JOURNAL OF MANAGEMENT AND BUSINESS SOLUTIONS

Providing a Model of Factors Influencing the Acceptance of Information Technology Utilization in the Internal Auditing Profession

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ABSTRACT

In today's business environment, the use of information technology in the internal auditing profession is a strategic and operational necessity that has fundamentally transformed the functionality, efficiency, and value of internal audit services. Therefore, the present study sought to design a model of the factors influencing the acceptance of information technology utilization in the internal auditing profession. This research employed a mixed-methods approach. In the qualitative phase, a thematic analysis strategy was used, and in the quantitative phase, a survey strategy was applied. Data were collected through semi-structured interviews in the qualitative section and through a questionnaire in the quantitative section. Sixteen semi-structured interviews were conducted using snowball sampling until theoretical saturation was reached, with two groups of participants: academic experts and professional practitioners. After transcribing the interviews into MAXQDA software, the research data were analyzed through the thematic analysis technique based on the Attride-Stirling approach at three levels: basic themes (121 codes), organizing themes (17 codes), and global themes (4 codes). The statistical population of the quantitative phase consisted of employees in the internal audit units of companies listed on the Tehran Stock Exchange. A total of 407 questionnaires related to the dimensions of technology utilization and the questionnaire related to IT acceptance were distributed among them, and the data were analyzed using structural equation modeling (SEM) with the partial least squares (PLS) method in SmartPLS software. The findings indicated that outcomes had a positive and significant effect, and challenges and ethical considerations had a negative and significant effect, on the acceptance of information technology from the perspective of employees in internal audit units of the listed companies. Therefore, it is recommended that innovation be encouraged and experience-sharing groups be created to strengthen employees' sense of participation in the success of technology within internal audit units. Mandatory training on data ethics and secure reporting channels for ethical concerns should also be provided. Moreover, professional bodies should publish more documented evidence of technology effectiveness and redesign internal auditing standards and guidelines to facilitate the transition from awareness to optimal and effective use of information technology.

Keywords: technology acceptance model, risk management, corporate governance, ethical considerations.

Introduction

The accelerating evolution of digital technologies, artificial intelligence, advanced analytics, and automation has reshaped the landscape of organizational governance and, in particular, the internal auditing function. As organizations worldwide increasingly rely on digital infrastructures, internal audit departments are expected to

Article history:
Received 08 April 2025
Revised 25 May 2025
Accepted 27 May 2025
Published online 25 June 2025

How to cite this article:
Rahmani, A., Hematfar, M., & Aslani, M. (2025). Providing a Model of Factors Influencing the Acceptance of Information Technology Utilization in the Internal Auditing Profession. *Journal of Management and Business Solutions, 3*(3), 1-19. https://doi.org/10.61838/jmbs.98

transform their methodologies, competencies, and technological capabilities in order to remain relevant, effective, and value-adding. This transformation is not merely optional but is now viewed as a strategic necessity for ensuring transparency, reliability, and risk-responsive oversight systems in contemporary enterprises (1). The shift toward digitalized and technology-enabled auditing environments reflects broader developments in business models, data ecosystems, and regulatory expectations, all of which demand new forms of assurance that traditional audit approaches are no longer able to provide efficiently or comprehensively (2).

Digital transformation has intensified the pressure on internal auditors to modernize their tools, adopt data-centric methodologies, and develop technological competence to address increasingly complex risk structures. Empirical evidence demonstrates that the adoption of information technology (IT), including computer-assisted audit techniques (CAATs), generalized audit software (GAS), robotic process automation, and artificial intelligence tools, significantly enhances the quality, depth, and scope of internal audit procedures (3, 4). As internal audit teams gain the capacity to process vast datasets, detect anomalies more accurately, and provide real-time insights, organizations experience greater assurance, better decision-support, and improved operational efficiency (5). Moreover, the integration of IT into internal audit processes has been shown to strengthen risk assessment, improve fraud detection mechanisms, and support continuous monitoring systems that help organizations prevent, predict, and mitigate risks before they escalate (6, 7).

The global demand for digital integration in auditing is underscored by the rising complexity of risks, especially in developing economies where technological adoption remains uneven and organizational readiness varies widely. A considerable body of research highlights barriers such as limited IT infrastructure, insufficient auditor training, institutional resistance, and ethical concerns that may impede the successful adoption of emerging auditing technologies (8-10). Despite these challenges, the potential gains in audit efficiency and organizational transparency drive policymakers and industry practitioners to promote IT-enabled internal audit systems. This is particularly pressing in environments experiencing rapid digital transformation across business and regulatory sectors, where internal auditors must adapt in order to meet modern governance expectations (11, 12).

Artificial intelligence (AI) has emerged as a critical component of the future of internal auditing. Recent studies indicate that AI-augmented audit tools can significantly reduce errors, enhance professional judgment, and increase audit coverage by automating repetitive and rule-based tasks (13). Nonetheless, the adoption of AI in auditing introduces new concerns related to ethical risks, algorithmic bias, transparency, explainability, and loss of human oversight—factors that may compromise the credibility and acceptance of AI-based audit processes (14, 15). These ethical dilemmas are further complicated by data privacy concerns, security vulnerabilities, and unclear regulatory frameworks in many jurisdictions, making the integration of AI both a promising and challenging endeavor for internal audit functions worldwide (16, 17).

Internal audit competence and professional skepticism remain essential determinants of successful IT adoption. Evidence suggests that auditors with higher technological literacy, stronger analytical skills, and deeper knowledge of digital audit methodologies are more likely to embrace advanced auditing tools and leverage them effectively in organizational settings (18, 19). Studies conducted in public and private sector organizations confirm that auditor competence interacts with organizational culture, management support, and IT governance to shape the readiness and maturity of internal audit units for digital transformation (20, 21). In particular, management encouragement, resource availability, and strategic alignment are viewed as essential enabling factors for technology-driven internal audit modernization (22, 23).

Recent research further emphasizes that the adoption of IT in internal auditing is influenced not only by technological factors but also by organizational determinants such as leadership commitment, audit committee support, and the overall digital orientation of the firm. Organizations that successfully integrate digital tools into their audit processes tend to have robust IT governance frameworks, clear digital strategies, and an innovation-oriented culture that facilitates continuous learning and adaptation (24, 25). Moreover, digital transformation initiatives in internal auditing often require reengineering audit workflows, redefining role responsibilities, and adopting hybrid audit models that incorporate both human expertise and automated intelligence (10, 26).

Despite the demonstrated benefits, the literature acknowledges that many organizations continue to face obstacles in implementing IT-enabled internal audits. Among the most frequently cited challenges are lack of technical training, resistance to change among auditors, insufficient IT budgets, inadequate digital infrastructure, and ambiguity regarding ethical use of AI-assisted audit tools (27, 28). Furthermore, research shows that auditors may struggle to interpret outputs generated by advanced algorithms or to validate machine-generated results, especially in cases where models lack transparency or explainability (29, 30). These concerns raise important questions about accountability, reliability, and the evolving role of human auditors within automated digital ecosystems.

In the context of emerging markets, the complexities multiply as organizations confront structural, cultural, technological, and regulatory constraints. Studies show that internal auditors in these environments often lack access to advanced digital tools, face limited training opportunities, and operate under governance systems that have not yet adapted to technological disruption (4, 31). Even when digital tools are available, internal auditors may hesitate to adopt them due to fear of job displacement, lack of confidence in IT systems, or limited awareness of their potential benefits (7, 28). Such conditions underscore the need for context-specific frameworks that capture the unique barriers, drivers, and ethical considerations influencing IT acceptance in internal auditing.

A growing body of theoretical and empirical evidence also suggests that the integration of IT into internal auditing significantly affects audit risk assessment, fraud detection, and organizational resilience. For example, the use of CAATs, continuous auditing systems, and predictive analytics has proven effective in identifying anomalies, detecting irregular transactions, and strengthening internal controls (3, 8). Moreover, automated audit tools can improve the timeliness of reporting and enable ongoing surveillance of risk indicators, thereby reducing audit risk and improving internal audit responsiveness (32, 33). For public sector organizations, where transparency and accountability are critical, digital audit systems have been shown to enhance audit independence and reduce corruption risks (21, 25).

Importantly, the literature stresses the central role of ethical frameworks in guiding the responsible adoption of IT in auditing. Ethical auditing practices must adapt to address challenges associated with data privacy, cybersecurity, algorithmic fairness, and the integrity of automated audit judgments (14, 15). Researchers argue that organizations must implement clear ethical guidelines, strengthen auditor training in data ethics, and ensure transparency in the application of AI-driven audit tools in order to maintain trust and professional credibility (6, 16). Without coherent ethical frameworks, the introduction of advanced technologies risks undermining audit reliability and institutional integrity.

Taken together, existing studies clearly demonstrate that the adoption of information technology in internal auditing is a multidimensional process shaped by technical, organizational, ethical, and human factors. While IT provides substantial opportunities for improving audit quality, operational efficiency, and risk management, its integration is constrained by numerous contextual challenges that vary across industries and countries (9, 11). The literature thus highlights a critical research gap concerning comprehensive, empirically grounded models that explain the combined influence of opportunities, outcomes, challenges, and ethical considerations on the acceptance of IT in internal auditing—especially within developing and rapidly transforming markets.

Accordingly, the aim of the present study is to develop and validate a comprehensive model identifying the factors that influence the acceptance of information technology utilization in the internal auditing profession.

Methods and Materials

The present study is applied and developmental in terms of purpose and exploratory in nature. The data collection approach is mixed, employing a grounded theory research method. In the qualitative phase of the study, theoretical foundations and prior research were first reviewed using library studies, and subsequently, based on the field data collected, the theoretical model of the research was designed. The data collection instrument in the qualitative phase was the semi-structured interview based on the principle of theoretical saturation. The statistical population in the qualitative section consisted of academic experts and professional practitioners in the internal auditing field. For sampling in this phase, purposive and snowball sampling methods were used. After conducting semi-structured interviews with 16 experts, the researcher reached theoretical saturation, and no new concept of added value was found; therefore, interviews were discontinued. In the qualitative phase, the collected data were analyzed using thematic analysis and the Attride–Stirling approach in MAXQDA software (2020). The reliability of the qualitative section was assessed through Cohen's Kappa coefficient (Cohen, 1960). In the quantitative section, a descriptive–survey method was used. The quantitative data were gathered using a questionnaire developed based on the basic themes extracted in the qualitative phase. The questionnaire was distributed among the statistical sample by sending an electronic response link via an online survey service platform, email, social networks, or SMS. The statistical population in the quantitative section consisted of employees working in the internal audit units of companies listed on the Tehran Stock Exchange. Convenience sampling was used in this phase. Considering the uncountable nature of the statistical population, according to the Morgan and Krejcie table, 384 questionnaires needed to be collected at a 0.05 error level. To ensure sufficient data, 500 electronic questionnaires were distributed, of which 418 were completed; after careful review and removal of incomplete questionnaires, 407 questionnaires qualified for statistical analysis. The quantitative data were analyzed using the structural equation modeling (SEM) approach and the partial least squares (PLS) method in SmartPLS version 3. The validity of the quantitative instrument was examined through qualitative content validity as well as convergent and discriminant validity, and its reliability was assessed through Cronbach's alpha coefficient, composite reliability, and homogeneity reliability.

Findings and Results

To extract a model of the factors influencing the acceptance of information technology utilization in the internal auditing profession, interviews were first conducted with academic experts and professional practitioners in internal auditing. After collecting interview responses, codes representing various dimensions of IT utilization in internal auditing were extracted as basic themes through thematic analysis. The basic themes were then classified into organizing themes and finally grouped into the global themes of opportunities, outcomes, challenges, and ethical considerations. Based on the coded basic themes, a questionnaire was developed and distributed, along with

Davis's (1986) standard technology acceptance questionnaire, among employees of internal audit units to examine and identify the factors influencing IT acceptance in the internal auditing profession.

In the qualitative phase and using the Attride–Stirling approach, after thoroughly reviewing the interviews, a total of 121 themes were extracted and coded as basic themes. Two independent individuals were then asked to classify the extracted basic themes into organizing themes and subsequently into the four global themes: opportunities, outcomes, challenges, and ethical considerations. To assess the reliability of the qualitative section, the classified basic themes were numbered and entered into SPSS software, and Cohen's Kappa coefficient (Cohen, 1960) was calculated. If the value of this coefficient exceeds 0.60, reliability is established. Based on the classification numbering analysis performed by the two independent coders and according to the Kappa agreement coefficient shown in Table 1, the Kappa value was obtained as 0.648, indicating the validity of the thematic classification of the extracted codes.

Table 1. Kappa Agreement Coefficient

Description	Value	Standard Error	Approx. t-Statistic	Significance Level	Valid Cases
Kappa Agreement Scale	0.648	0.053	12.503	0.000	121

Therefore, after a detailed examination of the interviews, 121 basic themes were extracted and, based on the final classification summarised by two independent individuals, were categorized into 17 organizing themes and ultimately 4 global themes (opportunities, outcomes, challenges, and ethical considerations). Accordingly, the thematic network of the study includes 4 global themes, 17 organizing themes, and 121 basic themes, which are presented in Table 2.

Table 2. Thematic Network of Dimensions of Information Technology Utilization in the Internal Auditing Profession

Global Theme	Organizing Theme	Basic Themes (Examples)
Opportunities	Planning and organizing internal audit actions and activities	More dynamic and flexible planning; remote auditing; real-time supervision; simultaneous expertise use; optimal resource allocation by risk prioritization; enhanced standardization and organization
	Implementation and execution of internal audit processes and tasks	Real-time data analysis; access to large datasets; process integration; automation; automated monitoring; smart internal controls; continuous online reporting; NLP-based document analysis; expanded audit coverage
	Operational and financial efficiency	Reduced need for manpower and resources; profitability improvement; timely and accurate reporting; automation-driven efficiency; reduced travel costs; low-cost outsourcing; faster detection of financial deviations
	Professional and organizational effectiveness	Reduced error and fraud costs; better integration with e-commerce and fintech; improved internal controls; stronger documentation; increased audit transparency; comprehensive data-driven oversight
Outcomes	Quality of internal auditing (efficiency, effectiveness, assurance, impartiality, etc.)	Reduced audit time and cost; fast communication; improved internal control evaluation; data-driven assurance; reduced human error; precise documentation; blockchain-like audit trail
	Audit activities and tasks	Faster audit processes; early fraud detection; centralized data access; reduced conflict; real-time monitoring; flexible audit methods
	Organizational operational and financial activities	Better modeling of scenarios; faster fraud detection; stronger risk management; enhanced strategic goal attainment; improved financial efficiency; more transparency
	Quality and transparency of financial reporting	Comprehensive financial insight; increased process transparency; timeliness and relevance of reports; enhanced credibility; stronger internal control framework
	Organizational risk management	Better risk prediction; rapid identification of concerns; focus on key risks; real-time monitoring; automated risk processes; reduced organizational risk; IT-risk prevention; identification of emerging risks
Challenges	Internal organizational processes and structure	High implementation and training costs; resource intensity; loss of traditional skills; employee resistance; lack of senior support; increased algorithmic risk; absence of IT audit strategy

	Professional and legal issues	Lack of standards; rejection by external auditors; unclear responsibility; continuous training requirement; compliance burdens; inability to interpret evidence content; unclear legal liability; IT regulatory requirements; algorithmic liability
	Technical and infrastructural requirements	High cybersecurity costs; constant network access need; equipment shortages; need for compatible OS/apps; lack of technical support; sanctions-bound software limitations; poor system integration
	Human resources (skills, training, acceptance)	Insufficient skills; lengthy training; rapid tech changes; poor IT/AI education; fear of job loss; lack of awareness; low confidence; reduced skepticism; tech dependence
Ethical Considerations	Privacy and data security	Ambiguous confidentiality scope; security concerns; need for physical and technical controls; untraceable cyberattacks; potential data manipulation
	Transparency and explainability	Inability to explain judgments; invisible audit trail; machine inability to grade risks; lack of feedback; unclear analytical logic
	Reliability and robustness	Inability to standardize processes; inconsistent results; misalignment with audit needs; data manipulation risk; incomplete use of data; overreliance on technology
	Behavioral and judgmental biases	Algorithmic restriction to auditors' assumptions; overreliance on certain methods/data; availability bias; overconfidence; preference for common tools; ignoring non-quantitative data; distrust of AI results; use of familiar tech despite inefficiency

As Table 2 shows, the thematic network model of various dimensions of information technology utilization in the internal auditing profession—derived from the perspectives of 16 experts—was presented in the form of 121 basic themes, 17 organizing themes, and 4 global themes: opportunities, outcomes, challenges, and ethical considerations, each containing its own set of organizing-theme codes. For example, the global theme "Opportunities for IT Utilization in the Internal Auditing Profession" includes four organizing themes (planning and organizing internal audit actions and activities; implementing and performing internal audit processes and tasks; operational and financial efficiency of internal audit processes and tasks; and professional and organizational effectiveness of internal audit processes and tasks). As an illustration, the organizing theme "Planning and organizing internal audit actions and activities" contains six basic theme codes. In continuation, to identify and determine the factors influencing IT acceptance in the internal auditing profession, the quantitative approach is employed. Figure 1 presents the theoretical model of the dimensions of information technology utilization in the internal auditing profession.

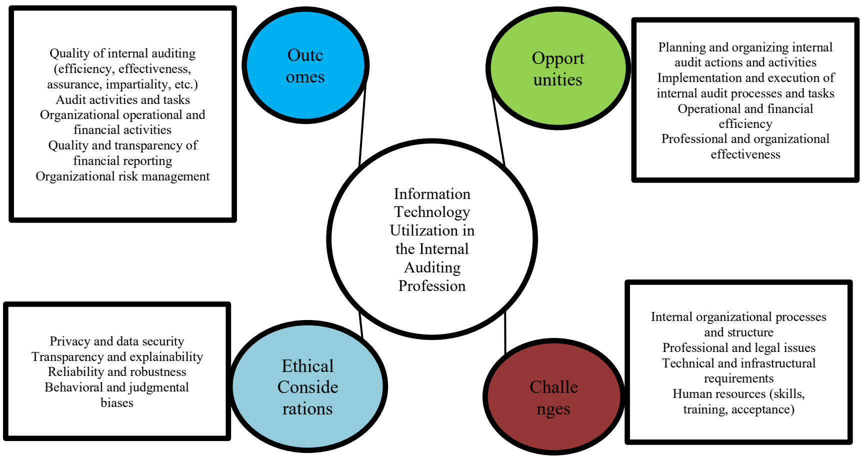

Figure 1. Theoretical Model of Dimensions of Information Technology Utilization in the Internal Auditing Profession

Using the field data collected through interviews in the qualitative section, and based on coding and classifying the basic themes into groups of organizing themes and, ultimately, global themes, a researcher-made questionnaire was developed to collect the opinions of the statistical population in the quantitative phase of the study. This population consisted of employees working in the internal audit units of companies listed on the Tehran Stock Exchange, and the questionnaire focused on the global themes (opportunities, outcomes, challenges, and ethical considerations) with 121 items using a 5-point Likert scale. The content validity of the researcher-made questionnaire was confirmed through qualitative content validity assessment using the opinions of five academic experts and specialists in the field of auditing. In addition, to collect the opinions of the statistical population regarding the acceptance of information technology in internal auditing, the standard Technology Acceptance Model (TAM) questionnaire was used, which is a general instrument for identifying and explaining factors influencing the intention to use technology-based products and services (Davis, 1986). The data from both questionnaires were then statistically analyzed using the structural equation modeling (SEM) approach and the partial least squares (PLS) method in SmartPLS software, and the results are presented as follows.

Table 3 presents the demographic information (frequency and percentage) of the sample in the quantitative phase of the study. According to Table 3, 55.5% of respondents were male and 44.5% were female. The field of study of the majority of respondents (48.9%) was accounting and auditing. Moreover, 39.8% of them held associate's and bachelor's degrees, 37.3% held master's degrees, and 22.9% held doctoral degrees. Most respondents (39.8%) had between 5 and 10 years of work experience. Furthermore, 38.1% of the respondents had experience as the head of the internal audit unit.

Table 3. Frequency and Percentage of Demographic Characteristics

Variables	Categories	Frequency	Percentage
Gender	Female	181	44.5
	Male	226	55.5
Field of study	Accounting and Auditing	199	48.9
	Financial Management	96	23.6
	Economics	22	5.4
	Other fields	90	22.1
Level of education	Associate's and Bachelor's	162	39.8
	Master's	152	37.3
	Doctorate	93	22.9
Work experience in internal auditing	Less than 5 years	75	18.4
	5 to 10 years	162	39.8
	10 to 20 years	101	24.8
	20 to 30 years	61	15.0
	More than 30 years	8	2.0
Job position in internal audit unit	Audit committee member	91	22.4
	Internal audit unit staff	161	39.6
	Head of internal audit unit	155	38.1

In the quantitative section of this study, the predetermined global themes (opportunities, outcomes, challenges, and ethical considerations of IT utilization in internal auditing), derived from the codes extracted from the qualitative interviews, were considered as latent (unobserved) variables, and the basic themes (121 themes) were considered as questionnaire items in the researcher-made instrument and as observed (measurable) variables. The median of responses to the basic themes (items) of each organizing theme (17 themes) was taken as an observable variable to measure the latent variables. Likewise, acceptance of IT utilization in internal auditing was considered as a latent (unobserved) variable, and the medians of responses to the 32 items across the 9 dimensions of the standard

Technology Acceptance Model (TAM) questionnaire were considered as observed (measurable) variables. Then, before implementing the structural equation modeling (SEM) approach and the partial least squares (PLS) method, the measurement model of the study was first examined using confirmatory factor analysis (CFA) in order to evaluate the items and confirm their role in measuring the latent variables, and the results are shown in Figure 2.

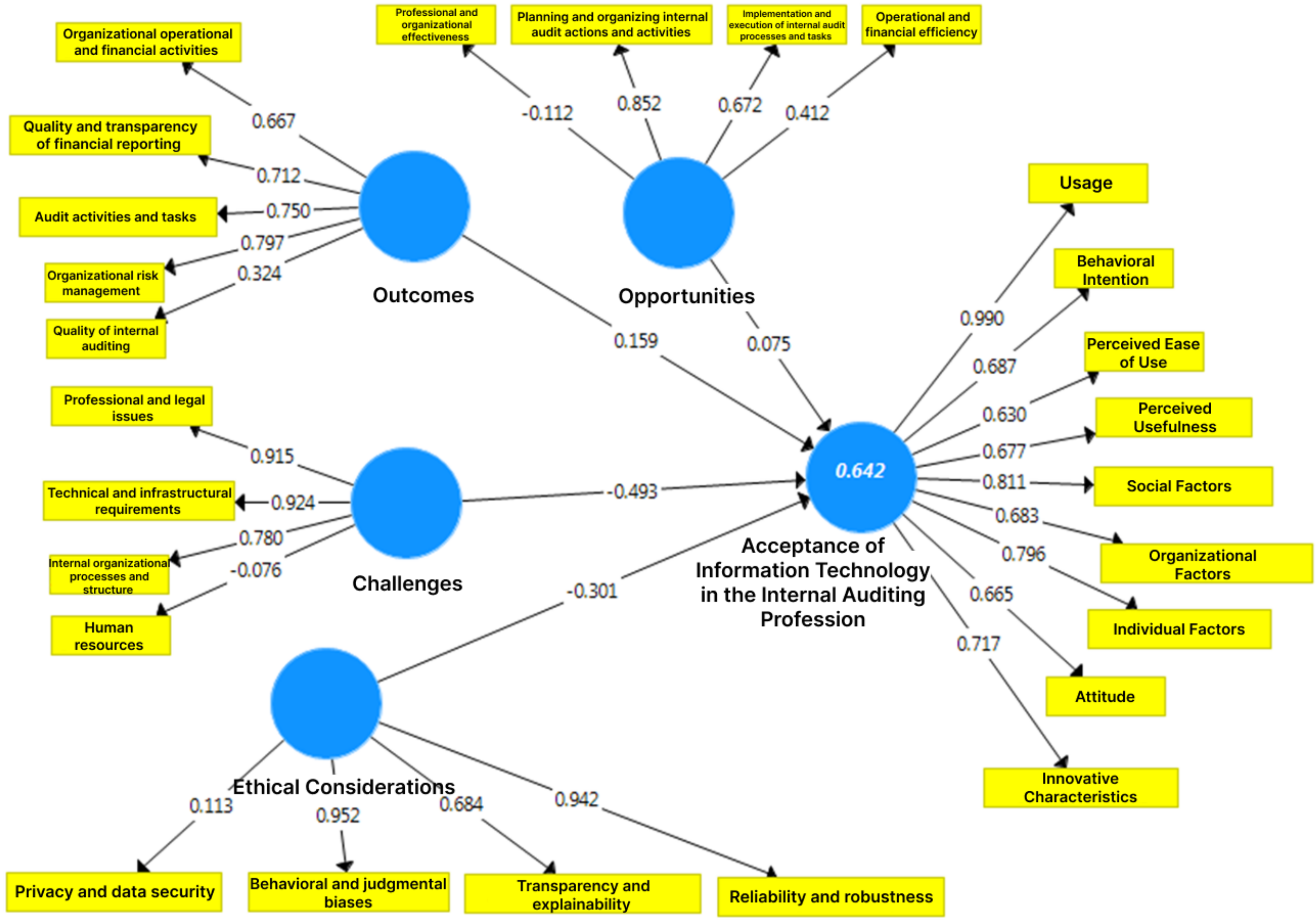

Figure 2. Confirmatory Factor Analysis of the Measurement Model

As can be seen in Figure 2, the factor loadings obtained for some items are less than 0.40, and their t-statistics are also less than 1.96; therefore, they are not significant at the 0.05 error level. Thus, it can be stated that these observed variables do not adequately relate to the measurement of their respective latent variables and must be removed from the measurement model. Accordingly, the items corresponding to effectiveness (from the opportunities dimension), quality (from the outcomes dimension), human resources (from the challenges dimension), and privacy and security (from the ethical considerations dimension) were removed from the initial model, and the revised model was re-estimated, as shown in Figure 3.

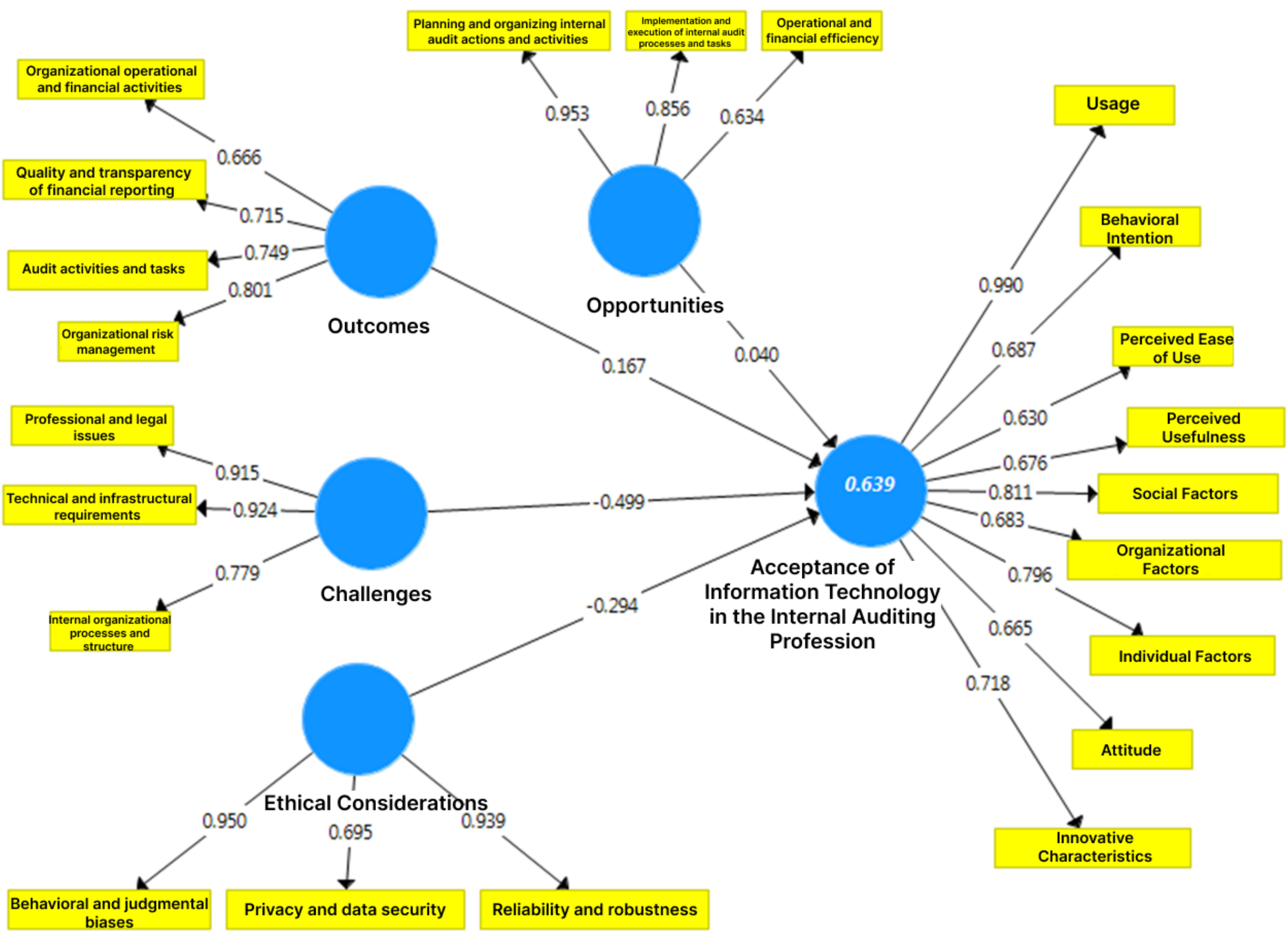

Figure 3. Confirmatory Factor Analysis of the Revised Measurement Model

As can be seen in Figure 3, after revising the measurement model, the factor loadings obtained are greater than 0.40 and therefore are relevant in measuring their respective latent variables. Subsequently, to assess the fit of the measurement model, reliability indices (Cronbach's alpha, homogeneity reliability coefficient, and composite reliability) and validity indices (average variance extracted as a measure of convergent validity, Fornell–Larcker criterion for discriminant validity, and the heterotrait–monotrait ratio of correlations for discriminant validity) were used.

Table 4. Reliability Indices and Convergent Validity of the Measurement Instrument

Latent Variables	Cronbach's Alpha	Homogeneity Reliability Coefficient	Composite Reliability Index	Average Variance Extracted
Opportunities	0.827	0.965	0.862	0.681
Ethical Considerations	0.835	0.910	0.901	0.756
Acceptance of IT in Internal Auditing	0.897	0.912	0.918	0.558
Outcomes	0.718	0.734	0.823	0.539
Challenges	0.854	0.945	0.907	0.766

The Cronbach's alpha reliability index is a classical criterion for assessing reliability and an appropriate measure for evaluating internal consistency. Internal consistency reflects the degree of correlation between a construct and its related indicators. If this index is greater than 0.70, reliability is considered acceptable. As shown in Table 4, Cronbach's alpha for all latent variables in the study is greater than 0.70.

The homogeneity reliability coefficient (Rho_a), also known as Dillon–Goldstein's rho, is used to test the internal validity of constructs in the partial least squares method. Therefore, it can be stated that the homogeneity reliability coefficient (Rho_a) is a better alternative to Cronbach's alpha. Homogeneous composite reliability (sometimes called construct reliability) is a criterion for internal consistency among scale items, and its value should also exceed 0.70. As shown in Table 4, the homogeneity reliability coefficient for all latent variables in the study is greater than 0.70.

The composite reliability (CR) index is a measure for assessing the internal consistency of the indicators of a scale. This index is functionally very similar to Cronbach's alpha. In the composite reliability (CR) index, construct reliability is not calculated in absolute terms but rather relative to the correlations of the construct indicators with each other. The composite reliability (CR) can be considered equal to the ratio of the true-score variance to the total variance of the scale. In this calculation, indicators with higher factor loadings are assigned greater importance, resulting in a more realistic and accurate criterion than Cronbach's alpha. The value of this index should also be greater than 0.70. As shown in Table 4, the composite reliability index for all latent variables in the study is greater than 0.70.

Convergent validity (CV) is a quantitative measure that indicates the degree of internal correlation and alignment among the items measuring a construct. Whenever a construct (latent variable) is measured based on several items (observable variables), the correlation between those items can be examined using convergent validity. To evaluate convergent validity, the average variance extracted (AVE) must be calculated. The AVE index yields a value between zero and one and must be greater than 0.50. The closer the value is to one, the higher the convergent validity. As shown in Table 4, the AVE index for all latent variables in the study is greater than 0.50.

Table 5. Fornell–Larcker Discriminant Validity Matrix of the Measurement Model

Latent Variables	Opportunities	Ethical Considerations	IT Acceptance in Internal Auditing	Outcomes	Challenges
Opportunities	0.825				
Ethical Considerations	-0.126	0.869			
IT Acceptance in Internal Auditing	0.079	-0.676	0.747		
Outcomes	-0.000	-0.448	0.446	0.734	
Challenges	-0.005	0.606	-0.726	-0.297	0.875

Discriminant validity (DV), or divergent validity, is a criterion that indicates the extent to which the measures of different constructs are truly distinct from one another. In a questionnaire designed to assess several constructs, multiple questions are used; therefore, it is essential to ensure that these questions are distinguishable and non-overlapping. Discriminant validity is one of the main criteria for assessing the fit of measurement models in the partial least squares (PLS) method and is determined based on the factor loadings of the items for each construct. Discriminant validity refers to the low correlation between the indicators of a latent variable and variables that should theoretically be unrelated. The Fornell–Larcker matrix (Fornell & Larcker, 1981) is the first method used to assess discriminant validity. According to this criterion, the square root of the AVE value for each construct must be greater than the absolute value of its correlations with other constructs. Therefore, the diagonal values of the matrix must be greater than all corresponding column values. According to Table 5, the research model has satisfactory discriminant validity, as the diagonal values are greater than the absolute values of all other correlations in their respective columns.

Table 6. Heterotrait–Monotrait Ratio (HTMT) Discriminant Validity Matrix

Latent Variables	Opportunities	Ethical Considerations	IT Acceptance in Internal Auditing	Outcomes	Challenges
Opportunities					
Ethical Considerations	0.250				
IT Acceptance in Internal Auditing	0.076	0.728			
Outcomes	0.085	0.564	0.530		
Challenges	0.084	0.698	0.757	0.384	

Heterotrait–Monotrait discriminant validity (HTMT) is another method for assessing the degree of discriminant validity among the items forming each construct, introduced by Henseler et al. (2015). In other words, it is a criterion used to evaluate the extent of overlap between different constructs within structural equation models. This index is calculated by examining the ratio of correlations between different latent variables. HTMT is an alternative to the Fornell–Larcker method, and if its values are less than 0.90, discriminant validity is considered acceptable. According to Table 6, the HTMT values for the latent variables are all below 0.90; therefore, the research model possesses satisfactory discriminant validity.

Once the reliability and validity of the measurement model were confirmed, the structural model of the study was evaluated to examine the relationships among the latent variables using structural equation modeling (SEM) and the partial least squares (PLS) method. To assess the fit of the structural model, t-values, the coefficient of determination (R^2), Stone–Geisser's Q^2 index, and the effect size (F^2) were used. The results of the SEM analysis for the modified model are illustrated in Figure 4.

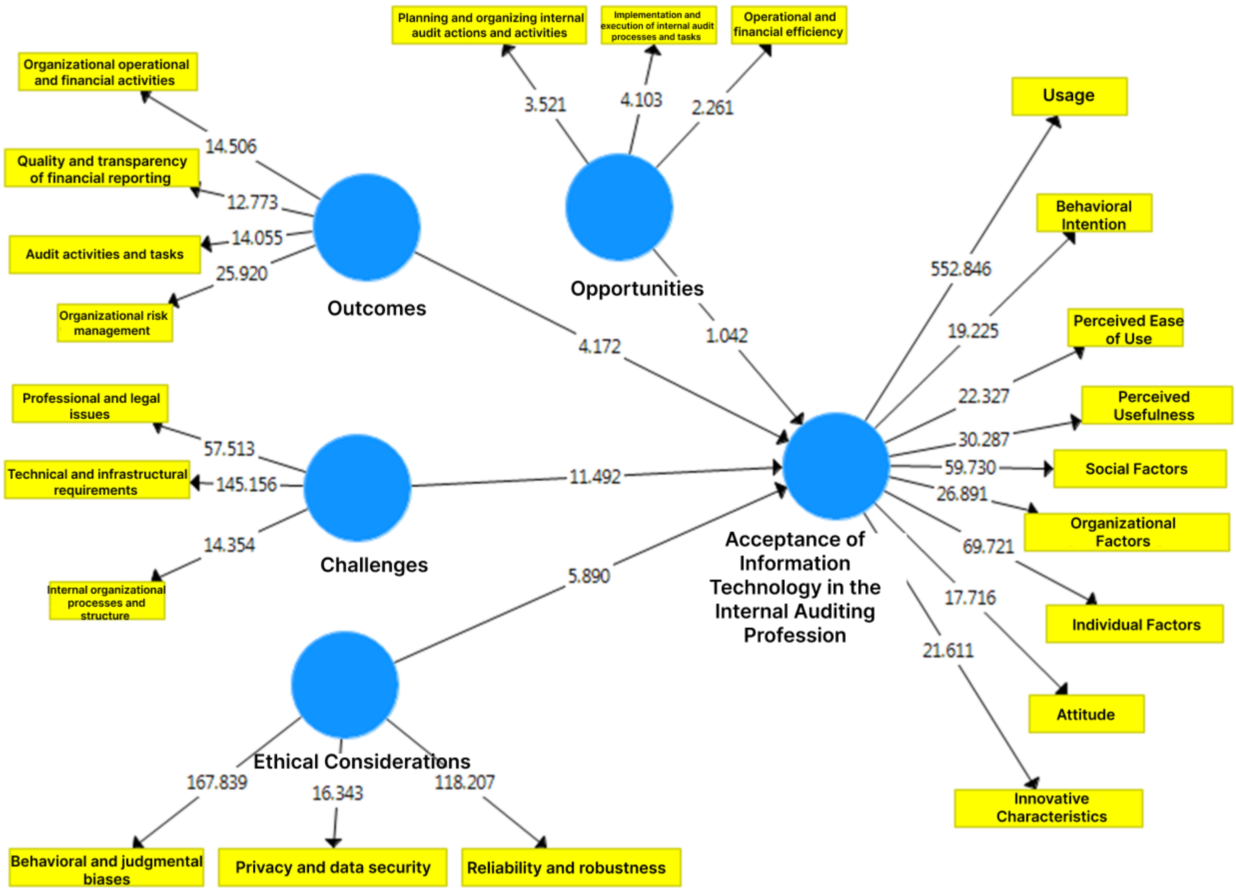

Figure 4. Path Coefficients of the Structural Model

As shown in Figure 4, the t-values for all items (observable variables) in the measurement model are greater than 1.96; therefore, they are statistically significant at the 0.05 error level and meaningfully measure their corresponding latent constructs. Additionally, the path coefficients of the latent variables, except for the latent variable "opportunities for IT utilization in internal auditing," are greater than 1.96, indicating the validity of the relationships among latent variables and supporting the research hypotheses at the 95% confidence level.

Figure 6 displays the path coefficients (PC) of the latent variables and their corresponding p-values. As shown, the path coefficient of the latent variable "opportunities for IT utilization in internal auditing" on IT acceptance by internal auditors is 0.04, which is not significant at the 0.05 error level. However, the path coefficients of the latent variables outcomes, challenges, and ethical considerations on IT acceptance by internal auditors are 0.167, -0.499, and -0.294 respectively, and they are significant at the 0.05 level. As indicated in Figure 5, the latent variables outcomes, challenges, and ethical considerations collectively explain IT acceptance by internal auditors with a coefficient of determination (R^2) of 0.639.

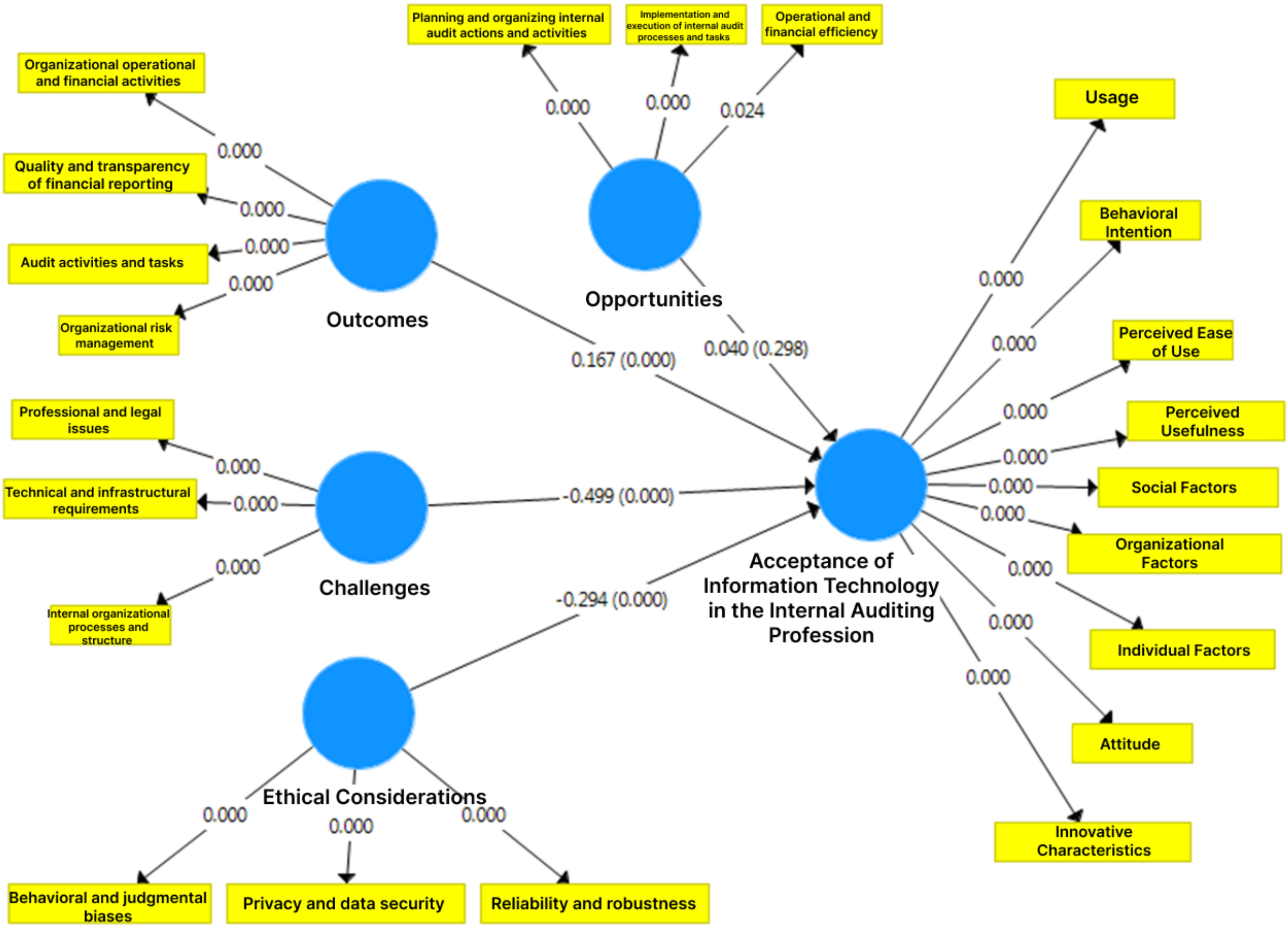

Figure 5. t-Statistics and Significance Levels of the Structural Model

Table 7. Model Fit Evaluation

Coefficient of Determination (R^2)	Stone–Geisser Index (Q^2)	Goodness of Fit Index
0.639	0.313	0.649

The coefficient of determination (R^2) measures the degree of linear association between variables. In other words, it represents the proportion of variance in the dependent variable that can be attributed to the independent variables. R^2 ranges from 0 to 100%, where 0% indicates no relationship between the model and the dependent and independent variables around the mean, while 100% indicates that the model explains all variability in the dependent variable around its mean. The values 0.19, 0.33, and 0.67 are considered benchmarks for weak, moderate, and strong coefficients of determination, respectively. According to Table 7, the R^2 value of the research model is 0.639, indicating that the structural model exhibits a good to strong level of fit.

The Stone–Geisser index (Q^2) (Stone, 1975; Geisser, 1975) is an evaluation criterion that examines cross-validated predictive relevance for the path model in the partial least squares (PLS) method and determines the predictive power of the model for the dependent variables. Based on the Q^2 value, one can assess the model and its level of fit. Negative values are unacceptable; Q^2 must be positive. A positive and large Q^2 indicates high predictive capability, whereas negative values indicate very weak predictive estimates for the latent variable. Stone and Geisser introduced threshold values of 0.02, 0.15, and 0.35 as indicators of low, moderate, and high predictive power for all endogenous constructs. According to Table 7, the Q^2 value for this study's model is 0.313, indicating that the independent variables of the study possess moderate to high predictive relevance.

The Goodness of Fit index (GOF) assesses the fit of both the structural and measurement components of the model simultaneously. This index is calculated using the geometric mean of the coefficient of determination (R^2) and the average communalities. Since, in the PLS method, communalities are equal to the average variance extracted (AVE), Wetzels et al. (2009) proposed Formula 1 for calculating the GOF index:

$$\text{Formula 1: } GOF = \sqrt{(\text{average AVE} \times \text{average } R^2)}$$

The GOF index provides a practical solution for evaluating the overall fit of a model in PLS. This index ranges from zero to one, with values closer to one indicating higher model validity and quality. Wetzels et al. (2009) proposed three thresholds for GOF evaluation: weak (0.10 to 0.25), moderate (0.25 to 0.36), and strong (greater than 0.36). According to Table 7, the GOF value for the research model is 0.649, indicating that the overall fit of the model is strongly confirmed.

Table 8. Communality (CV-COM) Values

Latent Variables	Communality Index Value	Index Status
Opportunities	0.336	Moderate
Ethical Considerations	0.497	Strong
IT Acceptance in Internal Auditing	0.403	Strong
Outcomes	0.209	Moderate
Challenges	0.542	Strong

The communality index, also referred to as the redundancy index (CV-COM), assesses how well the model predicts observable variables based on the values of their corresponding latent variables. Positive CV-COM values indicate an appropriate quality of the reflective measurement model, and if this index is positive, the quality of the reflective measurement model is confirmed. Threshold values of 0.02, 0.15, and 0.35 represent weak, moderate, and strong quality levels of the measurement model, respectively. If values fall within the weak range, the measurement model and its indicators must be reconsidered. According to Table 8, all communality index values in this study range from moderate to strong, indicating the high predictive power of the measurement model.

Table 9. Cohen's Effect Size (F^2)

Latent Variables	IT Acceptance in Internal Auditing	Predictive Power
Opportunities	0.004	Weak
Ethical Considerations	0.129	Weak
IT Acceptance in Internal Auditing	—	—

Outcomes	0.061	Weak
Challenges	0.432	High

Cohen's effect size (F^2) (Cohen, 1988) indicates the degree to which an independent latent variable has a substantial effect on the dependent variable. By calculating the coefficient of determination with and without the predictor variable, the effect size of that variable can be estimated. Cohen (1988) proposed values of 0.02 (weak), 0.15 (medium), and 0.35 (strong). Therefore, if the F^2 index lies between 0.02 and 0.15, the independent latent variable has low predictive power; values between 0.15 and 0.35 indicate moderate predictive power, and values greater than 0.35 indicate strong predictive power. According to Table 9, the variable "Challenges of IT Utilization in Internal Auditing" demonstrates high predictive power for the acceptance of IT by internal auditors.

Table 10. Summary of Structural Model Results for Factors Influencing IT Acceptance in Internal Auditing

Latent Variable Paths	Path Coefficient	Standard Error	t-Statistic	p-Value	Result
Opportunities → IT Acceptance in Internal Auditing	0.040	0.038	1.042	0.298	Not Significant
Ethical Considerations → IT Acceptance in Internal Auditing	-0.294	0.050	5.890	0.000	Negative & Significant
Outcomes → IT Acceptance in Internal Auditing	0.167	0.040	4.172	0.000	Positive & Significant
Challenges → IT Acceptance in Internal Auditing	-0.499	0.043	11.492	0.000	Negative & Significant

The structural equation modeling (SEM) results using the partial least squares (PLS) method, as shown in Table 10, indicate that the opportunities associated with IT utilization in internal auditing do not significantly influence IT acceptance by internal auditors at the 0.05 error level. However, the outcomes of IT utilization in internal auditing, with a path coefficient of 0.167, have a positive and significant effect on IT acceptance by internal auditors. Conversely, the challenges and ethical considerations associated with IT utilization in internal auditing have negative and significant effects on IT acceptance, with path coefficients of –0.499 and –0.294, respectively, at the 0.05 significance level.

Discussion and Conclusion

The purpose of this study was to examine the factors influencing internal auditors' acceptance of information technology (IT) in the internal auditing function, using a mixed-methods design that identified opportunities, outcomes, challenges, and ethical considerations as major dimensions shaping IT adoption. The quantitative analysis revealed that while opportunities associated with IT—such as efficiency gains, process improvements, and enhanced analytical capacity—did not exert a statistically significant impact on IT acceptance, the dimensions of outcomes, challenges, and ethical considerations significantly influenced internal auditors' willingness to implement and use advanced technological tools. These findings suggest that internal auditors may not be primarily motivated by abstract or potential benefits of IT but are instead more responsive to tangible results, perceived risks, and normative concerns related to technology use in auditing. This aligns with the view that adoption behavior in professional environments is shaped by pragmatic and contextual considerations rather than theoretical advantages (34).

The positive and significant effect of outcomes on IT acceptance reinforces the argument that internal auditors prioritize demonstrable performance improvements, such as improved audit quality, faster data processing, enhanced fraud detection capabilities, and real-time monitoring functionality. Prior research supports this perspective, showing that the value created by digital tools—particularly data analytics, generalized audit software, and CAATs—positively influences perceived usefulness and, in turn, contributes to higher adoption rates (3, 4). Similar findings were reported in studies of audit environments undergoing digital transformation, where the effectiveness of IT in strengthening internal controls and risk management strongly predicted auditors' willingness to integrate new tools into their workflows (5, 6). The current findings thus confirm that internal auditors are more inclined to adopt IT when they experience or observe tangible, performance-enhancing outcomes, consistent with technology acceptance theory and empirical evidence from multiple audit contexts (19).

The negative and significant effect of challenges on IT acceptance further highlights the structural and organizational constraints that inhibit technological adoption. High implementation costs, insufficient training, resistance among auditors, inadequate IT infrastructure, and limited organizational support were identified as principal barriers. These findings align with studies showing that technological readiness—both individual and organizational—is a critical determinant of IT adoption in internal auditing (9, 22). Research in developing economies similarly shows that barriers such as lack of IT expertise, funding limitations, and outdated systems impede the widespread use of CAATs and AI-enhanced auditing techniques (8, 16). The present study confirms that if organizations fail to provide adequate resources, infrastructure, and support systems, internal auditors may perceive technological tools as burdensome rather than empowering, thereby reducing their likelihood of acceptance. Challenges also reflect emotional and psychological factors, including fear of job displacement, decreased confidence in technology, and concerns over maintaining professional judgment—issues frequently reported in the literature (10, 26).

Ethical considerations were also found to exert a significant negative effect on IT acceptance. This is consistent with recent debates emphasizing the ethical risks associated with the use of AI, automation, and data-intensive technologies in auditing. Concerns regarding data privacy, algorithmic bias, transparency of automated decision processes, and accountability in the event of system failures shape auditors' perceptions of technology and may deter adoption if appropriate safeguards are not in place (14, 15). Ethical apprehensions may be especially acute in internal audit settings, where sensitive information is routinely handled and misjudgments may lead to major organizational consequences. Prior studies highlight that auditors are reluctant to rely on tools they cannot fully explain or validate, especially when the logic underpinning automated outputs is opaque or complex (17, 29). The findings of this study support these concerns, showing that without clear ethical guidelines, transparency mechanisms, and strong governance systems, internal auditors are likely to resist adopting advanced technological tools—even when their potential benefits are substantial.

Interestingly, the analysis showed that opportunities as a construct did not significantly influence acceptance. Although opportunities such as improved planning, standardization, cost savings, automation, and enhanced organizational effectiveness are frequently emphasized in IT adoption literature, the lack of a direct effect in this study suggests that internal auditors may perceive these aspects as theoretical or distant rather than immediately actionable. Existing research notes that auditors may be skeptical of claimed benefits if they have not personally experienced them or if they believe organizational barriers limit the realization of these advantages (7, 25). Moreover, opportunities are often contingent upon factors such as management support, availability of resources, and quality of implementation—conditions that may not be uniformly present across organizations. Therefore, opportunities alone may not be sufficient to motivate acceptance unless accompanied by strong enabling environments and proven positive outcomes, a conclusion that aligns with findings in several international audit studies (21, 24).

The results also contribute to ongoing discussions about the role of competence and professional skepticism in shaping technology acceptance among auditors. Literature indicates that auditors who possess stronger technological awareness and skills are more likely to embrace IT tools and integrate them into their daily tasks (14, 18). However, if ethical issues and challenges are perceived as outweighing potential benefits, competence alone may not be enough to drive acceptance. This dynamic underscores the interplay of personal, organizational, and contextual factors highlighted in recent studies examining the digital transformation of audit functions (4, 13). The findings of the present research reinforce the notion that successful adoption requires not only capable auditors but also supportive structures, ethical safeguards, and result-oriented frameworks that build trust and confidence in IT applications.

Overall, the study confirms that IT acceptance in internal auditing is a multifaceted process shaped by the interaction of perceived outcomes, structural challenges, and ethical considerations. The findings support previous research asserting that internal audit transformation depends not only on technological innovation but also on organizational alignment, governance maturity, cultural readiness, and regulatory compliance (9, 23). Furthermore, this study provides empirical evidence from a developing-country context, contributing to a growing body of literature emphasizing the unique adoption patterns and barriers faced in environments undergoing rapid but uneven digital transformation (11, 31).

This study is limited by its reliance on self-reported data, which may introduce response bias. The sample, although substantial, is restricted to internal auditors within companies listed on a single national stock exchange, limiting generalizability to other contexts or industries. Additionally, the cross-sectional nature of the quantitative data prevents causal inference, and rapid technological developments may change adoption dynamics beyond the timeframe of the study.

Future studies should incorporate longitudinal designs to observe how IT acceptance evolves as organizations progress through digital transformation stages. Comparative studies across countries or industries would provide broader insights into contextual influences. Qualitative studies focusing on auditor perceptions of AI ethics could deepen understanding of resistance factors. Experimental research could also examine how training interventions influence acceptance behaviors.

Organizations should prioritize strengthening ethical governance, providing transparent guidelines, and enhancing accountability mechanisms for technology use. Investment in IT infrastructure, auditor training, and change-management initiatives is crucial for reducing barriers. Managers should focus on demonstrating tangible outcomes of IT adoption, creating environments where auditors trust and feel empowered by technology rather than threatened by it.

Acknowledgments

We would like to express our appreciation and gratitude to all those who helped us carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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