

THE EFFECT OF DIGITAL ACCOUNTING LITERACY AND ARTIFICIAL INTELLIGENCE (AI) AWARENESS ON THE EFFECTIVENESS OF USING ACCOUNTING INFORMATION SYSTEMS WITH DIGITAL COMPETENCE AS A MODERATING VARIABLE

(Study on Accounting Students at Private Universities in Lamongan)

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Abstract: The rapid advancement of digital technologies has transformed accounting education, requiring students to develop not only digital accounting literacy but also awareness of Artificial Intelligence (AI) to effectively utilize Accounting Information Systems (AIS). Although previous studies have examined digital literacy, AI adoption, and AIS effectiveness separately, limited research has integrated these variables while considering the moderating role of digital competence, particularly among accounting students in regional higher education institutions. This study aims to examine the effects of digital accounting literacy and AI awareness on the effectiveness of AIS use, with digital competence serving as a moderating variable. A quantitative explanatory approach was employed using data collected from 77 accounting students enrolled in three private universities in Lamongan Regency, Indonesia. Data were gathered through an online questionnaire and analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The findings reveal that digital accounting literacy, AI awareness, and digital competence each have positive and significant effects on the effectiveness of AIS use. Furthermore, digital competence significantly weakens the relationship between digital accounting literacy and AIS effectiveness, indicating a substitution effect, while simultaneously strengthening the relationship between AI awareness and AIS effectiveness. The structural model demonstrates strong explanatory and predictive power, suggesting that accounting students' technological readiness is shaped by the interaction among digital accounting literacy, AI awareness, and digital competence. This study contributes to the literature by extending technology acceptance perspectives through the integration of these variables into a single research model. Practically, the findings provide insights for higher education institutions in designing accounting curricula

that better integrate AI literacy and digital competency development to prepare graduates for the digital transformation of the accounting profession.

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Introduction



The development of digital technology has had a significant impact on various sectors, including education and accounting practices (Dwirini 2025). Digital transformation requires accountants to not only master conventional accounting principles, but also possess digital accounting literacy and an understanding of Artificial Intelligence (AI) technology, in order to optimize the use of Accounting Information Systems (AIS) effectively and efficiently. Digitalization in accounting has also shifted the role of accountants from mere data processors to strategically oriented analysts supported by technology.

Digital literacy is the awareness, attitude, and ability of individuals to utilize digital devices and facilities appropriately and responsibly (Ifada et al. 2023). A more specific context in the field of accounting develops this concept into digital accounting literacy, namely the ability of accounting students to understand, analyze, and implement digital technology in accounting practice, including mastery of accounting software, cloud accounting, and data analysis integrated in a digital system. (Ni Kadek Listiani 2024) found that user technical skills and the use of information technology have a positive and significant effect on employee performance, which indicates that mastery of technology contributes to supporting the optimization of AIS utilization.

As digital technology becomes increasingly complex, the use of Artificial Intelligence (AI) is also beginning to be integrated into modern accounting practices. AI awareness represents an individual's level of understanding, perception, and readiness to accept and integrate AI technology into accounting systems, contributing to the automation of transaction recording, predictive analysis, and increased accuracy and efficiency of financial reporting. (Nainggolan et al. 2024) shows that the implementation of AI has a positive impact on the effectiveness of the accounting system by increasing operational efficiency and the quality of the information produced.

The effectiveness of using AIS as a dependent variable reflects the system's ability to provide benefits to users, particularly in terms of speed of information presentation, data accuracy, and relevance of information to support decision making. (Larissa 2024) explains that sophisticated information technology and the effectiveness of AIS play a role in producing accurate and timely information, thereby supporting improved organizational performance. This demonstrates that the success of AIS implementation is determined not only by the sophistication of the system, but also by the readiness of users to utilize it optimally.

Digital competence of accounting students is a crucial aspect because it reflects technical abilities in using digital-based accounting software, as well as critical thinking skills and readiness to adapt to technological changes. (Agustina et al. 2025) confirms that the level of digital competence can influence the strength or weakness of the relationship between variables, so in this study, digital competence is suspected to play a moderating role in the influence of digital accounting literacy and AI awareness on the effectiveness of AIS use. This phenomenon can be explained through the Technology Acceptance Model or TAM approach (Davis 1989), Unified Theory of Acceptance and Use of



Technology or UTAUT (Venkatesh et al. 2003), as well as the Theory of Planned Behavior or TPB (Icek Ajzen, Netemeyer and Ryn 1991). These three theories emphasize that the effectiveness of technology use is influenced by an individual's perception of its usefulness and ease of use, as well as by the user's attitudes, subjective norms, and perceived behavioral control.

Research on digital literacy, AI, and the use of accounting technology has been largely conducted in a fragmented manner, without integrating digital accounting literacy and AI awareness into a single model that includes digital competence as a moderating variable. Research in the context of accounting students at regional universities, particularly in Lamongan, is also relatively limited. Therefore, this study aims to develop a more integrative model by examining the influence of digital accounting literacy and Artificial Intelligence (AI) awareness on the effectiveness of Accounting Information Systems use, with digital competence as a moderating variable, among accounting students at private universities in Lamongan. This can provide theoretical contributions to the development of technology acceptance models and practical contributions to strengthening technology-based auditing and accounting curricula in universities.

Literature Review and Hypothesis Development

This research is based on three main theories. First, the Technology Acceptance Model or TAM (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology or UTAUT (Venkatesh et al., 2003), which explain that the effectiveness of using an information system is determined by the perception of ease of use and perception of usefulness, which are formed by the user's level of understanding and readiness for technology. Second, the Theory of Planned Behavior or TPB (Ajzen et al., 1991), which explains that an individual's intention and behavior in using a system are formed by three factors: attitude, subjective norms, and perceived behavioral control. In this study, digital accounting literacy is positioned as a shaper of students' attitudes towards the use of AIS, Artificial Intelligence awareness is positioned as a factor that forms subjective norms due to the encouragement of the academic environment to adapt to AI-based technology, while digital competence is positioned as a representation of perceived behavioral control, namely an individual's ability to control and utilize technology effectively. Third, human capital theory, which is used to explain the role of digital competence as a form of individual capital that increases the productivity of system use.

Digital Accounting Literacy

Digital accounting literacy is an individual's ability to understand, apply, and utilize digital technology in accounting processes. According to TAM, the level of understanding and ease of use of technology influence the effectiveness of information system utilization. (Zohry and Al-dhubaibi 2024) shows that the user's ability to understand digital technology has a positive effect on the effectiveness of using AIS, because digital literacy increases the user's understanding of the system and the quality of the information produced.

H1: Digital accounting literacy has a positive influence on the effectiveness of using Accounting Information Systems.

Artificial Intelligence (AI) Awareness

AI awareness is the level of individual understanding and knowledge regarding the use of AI technology in the accounting field, which helps with automation processes, data analysis, and decision-making. (Solikin and Darmawan 2023) shows that the application of Artificial Intelligence has a positive effect on the effectiveness of AIS because it is able to increase the efficiency and quality of data processing.

H2: Artificial Intelligence (AI) awareness has a positive influence on the effectiveness of using Accounting Information Systems.

Digital Competence

Digital competence is an individual's ability to use digital technology effectively, including operating software, understanding information systems, and managing data digitally.(Rafika 2025)And(Darma et al. 2024)shows that user competence has a positive influence on the effectiveness of using accounting information systems because individuals with good digital skills are able to utilize the system optimally.

H3:Digital competence has a positive influence on the effectiveness of using Accounting Information Systems.

Digital Competence Moderates the Influence of Digital Accounting Literacy

Digital competence is thought to not only have a direct influence, but also strengthen the relationship between digital accounting literacy and the effectiveness of system use, because individuals with high digital competence are better able to apply digital accounting knowledge optimally.(Manan and Gunawan 2026)shows that the adoption of digital technology can strengthen the influence of digital literacy on human resource performance.

H4:Digital competence moderates the influence of digital accounting literacy on the effectiveness of using Accounting Information Systems.

Digital Competence Moderates the Influence of Artificial Intelligence (AI) Awareness

Individuals with high digital competencies are thought to find it easier to understand and implement AI technology in AIS, thereby increasing the effectiveness of its use.(Ighoroje et al. 2025)shows that digital competence is able to strengthen the relationship between technology utilization and the effectiveness of information systems.

H5:Digital competence moderates the influence of Artificial Intelligence (AI) awareness on the effectiveness of using Accounting Information Systems.

Research methods

This study uses a quantitative approach with explanatory research to test the causal relationship between variables. The research objects include digital accounting literacy (X1), Artificial Intelligence awareness (X2), the effectiveness of using Accounting Information Systems (Y), and digital competence (Z) as a moderating variable. The study was conducted at three private universities in Lamongan Regency, namely Darul 'Ulum Islamic University Lamongan (UNISDA), Lamongan Islamic University (UNISLA), and Muhammadiyah University Lamongan (UMLA), during the period May–August 2026.

The research population was all active students of the Accounting Study Program in semesters IV–VIII at the three universities, totaling 326 students. The number of samples was determined using the Slovin formula with a margin of error of 10%, resulting in a sample of 77 students. The sampling technique used purposive sampling with the following criteria: (1) active students in semesters IV–VIII, (2) have or are currently taking the Accounting Information Systems course, and (3) have knowledge or have been exposed to Artificial Intelligence-based technology.

Primary data were collected through a Likert-scale online questionnaire (1 = Strongly Disagree to 5 = Strongly Agree) distributed through Google Forms. Data were analyzed using Partial Least Squares–Structural Equation Modeling (PLS-SEM) assisted by SmartPLS version 4, through two stages of evaluation: the measurement model (outer model) that assesses convergent validity (outer loading and Average Variance Extracted), discriminant validity (cross loading), and construct reliability (Cronbach's Alpha and Composite Reliability); and the structural model (inner model) that assesses R-Square, effect size (f^2), and hypothesis testing through a bootstrapping procedure, with significance

criteria of T-statistics > 1.96 and P-value < 0.05 at an error level of $\alpha = 5\%$. Model suitability was evaluated through Predictive Relevance (Q^2), Normed Fit Index (NFI), and Standardized Root Mean Square Residual (SRMR).

Results and Discussion

Respondent Characteristics

This study involved 77 active students of the Accounting Study Program. Based on their university of origin, the majority of respondents came from UNISDA (42 students; 54.5%), followed by UNISLA (23 students; 29.9%), and UMLA (12 students; 15.6%). Based on semester distribution, respondents consisted of those in semester VIII (38 students; 49.4%), semester VI (21 students; 27.3%), and semester IV (18 students; 23.4%).

Table 1. Respondent Characteristics Based on College of Origin

College of Origin	Number of Respondents	Percentage
UNISDA	42	54.5%
UNISLA	23	29.9%
UMLA	12	15.6%
Total	77	100%

Source: primary data processed by researchers, 2026

Based on university origin, the majority of respondents came from UNISDA (42 students) (54.5%), followed by UNISLA (23 students) (29.9%), and UMLA (12 students) (15.6%). This composition indicates that the study respondents were dominated by students from UNISDA, although all three universities were adequately represented.

Table 2. Respondent Characteristics Based on Semester

Semester	Number of Respondents	Percentage
IV	18	23.4%
VI	21	27.3%
VIII	38	49.4%
Total	77	100%

Source: primary data processed by researchers, 2026

Based on semester distribution, respondents were dominated by eighth-semester students (38 students or 49.4%), followed by sixth-semester students (21 students or 27.3%), and fourth-semester students (18 students or 23.4%). Eighth-semester students have academically completed most of the core accounting courses, including Accounting Information Systems (AIS), and are therefore considered to have a solid basic understanding of the research topic.

Measurement Model Test Results (Outer Model)

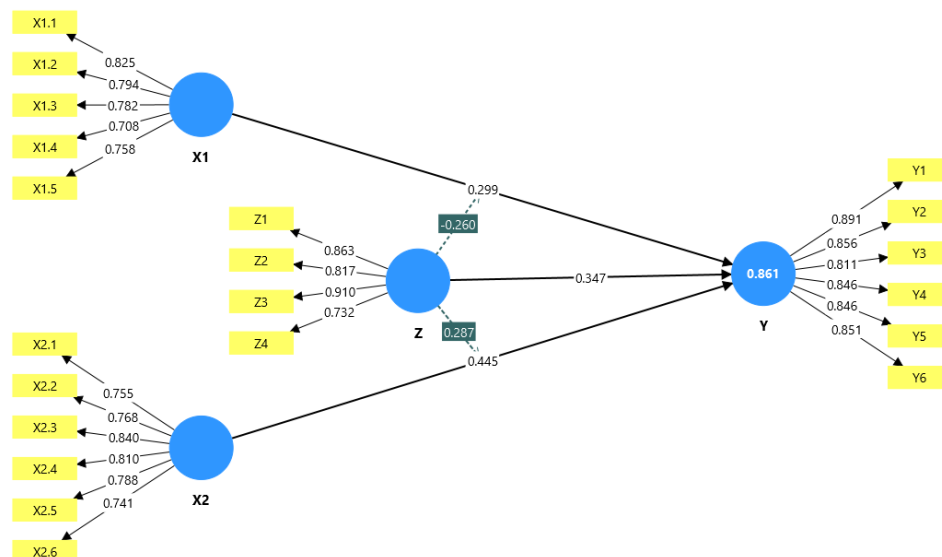


Figure 1. SmartPLS 4.0 output, 2026

Convergent Validity

Convergent validity is used to measure the high level of correlation between an indicator and its corresponding construct. Generally, a factor loading value of ≥ 0.70 is the standard for convergent validity, indicating that the indicator makes a significant contribution to the formation of the latent variable.

Table 3. Convergent Validity Results (Outer Loading)

Indicator	X1	X2	Y	Z	Note:
X1.1	0.825	-	-	-	Valid
X1.2	0.794	-	-	-	Valid
X1.3	0.782	-	-	-	Valid
X1.4	0.708	-	-	-	Valid
X1.5	0.758	-	-	-	Valid
X2.1	-	0.755	-	-	Valid
X2.2	-	0.768	-	-	Valid
X2.3	-	0.840	-	-	Valid
X2.4	-	0.810	-	-	Valid
X2.5	-	0.788	-	-	Valid
X2.6	-	0.741	-	-	Valid
Y1.1	-	-	0.891	-	Valid
Y1.2	-	-	0.856	-	Valid

Y1.3	-	-	0.811	-	Valid
Y1.4	-	-	0.846	-	Valid
Y1.5	-	-	0.846	-	Valid
Y1.6	-	-	0.851	-	Valid
Z1.1	-	-	-	0.863	Valid
Z1.2	-	-	-	0.817	Valid
Z1.3	-	-	-	0.910	Valid
Z1.4	-	-	-	0.732	Valid

Note: X1 = Digital Accounting Literacy, X2 = AI Awareness, Y = Effectiveness of AIS Use, Z = Digital Competence. Source: SmartPLS Output (processed), 2026

All indicators in the Digital Accounting Literacy variable (X1) show loading factor values above 0.70, with a range between 0.708 and 0.825; indicator X1.1 has the highest value (0.825). In the Artificial Intelligence Awareness variable (X2), the loading factor values range from 0.741 to 0.840, with X2.3 as the largest contributor. For the Digital Competence variable (Z), the loading factor values range from 0.732 to 0.910, with Z3 as the strongest indicator. Meanwhile, in the Effectiveness of AIS Use variable (Y), the loading factor values range from 0.811 to 0.891, with Y1 as the most representative indicator. Thus, all indicators of the four main latent constructs have met the convergent validity criteria.

Reliability Test

The reliability test aims to measure the internal consistency of the indicators that represent the latent constructs being studied, assessed through Cronbach's Alpha and Composite Reliability (CR) with a threshold of ≥ 0.70 , as well as Average Variance Extracted (AVE) with a threshold of ≥ 0.50 . (Hair 2021 nd).

Table 4. Results of Construct Reliability Test

Variables	Cronbach's Alpha	rho_a	rho_c	AVE
X1	0.833	0.840	0.882	0.600
X2	0.875	0.878	0.905	0.615
Y	0.923	0.927	0.940	0.723
Z	0.850	0.858	0.900	0.694

Source: SmartPLS output (processed), 2026

All latent constructs have AVE values above 0.50 and Cronbach's Alpha and Composite Reliability values exceeding 0.70, starting from the lowest value in construct X1 (AVE 0.600; Cronbach's Alpha 0.833) to the highest value in construct Y (AVE 0.723; Cronbach's Alpha 0.923). Thus, this measurement model is declared valid and reliable for use in further analysis.

Discriminant Validity

Table 5. Results of the Discriminant Validity Test (Fornell-Larcker Criteria)

Variables	X1	X2	Y	Z
X1	0.774	-	-	-

X2	0.779	0.784	-	-
Y	0.835	0.847	0.851	-
Z	0.725	0.750	0.826	0.833

Source: SmartPLS output (processed), 2026

Based on the Fornell-Larcker test, the square root of the AVE (diagonal) for each latent variable is consistently greater than the correlation value between latent variables in the same column, indicating a good empirical separation of constructs. The cross-loading test also confirms that the loading factor value of each indicator on its main construct is much greater than its cross-correlation with other constructs, so there is no problem of overlapping measurements between constructs.

Structural Model Test Results (Inner Model)

The structural model (inner model) is used to test the relationship between latent constructs in this study, evaluated through the coefficient of determination (R-Square) and effect size (effect size or f^2).

Coefficient of Determination (R-Square)

Table 6. R-Square Value

Dependent Variable	R-Square	Category
Effectiveness of Using SIA	0.861	Strong

Source: SmartPLS output (processed), 2026

The R-Square value of 0.861 indicates that 86.1% of the variation in the Effectiveness of Accounting Information System Use can be explained by Digital Accounting Literacy, Artificial Intelligence Awareness, Digital Competence, and their moderating interactions, while the remaining 13.9% is explained by other factors outside the model. Referring to Chin's (1998) criteria, this value is considered strong ($R^2 > 0.67$).

F-Square Test (f^2)

Table 7. F-Square Value (f^2)

Path to Y	f^2 value	Category
Digital Accounting Literacy (X1)	0.221	Intermediate
Artificial Intelligence Awareness (X2)	0.392	Big
Digital Competence (Z)	0.331	Medium approaching large
Z x X2 (moderation)	0.140	Small approaching medium
Z x X1 (moderation)	0.089	Small

Source: SmartPLS output (processed), 2026

Artificial Intelligence awareness contributes the greatest influence on the Effectiveness of AIS

Use ($f^2 = 0.392$; large category), followed by Digital Competence ($f^2 = 0.331$) and Digital Accounting Literacy ($f^2 = 0.221$) which are both in the medium category. The moderating effect of $Z \times X2$ ($f^2 = 0.140$) is greater than $Z \times X1$ ($f^2 = 0.089$), which indicates that the role of digital competence as a moderator is stronger in the relationship between AI awareness and AIS effectiveness.

Hypothesis Testing

Hypothesis testing was conducted through the bootstrapping procedure in SmartPLS 4, with the relationship declared significant if the T-statistics > 1.96 and P-value < 0.05 .

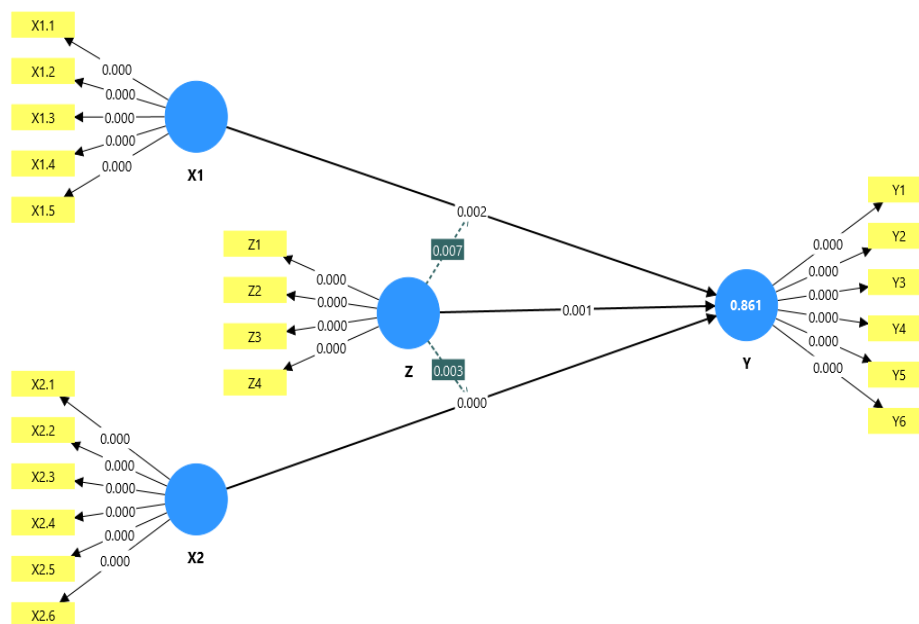


Figure 2. SmartPLS 4.0 output, 2026

Table 8. Bootstrapping Results

Track	Original Sample	T-Statistics	P-Values	Information
X1 -> Y (H1)	0.299	3,100	0.002	Accepted (significant positive)
X2 -> Y (H2)	0.445	3,615	0.000	Accepted (significant positive)
Z -> Y (H3)	0.347	3,192	0.001	Accepted (significant positive)
Z moderates X1 -> Y (H4)	-0.260	2,678	0.007	Accepted (significant, weakening)
Z moderates X2 -> Y (H5)	0.287	2,941	0.003	Accepted (significant, reinforcing)

Source: SmartPLS output (processed), 2026

The direct relationship between Digital Accounting Literacy (X1) and the Effectiveness of AIS Use (Y) shows a path coefficient of 0.299, T-statistics of 3.100, and P-value of 0.002 (<0.05), so H1 is accepted: digital accounting literacy has a positive and significant effect on the effectiveness of AIS use.

Artificial Intelligence Awareness (X2) on the Effectiveness of AIS Use (Y) shows a path coefficient of 0.445, a T-statistic of 3.615, and a P-value of 0.000, so H2 is accepted. AI awareness is the most dominant direct influence factor in this structural model.

Digital Competence (Z) on the Effectiveness of AIS Use (Y) shows a path coefficient of 0.347, T-statistics of 3.192, and P-value of 0.001, so H3 is accepted: digital competence is directly able to significantly increase the effectiveness of AIS use.

The moderating effect of Digital Competence on the relationship between Digital Accounting Literacy and the Effectiveness of AIS Use ($Z \times X1 \rightarrow Y$) shows a path coefficient of -0.260, T-statistics of 2.678, and a P-value of 0.007. A P-value below 0.05 proves that this moderating effect is significant, but a negative coefficient indicates that Digital Competence weakens/dampens the positive influence of Digital Accounting Literacy on the Effectiveness of AIS Use, so that H4 is accepted in terms of statistical significance even though the direction of the relationship is opposite to that hypothesized.

The moderating effect of Digital Competence on the relationship between AI Awareness and the Effectiveness of AIS Use ($Z \times X2 \rightarrow Y$) shows a path coefficient of 0.287, T-statistics of 2.941, and P-value of 0.003, so that H5 is accepted in the hypothesized direction: Digital Competence strengthens/amplifies the positive influence of AI Awareness on the Effectiveness of AIS Use.

DISCUSSION

The test results show that digital accounting literacy has a positive and significant effect on the effectiveness of AIS use (coefficient = 0.299; T-statistics = 3.100; P-value = 0.002), thus H1 is accepted. Students with good digital accounting literacy tend to understand the system's working logic more quickly and are more efficient in completing AIS-based tasks. This finding is in line with the Technology Acceptance Model, which confirms that understanding technology increases the perception of the system's ease and usefulness, and is consistent with the results of Zohry & Al-dhubaibi (2024). However, its contribution is moderate compared to the other two independent variables, because digital accounting literacy is more foundational and not necessarily directly reflected in operational skills.

Artificial Intelligence (AI) awareness has been shown to have a positive and significant effect on the effectiveness of AIS use (coefficient = 0.445; T-statistics = 3.615; P-value = 0.000), thus H2 is accepted with the highest coefficient value among all independent variables. Students who understand the benefits and workings of AI features, such as recording automation or transaction anomaly detection, tend to be more confident and more optimal in utilizing the system. These results are in line with Solikin & Darmawan (2023) and confirm that awareness of artificial intelligence technology is the most determining factor in the effectiveness of AIS use in the era of digital transformation.

Digital competence also has a positive and significant effect on the effectiveness of AIS use (coefficient = 0.347; T-statistics = 3.192; P-value = 0.001), thus H3 is accepted. Students with high digital competence complete system-based tasks more quickly, make fewer technical errors, and adapt more easily to feature updates. This finding strengthens human capital theory and is in line with the results of Rafika (2025) and Darma et al. (2024), while also providing the basis for the dual role of digital competence as a moderating variable in H4 and H5.

In the moderation test, digital competence was proven to significantly moderate the influence of digital accounting literacy on the effectiveness of AIS (coefficient = -0.260; T-statistics = 2.678; P-

value = 0.007), but with a negative direction that is opposite to the initial hypothesis. This condition indicates a substitution effect: students with high digital competence tend to be able to operate AIS through their technical skills, so that the additional role of digital accounting literacy is conceptually relatively reduced, while for students with low digital competence, digital accounting literacy actually becomes a more important bridge of understanding.

Conversely, digital competence is proven to strengthen the influence of Artificial Intelligence awareness on AIS effectiveness (coefficient = 0.287; T-statistics = 2.941; P-value = 0.003), so that H5 is accepted in the hypothesized direction. Conceptual AI awareness requires technical skills to be translated into concrete actions in utilizing automation features and predictive analysis in AIS. These results are in line with Ighoroje et al. (2025) and confirm that digital competence has a dual role in this model: it is substitutive to digital accounting literacy (H4), but reinforcing to AI awareness (H5), depending on the characteristics of the moderating independent variables.

Conclusion

1. Digital accounting literacy has a positive and significant effect on the effectiveness of AIS use ($\beta = 0.299$; $t = 3.100$; $p = 0.002$), so H1 is accepted.
2. Artificial Intelligence awareness has a positive and significant effect on the effectiveness of AIS use ($\beta = 0.445$; $t = 3.615$; $p = 0.000$), being the most dominant predictor, so H2 is accepted.
3. Digital competence has a positive and significant effect on the effectiveness of AIS use ($\beta = 0.347$; $t = 3.192$; $p = 0.001$), so H3 is accepted.
4. Digital competence significantly moderates the effect of digital accounting literacy on the effectiveness of AIS use but weakens the relationship ($\beta = -0.260$; $t = 2.678$; $p = 0.007$), indicating a substitution effect between the two variables.
5. Digital competence moderates the effect of Artificial Intelligence awareness on the effectiveness of AIS use positively and significantly ($\beta = 0.287$; $t = 2.941$; $p = 0.003$), so H5 is accepted.

The research model has strong explanatory power ($R^2 = 0.861$) and high predictive relevance ($Q^2 = 0.819$), although the NFI (0.702) and SRMR (0.083) values in the estimated model have not fully reached the ideal threshold. An interesting finding from this study is the dual role of digital competence as a moderating variable, namely weakening the influence of digital accounting literacy but strengthening the influence of AI awareness, which confirms that the interaction mechanism between variables is contextual.

Based on these conclusions, it is recommended that: (1) universities integrate AI awareness materials, including benefits, limitations, and potential biases, into accounting information systems curricula; (2) digital competency improvement programs be specifically directed to support the implementation of AI-based technology; (3) institutions continue to develop digital accounting literacy proportionally for students with low digital competencies; and (4) further research expands the sample scope, considers longitudinal designs, and adds other variables such as institutional support, technological infrastructure, or self-efficacy to enrich the model.

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