



Measurement Degree of Acceptance of Information Technology Implementation in Higher Education

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ABSTRACT

The use of information technology as a tool to support higher education activities becomes a necessity that cannot be separated from the management and governance of higher education. The purpose of this study is to measure the degree of acceptance of information technology implementation in tertiary institutions. The methodology used in this study uses a mix-method approach using a modified Technology Acceptance Model (TAM) framework. The variables examined in this study were perceived usefulness, perceived ease of use, behaviour intention to use, and actual system use. The respondents of this study consisted of 214 lecturers working at UIN Sunan Gunung Djati Bandung. Data is processed using the Structural Equation Model (SEM) approach to analyse the causal relationships between the variables studied. The results showed that partially or simultaneously perceived usefulness, perceived ease of use, and behavioural intention to use positively and significantly influence the increase in actual system use. To increase the use of information technology in tertiary institutions, this study recommends the agenda of activities that increase perceptions of the ease, benefits, and interests of implementing information systems that can be carried out by providing useful information system facilities, socialization, training, and habituation.

Key words: Higher Education, Information Technology, Technology Acceptance, User Perception

1. INTRODUCTION

The implementation of information technology has implications for the effectiveness and efficiency of

governance in higher education. Higher educations that carry out their functions with the support of information technology can improve services to students and other stakeholders, such as government, parents, and other institutions [1], [2]. The use of ze-learning, virtual classes, and other various digital devices that support universities has become a necessity that cannot separate from business processes that occur in universities. All academic activities ranging from an admission of new students to graduation currently have implemented a digital system. Various systems and applications built and developed to increase the effectiveness and efficiency of various activities in tertiary institutions. However, based on the results of observations by researchers, the use of digital systems is not fully supported by awareness and culture of "technological literacy."

The fact shows that in 2015, out of 1,800 software (software), 37% of the software was wasted [3]. Moreover, the highest percentage of unused software is in the field of Education, which is 47%. The wasted software is caused by several factors, such as unmet user needs; there are software errors, faults, and failures; software quality is not fulfilled; no innovation; does not apply the concept of human and computer interaction properly; difficult to use; not according to market needs (not up-to-date); to the lack of understanding of the use of technology due to its rapid development so that the trend cannot be followed.

Universitas Islam Negeri (UIN)/ State Islamic University of Sunan Gunung Djati Bandung is one of the higher education with a vision to become a superior and competitive campus through the use of technology. No less than 58 information system applications in the UIN Sunan Gunung Djati Bandung environment to support educational activities, ranging from admission systems, educational service administration systems, financial information systems, employee information systems, e-libraries, e-learning, systems trial

registration, helpdesk system, and various other information system applications. However, it turns out that awareness, abilities, and needs for the use of information systems are not evenly distributed across the entire academic community, there is still personnel who rely on each other, even academics who behave indifferently.

Following the various issues regarding the awareness, abilities, and culture of the academic community in using digital systems in higher education, research needed to analyse the degree of acceptance of information technology implementation. The study conducted to reveal the factors that influence the level of use of information technology in tertiary institutions. There are several previous studies related to this research, including (a) The TAM: A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education" [4]. (b) analysis of the use of social media in Higher Education Institutions (HEIs) using the TAM [5]. (c) Student acceptance of virtual laboratory and practical work: An extension of the TAM [6]. (d) Extending the TAM to understand students' use of learning management systems in Saudi higher education [7]. Based on several studies, TAM has been proven competently and comprehensively in evaluating the degree of acceptance of the use of technology in various fields of study, one of which is in the field of education. This study aims to examine the degree of acceptance of information technology implementation in higher education, followed by the formulation of relevant agendas/ activities to increase the use of information technology in tertiary institutions. This study uses TAM to analyse technology acceptance based on the user's perspective approach on aspects of its ease and usefulness.

2. METHODS

The methodology used in this study uses quantitative methods with a path-analysis approach. This research conducted at UIN Sunan Gunung Djati Bandung, with 214 respondents who volunteered to distribute the questionnaires. The total lecturer population at UIN Sunan Gunung Djati Bandung is 847 people. Data obtained by survey techniques using the help of Google Form software. Structural relationships between variables studied using the TAM framework developed by Davis (1989). The variables studied were perceived ease of use (x_1), perceived usefulness (x_2), behaviour intention to use (y), and actual system use (z). Data is processed using the Structural Equation Model (SEM) approach to analyse the causal relationships between the variables studied. The software used as data processing is AMOS 18.

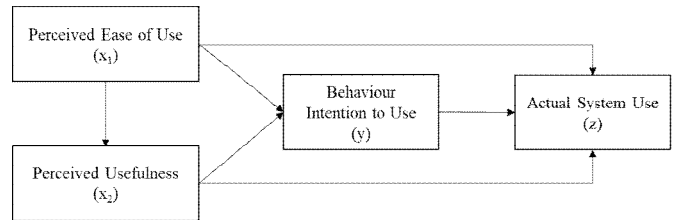


Figure 1: Framework of TAM [8]

3. RESULT AND DISCUSSION

3.1 Result

Questionnaire data collected from the survey results were 214 respondents. To test the completeness and consistency of filling out the questionnaire, an outlier test performed using the Mahalanobis distance model [9]. Mahalanobis distance testing produced standard data of 181 from 214 respondents. Descriptive statistics and inference calculations performed in this study use filtered data based on outlier testing.

3.1.1 Descriptive analysis

Based on the results of calculations using a descriptive statistical approach, information obtained, as presented in Table 1.

Table 1: Description of research variables

Variable	Mean	Standard Error	Standard Deviation	Sample Variance	Range
Perceived ease of use (x_1)	2.94	0.04	0.53	0.28	2.67
Perceived usefulness (x_2)	3.98	0.04	0.53	0.28	2.50
Behaviour intention to use (y)	3.42	0.02	0.29	0.09	1.82
Actual system use (z)	2.65	0.03	0.37	0.13	1.93

This data, when compared with the ideal condition based on researcher understanding and interviews with university leaders, refer to estimation and performance achievements in the Development Master of UIN Sunan Gunung Djati Plan Bandung in 2020 is approximately in the range of values of 3.0 (Figure 2). Figure 2 shows that several variables have exceeded the ideal conditions, namely the variable perceived usefulness (x_2) and behaviour intention to use (y). Variables that do not meet the ideal conditions are perceived ease of use (x_1) and actual system use (z).

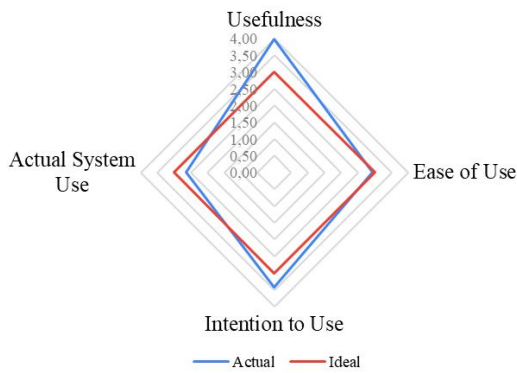


Figure 2: Average measurement results of research variables

Judging from the range of respondents' answers showed a striking disparity in respondents' perceptions. However, when referring to information presented on the value of standard error, standard deviation, and sample variance, the opinions given by respondents in answering items are relatively homogeneous.

3.1.2 Inferential analysis

The results of testing the path analysis of the research paradigm using AMOS, obtained information regarding the structural relationship between research variables (available in Table 2).

Table 2: Testing the relationship between variables (regression weights)

Variable	Estimate	S.E.	C.R.	P	Conclusion
$x_1 \rightarrow x_2$	1.036	0.081	12.851	***	Significant
$x_2 \rightarrow y$	0.130	0.037	3.521	***	Significant
$x_2 \rightarrow z$	0.458	0.060	7.608	***	Significant
$x_1 \rightarrow z$	0.215	0.089	2.422	0.015	Significant
$y \rightarrow z$	0.404	0.086	4.673	***	Significant

Tests on the research paradigm, as in Figure 1, show information that the relationship between the variables' perceived ease of use (x_1) does not significantly influence the behavioural intention to use (y). The insignificant relationship between these variables, using the trimming technique, results in a new structural relationship between the research variables (illustrated in Figure 3). The structural relationship is an important finding of this study.

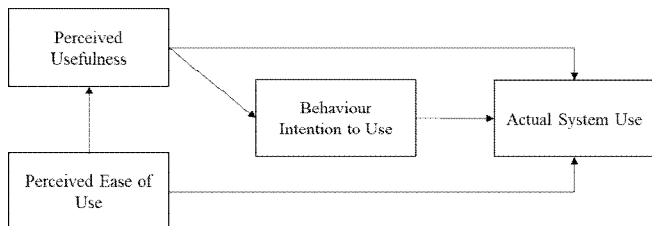


Figure 3: Structural relationships between variables

3.2 Discussion

Technology Acceptance Model (TAM) is one of the models that built to analyse and understand the factors that influence

the acceptance of the use of technology. Figure 4 describes the simple concepts of TAM that begin from system features and capabilities as the stimulus, user's motivation to use the system as an organism, and response for actual system use.

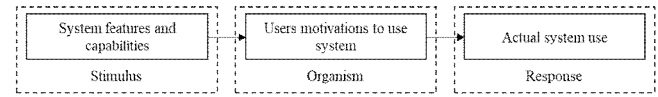


Figure 4: Simple TAM Concept [8], [10], [11]

TAM is specialized to model user acceptance of information systems, which designed to explain how users understand and apply information technology [12]–[14]. The purpose of TAM is to describe the determinants of general information-based technology acceptance and explain the behaviour of end-users of information technology with a wide enough variation in the user population.

Another purpose of TAM is to provide a basis for knowing the effect of external factors on internal beliefs, attitudes, and intentions. TAM formulated to achieve this goal by identifying a small number of critical variables, obtained from previous research on theories and determinants of technology acceptance, and applying Theory of Reasoned Action (TRA) as a theoretical background in modeling the relations between variables. TAM has aim to explain and predict user acceptance of the technology. TAM is the development of TRA and believed to be able to predict user acceptance of technology based on the impact of two factors, namely the perceived usefulness perspective and the perceived ease of use. The original construction of TAM is perceived usefulness, perceived ease of use, attitude, behavioural intention, actual use, and added a number of external perspectives, namely, experience and complexity [12], [15].

In the world of education, including higher education, digital systems that should be available and often used are e-learning to mobile learning. Some studies apply TAM to evaluate and analyse the adoption of e-learning in the world of Education. The TAM is applied to evaluate the use of mobile learning in the academic community in tertiary institutions with the best results adopted in Taiwan and the most widely used in the fields of humanities and education, followed by information technology and computer science [16]. TAM model is widely used to evaluate and analyse the behaviour of the use of e-learning in education, both internal and external factors [17]–[22].

3.2.1 Perceived ease of use

Information technology is a technology that seeks to produce information very quickly, accurately, and effectively. The utilization of information technology used to help human performance in completing its work [23], [24]. Technology can define as the systematic application of science or organized knowledge to carry out tasks or solve practical problems [25], [26]. Referring to the concept of technology, the ease of use is a condition and the nature of technology.

Based on the survey results, the level of ease of use of information systems applications at UIN Sunan Gunung Djati Bandung is at an average score of 2.94. This score indicates that the socialization process carried out by the University has not been able to improve the ability of information system implementation to users. The socialization model that is generally carried out by universities is limited to the presentation of the use of information system applications, has not been able to touch the experience of the user is running the information system application.

The provision of modules/ manuals has a positive influence on the acceleration of the increase in the ability of information system users [27]. The provision of a manual book module usually accompanies the information system application launching at UIN Sunan Gunung Djati Bandung. This handbook should be prepared by avoiding the use of technical information terms, which may be unfamiliar to potential users. The use of foreign terms will result in the reader not being able to easily digest the intent/ procedure indicated from the manual book.

For improvements in the socialization phase, universities should produce video tutorials, which deliver potential users to a deeper level of experience. Based on research, the use of video tutorials in some cases can increase the knowledge, skills, and behaviour of learners [28]–[30].

3.2.2 *Perceived usefulness*

The benefits of the information system application made by UIN Sunan Gunung Djati Bandung are at an average score of 3.98, above the ideal score. This value indicates that the implementation of information system applications has been realized and is known to be beneficial for its users.

3.2.3 *Behaviour Intention to Use*

A person's decision to do something influenced by the interest of the individual concerned [31]. Interest in the use of information systems based on survey results obtained an average score of 3.42; this score is above the ideal level.

3.2.4 *Actual system use*

No matter how sophisticated information technology designed, if the application program is not used properly, it will not have significant implications for university activities. One of the main problems with the failure to implement a digital system is that it is not ready for acceptance of the rapid technological change. The slow acceptance of the use of this technology is thought to have resulted from a thick manual work culture. As a result, many applications are not used properly or rely on help from others to use them. At many universities, there is still much e-learning that is not optimized or even actively used, as well as educational service systems that still rely on operators to fill schedules, grades, and so on. The phenomenon of this problem thought to affect the actual level of use of the information system, where based

on the survey results obtained an average score of 2.65, this score is below the ideal value.

The use of information systems is a form of behaviour that can be observed, where in psychological terminology, behaviour is a function of the relationship between individuals and their environment [32]. Actual usage behaviour of the system can be improved, so it is necessary to create an environment that is conducive for users to be able to run information system applications properly. The provision of good hardware and network connections by the university will have a positive influence on user behaviour to utilize information systems applications. Referring to various studies, work culture has a positive and significant effect on performance [33]–[35]. The efforts of universities to shape digital culture as a university work culture in the academic community are substantial so that the use of information system applications can increase.

3.2.5 *Relationship between Variables*

Based on the results of the path analyst on the structural relationship between variables, it can be concluded that partially or simultaneously perceived usefulness, perceived ease of use, and behavioural intention to use have a positive and significant effect on increasing actual system use.

The structural relationship diagram shows that the ease of use variable is an independent variable. So that touch on the convenience variable will give effect to all variables. Strengthening the ease of use of information systems variables can be started with the design of information systems that are simple and easily implemented by users, without changing the complexity of the procedures run by the computer. Referring to various studies, ease of use of information systems applications, will increase the use of information systems [4]–[7]. Improving human and computer interaction that is realized by the design of familiar features, simple commands, attractive appearance, and system integration from various applications is a logical effort that can be done by software developers at universities to increase the use of information systems by the academic community. Besides, improving the digital culture can achieve the goals of techno university [36].

4. CONCLUSION

This study shows that the paradigm of structural relationships between variables in TAM can effectively illustrate the impulse of user perception to use information systems applications. The results of the study concluded that partially or simultaneously perceived usefulness, perceived ease of use, and behavioural intention to use positively and significantly influence the increase in actual system use. The limitation of this research lies in the processing of data sourced from user opinions, which expressed in the assessment of all research variables based on user perceptions. This study recommends further research, which uses measurements based on standardized standards of evaluation of the ease, usefulness, interests, and actual use of information systems that are not perceptions/ opinions of respondents.

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REFERENCES

- [1] L. Ernawati and H. B. Santoso, "Identifikasi dan Analisa Risiko Penerapan Teknologi Informasi di Lingkungan Perguruan Tinggi," in *Seri Prosiding Seminar Nasional Dinamika Informatika*, 2017, vol. 1, no. 1, pp. 21–28.
- [2] W. Darmalaksana, M. A. Ramdhani, R. Cahyana, and A. S. Amin, "Strategic Design of Information System Implementation at University," *Int. J. Eng. Technol.*, vol. 7, no. 2.29, pp. 787–791, 2018.
<https://doi.org/10.14419/ijet.v7i2.29.14257>
- [3] 1E Company, "The Real Cost of Unused Software," 2015.
- [4] R. Scherer, F. Siddiq, and J. Tondeur, "The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education," *Comput. Educ.*, vol. 128, pp. 13–35, 2019.
- [5] D. Z. Dumpit and C. J. Fernandez, "Analysis of the use of social media in Higher Education Institutions (HEIs) using the Technology Acceptance Model," *Int. J. Educ. Technol. High. Educ.*, vol. 14, no. 1, p. 5, 2017.
- [6] R. Estriegana, J.-A. Medina-Merodio, and R. Barchino, "Student acceptance of virtual laboratory and practical work: An extension of the technology acceptance model," *Comput. Educ.*, vol. 135, pp. 1–14, 2019.
<https://doi.org/10.1016/j.compedu.2019.02.010>
- [7] S. S. Binyamin, M. Rutter, and S. Smith, "Extending the Technology Acceptance Model to Understand Students' use of Learning Management Systems in Saudi Higher Education," *Int. J. Emerg. Technol. Learn.*, vol. 14, no. 03, pp. 4–21, 2019.
- [8] F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Q.*, 1989.
- [9] R. De Maesschalck, D. Jouan-Rimbaud, and D. L. Massart, "The Mahalanobis distance," *Chemom. Intell. Lab. Syst.*, vol. 50, no. 1, pp. 1–18, Jan. 2000.
- [10] M. Chuttur, "Overview of the Technology Acceptance Model: Origins , Developments and Future Directions," *Sprouts Work. Pap. Inf. Syst.*, 2009.
- [11] H. Aulawi and A. S. Amin, "E-learning analysis and design based on technology acceptance model," *Int. J. Sci. Technol. Res.*, 2019.
- [12] F. D. Davis, "User acceptance of information technology: system characteristics, user perceptions and behavioral impacts," *Int. J. Man. Mach. Stud.*, 1993.
<https://doi.org/10.1006/imms.1993.1022>
- [13] M. McCord, "Technology acceptance model," in *Handbook of Research on Electronic Surveys and Measurements*, 2006.
- [14] Y. Lee, K. A. Kozar, and K. R. T. Larsen, "The Technology Acceptance Model: Past, Present, and Future," *Commun. Assoc. Inf. Syst.*, 2003.
- [15] G. Wang, S. Alatas, and A. Wiraniagara, "Factors affecting acceptance of mobile health insurance in Indonesia: TAM applicability," *Int. J. Adv. Trends Comput. Sci. Eng.*, 2019.
<https://doi.org/10.30534/ijtcse/2019/54862019>
- [16] M. Al-Emran, V. Mezhuyev, and A. Kamaludin, "Technology Acceptance Model in M-learning context: A systematic review," *Comput. Educ.*, vol. 125, pp. 389–412, 2018.
- [17] N. P. Wingo, N. V Ivankova, and J. A. Moss, "Faculty perceptions about teaching online: Exploring the literature using the technology acceptance model as an organizing framework.," *Online Learn.*, vol. 21, no. 1, pp. 15–35, 2017.
- [18] C.-T. Chang, J. Hajiyev, and C.-R. Su, "Examining the students' behavioral intention to use e-learning in Azerbaijan? The general extended technology acceptance model for e-learning approach," *Comput. Educ.*, vol. 111, pp. 128–143, 2017.
- [19] F. Abdullah and R. Ward, "Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors," *Comput. Human Behav.*, vol. 56, pp. 238–256, 2016.
- [20] A. Tarhini, T. Elyas, M. A. Akour, and Z. Al-Salti, "Technology, demographic characteristics and e-learning acceptance: a conceptual model based on extended technology acceptance model.," *High. Educ. Stud.*, vol. 6, no. 3, pp. 72–89, 2016.
- [21] A. Al-Azawei, P. Parslow, and K. Lundqvist, "Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM)," *Australas. J. Educ. Technol.*, vol. 33, no. 2, 2017.
- [22] S. A. Salloum, M. Al-Emran, A. A. Monem, and K. Shaalan, "A Survey of Text Mining in Social Media: Facebook and Twitter Perspectives," *Adv. Sci. Technol. Eng. Syst. J.*, 2017.
<https://doi.org/10.25046/aj020115>
- [23] A. A. Nugroho, D. S. P. Astuti, and D. Kristianto, "Pengaruh Teknologi Informasi, Kemampuan Teknik Pemakai, Dukungan Manajemen Puncak Dan Kompleksitas Tugas Terhadap Kinerja Sistem Informasi Akuntansi," *J. Akunt. dan Sist. Teknol. Inf.*, vol. 14, no. 4, pp. 507–518, 2019.
- [24] M. B. Carnicer, "The Use of Educational Data Mining Technique in Technology Assimilation Evaluation: A Response Assessment," *Int. J. Adv. Trends Comput. Sci. Eng.*, vol. 8, no. 3, pp. 195–200, 2019.

- <https://doi.org/10.30534/ijatcse/2019/50832019>
- [25] A. Jayady, “Teknologi Konstruksi: Sebuah Analisis,” *J. Karkasa*, vol. 4, no. 1, pp. 13–20, 2018.
- [26] M. Kassim and M. T. H. M. Zubir, “Design of Augmented Reality for Engineering Equipment in Education,” *Int. J. Adv. Trends Comput. Sci. Eng.*, vol. 8, no. 6, pp. 2773–2781, 2019.
<https://doi.org/10.30534/ijatcse/2019/15862019>
- [27] M. S. Mazaya, “Effective practical learning model for the subject of basic information technology,” *J. Phys. Conf. Ser.*, vol. 1157, p. 42003, Feb. 2019.
- [28] S. Sutrisno and A. Pratama, “Pengembangan Media Pembelajaran Video Tutorial untuk Meningkatkan Keterampilan pada Mata Pelajaran Teknik Animasi 2 Dimensi dan 3 Dimensi Siswa Jurusan Multimedia SMK Negeri 1 Tonjong,” *Joined J. (Journal Informatics Educ.*, vol. 2, no. 2, pp. 1–6, 2020.
- [29] M. Mandalika and S. Syahril, “Pengembangan Media Pembelajaran Berbasis Video Tutorial untuk Meningkatkan Efektifitas Pembelajaran pada Mata Kuliah Tata Rias Pengantin Indonesia,” *INVOTEK J. Inov. Vokasional dan Teknol.*, vol. 20, no. 1, pp. 85–92, 2020.
- [30] A. B. Chahyadi, H. Sitompul, and K. Panjaitan, “Pengembangan Media Video Pembelajaran Merakit Personal Komputer,” *J. Teknol. Inf. Komun. dalam Pendidik.*, vol. 6, no. 2, pp. 117–129, 2020.
<https://doi.org/10.24114/jtikp.v6i2.16955>
- [31] G. S. Taungke and S. Sunarti, “Pengaruh Celebrity Endorser dan Electronic Word of Mouth Terhadap Minat Beli dan Dampaknya terhadap Keputusan Pembelian: Survei pada Konsumen Erigo di Akun Resmi Instagram Erigo,” *J. Adm. Bisnis*, vol. 78, no. 1, pp. 209–218, 2020.
- [32] S. P. Robbins and T. A. Judge, *Perilaku Organisasi*. Jakarta: Gramedia, 2010.
- [33] U. Riyani, S. Syaifullah, T. K. Ahsyar, M. Megawati, and M. Jazman, “Pengaruh budaya organisasi terhadap efektivitas penerapan e-learning dengan metode OCAI dan Hot Fit,” *J. Ilm. Rekayasa dan Manaj. Sist. Inf.*, vol. 5, no. 2, pp. 161–170, 2019.
- [34] M. Fadhil and M. Ashoer, “Pengaruh Budaya Kerja, Kemampuan dan Komitmen terhadap Kinerja Dosen pada Perguruan Tinggi di Kabupaten Maros,” *JIMF (Jurnal Ilm. Manaj. Forkamma)*, vol. 3, no. 2, 2020.
- [35] J. Santosa, D. Mahendra, and A. R. Pamungkas, “Peran Budaya Organisasi dalam Meningkatkan Pemanfaatan Teknologi Informasi terhadap Kepuasan Pegawai dan Kinerja Pegawai di Pemerintah Kabupaten Grobogan,” *J. Indones. Sci. Econ. Res.*, vol. 1, no. 1, pp. 37–44, 2019.
- [36] D. Jamaluddin, M. A. Ramdhani, T. Priatna, and W. Darmalaksana, “Techno University to increase the quality of islamic higher education in Indonesia,” *Int. J. Civ. Eng. Technol.*, 2019.