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DEVELOPMENT INTEGRATIVE MODEL FOR ACADEMIC INFORMATION SYSTEMS USING UTAUT, DELONE&MCLEAN, AND TTF

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Abstract: The Academic Information System (SIAKAD) plays an important role in supporting the management of academic administration in higher education institutions, particularly for students. ABC University has implemented SIAKAD since 2018 to facilitate administrative ativities in line with its motto of a high technology campus. This study aims to measure the sucess of SIAKAD usage from the aspects of acceptance, satisfaction, suitability, and perceived benefits. The integration of the Unified Theory of Acceptance and Use of Technology (UTAUT), DeLone & McLean, and Task Technology Fit (TTF) models was carried out to obain a more comprehensive overview in assessing the success of SIAKAD. UTAUT explains the factors influencing the intention to use, DeLone & McLean emphasizes the relationship between system quality and both user satisfaction and net benefits, while TTF evaluates the fit between technology and user tasks. By combining these three models, the study addresses the limitations of each model and produces a more holistic approach in measuring acceptance, success, and the appropriateness of system use. The testing was conducted using SPSS and Structural Equation Modeling (SEM) analysis through AMOS.

Keywords: siakad; utaut; delone&mclean; penerimaan teknologi; sem

Abstrak: Sistem Informasi Akademik (SIAKAD) memiliki peran penting dalam mendukung pengelolaan administrasi akademik di perguruan tinggi, khususnya bagi mahasiswa. Perguruan Tinggi ABC telah menerapkan SIAKAD sejak tahun 2018 guna mempermudah aktivitas administrasi sesuai motto high technology campus. Penelitian ini bertujuan mengukur keberhasilan penggunaan SIAKAD dari aspek penerimaan, kepuasan, kesesuaian, dan manfaat yang dirasakan pengguna. Integrasi model Unified Theory of Acceptance and Use of Technology (UTAUT), DeLone & McLean, dan Task Technology Fit (TTF) dilakukan untuk memperoleh gambaran yang lebih komprehensif dalam menilai keberhasilan SIAKAD. UTAUT menjelaskan faktor-faktor yang memengaruhi niat penggunaan, DeLone & McLean menekankan hubungan antara kualitas sistem dengan kepuasan serta manfaat bersih, sementara TTF menilai kesesuaian teknologi dengan tugas pengguna. Dengan menggabungkan ketiganya, penelitian dapat menutup kelemahan masing-masing model sekaligus menghasilkan pendekatan yang lebih utuh dalam mengukur penerimaan, kesuksesan, dan kesesuaian penggunaan sistem. Pengujian dilakukan menggunakan SPSS dan analisis Structural Equation Modeling (SEM) melalui AMOS.

Kata kunci: siakad; utaut; delone&mclean; penerimaan teknologi; sem

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INTRODUCTION

Information Technology plays a pivotal role in enhancing academic services within higher education institutions, aiming to deliver optimal support for students. In this regard, the presence of information systems is essential to ensure that academic processes are carried out effectively and efficiently. Nevertheless, user acceptance of such systems constitutes a critical determinant of successful implementation, thereby necessitating a more comprehensive investigation [1]. A successful information system implementation is expected to yield positive outcomes and significantly improve organizational performance [2].

Information systems serve as a reliable repository of data, particularly in the field of archiving. Prior studies emphasize that digital archives must ensure the reliability and accuracy of both data and metadata in order to function as trustworthy evidence. Consequently, the stored information should accurately represent transactions, activities, or facts [3].

An information system also represents a relationship between data and methods that utilize hardware and software to store useful information. In addition, its components function to manage data so that it can be processed into valuable information that supports the achievement of organizational objectives. Internet-based information systems are employed to assist institutions or organizations in providing information and services online. The purpose is to facilitate user interaction without the need for physical presence or face-to-face meetings [4]. However, the implementation of an information system poses a challenge, namely whether an organization or institution will succeed in adopting the system or, conversely, face failure.

This study employs a combined model of UTAUT, the DeLone and McLean IS Success Model, and Task–Technology Fit (TTF), with UTAUT as the primary foundation. UTAUT explains behavioral intention but does not capture system outcomes [5] , while the DeLone and McLean model links system use with net benefits [2] , and TTF evaluates the alignment between technology and tasks [6]. The integration of these models provides a comprehensive framework to assess the acceptance, success, and task–technology alignment of SIAKAD. The variables employed encompass factors from the three models, derived from previous studies [7],[8],[9],[10],[11],[12],[13].

Although SIAKAD are widely implemented in universities, few studies have examined the low utilization of system features over time, creating a gap between technological availability and actual use in supporting academic services [14],[15].

According to the university's information systems unit, SIAKAD has been operating since 2018 however, field implementation shows that several features such as graduation, assessment, attendance, finance, storage of Semester Learning Plans, and learning satisfaction questionnaires remain unused. Only about 60% of the available features are utilized, indicating suboptimal usage. Moreover, student adoption is still limited, as some continue to seek information from the academic office that is already available in SIAKAD.

These problems highlight a gap between the availability of technology and its actual utilization in supporting academic services. Hence, this study aims to analyze the factors that influence the limited use of SIAKAD, as well as to

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evaluate the level of user acceptance and its alignment with user needs.

METHOD

This study uses a quantitative survey method to test and validate the proposed hypotheses. The research flow is shown in Image 1.

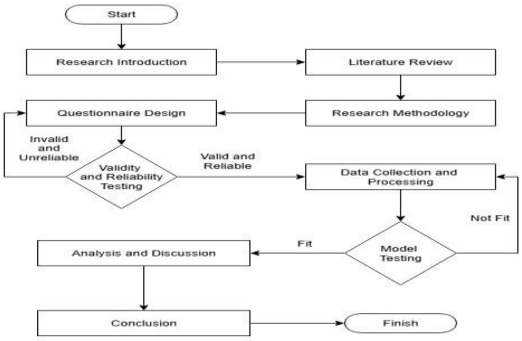

Image 1. Research Flow

This study outlines the problems, objectives, and rationale, followed by a literature review to build the conceptual framework and model. The methodology covers variable identification, questionnaire design, and data analysis. After a pilot test with 40 students, data from questionnaires and SIAKAD management interviews were analyzed using SPSS and AMOS. The study integrates the UTAUT, DeLone & McLean, and TTF models, with UTAUT as the main foundation shown in Image 2

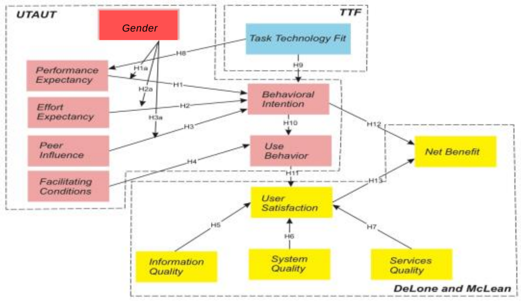

Image 2. Proposed Research Model

Based on the proposed research model, hypotheses were formulated to be used in this study.

Table 1. Research Hypotheses

Code	Hypotheses Statement
H1	Performance expectancy has an effect on behavioral intention.
H1a	Gender moderates the relationship between performance expectancy and behavioral intention
H2	Effort expectancy has an effect on behavioral intention.
H2a	Gender moderates the relationship between effort expectancy and behavioral intention.
H3	Peer influence has an effect on behavioral intention.
H3a	Gender moderates the relationship between peer influence and behavioral intention.
H4	Facilitating conditions have an effect on use behavior.
H5	Information quality has an effect on user satisfaction.
H6	System quality has an effect on user satisfaction.
H7	Service quality has an effect on user satisfaction.
H8	Task technology fit has an effect on performance expectancy
H9	Task technology fit has an effect on behavioral intention.
H10	Behavioral intention has an effect on use behavior.
H11	Use behavior has an effect on user satisfaction.
H12	Behavioral intention has an effect on net benefits.
H13	User satisfaction has an effect on net benefits.

Table 2. Variables and Indicators

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Variabel	Indicators
Performance Expectancy (X1)	Perceived usefulness (X1.1)
	Extrinsic motivation (X1.2)
	Relative advantage (X1.3)
Effort Expectation (X2)	Perceived ease of use (X2.1)
	Complexity (X2.2)
	User-friendliness (X2.3)
Peer Influence (X3)	Subjective norm (X3.1)
	Social factors (X3.2)
	Impression (X3.3)
Facilitating Condition (X4)	Perceived behavioral control (X4.1)
	Facilitating conditions (X4.2)
	Compatibility (X4.3)
Information Quality (X5)	Understandability (X5.1)
	Accessibility (X5.2)
	Reliability (X5.3)
	Timeliness (X5.4)
System Quality (X6)	Convenience (X6.1)
	Access speed (X6.2)
	Flexibility (X6.3)
	Feature usefulness (X6.4)
Services Quality (X7)	Responsiveness (X7.1)
	Reliability (X7.2)
	Assurance (X7.3)
	Empathy (X7.4)
Task Technology Fit (X8)	Data access authority (X8.1)
	Training (X8.2)
	Technical and business planning support (X8.3)
Behavioran Intention (Y1)	Usage intention (Y1.1)
	Predicted use (Y1.2)
	Planned use (Y1.3)
Use Behavior (Y2)	Usage intensity (Y2.1)
	User behavior (Y2.2)
	Duration of use (Y2.3)
User Satisfaction (Y3)	Content (Y3.1)
	Accuracy (Y3.2)
	Format (Y3.3)
Net Benefit (Z1)	Individual impact (Z1.1)
	Task completion speed (Z1.2)
	Work facilitation (Z1.3)
	Effectiveness (Z1.4)
Gender (M1)	Respondent gender (M1.1)

The measurement model, tested through CFA, establishes convergent validity, discriminant validity, and reliability of the indicators. Once confirmed, the structural model is analyzed to evaluate causal relationships among the latent variables.

RESULT AND DISCUSSION

Based on data collected from 328 questionnaire respondents, 197 students (63%) were male, and 116 students (37%) were female. Regarding the study programs, 80 respondents (25%) were from Mechanical Engineering, 81 respondents (26%) from Electrical Engineering, 75 respondents (24%) from Civil Engineering, and 77 respondents (25%) from Informatics Engineering.

Measurement Model Testing

The measurement model was tested using CFA by connecting all research variables. The purpose is to reduce indicators to achieve model fit before the subsequent testing stage

Table 3. CFA Testing Result

Model	CFA Testing		
	DF	P	CMIN/DF
Default	368	0.067	1.113
Saturated	0	-	-
Independence	465	0.000	9.441

The CFA results shown in Table 3 indicate that the model meets the fit criteria ($P = 0.067 > 0.05$).

Structural Model Testing

This testing is based on the variables and indicators that were confirmed to be fit in the previous assessment.

Normality Testing

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The normality test was conducted based on the critical ratio of the skewness value, which is expected to be around ±2.58. The results of the normality assessment are presented in Table 4.

Table 4. Normality Testing Result

Variable	Normality Testing		
	skew	kurtosis	c.r.
Z1.4	-.841	1.149	4.148
Z1.1	-.873	.556	2.008
Z1.2	-.869	1.227	4.432
X2.3	-.583	.518	1.871
X1.1	-.616	1.385	5.001
X1.2	-.755	1.247	4.502
Multivariate			35.590

The results in Table 4 indicate non-normality, as the critical ratio for skewness exceeds ±2.58 and the multivariate.

Outliers Testing

Data normality was tested using the Mahalanobis method by comparing Mahalanobis values with the chi-square value at 31 degrees of freedom and a significance level of 0.01. The obtained chi-square value was 52.192, so data with Mahalanobis values above this threshold are considered outliers.

Table 5. Mahalanobis Testing Result

Observation number	Mahalanobis d-squared
122	49.474
244	49.323
45	49.06
186	49.043
160	44.789

Convergent Validity Testing

Validity testing was conducted using convergent validity, with the criterion that the loading factor (standardized loading estimate) should be greater than 0.5.

Table 6. Convergent Validity Result

Variable	Indicators			Convergent Validity	
				Loading Factor	Result
Performance Expectancy	X.1	on	X.1.2	0.799	Valid
	X.1	on	X.1.1	0.736	Valid
Effort Expectation	X.2	on	X.2.3	0.659	Valid
	X.2	on	X.2.1	0.532	Valid
Peer Influence	X.3	on	X.3.3	0.733	Valid
	X.3	on	X.3.2	0.827	Valid
	X.3	on	X.3.1	0.785	Valid
Facilitating Condition	X.4	on	X.4.3	0.525	Valid
	X.4	on	X.4.2	0.626	Valid
Information Quality	X.5	on	X.5.2	0.619	Valid
	X.5	on	X.5.1	0.671	Valid
	X.5	on	X.5.4	0.706	Valid
System Quality	X.6	on	X.6.3	0.685	Valid
	X.6	on	X.6.2	0.798	Valid
Services Quality	X.7	on	X.7.3	0.789	Valid
	X.7	on	X.7.4	0.811	Valid
Task Technology Fit	X.8	on	X.8.3	0.499	Not Valid
	X.8	on	X.8.2	0.668	Valid
	X.8	on	X.8.1	0.578	Valid
Behavioran Intention	Y.1	on	Y.13	0.682	Valid

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	Y.1	on	Y.1.2	0.671	Valid
	Y.1	on	Y.1.1	0.697	Valid
Use Behavior	Y.2	on	Y.2.3	0.680	Valid
	Y.2	on	Y.2.2	0.697	Valid
	Y.2	on	Y.2.1	0.684	Valid
User Satisfaction	Y.3	on	Y.3.3	0.693	Valid
	Y.3	on	Y.3.1	0.713	Valid
Net Benefit	Z.1	on	Z.1.3	0.728	Valid
	Z.1	on	Z.1.2	0.708	Valid
	Z1	on	Z1.1	0.553	Valid
	Z.1	on	Z.1.4	0.737	Valid

Construct Reliability Testing

A construct is considered reliable if the Construct Reliability (CR) value reaches at least 0.70. If it falls within the range of 0.60–0.70, reliability can still be accepted provided that the indicators used are valid

Table 7. Construct Reliability Result

Variable	Construct Reliability	
	CR Value	Result
X.1	0.74	Reliable
X.2	0.73	Reliable
X.3	0.83	Reliable
X.4	0.70	Reliable
X.5	0.70	Reliable
X.6	0.71	Reliable
X.7	0.78	Reliable
X.8	0.75	Reliable
Y.1	0.72	Reliable
Y.2	0.73	Reliable
Y.3	0.66	Reliable
Z.1	0.78	Reliable

Goodness of Fit Testing

Goodness of Fit (GoF) testing involves comparing the test results with the cut-off values. In this analysis, the chi-square value was obtained from the chi-square distribution table with df = 371 and α = 0.05, which is 416.9.

Table 8. Gof Result

Gof Index	Gof Value	
	Cut off	Result
Chi-Square	≤ 416.9	405
Probability	≥ 0.05	0.079

Hypotheses Testing

Hypothesis testing is based on the significance value, where H0 is rejected and Ha is accepted if $p < 0.05$ and the C.R. exceeds 1.96. This confirms that the hypothesis has a significant effect.

Table 9. Hypotheses Testing Result

Code	Hypotheses Testing		
	Path	C.R	p
H1	X.1 to Y.1	-0.648	0.517
H2	X.2 to Y.1	-0.502	0.616
H3	X.3 to Y.1	-1.707	0.088
H4	X.4 to Y.2	2.222	0.026
H5	X.5 to Y.3	1.488	0.137
H6	X.6 to Y.3	-1.356	0.175
H7	X.7 to Y.3	0.004	0.997
H8	X.8 to X.1	8.106	***
H9	X.8 to Y.3	4.321	***
H10	Y.1 to Y.2	6.121	***
H11	Y.2 to Y.3	7.356	***
H12	Y.1 to Z.1	-0.073	0.942
H13	Y.3 to Z.1	4.885	***

Table 10. Hypothesis Testing Results for Moderate Variables

Code	Hypotheses Testing		
	Path	C.R	p
H1a	X.1 ke Y.1	0.689	0.456
H2a	X.2 ke Y.1	0.634	0.494
H3a	X.3 ke Y.1	0.713	0.440

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Final Model Result

Based on the results of the hypothesis testing, relationships that were found to have no significant effect were removed, resulting in the final model of this study, as shown in Image 3.

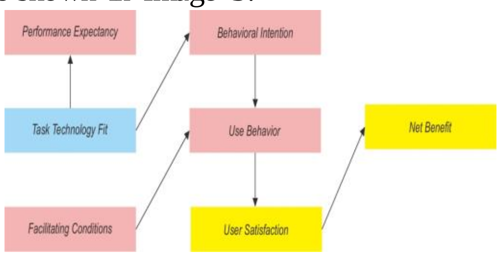

Image 3. Research Final Model

CONCLUSION

The analysis results indicate that Task Technology Fit, Facilitating Conditions, Behavioral Intention, and Use Behavior significantly affect User Satisfaction and Net Benefit in the use of SIAKAD, both directly and indirectly. Task Technology Fit influences Behavioral Intention by 55% and Performance Expectancy by 50%, while Behavioral Intention contributes 59% to Use Behavior. Use Behavior affects User Satisfaction by 68%, which in turn impacts Net Benefit by 69%. The highest indirect effect comes from Use Behavior through User Satisfaction on Net Benefit, at 65%. These findings confirm that task-technology alignment, facility support, user intention, and user behavior collectively determine the level of satisfaction and benefits derived from SIAKAD implementation in higher education

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