Evaluation of Success Factors for Academic Information System Applications in Higher Education Using the Hot-Fit Model

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ABSTRACT

This research explored the adoption of the HOT-Fit paradigm and its influence on the success of an academic information system application in higher education. Using the PLS-SEM multivariate data analysis approach, the HOT-Fit model was evaluated in order to investigate the foundations of theory from a prediction standpoint. This was done to find out more about the model's potential applications. The HOT-Fit method takes various elements into account when performing a system analysis. Humans, organizations and technology are integrated elements and must be considered for the continued existence of an operating entity. This study uses hypothesis testing on a total of ten hypotheses to show the relationship between Academic Information System variables. The results show that six of the investigated hypotheses have a significant effect, while the other four are discarded because they are not relevant. 7.344 is the variable value of customer satisfaction. Program Features and Benefits The use of a variable with a value of 0.426 contributes little to the overall clarity of the situation. Based on the results of demo data processing, 121 participants (76.58%) reported good results, 13 (8.13%) rated this system as good, and 24 (15.19%) rated it as bad, resulting in a disparity between user expectations and the situation.

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1. INTRODUCTION

Digital technology has impacted the behavior of people both in Indonesia and globally. Rapidly developing information technology can have negative consequences if not well understood. In the legal context, technology opens new opportunities, one of which is the emergence of start-ups like HeyLaw Indonesia, a legal education platform that provides educational services, literacy, and consultation.

Founded in 2020, HeyLaw aims to meet legal needs by offering online legal classes, webinars, legal literacy, and legal consultations (Heylaw Indonesia, 2023). Initially, HeyLaw only offered online legal classes with engaging and high-quality content taught by prominent legal experts. Later, they launched products like webinars and legal literacy services on separate websites, offering thousands of regulatory documents, academic journals, comparisons, and legal rulings. Their latest product is a legal consultation service, released alongside the merging of both websites (Heylaw Indonesia, 2023). HeyLaw Indonesia continues to innovate to maintain its position in the industry, but it is also important to continually assess user satisfaction and quality (Prasetyaningtias et al., 2018). This study aims to evaluate the usability of the HeyLaw website and ensure the system's relevance.

Initial observations revealed several issues on the HeyLaw website, such as ineffective search features, inconsistent interfaces, and the absence of certificate name validation, causing mismatches between the certificate name and the user's name. Usability evaluation is necessary to ensure the system functions well and meets user needs (Maita et al., 2023).

Usability is a key factor in gaining market share, as user-friendly sites improve user satisfaction and efficiency (Farrahi et al., 2019). Usability also plays a role in digital marketing by increasing engagement and conversion (Sharma & Tripathi, 2023). However, limited development time often sacrifices usability aspects (Malik et al., 2021). Usability evaluation assesses the ease of completing tasks on a site (Wang & Senecal, 2008). This study uses the heuristic evaluation method, assessing usability based on the user interface using a heuristic checklist. Heuristic evaluation involves assessment using principles developed by Nielsen & Molich (1990), conducted by 3-5 experts for optimal results (Nielsen, 1994b).

In this study, Jakob Nielsen's 10 principles are used as main indicators, with additional privacy indicators from Pierotti & Nielsen (2012) and Gómez et al. (2014) to ensure the platform is secure and protects user data. The study uses 11 indicators across two iterations, with 10 from Nielsen's principles and one additional privacy indicator adopted from Pierotti & Nielsen (2012) and Gómez et al. (2014). The privacy indicator was added to ensure that HeyLaw Indonesia's platform is secure, trustworthy, and protects user data, given the current risks of personal data breaches. Therefore, privacy is considered an important aspect of this usability evaluation.

Many studies have explored system usability levels using various methods, including heuristic evaluation. For example, Prasetyaningtias et al. (2018) evaluated the LAPOR! app, Gusti et al. (2020) evaluated the iBandung app, and Wagwu & Obuezie (2020) assessed a university library website in Nigeria. Similar studies were conducted by Oktafina et al. (2021) on the XYZ City Public Works Department website and Lestari et al. (2019) on the PLN Mobile app. Other studies using this method include Nugroho et al. (2020) on the AKN Pacitan website, Ahsyar & Afani (2019) on an online news website, and Pratama et al. (2022) on the Batu City Education Department website.

Some studies combine heuristic evaluation with other methods, such as Dewi et al. (2022), who used WEBUSE to assess the ACC Career website, and Umam et al. (2021), who compared three methods to identify usability issues in the Situbondo Tera' app, finding heuristic evaluation identified more issues than usability testing and cognitive walkthrough. Additionally, Tinar et al. (2019) showed that heuristic evaluation was more effective in identifying usability problems than usability testing on the Health Polytechnic Library website in Malang.

Heuristic evaluation is chosen for its ease, speed, low cost, and applicability at any phase of system development (Gómez et al., 2014; Salman & Almukhtar, 2023). This study will perform two iterations, analyzing issues based on severity ratings and providing suggestions for improvement. These ratings are used to assess problem severity (Nielsen, 1994a). It is hoped that this research will identify usability issues and offer solutions and suggestions for future interface design improvements.

2. RESEARCH METHODS

2.1 Research Design

This research was performed out at a for-profit university. Distribution of questionnaires and survey data collection are both aspects of quantitative research. Based on gender statistics, usage statistics, system statistics, system roles, and system success statistics, questionnaire indicators for demographic characteristics are determined.

2.2 Population and Sample Size

This study's population comprised all active instructors and students who engaged with the Academic Information System, a total of 260 users comprised of 251 students and 9 permanent lecturers. The quantity of samples that were obtained using the Slovin method with a predicted error rate of 5%.The computation using the slovin method is as follows:

$s = \frac{\mathrm{n}}{(1+ne^2)}$ with e = 5% = 0.05 (1)

$s = \frac{260}{1+260(0{,}05)^2}$ = 157. 6 be rounded 158 (2)

2.3 Data Collection Techniques

The evaluation form included a Likert scale with the options 1 (Strongly Disagree), 2 (Disagree), 3 (Disagree), 4 (Agree), and 5 (Agree) (Strongly Agree). Finding the pertinent elements, gathering data, and conducting analysis are all necessary steps in the measurement of variables.

Using the variables from the HOT-Fit Model, the acquired data will be examined. To examine the complicated interactions between variables in a model and hypotheses, a statistical technique known as SEM (Structural Equation Modeling) is required. (AlNuaimi et al., 2021) describes PLS (Partial Least Squares) as a method for analyzing data in the SEM model. The benefits of SEM-PLS are (Dash & Paul, 2021);

- Tolerance for less normal data
- The ability to manage basic samples
- Flexibility in dealing with complex models
- A more predictive approach

Data that has been processed and assessed using SEM-PLS will be the output of an outer model analysis performed with SmartPLS 3.0. The HOT-Fit factor, which illustrates how system readiness in tertiary institutions affects computer control support, compatibility, relative advantage, and significant complexity, was used to test survey data with smart PLS (Mirabolghasemi et al., 2019).

2.4 Research Model

The evaluation methodology for HOT-Fit was used to conduct of research. The HOT-Fit model consists of three dimensions (Setiorini et al., 2021):

- The Human Fit dimension aids in comprehending user happiness and system usage.
- The Organizational Fit factor facilitates the evaluation of stakeholder support for the implementation of organizational systems.
- The Technology Fit factor facilitates comprehension and measurement of the support offered by stakeholders accountable for guaranteeing service quality

The research strategy involves integrating quantitative and qualitative methodologies to obtain more comprehensive and reliable data. Data collection methods included structured interviews, observations, and the distribution of questionnaires based on the Likert scale. Quantitative data were analyzed statistically, while qualitative data were examined descriptively (Alfina & Irfan, 2020). Academic institutions evaluate their Academic Information Systems using the HOT-Fit methodology, as illustrated in the HOT-Fit framework shown in Figure 1.

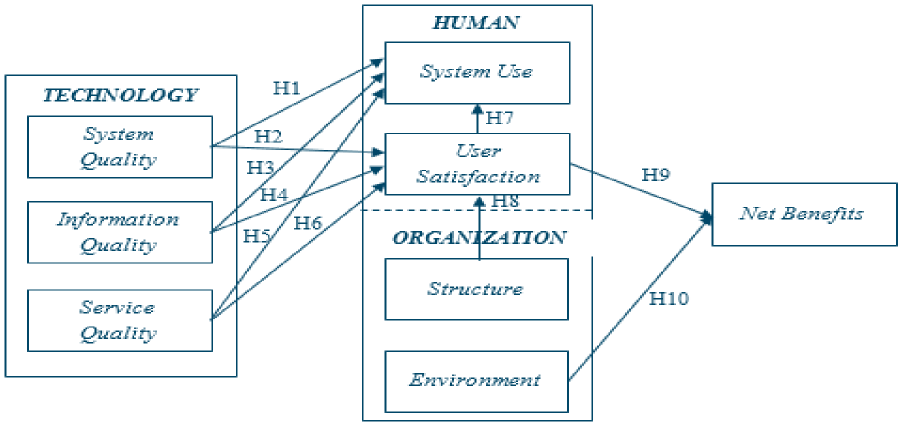

Figure 1. Human Organizational Technology Fit Model

According to the HOT-Fit technique framework in Academic Information Systems, tests are performed on each association between variables or hypotheses that have been determined. This study tests the following hypotheses:

H1: System Use is positively impacted by system quality. Application of Academic Information Systems can improve an organization's efficiency and performance.

H2: User satisfaction with the Academic Information System Application is positively impacted by the system quality, which will increase users' enthusiasm for using the system.

H3: Academic Information System Application System Use is positively impacted by information quality, which will motivate users to use the system.

H4: User satisfaction in academic information systems has improved as a result of information quality's positive impact.

H5: System Use Academic Information System Application is positively impacted by service quality, which increases user interest in using the system.

H6: Academic Information Systems Application User Satisfaction is benefited by Service Quality. User satisfaction may rise due to the system service standard.

H7: System Usage benefits significantly and favorably from User Satisfaction. Applications for academic information systems may persuade users to use the platform for all of their daily tasks.

H8: Structure influences User Satisfaction when utilizing Academic Information System Applications positively. A good and competent organizational structure will enhance institutional IT governance and increase user satisfaction with the system.

H9: The Net Benefit of the Academic Information System Application is significantly and favorably influenced by User Satisfaction.

H10: The application of academic information systems is positively and significantly influenced by the environment.

3. RESULTS AND DISCUSSION

In order to verify the success of implementing an academic information system application, research using the HOT-Fit model was carried out at an Indonesian higher education institution.

3.1 Mechanism of Academic Information System

The first step in using web-based applications is accessing academic information system applications in tertiary institutions. Users can access academic information system applications because the application is confirmed to be connected to the internet network. In order to manage the application without access issues, the user must enter a User ID and Password in the academic information system application.

The interface of academic information system applications in higher education is depicted as follows in Figure 2.

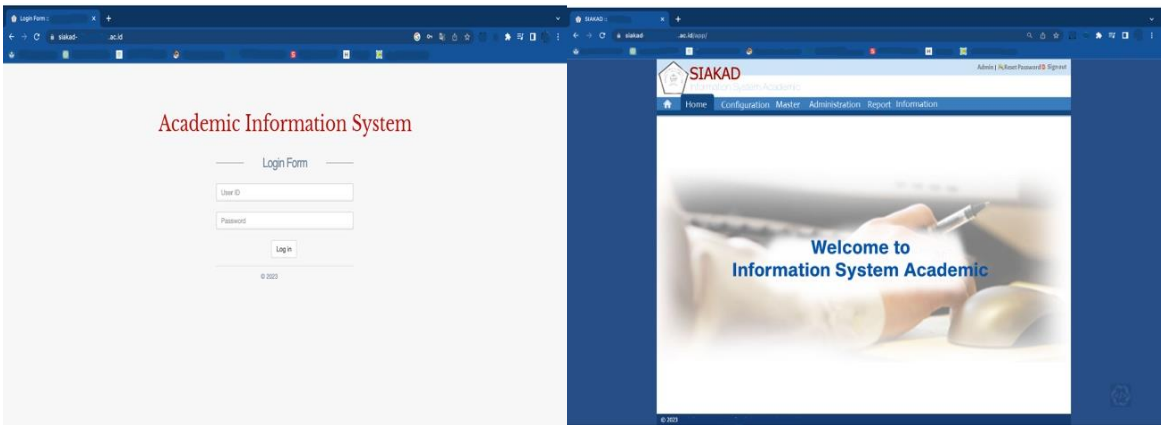

Figure 2. Interface Academic Information System Higher Education

3.2 Result of Demographic Analysis

This stage consisted of analyzing the respondents' responses to the questionnaire's questions, particularly the questions in the respondent's profile section and questions about academic information system application, in order to produce demographic information regarding the respondents' characteristics, application’s role, and the system's success rate. Researchers were successful in obtaining 158 demographic data from respondents, including gender, frequency of system usage, system role, and system success status.

3.2.1 Gender

The analysis was initiated by processing the demographic data gathered from respondents, categorized by gender, as presented in the static information in Table 1 below.

Table 1. Gender Information Statistics

Gender	Quantity	Percentage
Male	109	68,99%
Female	49	31,01%
Total	**158**	**100%**

The results of a description of the research conducted on 158 respondent data are presented in Table 1. The results show that the majority of the data is dominated by male respondents, specifically 109 individuals with a percentage of 68.99%, compared to 49 female respondents with a percentage of 31.01%.

3.2.2 Frequency of Usage

The analysis commenced by analyzing the demographic data obtained from respondents, grouped by usage frequency, as displayed in the static information in Table 2 below.

Table 2. Frequency Usage Information Statistics

Frequency of Use	Quantity	Percentage
<5	16	10,13%
5 up to 10	57	36,07%
10 up to 15	69	43,67%
>15	16	10,13%
Total	**158**	**100%**

From Table 2 that in this study the highest number of respondents from a frequency of 10 to 15 times, namely 69 people (43.67%) and the fewest respondents came from respondents who had used a frequency of <5 times, and then > 15 times, each of which was 16 people (10.13%).

3.2.3 The Role of System

The analysis started by examining the demographic data gathered from respondents, classified by system role, as presented in the static information in Table 3 below.

Table 3. Role System Information Statistics

System Role	Quantity	Percentage
Less helpful	4	2,53%
Quite helpful	79	50,0%
Help	65	41,14%
Very helpful	10	6,33%

Total	**158**	**100%**

Table 3 reveals that as many as 65 participants 41.14 % in this study felt aided by the system, and 79 of them (50 percent) claimed the system was very helpful in finishing their work/studies. Only four individuals 2.53% indicated that the system was not very useful for completing tasks or assignments.

3.2.4 System Success Status

The analysis began by evaluating the demographic data collected from respondents, categorized by system success status, as shown in the static information in Table 4 below.

Table 4. System Success Information Statistics

System Success	Quantity	Percentage
Not good	24	15,19%
Good	121	76,58%
Very Good	13	8,23%
Total	**158**	**100%**

According to Table 4, 121 respondents indicated that the system's success rate was good, representing the majority of those who provided feedback 76.58%. Even better, thirteen individuals 8.23% believe the system to be excellent. However, 24 persons 15.19% believed that the system was inadequate.

3.3 Instrument Testing

The research model evaluation consisted of four phases: item-specific reliability, internal consistency reliability, variance extraction on an average basis, and discriminant validity. The first three measurements are classified under convergent validity, which seeks to quantify the strength of the correlation between contracts and latent variables. This assessment included 158 participants.

3.3.1 Individual Item Reability (IRR)

This test can be determined from the standardized factor loading value. This value explains the magnitude of the correlation results of each indicator measurement item based on the indicator construct. As a construct-measuring indicator, a loading factor value greater than 0.70 is considered optimal. After three tests, there are ten indicators whose value is below 0.7, namely KI4 (Ease of Reading Information), KL3 (Accessibility), KP1 (Interface), KS3 (System Ease), KS4 (Report Completeness), LO3 (Support of All Units), M3 (Ease of Data Processing), M5 (Reduction of Errors), PS2 (Helping with Work), and SO3 (Staff Structure).

3.3.2 Internal Consistency Reliability (ICR)

This test was conducted to establish the composite reliability value with a threshold of 0.70. Test findings with a cutoff value of 0.7 are deemed acceptable, and if the cutoff value is between 0.8 and 0.9, the results are deemed to be extremely satisfactory. After conducting individual item reliability tests and eliminating ten indicators, Table 5 displays the composite reliability values for all variables with composite reliability values more than 0.70, indicating that the variables meet the standards for use.

Table 5. Composite Reliability Value

Variable	Composite Reliability
KS	0,855
KI	0,897
KL	0,784
PS	0,846
KP	0,885
SO	0,792
LO	0,862
M	0,841

3.3.3 Average Variance Extracted (AVE)

AVE measures the convergent validity value of variables in latent constructs. The validity indicator is convergently valid if the minimum AVE value is equal to or greater than 0.5. More than fifty percent of the variance of each indicator can be explained by latent variables on average. In Table 6, the AVE values of all variables are summarized. The obtained AVE value was greater than 0.5, a value that was predetermined and deemed eligible for inclusion in the research.

Table 6. Average Variance Extracted (AVE)

Variable	Average Variance Extracted (AVE)
KS	0,664
KI	0,687
KL	0,645
PS	0,647
KP	0,721
SO	0,659
LO	0,757
M	0,638

3.3.4 Discriminant Validity

Discriminant Validity is a reflective model that can evaluate cross loading and compare the AVE value to the squared value of the correlation between the constructs or the AVE value to the correlation. Cross loading exists because the indicator has a construct of all variables that correlates more strongly with other block constructs. The AVE root value therefore appears to be more significant than the correlation between the other

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components. Based on the examination results, it is determined that the discriminant validity test is without flaws. Table 7 displays discriminant validity values.

Table 7. Discriminant Validity Value

	KI	KL	KP	KS	LO	M	PS	SO
KI	0.845							
KL	0.604	0.803						
KP	0.829	0.492	0.849					
KS	0.614	0.598	0.561	0.815				
LO	0.447	0.529	0.406	0.417	0.870			
M	0.469	0.504	0.431	0.443	0.623	0.799		
PS	0.326	0.605	0.122	0.409	0.466	0.528	0.804	
SO	0.511	0.592	0.523	0.451	0.517	0.528	0.279	0.812

Based on the four stages of variable testing conducted with the measurement model analysis, the correlation between variables is illustrated through the outer model, as shown in Figure 3.

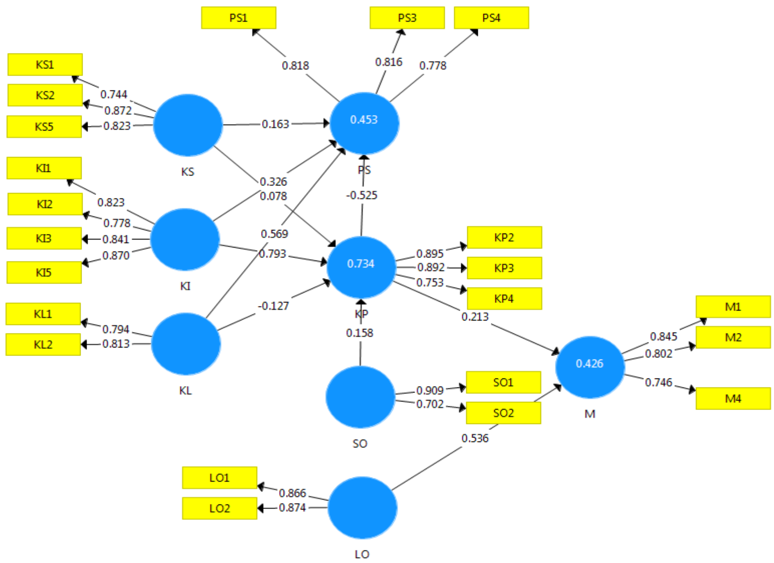

Figure 3. Outer Model Analysis Results Using SmartPLS 3.0

The test results clearly indicate that the model proposed in this study has exhibited strong statistical properties and fulfilled all the criteria at each phase of the measurement model. Consequently, it can be inferred that the model is ready to advance to the subsequent phase, which involves testing the structural model or inner model.

3.4 Evaluation Process

The evaluation process is carried out based on the acquisition of analysis results based on variable measurements. The results of the analysis are displayed through the outer model with SmartPLS 3.0, which is useful for assessing the level of contract correlation with latent variables. The evaluation process has six stages of testing in analyzing the structure of the model, namely:

3.4.1 Path Coefficient Test (β)

The path coefficient test pays attention to the threshold value with a value greater than 0.1 so that it can be stated that the use of the path has an influence on the model. The results of the path used are 3 out of 10 paths, namely KL-KP, KP-PS, and KS-KP, with no significant effect.

3.4.2 Coefficient of Determination Test (R^2)

This test describes the test results from the influence of certain exogenous constructs on endogenous constructs. The standard measurement of the influence of variables is classified into 3 variants: strong, moderate, and weak. The variant will be declared strong if the value reached is around 0.670. The variant is declared moderate if the value achieved is around 0.333, and the variant is declared weak with a value below 0.190. The results of this test obtained a strong variant value of customer satisfaction (KP) of 0.734 and a moderate variant value of benefits (M) of 0.426 and system use (PS) of 0.453.

3.4.3 T-Test

The t-test was adopted using the bootstrapping method in SmartPLS 3.0, using a two-tailed test to test the research hypothesis. From the test results, the hypothesis can be accepted if it has a significance level of 5% and the t-test is greater than 1.96. The results obtained from the t-test had 4 out of 10 paths below the value of 1.96, namely KI-KP (Quality of Information on User Satisfaction), KL-KP (Service of Quality on User Satisfaction), KS-KP (Quality of System on User Satisfaction), and LO-M (Organizational Environment on Benefit), which were declared to be rejected hypotheses. Values above 1.96, namely KI-KP, KL-PS, KP-M, KP-PS, LO-M, and SO-KP (Organizational Structure on User Satisfaction), are declared hypotheses acceptable.

3.4.4 Effect Size (f^2)

Effect sizes are useful for predicting the influence of a correlation between variables. The effect size is applied to the model structure by adopting a threshold value of 0.02 for a small effect, 0.15 for a moderate effect, and 0.035 for a significant effect. The effect size test conducted on 10 paths results in four paths. The results for paths with a great deal of influence are KI-KP and LO-M, while the results for paths with little influence are KS-KP and KL-KP.

3.4.5 Predictive Relevance (Q^2)

Using predictive relevance, the blindfolding method provides evidence of the predictive association between certain variables and other variables. The endogenous variables KP (0.495), M (0.249), and PS (0.255) indicate that this test model has a measurement threshold greater than zero.

3.4.6 Relative Impact (q^2)

Relative impact applies the blindfolding method, namely variables with limit values. The limit value with a smaller effect is obtained at 0.02. The cut-off value for medium effects is 0.15 and 0.35 for very large influences. The results of the *(q^2)* test on the ten pathways in this study indicate that three pathways have a large effect, four pathways have a medium effect, and two pathways have a small effect. Table 8 shows the test results for relative impact.

Table 8. Relative Impact Test Results

No	Path	q2			Analysis
		Q2-in	Q2-ex	Σq2	q2
H1	KS -> PS	0,255	0, 002	0,340	Moderate
H2	KS -> KP	0,495	0	0,980	Large
H3	KI -> PS	0,255	0,002	0,340	Moderate
H4	KI -> KP	0,495	0	0,980	Large
H5	KL -> PS	0,255	0,002	0,340	Moderate
H6	KL -> KP	0,495	0	0,980	Large
H7	KP -> PS	0,255	0,002	0,340	Moderate
H8	SO -> KP	0,495	0	0,980	Large
H9	KP -> M	0,249	0,114	0,180	Small
H10	LO -> M	0,249	0,114	0,180	Small

3.5 Recommendations Results

Ten hypotheses were evaluated using the PLS-SEM method to analyze the data: KS-PS (Quality of System on User Satisfaction), KS-KP (Quality of System on User Satisfaction), KI-PS (Quality of Information on System Users), KI-KP (Quality of Information on User Satisfaction), KL-PS (Quality of Service on System Utilization), KL-KP (Quality of Service on User Satisfaction) (Organizational Environment of Benefits). This hypothesis is accepted on the basis of the respondent's perception of its appropriateness, whereas the alternative hypothesis is rejected on the basis of the following criteria:

- KS->KP: Users are dissatisfied with the application of the academic information system because the system's data is less precise and less secure in terms of data integration.
- KS->PS: The hypothesis is rejected since the data are erroneous and the system frequently has delays in updating information, causing issues for users.

- KI->PS: Because the information on the application of the academic information system is limited and incomplete, users can only access the system at specific times, thus refuting the hypothesis.
- KL->KP: The argument is invalid because the service system lacks technical support according to system functions, resulting in dissatisfied customers.

The results of the rejected hypothesis are able to provide several recommendations that can be applied by higher education for future improvement. The results of the recommendations are as follows:

- System development must consider expanding the specification server to expedite the process of updating information on the academic information system for higher education.
- Adding and updating information that can be incorporated on the existing elements of the academic information system.

4. CONCLUSION

The results showed that evaluating the success of the academic information system in tertiary institutions using the HOT-Fit Model concluded that from the results of data processing, 10 of the 32 indicators were removed, namely KI4, KL3, KP1, KS3, KS4, LO3, M3, M5, PS2, and SO3 in this research model because they are below the standard outer loading value. The results of processing carried out on demographic data showed several responses, including that as many as 121 people (76.58%) assessed the success status of the system as good, as many as 13 people (8.23%) felt the system used was very good, and as many as 24 people (15.19%) felt the system was not good due to a gap between user expectations and the state of the system. To find out the factors that influence the level of success of the system, a consideration of the hypotheses that can be accepted and rejected is carried out. The hypotheses that were accepted were KI-KP, KL-PS, KP-PS, SO-KP, KP-M, and LO-M, and the hypotheses that were rejected were KS-PS, KS-KP, KI-PS, and KL-KP.

The four hypotheses were rejected because the accuracy of the data, the appearance of the system, and the quality of information and services in the application did not affect the frequency of users managing the application or the increase in user satisfaction. From the results of the study, it can be concluded that the academic information system needs to be changed so that it can help users, and organizations need to conduct training related to the application system before implementing the whole system so that users can understand the system well. This research needs to be further developed in applying the HOT-Fit method by paying more attention to and exploring indicators from various literature to avoid misinterpretation and adapt to system requirements in a comprehensive manner. Evaluation is needed to understand cause and effect in terms of the significance of the relationship between variables. In research, it is necessary to add a sample that is larger than the number of respondents so that the results obtained are more optimal.

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