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USER BEHAVIOR IN THE HAJI PINTAR APPLICATION USING THE TECHNOLOGY ACCEPTANCE MODEL APPROACH

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Abstract: This study aims to analyze the factors influencing the acceptance of the Haji Pintar application by users or prospective pilgrims using the technology acceptance model, which consists of three variables, namely intention to use, perceived usefulness, and perceived ease of use. This study adopts a quantitative approach. The target population comprises users of the Haji Pintar application, with sample data collected via online questionnaires distributed using an accidental sampling method, a type of non-probability sampling. The collected data will be processed through using the SmartPLS software. The results show that two of the three proposed hypotheses received support at a significance level 0.05. Specifically, it was determined that perceived ease of use positively and significantly influences perceived usefulness and the intention to use. At the same time, one hypothesis was rejected, indicating that perceived usefulness does not significantly affect the intention to use. Overall, Haji Pintar app users consider the application easy to use, which may increase their desire to use it again. However, the application has not yet provided significant usefulness, which may be a consideration for further development and improvement of the Haji Pintar application.

Keywords: Haji Pintar Application; TAM; Acceptance Technology

Abstrak: *Penelitian ini bertujuan untuk menganalisis faktor-faktor yang mempengaruhi penerimaan aplikasi Haji Pintar oleh pengguna atau calon jamaah haji menggunakan Model Penerimaan Teknologi (TAM), yang terdiri dari tiga variabel, yaitu intention to use, perceived usefulness, dan perceived ease to use. Penelitian ini menggunakan pendekatan kuantitatif. Populasi sasaran terdiri dari pengguna aplikasi Haji Pintar, dengan data sampel dikumpulkan melalui kuesioner online yang didistribusikan menggunakan metode insedental yang merupakan jenis sampling non-probabilitas. Data yang dikumpulkan akan diproses, menggunakan SmartPLS. Hasil menunjukkan bahwa dua dari tiga hipotesis yang diajukan mendapat dukungan pada tingkat signifikansi 0,05. Yaitu perceived ease to use secara positif dan signifikan mempengaruhi perceived usefulness maupun intention to use, sementara satu hipotesis pengaruh perceived usefulness terhadap intention to use ditolak. Secara keseluruhan, pengguna aplikasi Haji Pintar menganggap aplikasi ini mudah digunakan (perceived ease to use), yang dapat meningkatkan keinginan mereka untuk menggunakannya kembali. (intention to use). Akan tetapi, aplikasi ini belum memberikan manfaat (perceived usefulness) yang signifikan, yang dapat menjadi pertimbangan untuk pengembangan dan penyempurnaan aplikasi Haji Pintar.*

Kata Kunci: Haji Pintar, TAM, Penerimaan Teknologi

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Introduction

Indonesia is known as one of the countries with the largest Muslim populations in the world, which directly contributes to the large number of Hajj pilgrims. In the last three years (2022–2024), Indonesia has consistently ranked first with the largest number of Hajj pilgrims worldwide. This situation presents challenges, including the lengthy waiting list for those wishing to perform the Hajj.[1] The average waiting period for prospective Hajj pilgrims from getting a Hajj quota until the departure or the performance of the Hajj ranges from 10 to 39 years.[2]

The Hajj pilgrimage is a large-scale event involving millions of Muslims worldwide, including Indonesia, with the largest number of pilgrims. This process requires complex planning, management, and services, from the registration stage, rituals, departure, performance of the pilgrimage, to the return of the pilgrims. The complexity of the registration, verification, training, and departure processes necessitates an integrated and easily accessible information system. To enhance efficiency and the quality of Hajj services, the Ministry of Religious Affairs of the Republic of Indonesia (Kemenag) has launched the Haji Pintar application (Haji Pintar App). This digital platform provides real-time information and services related to the Hajj, including worship guidelines, activity schedules, pilgrim locations, and service complaints. Therefore, Hajj management in Indonesia must be conducted optimally and transparently to ensure fairness, efficiency, and better service for all prospective pilgrims. The Haji Pintar app, as the official digital platform of the Kemenag, is designed to provide various important pieces of information related to the organization of the Hajj, such as checking quota numbers, departure estimates, worship guidelines, and service information in the holy land. The Haji Pintar app has received the Digital Innovation for Public Service Award.[3]

The presence of the Haji Pintar app is a strategy to improve the quality of Hajj service delivery.[4] The development of the Haji Pintar app can provide a different experience, thereby increasing the interest of prospective pilgrims and pilgrims in performing the Hajj because this application is capable of creating an interactive virtual environment.[5] However, the effectiveness of this application in improving pilgrims' literacy, ease of access to information, and its contribution to public services has not been well implemented. The Haji

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[1] F. Zulfikar, "5 Negara dengan Kuota Haji Terbanyak di Dunia, Indonesia Nomor Satu? Baca artikel detikedu, "5 Negara dengan Kuota Haji Terbanyak di Dunia," *Indonesia Nomor Satu?" Detik.Com*, May 3, 2025, https://www.detik.com/edu/detikpedia/d-7897768/5-negara-dengan-kuota-haji-terbanyak-di-dunia-indonesia-nomor-satu.

[2] Kemenag, "Haji Cukup Sekali, Menuju Kebijakan Haji yang Adil dan Merata," *Kemenag*, June 17, 2024, https://kemenag.go.id/kolom/haji-cukup-sekali-menuju-kebijakan-haji-yang-adil-dan-merata-ZRYkS.

[3] Kemenag, "Kilas Balik 2022, Aplikasi Haji Pintar dan Penghargaan Digital Innovation For Public Service," January 17, 2023, https://kemenag.go.id/nasional/kilas-balik-2022-aplikasi-haji-pintar-dan-penghargaan-digital-innovation-for-public-service-xo1g3h.

[4] F.S. Fajriansyah, *Strategi Komunikasi Kementerian Agama Republik Indonesia Dalam Mensosialisasikan Aplikasi "Haji Pintar* (Universitas Islam Negeri Syarif Hidayatullah, 2023).

[5] A.A. Senoaji et al., "Aplikasi Sistem Informasi Pelayanan Haji Dan Umrah Berbasis Augmented Reality/Virtual Reality," *Jurnal Penelitian Saintek* 25, no. 2 (2020): 205–13.

Pintar app has failed to deliver adequate support to its consumers.[6] Several shortcomings in the Haji Pintar app, including slow performance, unclear information on Hajj rituals, and language features that are confusing for some users.[7]

Research on the Haji Pintar application developed by the Ministry of Religious Affairs shows several important gaps. This application is still difficult to access for elderly users who are not tech-savvy and have limited internet connectivity, so it has not been optimally utilized by all prospective pilgrims.[8] In addition, the dissemination and education of the application's use among various groups still need to be improved to increase the application's adoption rate.[9] Technical obstacles such as system and internet network disruptions also need attention to maintain the reliability of the application.[10] These gaps open up opportunities for application development to be more inclusive, user-friendly, and integrated to increase satisfaction and intention to use among prospective Indonesian Hajj pilgrims. In addition to the research findings, several reviews on the Google Play Store indicate user dissatisfaction with the app's performance. Therefore, research on the Haji Pintar app is important to determine how well the app meets the needs of pilgrims, improves service transparency, and contributes to digital bureaucratic reform in hajj services in Indonesia, ultimately gaining acceptance from users or prospective hajj pilgrims. Studying users' acceptance of technology is important in this context, particularly using the Technology Acceptance Model (TAM) approach. According to this concept, users' attitudes and intentions toward information technology systems (intention to use) are influenced by two exogenous variables: perceived utility and perceived ease of use.

Through this study, we will analyze how pilgrims' perceptions of the convenience and benefits of the Haji Pintar app affect their acceptance of it. This study is expected to provide recommendations regarding factors that need to be considered by the Ministry of Religious Affairs as the application developer in developing and improving the Haji Pintar app, particularly concerning user interface design, training, more efficient technological outreach, and increasing technology adoption among pilgrims.

Theoretical Approach

Technology Acceptance Model (TAM)

Fred Davis created the TAM in 1989 to examine the variables affecting a technology's user acceptance. The two primary components of this model are Perceived Usefulness (PU), which gauges how much consumers think a technology can help them perform better, and Perceived Ease of Use (PEU), which evaluates how simple it is to utilize the technology. Together, these two elements impact the user's attitude toward the technology, affecting their behavioural intention to use it and how the system is used.

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[6] M.W. Laksana, "Analisis Diskrepansi Kepuasan Penggunaan Aplikasi Haji Pintar," *Khazanah Multidisiplin* 4, no. 1 (2023): 171–89, https://doi.org/10.15575/kl.v4i1.24614.

[7] Z.A. Mubarok et al., "Efektifitas Penggunaan Aplikasi Haji Pintar Sebagai Platform Website Berbasis Aplikasi Yang Memudahkan Jamaah Haji Untuk Mengakses Informasi Terkait Haji Pada Masyarakat Kecamatan Natar," *Jurnal Dewantara* 15, no. 02 (2024): 19–44.

[8] M. Apriyani, *Efektivitas Aplikasi Haji Pintar dalam Pelayanan Pendaftaran Jamaah Haji pada Kantor Kementerian Agama Kota Tangerang Selatan* (Universitas Islam Negeri Syarif Hidayatullah Jakarta, 2024).

[9] F.H. Nasution, *Inovasi Pelayanan Publik Melalui Aplikasi Haji Pintar Di Kantor Kementerian Agama Kota Pekanbaru* (Universitas Islam Riau, 2025).

[10] Apriyani, *Efektivitas Aplikasi Haji Pintar dalam Pelayanan Pendaftaran Jamaah Haji pada Kantor Kementerian Agama Kota Tangerang Selatan.*

TAM has been extensively utilized in numerous studies to assess the acceptance of information technology, ranging from enterprise systems and mobile applications to e-government services. The main advantage of this model lies in its simplicity, which allows for development by adding external variables according to the research context. However, TAM also has limitations because it does not consider social and cultural factors and is overly dependent on users' subjective perceptions.

As an empirically tested model, TAM remains the primary choice in technology acceptance research due to its ability to predict adoption. This model is useful for researchers, system developers, and business practitioners in designing technology solutions that better align with user needs and characteristics. Recent developments indicate that TAM continues to evolve to address challenges in measuring acceptance of the latest technological innovations. Images of TAM can be seen in Figure 1.

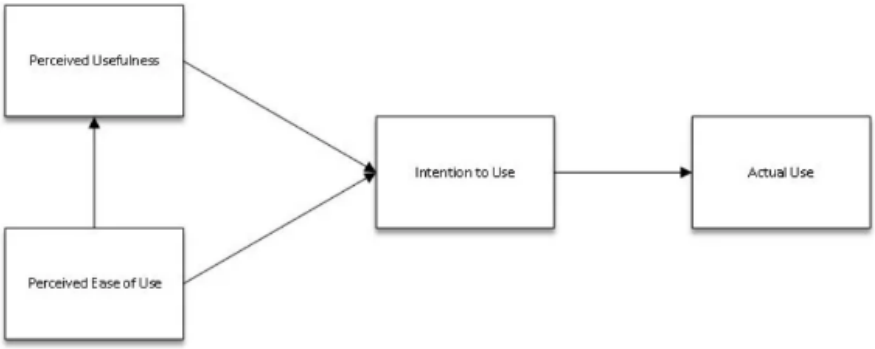

Figure 1. TAM Model

This study used TAM because it is simpler than UTAUT. TAM only focuses on two main constructs: perceived usefulness and ease of use. This simplicity makes TAM easy to use and validate in various research contexts without requiring many additional variables.[11] TAM is also more widely used and has been extensively tested, resulting in numerous studies that strongly validate the use of this model for technology acceptance, especially in the context of simple information systems or those that do not require complex social variables, such as Haji Pintar applications.[12] Studies on e-government that apply the TAM model are referenced in this work.[13]

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[11] I. Bazine, "Exploring the Development of the Technology Acceptance Model (TAM): A Chronological Overview," *International Journal of Research and Scientific Innovation* XII, no. VI (2025): 1643–55, https://doi.org/10.51244/IJRSI.2025.120600138.

[12] K.R. Siregar, "Kajian Mengenai Penerimaan Teknologi Dan Informasi Menggunakan Technology Accaptance Model (TAM)," *Rekayasa* 4, no. 1 (2011): 27–32, https://doi.org/10.21107/REKAYASA.V4I1.2322; H.G. Musa et al., "Marketing Research Trends Using Technology Acceptance Model (TAM): A Comprehensive Review of Research (2002–2022," *Cogent Business & Management* 11, no. 1 (2024): 2329375, https://doi.org/10.1080/23311975.2024.2329375.

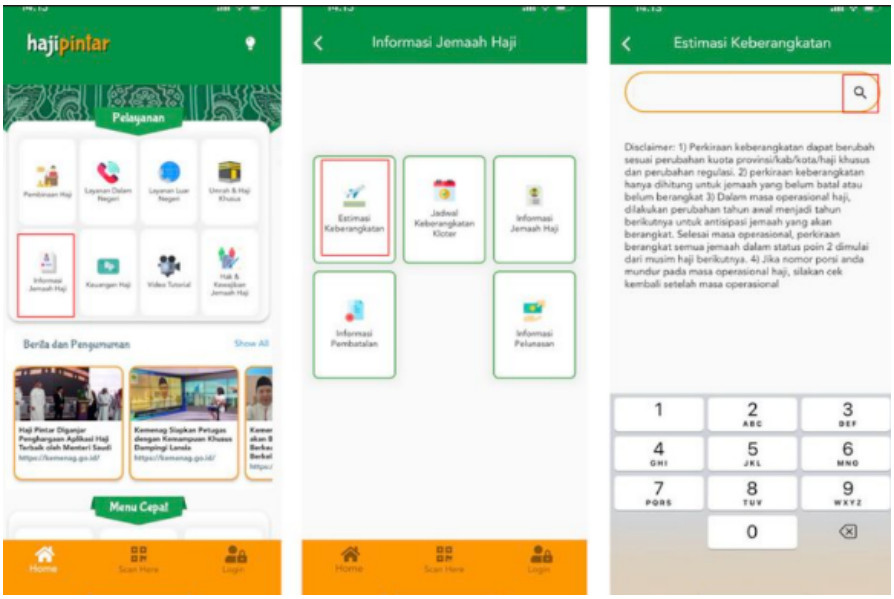
[13] T.D. Susanto and M. Aljoza, "Individual Acceptance of E-Government Services in a Developing Country: Dimensions of Perceived Usefulness and Perceived Ease of Use and the Importance of Trust and Social Influence," *Procedia Computer Science* 72 (2015): 622–29, https://doi.org/10.1016/J.PROCS.2015.12.171; M. Anityasari et al., "Measuring User Acceptance of E-Government Adoption in an Indonesian Context: A Study of the Extended Technology Acceptance Model," *International Journal of Electronic Governance* 16, no. 2 (2024): 172–95, https://doi.org/10.1504/IJEG.2024.140787; D. Afrizal et al., "Citizens' Intention to Use E-Government Services in Local Government by Integrating UTAUT, TPB, and TAM Model," *Journal of Local Government Issues* 7, no. 2 (2024): 129–43, https://doi.org/10.22219/LOGOS.V7I2.32437; R. Anggraeni and

Haji Pintar Application

The Haji Pintar application is an official digital application developed by Kemenag to provide easy access to information for Indonesian Hajj pilgrims. This app is designed to help pilgrims obtain accurate, fast, and transparent information about the Hajj pilgrimage, from preparation to implementation in the Holy Land. Based on observations on the Google Play Store, it has been downloaded millions of times and received a rating of 4 (1 to 5).

The presence of Haji Pintar is in line with efforts to transform digital public services, particularly in the religious sector, so that the Hajj pilgrimage can run in a more orderly, focused, and regulated manner. The Haji Pintar app provides a comprehensive range of menus and service features. Some of these include: Hajj Quota Information, Departure Schedule, and Hajj Quota Number, which enable prospective pilgrims to monitor the estimated year of their departure directly. Additionally, the app provides information on Hajj Ritual Guidance, a list of groups and embarkation points, and maps of locations and routes in the Holy Land, which are highly useful during the pilgrimage. The app also provides a complaint or feedback feature, pilgrim health information, and official news and announcements regarding Hajj policies from the government. With these comprehensive features, the Haji Pintar app is expected to serve as an effective communication and information platform between the government and Hajj pilgrims while also contributing to the overall improvement of Hajj service quality. The Haji Pintar app display is shown in Figure 2.

Figure 2. Haji Pintar App Display



Previous Research

Previous research related to Haji Pintar app has been conducted with a quantitative methodology utilizing the Uses and Gratifications 2.0 framework with Palmgreen's

F.A. Alijoyo, "The Effect of Technology Awareness and Government Support on the Acceptance of Identitas Kependudukan Digital Apps in Sumedang Using TAM Framework," *Journal of World Science* 4, no. 1 (2025): 7–21, https://doi.org/10.58344/JWS.V4I1.1271.

expectancy-values model.[14] This study concluded that the 'Haji Pintar' app has failed to deliver user satisfaction.

Several qualitative studies on the Haji Pintar App have been conducted, by using a qualitative approach through analysis and interviews, identifying challenges related to slow application performance, unclear manasik information, and language features that were somewhat confusing for certain groups.[15]. Another research found that the Haji Pintar app is very helpful and convenient for prospective Hajj pilgrims, particularly those in the Kemenag of Bandung Regency.[16] Among the factors that pose challenges or obstacles in registering for the Hajj through the Haji Pintar app are low literacy regarding the app and the fact that many people still do not understand or know how to use the Haji Pintar app. Several qualitative studies on the Haji Pintar App on this researh[17]. TAM was chosen as the theoretical model because it is simple and can generally be used to study the adoption of information technology.[18] When examining three models, namely ECM-IT, TAM, and extended ECM-IT, the results showed that the TAM model had the best fit among the three. Data analysis was conducted utilizing Partial Least Squares-Structural Equation Modelling (PLS-SEM).

Research Framework

This study uses the TAM theoretical model and utilizes a set of variables that include exogenous factors, specifically perceived ease of use (PEU) and perceived usefulness (PU), and endogenous variables, namely intention to use (ITU). This study adopts the modified framework[19]. The proposed research model or framework can be seen in Figure 3.

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[14] Laksana, "Analisis Diskrepansi Kepuasan Penggunaan Aplikasi Haji Pintar."

[15] Mubarok et al., "Efektifitas Penggunaan Aplikasi Haji Pintar Sebagai Platform Website Berbasis Aplikasi Yang Memudahkan Jamaah Haji Untuk Mengakses Informasi Terkait Haji Pada Masyarakat Kecamatan Natar."

[16] M.R. Fauzi, *Pendaftaran Haji Melalui Aplikasi Haji Pintar (Studi Kasus Kementerian Agama Kabupaten Bandung* (Universitas Islam Negeri Sunan Gunung Djati, 2024).

[17] L.S. Wahyuni and I.D. Pramudiana, "Inovasi Pelayanan Pendaftaran Haji Melalui Aplikasi Haji Pintar di Kantor Kementrian Agama Kabupaten Lamongan," *Soetomo Magister Ilmu Administrasi* 2, no. 1 (2024): 163–70; S.S. Sholeha and I. Ratnasari, "Efektivitas Inovasi Pendaftaran Haji Melalui Aplikasi Haji Pintar di Kantor Kementerian Agama Kota Bekasi," *Jurnal Ilmiah Wahana Pendidikan* 11, no. 3. C (2025): 59–65, https://jurnal.peneliti.net/index.php/JIWP/article/view/9902; Prihadini Krishantoro et al., "Efektivitas Inovasi Pendaftaran Haji Melalui Aplikasi Haji Pintar Di Kantor Kementrian Agama Kota Bekasi," *Transparansi: Jurnal Ilmiah Ilmu Administrasi* 4, no. 2 (2021): 241–47, https://doi.org/10.31334/transparansi.v4i2.2888; M.R. Nawawi and L.F. Fatika, "Analisis Pemanfaatan Aplikasi Haji Pintar dalam Meningkatkan Akses Informasi bagi Calon Jemaah Haji di Kementerian Agama Lampung Tengah," *Mabrur: Academic Journal of Hajj and Umra* 4, no. 1 (2025): 21–34, https://doi.org/10.15575/mjhu.v4i1.42859; Apriyani, *Efektivitas Aplikasi Haji Pintar dalam Pelayanan Pendaftaran Jamaah Haji pada Kantor Kementerian Agama Kota Tangerang Selatan*.

[18] Yihang WangKaiyu DaiYueying LinLiu Hong, "Bridging Bytes And Bonds: A Qualitative Exploration Of Student Experiences In A Computer Science Service-Learning Course," *Applied Research in Quality of Life*, 2023, https://link.springer.com/article/10.1007/s11482-023-10267-9.

[19] F. Weng et al., "A TAM-Based Study of the Attitude Towards Use Intention of Multimedia among School Teachers," *Applied System Innovation* 1, no. 3 (2018): 36, https://doi.org/10.3390/asi1030036; S.R. Natasia et al., "Acceptance Analysis of NUADU as an E-Learning Platform Using the Technology Acceptance Model (TAM) Approach," *Procedia Computer Science* 197 (2022): 512–20; Y.K.Y. Kartini, "Pengaruh Perceived Usefulness dan Perceived Ease of Use Terhadap Kinerja melalui Intention To Use Dalam Menggunakan Sistem Informasi Laboratorium," *Economics and Digital Business Review* 5, no. 1 (2024): 262–75, https://doi.org/10.37531/ecotal.v5i1.882.

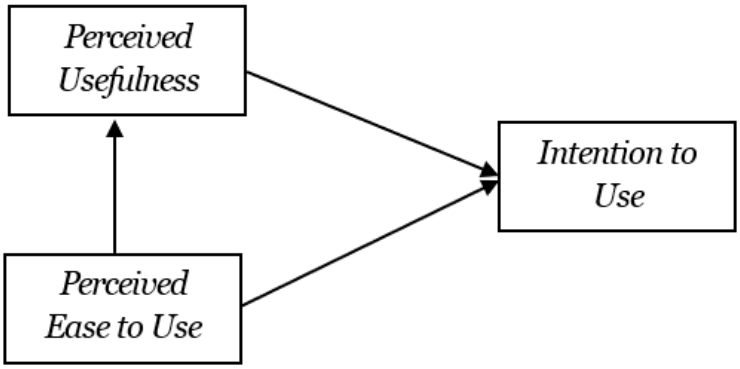

Figure 3. Research Framework

The relationship between perceived ease of use, usefulness, and intention to use.

Perceived Ease of Use (PEU) is the term used to describe how someone feels or perceives how easy or effortless they think using a specific system or technology will make their work or business.[20] Meanwhile, perceived usefulness (PU) is a person's opinion or sentiment about how much they think utilizing a specific system or technology will enhance their skills or productivity at work. The two most reliable indicators of interest or attitude toward using technology are PEO and PU. Meanwhile, the intention to use a system is determined by the user's belief in the usefulness and ease of use.[21] Attitudes toward it and its perceived utility will determine behaviour or intention in utilizing or embracing a technology or system.[22] People's attitudes and behaviours are undoubtedly impacted when they believe that technology is user-friendly and has perceived usefulness.[23] Based on what has been explained previously, this research formulates the following hypotheses:

H1: PEU has a significant effect on PU.

H2: PEU has a significant effect on ITU

H3: PU has a significant effect on ITU

The instruments used to measure each variable in this study are summarized in Table 1.

Table 1. Instrument Variables Research

Variables	Instruments
PEU	PEU1. Easy to use PEU2. Easy to learn and understand

[20] F.D. Davis, "Perceived Usefulness, Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly: Management Information Systems* 13, no. 3 (1989): 319–39, https://doi.org/10.2307/249008.

[21] Davis, "Perceived Usefulness, Ease of Use, and User Acceptance of Information Technology."

[22] M.O. Alassafi, "E-Learning Intention Material Using TAM: A Case Study," *Materials Today: Proceedings* 61 (2022): 873–77, https://doi.org/10.1016/j.matpr.2021.09.457; Weng et al., "A TAM-Based Study of the Attitude Towards Use Intention of Multimedia among School Teachers."

[23] R.K. Kampa, "Combining Technology Readiness and Acceptance Model for Investigating the Acceptance of M-Learning in Higher Education in India," *Asian Association of Open Universities Journal* 18, no. 2 (2023): 105–20, https://doi.org/10.1108/AAOUJ-10-2022-0149.

	PEU3. Making communication easier
	PU1. Accelerate the registration process
	PU2. Enhancing the impact of positive change
PU	PU3. Providing convenience in meeting needs
	PU4. Provide better benefits
	PU5. Making implementation run more smoothly
	ITU1. intend to use the application in the future
ITU	ITU2. will continue to use the app in the future
	ITU3. will use the app frequently in the future

Research Methods

This research is quantitative research based upon post-positivist philosophy to study a phenomenon/symptom/reality that numbers can measure, and the results can be classified through statistical analysiss.[24] The quantitative approach is appropriate for this study's goals, which were set up by creating hypotheses based on the theories used and testing the data collected from respondents using structured tools. Using hypotheses (temporary assumptions) as a reference for the data required to analyze predetermined instruments is a part of quantitative research. Perceived Usefulness (PU) and Perceived Ease of Use (PEU) were exogenous variables employed in this study, while Intention to Use (ITU) was an endogenous variable. The TAM theory was used to explain the occurrence of users regarding people's readiness in using technology (digitalization).

This research used primary data collected through questionnaires. The questionnaire consists of statements addressed to users of the Haji Pintar application using a 5-point Likert scale, ranging from 1, which means strongly disagree, to 5, which means strongly agree. In this research, the population referred to users of the information system or application Haji Pintar. In this case, a sampling technique was used to collect the respondents' data as it could save time, costs, and available energy resources (Supomo & Indriyanto, 2009) by accidental sampling as a part of non-probability sampling. In non-probability sampling, not every member of the population has an equal chance of becoming a sample, which means that the sample may not represent the population as a whole. Individuals who are available or easily accessible are selected as research subjects.[25]

The data collected will be processed and analyzed using Partial Least Squares-based Structural Equation Modelling (SEM PLS) with SmartPLS software 4. SEM PLS can be used on small or abnormal data sets because it does not require normal distribution. In addition, the bootstrapping method allows model estimation without the need for normally distributed data and can also handle models with complex latent variables and indicators. SEM PLS is excellent for studies with limited sample sizes, but still want to perform SEM analysis because of its flexibility.

[24] S. Sugiyono, *Metode Penelitian Kuantitatif dan Kualitatif dan R&D* (Alfabeta, 2010).
[25] Sugiyono, *Metode Penelitian Manajemen* (Alfabeta, 2015).

Result and Discussion

This study utilized data obtained from an online questionnaire conducted using Google Forms. Information about the URL or link to the online survey was distributed directly or through WhatsApp groups on instant messaging apps like WhatsApp. The online questionnaire was distributed in October 2023. A total of 52 respondents were successfully gathered, satisfying the criteria for data analysis. The analytical procedures follow established guidelines for SEM-PLS sample requirements.[26] Descriptive and inferential statistics were used to analyze the collected data.

Descriptive Statistics - Descriptive Data of Respondents

The demographics of respondents successfully collected in this study are presented in Table 2.

Table 2. Statistics of Respondents

Description	Criteria	Freq	%
Gender	Male	30	57,69
	Female	22	42,31
Residence	Java Island	47	90,38
	Non-Java Island	5	9,62
Age	20 - 30	2	3,85
	31 - 40	13	25
	41 - 50	20	38,46
	> 50	17	32,69
Education	D1 – D3	9	17,31
	D4/S1	18	34,62
	S2	21	40,38
	S3	4	7,69

Based on the demographic data of the respondents in Table 1, it is known that of the total 52 respondents, the majority were male, 30 people (57.69%), while female respondents numbered 22 people (42.31%). Based on place of residence, most respondents are from Java Island, totalling 47 people (90.38%), while the remaining five people (9.62%) are from outside Java Island. In terms of age groups, respondents were predominantly aged 41–50 years old, with 20 people (38.46%), followed by those aged >50 years old, with 17 people (32.69%). The 31–40 age group consisted of 13 people (25%), and the youngest age group, 20–30, consisted of only two people (3.85%). Most users are over 40 years old. The use of apps by older users is because the Haji Pintar app is typically used by prospective pilgrims who will depart for the holy land after waiting in line for between 10 and 39 years (Kemenag, 2024; Mutiarasari, 2024). In terms of educational attainment, respondents with a master's degree (S2) dominated with 21 people (40.38%), followed by those with a bachelor's degree (D4/S1) at 18 people (34.62%), then those with a diploma (D1–D3) at nine people (17.31%), and finally those with a doctoral degree (S3) at four people (7.69%). This data indicates that most respondents have a higher education background and reside

[26] M. Sholihin and D. Ratmono, *Analisis SEM-PLS dengan WarpPLS 3.0* (Andi, 2013).

on Java Island, with a fairly balanced gender distribution, although there are slightly more males.

Descriptive Statistics of Research Variables

Table 3 displays the descriptive statistics for each variable.

Table 3. Statistics of Research Variables

Variable	Min	Max	Mean	Std. Dev
PEU	3	5	4.327	0,671
PU	3	5	4.343	0,726
ITU	3	5	4.295	0,716

Based on the analysis of answers from 52 people, we got an overview of how users feel about the three main factors in TAM. The PEU scored between 3 and 5, averaging 4.327 and a standard deviation of 0.671. The data shows that the average respondent thought the system was easy to use, and their opinions were similar. The PEU variable had a minimum value of 3 and a maximum value of 5, with a mean of 4.327 and a standard deviation of 0.671. This value indicates that, in general, respondents had a high perception of the ease of use of the system, with a relatively low level of response dispersion.

Meanwhile, the PU variable also shows a high average of 4.343, with a standard deviation of 0.726 and a score range between 3 and 5. The findings suggest that most respondents perceive the information system as beneficial in facilitating their activities. For the ITU variable, the mean was 4.295 and the standard deviation was 0.716, with the same minimum and maximum values, namely 3 and 5. The data indicates a strong intention among users to engage with the system, and the data distribution is notably consistent.

Overall, all three variables have an average score above four on a scale of 1–5, indicating that respondents' perceptions of the ease, usefulness, and intention to use the Haji Pintar app are at a positive and fairly strong level.

Inferential Statistics

During data analysis with the SEM-PLS approach, it is essential to complete two testing stages to confirm the model's validity and reliability. The first test or evaluation is an evaluation of the outer model or measurement model. At this stage, the main focus is to evaluate the degree to which the indicators used in the study can reflect the latent variables being measured. This evaluation includes testing the validity and reliability of the indicators to ensure that the instruments used actually measure what they are supposed to measure.

The second stage involves assessing the inner model, commonly known as the structural model. This evaluation aims to examine the links among latent variables defined in the study framework. This phase assesses the intensity and orientation of links among constructs and tests previously formulated hypotheses. These two stages are important procedures in SEM-PLS to obtain accurate and reliable analysis results for concluding.[27]

[27] I. Ghozali and H. Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0* (Badan Penerbit Universitas Diponegoro, 2016).

Measurement Model Testing

The measurement model testing phase encompasses two distinct types of evaluations: validity testing and reliability testing. Validity testing encompasses both convergent validity and discriminant validity. Validity testing aims to assess how well a latent variable or construct is represented by its indicators. The result is evident in the strength of the correlation observed among the indicators within the construct. In the interim, reliability testing evaluates the instrument's consistency or indicators in measuring a particular construct. This study's complete data analysis and processing were conducted utilizing SmartPLS software version 4.

Convergent validity can be assessed by examining factor loading values and Average Variance Extracted (AVE) values. In this context, convergent validity assesses the degree to which indicators of a construct exhibit a strong relationship or correlation with the construct itself. A method to evaluate this involves utilizing standardized loading factors, which indicate the strength of the correlation between the indicators and the construct under examination.[28] An optimal loading factor value is > 0.7, signifying that the indicator substantially elucidates the construct or accounts for a minimum of 50% of the variation of the respective indicator.[29] In an exploratory study, results ranging from 0.6 to 0.7 remain acceptable[30], and the threshold of 0.6 is still considered adequate.[31]

According to the data in Table 4, all indicators of the analyzed variables exhibit loading factor values exceeding 0.7. In conclusion, all indicators have satisfied the criteria for convergent validity, indicating that the instruments employed in this study effectively reflect the relationship with the construct or variable they represent.

Alongside using the loading factor value, it is also possible to conduct convergent validity testing by examining the AVE value, as illustrated in Table 4. AVE measures convergent validity, which is how well latent variables explain the variance of their indicators. The commonly used threshold value is a minimum of 0.5. If the AVE meets or exceeds this number, the latent variables explain more than 50% of the indicator variance, so the construct is convergently valid. Based on the information provided in Table 4, all tested variables have satisfied the criteria for convergent validity, leading to the conclusion that these variables are indeed valid.

Discriminant validity can be assessed using various methods, such as examining cross-loading values and applying the Fornell-Larcker criterion. A commonly used technique is cross-loading analysis. This method guarantees that every indicator correlates more strongly with the construct under examination than with other constructs. An indicator demonstrates strong discriminant validity when its loading value for the specific variable exceeds its loading values for alternative variables.[32]

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[28] S. Haryono, "Metode SEM untuk Penelitian Manajemen AMOS Lisrel PLS," in *Jakarta: Luxima Metro Media* (Luxima Metro Media, 2017).

[29] D.R. Rahadi, "Pengantar Partial Least Squares Structural Equation Model (PLS-SEM," 2023.

[30] Ghozali and Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0*.

[31] B. Wiyono, *Metode Penelitian Bisnis: Pendekatan Kuantitatif* (UPP STIM YKPN, 2020).

[32] Sholihin and Ratmono, *Analisis SEM-PLS dengan WarpPLS 3.0*.

Table 4. Loading Factor, AVE, Cronbach's Alpha (CA) and Composite Reliability (CR) values.

		PEU	PU	ITU	AVE	CA	CR
PEU	PEU1	0.976			0.927	0.961	0.974
	PEU2	0.974					
	PEU3	0.938					
PU	PU1		0.809		0.800	0.937	0.952
	PU2		0.943				
	PU3		0.913				
	PU4		0.883				
	PU5		0.918				
ITU	ITU1			0.895	0.882	0.932	0.957
	ITU2			0.953			
	ITU3			0.967			

The Fornell-Larcker Criterion method is one of the techniques used to evaluate discriminant validity by comparing the extent of correlation between constructs or variables. In this method, a construct's correlation with itself—shown by the square root of the AVE value—needs to be higher than its correlation with other constructs in the model. Detailed information can be seen in Table 5.

Analysis of the data in Table 5 indicates that each indicator exhibits the highest loading value for its corresponding construct or variable compared to other variables' loading values. In other words, each instrument or question item shows a stronger correlation with the variable than other constructs that the indicator should not measure. This finding reinforces that the requirement for discriminant validity has been satisfied. The PEU-1 value to PEU is greater than the PEU-1 value to PU or ITU, and similarly for other indicators, the values are greater for the measured variable than for other variables.

Reliability testing for constructs or latent variables can be conducted using two methods: assessing Cronbach's alpha (CA) and composite reliability (CR) values. These two measures evaluate the internal consistency of indicators in assessing the intended construct. A construct is considered reliable when both its Cronbach's Alpha and Composite Reliability values exceed 0.7.[33] A reliability value of ≥ 0.8 indicates a very good or highly satisfactory level of internal consistency[34]. However, Cronbach's Alpha is known to often underestimate reliability. Therefore, it recommend not relying solely on Cronbach's Alpha, but using it together with Composite Reliability to obtain a more accurate and comprehensive measurement of construct reliability[35].

[33] Ghozali and Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0*; Sholihin and Ratmono, *Analisis SEM-PLS dengan WarpPLS 3.0*.

[34] Haryono, "Metode SEM untuk Penelitian Manajemen AMOS Lisrel PLS."

[35] Ghozali and Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0*.

Table 5. Discriminant validity – Cross Loading and Fornell-Larcker criterion

		Cross Loading			Fornell-Larcker criterion		
		PEU	PU	ITU	PEU	PU	ITU
PEU	PEU-1	**0.976**	0.872	0.863	**0.963**		0.858
	PEU-2	**0.974**	0.846	0.829			
	PEU-3	**0.938**	0.841	0.785			
PU	PU-1	0.668	**0.809**	0.573	0.886	**0.894**	0.826
	PU-2	0.827	**0.943**	0.809			
	PU-3	0.848	**0.913**	0.769			
	PU-4	0.800	**0.883**	0.751			
	PU-5	0.803	**0.918**	0.767			
ITU	ITU-1	0.820	0.717	**0.895**			**0.939**
	ITU-2	0.804	0.799	**0.953**			
	ITU-3	0.792	0.810	**0.967**			

The complete results of the construct reliability testing in this study can be seen in Table 4. Cronbach's alpha is a measure of internal reliability that indicates the consistency of an instrument in measuring the same latent variable. A good Cronbach's Alpha (CA) value is usually above 0.7, which means that the instrument has adequate consistency and is reliable for research. At the same time, Composite Reliability (CR) also measures internal reliability by considering the weight of the indicators, and the ideal value is also above 0.7. CR provides a more accurate picture of construct consistency than Cronbach's alpha, especially in PLS-SEM. Table 4 shows that all the variables in this study have Cronbach's Alpha and Composite Reliability values above 0.7. This information demonstrates that all instruments or indicators employed in measuring the constructs have satisfied the reliability criteria, indicating good internal consistency.

Structural Model Testing

The evaluation of structural models, also known as inner models, aims to test and predict the causal relationships among latent variables within the model and evaluate the hypotheses established in the research.[36] In the context of PLS-SEM, the inner model represents the relationships among latent variables or constructs while also showing how strong and significant the relationships between these constructs are.

Several statistical indicators are used to assess or test the validity of the inner model. These include testing the significance level of relationships between latent variables, measuring the coefficient of determination (R-squared) to quantify the explanatory power of independent variables on dependent variables, and measuring the effect size, which shows the strength of the relationships between variables in the model. These three aspects are integrated to assess whether the structural model built has adequate predictive power and significance.

Coefficient of Determination (R^2)

[36] H.M. Jogiyanto, *Sistem Informasi Keperilakuan* (Andi Offset, 2007).j

In the SEM-PLS approach, the R-square (R^2) value serves as an indicator to evaluate the degree to which exogenous variables (or independent latent variables) can explain endogenous variables (or dependent latent variables) in the research model. In other words, R^2 describes the overall predictive power of the structural model that has been constructed.

The R^2 value is calculated in a range between 0 and 1. A value approaching 1 indicates a superior predictive ability of the model. The assessment is conducted by examining the R^2 value for each dependent latent variable, which reflects the extent to which the variation or difference in that construct can be explained by the relevant independent construct.[37] A higher R^2 value indicates a more robust explanation of the dependent variable by the independent variable. However, to obtain more accurate results and avoid overestimation, especially in studies involving many predictor variables (more than two), researchers are also encouraged to use adjusted R^2 values, which correct for possible bias due to the large number of predictors.

As a complement to the evaluation of structural models, an assessment can also be made using the Q^2 value (predictive relevance), also known as the predictive sample reuse method. This technique is an alternative to assess how much the current predictive model can accurately reconstruct the observed values. The results of the R^2 value calculations for each variable in this model are shown in Table 6.

Table 6. R^2 and R^2 adjusted Values

	R^2	R^2 adjusted
PU	0.785	0.781
ITU	0.757	0.747

Table 6 indicates that the Adjusted R-Square (Adjusted R^2) value for the PU variable is 0.781, signifying that 78.1% of the variance in the PU variable is accounted for by exogenous variables (PEU). Factors or variables outside the scope of this study account for the remaining 21.9%. The adjusted R^2 value for the ITU variable is 0.747, indicating that 74.7% of the ITU variable is explained by the model's variables, specifically PU and PEU. The remaining 25.3% is attributed to other factors or variables not accounted for in this research model.

An adjusted R^2 value exceeding 0.5 indicates that the model employed in this study possesses substantial predictive power.[38] The test also involved an analysis of the Q^2 value (predictive relevance), which is useful for assessing how relevant and accurate the model is in predicting observational data. If the Q^2 value exceeds 0.35, the model possesses good predictive power and strong predictive relevance.[39]

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[37] Ghozali and Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0*.

[38] Ghozali and Latan, *Partial Least Squares Konsep, Metode dan Aplikasi Menggunakan Program WarpPLS 5.0*.

[39] Joseph F. Hair et al., *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 3rd ed. (SAGE Publications, 2022).

Model Fit Testing

Model Fit in SEM PLS is a measure to assess how well the model built fits or matches the data used in the analysis. In SEM PLS, model fit refers to the suitability of the relationship structure between latent variables (constructs) and their indicators and the relationship between latent variables in the structural model. Evaluation of model fit in Partial Least Squares-based Structural Equation Modelling (SEM-PLS) can be done by referring to several indicators or measurement parameters. Some commonly used parameters include the Standardized Root Mean Square Residual (SRMR), Normal Fit Index (NFI), d_ULS (Unweighted Least Squares discrepancy), Chi-Square (χ^2) and d_G (Geodesic discrepancy).

Hu & Bentler (1999) state that a model is deemed fit when the SRMR value is below the 0.10 threshold. Meanwhile, the d_ULS and d_G values will be examined based on the values obtained from the estimation results; in general, it is considered fit if the values are above 0.05. If using the chi-square parameter, the interpretation is performed by comparing the chi-square statistic value obtained from the model with the chi-square table value. If the statistic value exceeds the critical value from the table, the model can be stated to have a level of fit with the data.

In addition, the Normal Fit Index (NFI) is also used as a reference in this test. This score ranges from 0 to 1, with values approaching 1 indicating greater model appropriateness to empirical data, signifying a superior model (Ringle et al., 2022). Details regarding the testing parameters and standard rules (rule of thumb) can be seen in more detail in Table 7, which presents all the model fit measures in this study.

Table 7. Fit Model Testing Parameters

Parameters	Rule of thumb	Est. model	Description
SRMR	< 0,10	0.045	Fit
NFI	The model is better if the value is closer to 1	0.880	Fit
d_ULS	> 0,05	0.134	Fit
χ^2	χ^2 statistics > χ^2 table (X^2 value table with @ 0,05; df 10 =18,307)	94.980	Fit
d_G	> 0,05	0.335	Fit

Hypothesis Testing

This study's hypothesis testing approach aims to determine whether a significant relationship exists between the independent latent variables (exogenous) and the dependent latent variables (endogenous) inside the constructed model. We evaluate the importance of the link by examining the p-value and t-statistic derived from the route analysis results.

This study's significance level used to test the hypothesis is set at 5% or 0.05. The interpretation means that the hypothesis is considered statistically supported if the p-value is less than 0.05 or the t-statistic exceeds 1.96. Additionally, the direction of the relationship is also considered; a positive path coefficient signifies that the relationship between variables is in the same direction and supports the formulated hypothesis.

Figure 4 displays the visualization of the hypothesis testing findings, demonstrating the direction and strength of the correlations among the constructs in the model. At the same time, Table 8 shows more detailed numbers from the route analysis results, encompassing coefficient values, p-values, and t-statistics for each hypothesis.

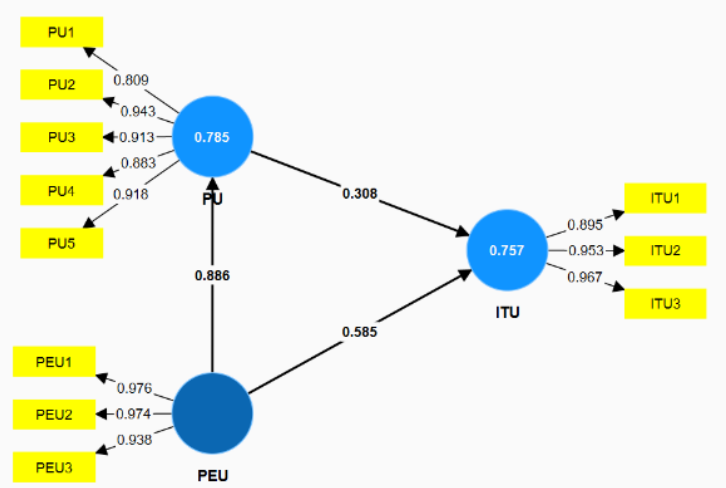

Figure 4. Model Testing Results

Table 8. Path coefficient values, p-values, and t-statistics

	Original sample	T-statistics	P-values	Supported
PEU -> PU	0.886	26.515	0.000	Yes
PEU -> ITU	0.585	3.394	0.001	Yes
PU -> ITU	0.308	1.688	0.092	No

The first hypothesis (H1) states that perceived ease of use (PEU) influences perceived usefulness (PU). The data results shown in Table 8 indicate that the relationship between PEU and PU has a path coefficient of 0.886, a positive value, with a p-value of 0.000 (less than 0.05) and a t-statistic of 26.515 (greater than 1.96). Therefore, we can assert that PEU significantly and positively affects PU. Therefore, we support and accept the first hypothesis (H1).

A positive path coefficient signifies a favourable correlation between perceived ease of use and perceived usefulness. The result indicates that an increase in perceived ease of use correlates with an increase in perceived usefulness. Consequently, the study's findings suggest that a system's ease of understanding and use (high PEU) correlates positively with users' perception of its utility in their work (high PU). The affirmative path coefficient supports the fundamental premise of the TAM model that usability influences perceptions of utility, enhancing the intention to utilize the system. Consequently, in deploying information systems, it is essential to ensure that the interface is intuitive and user-friendly, since this enhances usability and reinforces users' impressions of the system's utility. These

findings align with the core assumptions of the TAM model, which states that perceived ease of use positively affects perceived usefulness.[40]

The second hypothesis (H2) posits that perceived ease of use (PEU) affects intention to use (ITU). The data processing results (Table 8) indicate that the path coefficient of PEU on ITU is 0.585, demonstrating a positive correlation with a p-value of 0.001, below 0.05, and a t-statistic of 3.394, beyond the crucial threshold of 1.96. These values demonstrate that PEU exerts a beneficial and significant influence on ITU.

The three statistical indicators—path coefficients, p-value, and t-statistic—demonstrate that the correlation between perceived ease of use and intention to use is positive and significant. The results mean that the higher the users' perception that the system is easy to use, the stronger their intention to use it. It indicates that a greater assessment of the system's ease of use correlates with a stronger intention to use it. Consequently, the second hypothesis (H2), asserting that PEU positively influences the ITU, is supported.

Practically, this finding emphasizes the importance of designing information systems that are intuitive, easy to learn, and do not complicate users' operations. Ease of use not only affects user comfort but also directly increases their motivation or intention to continue using the system in the future, which ultimately contributes to the success of information system implementation. The results of this study align with the theoretical TAM model, which posits that PEU positively affects the ITU. These results align with the TAM framework, which suggests that perceived ease of use enhances perceived usefulness.[41]

The third hypothesis (H3) posits that perceived usefulness (PU) affects intention to use (ITU). The results of the data analysis presented in Table 8 indicate a positive correlation between PU and ITU, with a value of 0.308. However, the p-value is 0.092, exceeding the 0.05 threshold, and the t-statistic is 1.688, falling below the critical value of 1.96. Therefore, we reject or do not support the third hypothesis (H3).

The path coefficient from perceived usefulness (PU) to intention to use (ITU) is 0.308, signifying a positive relationship. Regarding direction, the higher the PU, the higher the ITU. The p-value of 0.092 exceeds the significance threshold of 0.05, and the t-statistic of 1.688 is below the critical value of 1.96. Consequently, the statistical analysis indicates that the impact of PU on ITU is not significant at the 5% significance level. The impact of PU is notable at a significance level of 0.1 or a confidence level of 90%.

The implication in the context of TAM is that, although users may feel that the information system is useful, this perception is not strong enough to encourage their intention to use it directly. The research results showing that the perceived usefulness variable in the TAM model for the Haji Pintar application does not have a significant effect

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[40] Natasia et al., "Acceptance Analysis of NUADU as an E-Learning Platform Using the Technology Acceptance Model (TAM) Approach"; R.A. Damayanti et al., "Analisis Perceived Ease of Use Dan Perceived Usefulness Terhadap Actual System Use Aplikasi SAKTI," *MANDAR: Management Development and Applied Research Journal* 7, no. 1 (2024): 65–76, https://doi.org/10.31605/mandar.v7i1.4431; Weng et al., "A TAM-Based Study of the Attitude Towards Use Intention of Multimedia among School Teachers."

[41] Weng et al., "A TAM-Based Study of the Attitude Towards Use Intention of Multimedia among School Teachers"; T.S.E. Sidabutar and R. Hanani, "Pengaruh Variabel Perceived Usefulness Dan Perceived Ease Of Use Terhadap Behavioral Intention To Use Pada Aplikasi E-Kinerja Di Kementerian Perhubungan: Tinjauan Berdasarkan Pendekatan Technology Acceptance Model (TAM," *Journal of Public Policy and Management Review* 14, no. 2 (2025): 925–45, https://doi.org/10.14710/jppmr.v14i2.50736.

on intention to use may be due to the existence of other applications that also serve similar needs, such as the PUSAKA (Pusat Layanan Keagamaan) application, IKHSAN application or other popular web applications that users widely use. Because these alternative applications exist, the perceived usefulness of Haji Pintar may be weaker or quite similar to other applications, thus only slightly affecting the intention to use. Users may already feel that other applications sufficiently meet their needs related to Hajj services, or they may consider the features and benefits of the Haji Pintar application to be not much different from other applications, so that perceived usefulness does not greatly influence their decision to use the application. In addition, other factors such as perceived ease of use, trust, or external factors may also play a greater role in shaping the intention to use the Haji Pintar application amid competition with other applications. These findings are important in developing, improving, and refining information systems. Therefore, system developers need to pay attention to other aspects that directly influence usage intent, such as ease of use or user satisfaction. In addition, it is necessary to consider alternative applications, including the PUSAKA application and web-based applications with similar functions and services, which suggest that usefulness does not significantly affect the intention to use. Another important factor is the high number of elderly users or prospective pilgrims, many of whom have low digital literacy due to limited familiarity with technology.[42]

Conclusion

According to the data analysis, at a 5% significance level (or 95% confidence level), two hypotheses were accepted: that perceived ease of use (PEU) positively affects perceived usefulness (PU) and intention to use (ITU). One hypothesis about the effect of perceived usefulness (PU) on intention to use (ITU) was rejected. However, the link between perceived usefulness (PU) and intention to use (ITU) is significant at a 10% significance level (or 90% confidence level). We reject or do not support one hypothesis, which concerns the influence of perceived usefulness (PU) on intention to use (ITU). The relationship between perceived usefulness (PU) and intention to use (ITU) is significant when using a significance level of 10% or a confidence level of 90%. In this case, perceived ease of use significantly influences users' intention to use the application more than perceived usefulness.

Overall, the use of the Haji Pintar app provides ease of use for users, and because it is easy to use, it can influence the intention to use. These factors can be considered in the development, improvement, and refinement of the Haji Pintar app. For the Ministry of Religious Affairs as the application developer, these findings are important to consider in developing, improving, and refining the information system. Possible developments and improvements to the application include enhancing features and services, improving the user experience or user interface, and integrating or consolidating existing similar applications, such as PUSAKA and IKHSAN applications. The limitations of this study are that the sample size was only 52 respondents, and the sample was taken using non-probability sampling techniques. Further research should be conducted with a larger and

[42] Fauzi, *Pendaftaran Haji Melalui Aplikasi Haji Pintar (Studi Kasus Kementerian Agama Kabupaten Bandung*; Nawawi and Fatika, "Analisis Pemanfaatan Aplikasi Haji Pintar dalam Meningkatkan Akses Informasi bagi Calon Jemaah Haji di Kementerian Agama Lampung Tengah"; Weng et al., "A TAM-Based Study of the Attitude Towards Use Intention of Multimedia among School Teachers."

more proportional sample size, and other methods such as the Delone and McLean Success Model or the Unified Theory of Acceptance and Use of Technology (UTAUT) may also be used.

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