and demographic factors such as gender, age, or education level among SLIMS 9 Bulian users in university libraries. These results suggest that the SLIMS application performs effectively across a diverse demographic of users. Despite the study's limited respondent pool, the findings indicated that librarians and library staff, as system administrators, provide a more representative measure of satisfaction with the library automation system when evaluated using the PIECES framework, compared to students who interact with the system primarily as general users.

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