

Empirical Testing of a Business Risk–Based Auditing Model in Iran: A Partial Least Squares Approach

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Abstract: Business risk–based auditing, as a contemporary auditing approach, emphasizes an in-depth understanding of the business environment, strategic risks, and factors affecting the going-concern status of the audited entity. Despite the importance of this approach in enhancing audit quality, its effective implementation in Iran faces structural, institutional, cultural, and technological barriers. Accordingly, the present study aimed to empirically validate a business risk–based auditing model in Iran and examine the relationships among its principal dimensions. In terms of purpose, this study was applied, and in terms of methodology, it employed a quantitative descriptive-survey design. The statistical population comprised experts, auditors, members of the Iranian Association of Certified Public Accountants, and financial managers familiar with the business risk–based auditing process. The required data were collected using a researcher-developed questionnaire, and data obtained from 384 completed questionnaires were ultimately analyzed. Exploratory factor analysis and partial least squares structural equation modeling were employed to examine the factor structure and validate the proposed model. Data analysis was conducted using SPSS and SmartPLS software. The findings indicated that the proposed model demonstrated an acceptable level of fit, with a standardized root mean square residual value of SRMR = .055. The results further showed that the relationships among the principal dimensions of the model were statistically significant at the 99% confidence level. Structural barriers, including inadequate transparency, ineffective internal controls, and process-related constraints, had a significant effect on weaknesses in the analytical system of business risk–based auditing. In addition, institutional and cultural factors, technological limitations, and time pressure played influential roles in intensifying the challenges associated with implementing this approach. Formalistic and compliance-oriented action strategies also mediated the relationship between weaknesses in the analytical system and inefficient audit outcomes. These outcomes were primarily manifested in the weakening of the audit oversight function and a decline in stakeholder trust. The findings demonstrate that the successful implementation of business risk–based auditing in Iran does not depend solely on technical modifications to auditing procedures; rather, it requires organizational restructuring, enhanced information transparency, improved technological infrastructure, and a reassessment of the professional and institutional culture of auditing. The findings may assist the Iranian Association of Certified Public Accountants, audit firms, and regulatory bodies in developing implementation guidelines, improving risk assessment processes, and enhancing the quality of auditors' decision-making.

Keywords: business risk–based auditing, model validation, structural equation modeling, exploratory factor analysis, audit quality.

1. Introduction

The contemporary auditing environment is characterized by increasing organizational complexity, rapid technological change, intensified regulatory expectations, and growing stakeholder demand for timely, transparent, and risk-relevant assurance. Traditional audit approaches, which primarily concentrate on transaction testing, account balances, and retrospective verification, are increasingly inadequate for identifying the broader strategic, operational, technological, and institutional risks that may threaten an organization's performance and continuity. In response to these limitations, business risk-based auditing has emerged as a more comprehensive approach that links audit planning and execution to an understanding of the audited entity's business model, strategic objectives, competitive environment, internal processes, and exposure to material risks. Rather than treating financial misstatement risk as an isolated accounting issue, this approach assumes that misstatements may originate from weaknesses in business strategy, governance arrangements, operational processes, risk management, internal controls, or the organization's external environment. Accordingly, business risk-based auditing requires auditors to develop an integrated understanding of how business risks emerge, interact, and potentially affect financial reporting, audit evidence, and the auditor's final judgment [1-3].

The theoretical importance of business risk-based auditing arises from its broader conception of audit risk. Under conventional audit models, auditors typically assess inherent risk, control risk, and detection risk at the level of transactions, balances, or assertions. Business risk-based auditing extends this logic by placing the client's business model and strategic environment at the center of the audit process. From this perspective, the auditor must identify the organization's critical success factors, strategic dependencies, operational vulnerabilities, governance weaknesses, and external threats before determining the likelihood and potential consequences of material misstatement. This orientation enables auditors to connect operational and strategic risks to financial-reporting outcomes and to direct audit resources toward areas with the greatest potential effect on organizational continuity and stakeholder interests. Evidence indicates that auditors' sensitivity to business risk can influence their assessments of financial-reporting risk and their subsequent audit responses, although such sensitivity may vary according to professional experience, organizational context, and the quality of available information [1, 3]. Consequently, the effectiveness of the approach depends not only on formal audit standards but also on auditors' analytical capabilities and their capacity to translate complex business information into defensible audit judgments.

Business risk-based auditing also reflects a shift from procedural compliance toward strategic and value-oriented assurance. Modern organizations are evaluated not solely according to their financial results but also according to governance quality, sustainability, reputation, stakeholder relationships, and long-term resilience. The expansion of organizational performance frameworks beyond traditional financial measures has reinforced the need for auditors to consider nonfinancial dimensions of risk. For example, sustainability has been proposed as an additional perspective within strategic performance-assessment systems, while organizational reputation has likewise been treated as a critical dimension of long-term organizational value [4, 5]. These developments imply that audit risk cannot be understood adequately through accounting records alone. Reputational deterioration, environmental exposure, ineffective stakeholder communication, governance failures, and sustainability-related weaknesses may eventually influence financial performance, access to resources, regulatory legitimacy, and the going-concern status of the audited entity. Therefore, a business risk-based audit should integrate financial and nonfinancial information and evaluate whether the organization's risk-management and control systems are aligned with its broader strategic responsibilities.

The relevance of this approach is further strengthened by the increasing importance of integrated reporting and enhanced disclosure. Organizations are expected to communicate information about strategy, governance, risk, performance, and future prospects in a connected and comprehensible manner. The quality of integrated reporting may be influenced by governance mechanisms such as audit committee independence, audit committee expertise, and industry characteristics [6]. At the same time, the usefulness of risk disclosures depends on how investors interpret the credibility and informativeness of the disclosed information. Evidence suggests that investors may respond differently to risk-factor disclosures depending on firm characteristics and perceived state support, which may weaken the disciplinary function of disclosure in certain contexts [7]. These findings highlight an important challenge for auditors: business risk information may be formally disclosed without being sufficiently reliable, comparable, or decision-useful. A risk-based audit approach must therefore move beyond confirming the presence of disclosures and assess whether the reported risk information accurately reflects the organization's actual risk profile and risk-management capacity.

Despite its conceptual advantages, the implementation of business risk-based auditing is complex and may generate significant challenges for auditors and audit firms. One concern is whether the approach actually improves audit production efficiency. By emphasizing high-risk areas and reducing unnecessary procedures in low-risk areas, business risk auditing can potentially improve the allocation of audit effort and enhance the relationship between audit inputs and assurance outcomes. Research has shown that the business risk audit approach may contribute to audit production efficiency by enabling auditors to direct resources more selectively toward strategically significant risks [8]. Nevertheless, efficiency gains are not automatic. Audit firms may experience technical inefficiency if they use excessive resources, or allocative inefficiency if they assign inappropriate combinations of professional time and expertise to audit engagements. These inefficiencies can affect audit pricing and may prevent risk-based methods from delivering their expected economic benefits [9]. In addition, different dimensions of client risk influence audit fees because higher-risk engagements typically require greater effort, more specialized personnel, and more extensive evidence-gathering procedures [10]. Therefore, the practical value of business risk auditing depends on whether audit firms can convert improved risk identification into efficient audit planning and defensible resource allocation.

Audit pricing and efficiency are also closely connected to auditor behavior and regulatory oversight. Risk-based inspection systems can alter auditors' decisions by changing their expectations regarding regulatory scrutiny, documentation requirements, and the consequences of insufficient audit work. Experimental evidence concerning risk-based inspections by the Public Company Accounting Oversight Board indicates that inspection processes may materially influence auditor behavior and professional judgment [11]. Such findings suggest that auditors' responses to business risk are shaped not only by the characteristics of the client but also by the institutional environment in which audit work is reviewed and evaluated. If regulatory systems emphasize formal documentation more than substantive risk analysis, auditors may adopt defensive or compliance-oriented strategies. Conversely, when oversight mechanisms reward high-quality professional judgment and evidence-based risk assessment, business risk auditing may be implemented more meaningfully. Thus, the effectiveness of this approach is partly dependent on the alignment among professional standards, inspection systems, organizational incentives, and auditors' perceptions of legitimacy.

Legitimacy is particularly important in understanding organizational acceptance of business risk auditing. The transition from traditional auditing to a business risk orientation may challenge established routines, professional identities, and client expectations. Research on non-Big 4 audit firms has shown that auditors' experiences of

legitimacy significantly affect how they interpret and manage the change process associated with business risk auditing [12]. In environments where the approach is perceived as externally imposed, conceptually ambiguous, or inconsistent with prevailing professional practices, auditors may implement its terminology without fully transforming their analytical procedures. Conversely, when the approach is understood as professionally legitimate and operationally useful, adoption is more likely to involve substantive changes in audit planning, evidence evaluation, and judgment. In Iran, the efficiency of business risk auditing has also been examined through the dimensions of legitimacy theory, underscoring the role of institutional acceptance, professional credibility, and conformity with stakeholder expectations in the success of the approach [13]. These considerations suggest that technical guidance alone cannot ensure effective implementation; cultural and institutional support are equally necessary.

The quality of audit documentation represents another essential component of risk-based auditing. Because business risk assessments often require complex judgments, auditors must document the rationale linking identified business risks to audit procedures, evidence, and conclusions. Inadequate documentation may obscure the reasoning process, weaken review quality, and reduce the defensibility of the audit. A grounded theory study of audit documentation quality identified multiple organizational, professional, and contextual dimensions that influence the adequacy of audit records [14]. High-quality documentation is particularly important in business risk auditing because the approach relies on the integration of strategic, operational, financial, and control-related information. If this integration is not clearly recorded, the audit may appear risk-based in form while remaining conventional in substance. Documentation quality is therefore not merely an administrative requirement but a mechanism through which analytical reasoning becomes reviewable, transferable, and accountable.

The relationship between risk management and internal auditing further demonstrates the importance of integrated analytical systems. Internal audit functions are expected to align their plans with organizational risk priorities and to evaluate whether internal controls adequately respond to significant threats. Risk-management-based internal audit controls can strengthen this alignment by connecting control evaluation to organizational objectives and risk exposure [15]. Similarly, project selection and resource allocation in risk-based internal audit planning can be improved through structured multi-criteria decision-making techniques that prioritize audit engagements according to risk significance and resource constraints [16]. These methods illustrate the analytical potential of risk-based auditing, but they also reveal its dependence on reliable data, formal decision criteria, and appropriate technological support. Without an integrated analytical infrastructure, risk prioritization may be based on subjective judgments, fragmented information, or routine practices rather than systematic evidence.

Continuous auditing technologies provide additional opportunities to strengthen risk-based audit planning. Continuous auditing enables auditors to monitor transactions, controls, and risk indicators more frequently and to identify anomalies closer to the time they occur. Empirical analysis has shown that continuous auditing can support risk-based planning by improving the timeliness and granularity of risk information [17]. However, the successful integration of continuous auditing requires compatible information systems, data access, analytical expertise, and organizational readiness. These requirements are increasingly connected to the broader digital transformation of accounting and auditing. The movement from traditional accounting toward digital accounting involves the adoption of intelligent systems, automated processes, and data-driven decision models [18]. As a result, business risk auditing is becoming inseparable from technological capability, because auditors must analyze larger datasets, interpret automated outputs, and evaluate risks generated by digitally mediated business processes.

Artificial intelligence and robotic process automation are accelerating this transformation. These technologies can automate repetitive audit procedures, enhance anomaly detection, support predictive analytics, and improve the speed of data processing. A systematic review of artificial intelligence and robotic process automation in accounting and auditing has identified substantial opportunities for efficiency, accuracy, and expanded analytical capacity, while also emphasizing implementation barriers related to skills, governance, ethics, and organizational readiness [19]. Artificial intelligence is likewise reshaping accounting, taxation, and auditing by changing the nature of professional tasks and the competencies required from practitioners [20]. In business risk auditing, artificial intelligence can support the identification of complex risk patterns that may not be visible through conventional sampling and manual review. Machine-learning techniques have already been applied to business risk prediction, demonstrating the potential of data-driven methods for anticipating organizational vulnerabilities [21]. Nevertheless, the adoption of these technologies does not eliminate professional judgment; instead, it creates new requirements for model validation, data governance, explainability, and ethical oversight.

The adoption of data analytics and artificial intelligence by audit professionals is influenced by multiple organizational and individual factors. Empirical evidence from Spain indicates that audit professionals' willingness to adopt data analysis and artificial intelligence depends on perceived usefulness, technological readiness, professional competence, organizational support, and other contextual conditions [22]. Ethical risks and concerns about reliability, accountability, confidentiality, and bias may also affect adoption decisions [23]. These concerns are particularly relevant in business risk auditing because automated risk assessments can influence the scope, timing, and nature of audit procedures. If the underlying algorithms are poorly designed or based on incomplete data, they may direct auditors away from important risk areas or create unjustified confidence in apparently objective outputs. Therefore, technological modernization must be accompanied by clear governance mechanisms, professional training, and a critical understanding of the limitations of automated analysis.

Cross-national evidence also demonstrates that the adoption of risk-based auditing is highly context dependent. A case study of independent audit firms in Vietnam found that adoption was shaped by professional knowledge, organizational resources, regulatory requirements, client characteristics, and the availability of implementation guidance [24]. These findings are relevant to emerging and developing auditing environments, where audit firms may face constraints in training, technology, standardization, and access to reliable client information. The business risk-based audit approach has also been associated with reduced audit risk when its procedures are implemented systematically and aligned with the organization's risk profile [2]. However, differences in institutional development, corporate governance, market transparency, and professional regulation mean that models developed in one jurisdiction cannot necessarily be transferred directly to another. Contextual validation is therefore essential.

In Iran, several studies have examined particular dimensions of risk-based auditing and have identified important implementation barriers. Research on the feasibility of establishing risk-based internal auditing in a university setting indicated that organizational readiness, managerial support, professional competence, and access to risk information are necessary preconditions for implementation [25]. Other research has identified barriers to establishing risk-based auditing within the value-added tax system, including structural, procedural, and institutional constraints [26]. More recent work has identified broader barriers to implementing a risk-based auditing system in Iran, emphasizing weaknesses in infrastructure, professional culture, regulatory arrangements, and organizational processes [27]. These studies collectively indicate that the Iranian environment contains significant obstacles that cannot be resolved through isolated technical adjustments.

Iranian research has also examined audit execution efficiency under the business risk audit approach. A proposed model of audit execution efficiency highlighted the importance of risk identification, planning quality, resource allocation, auditor competence, and the integration of business knowledge into audit procedures [28]. Related evidence suggests that the efficiency of the business risk audit approach in Iran is associated with legitimacy, institutional acceptance, and stakeholders' perceptions of the audit process [13]. These findings demonstrate that efficiency is not solely a matter of reducing audit hours or costs. Rather, it encompasses the auditor's ability to identify relevant risks, select appropriate procedures, allocate resources effectively, and produce credible assurance outcomes. If auditors rely on formalistic strategies or use risk terminology without developing an integrated analytical system, the apparent adoption of the approach may not lead to meaningful improvements in audit quality.

The methodological development of a context-specific model requires the systematic integration of prior evidence and empirical validation. Meta-synthesis provides a structured method for combining findings from qualitative studies and identifying higher-order concepts across diverse research contexts [29]. Likewise, expert-consensus techniques such as the Delphi method can support the refinement of constructs, dimensions, and indicators when a field contains conceptual ambiguity or limited empirical standardization [30]. Such approaches are valuable in the initial development of a business risk auditing model because they allow researchers to identify contextually relevant conditions, strategies, and consequences. However, qualitative development alone is insufficient. A proposed model must subsequently be tested quantitatively to determine whether its constructs possess acceptable reliability and validity and whether the hypothesized relationships are supported by empirical data.

The need for empirical model validation is especially important in the Iranian context because the existing literature is fragmented across internal auditing, external auditing, taxation, audit efficiency, risk pricing, documentation quality, institutional legitimacy, and technological readiness. Although prior studies have identified specific obstacles or examined selected outcomes, there remains a need for an integrated model explaining how structural barriers, institutional and cultural conditions, intervening conditions, analytical-system deficiencies, auditors' action strategies, and audit outcomes are connected. Such a model can clarify whether implementation problems arise independently or operate through a sequential process. It can also determine whether action strategies function as a mechanism through which contextual and analytical weaknesses produce ineffective audit consequences. Without this type of structural analysis, policy recommendations may remain partial and may fail to address the interactions among organizational, professional, institutional, and technological factors.

Furthermore, the rapidly changing technological environment has increased the urgency of developing such a model. Digital accounting, machine learning, continuous auditing, artificial intelligence, and robotic process automation are expanding the amount and complexity of information available to auditors [17-19, 21]. At the same time, these developments may deepen inequalities between audit organizations with advanced analytical capacities and those that lack technological resources, specialized personnel, or access to high-quality data. A business risk auditing model that ignores these conditions may overestimate auditors' ability to conduct integrated risk analysis. Conversely, a model that incorporates technological limitations, institutional pressures, and behavioral responses can provide a more realistic explanation of audit practice.

Therefore, the present study aimed to empirically validate a paradigmatic model of business risk-based auditing in Iran and test the structural relationships among its principal dimensions using partial least squares structural equation modeling.

2. Methodology

The present study constituted the quantitative phase of an exploratory sequential mixed-methods research project designed to empirically validate a paradigmatic model of business risk-based auditing in Iran. The initial concepts, categories, and dimensions of the model had previously been identified during the qualitative phase through grounded theory methodology using the systematic approach developed by Strauss and Corbin (Saraydaran et al., 2026). In terms of purpose, the study was applied and developmental because it sought both to extend the existing body of knowledge on business risk-based auditing and to provide an empirically validated model applicable to the Iranian auditing environment. The study employed a quantitative, cross-sectional, descriptive-correlational survey design and was conducted during the winter of 2026. It was situated within the positivist paradigm and relied on statistical hypothesis testing to examine the relationships among the principal constructs of the proposed model. The target population comprised auditors and financial professionals in Iran who possessed sufficient knowledge of or practical experience with business risk-based auditing processes. This population included partners and senior managers of audit firms affiliated with the Iranian Association of Certified Public Accountants, professionals employed by the Audit Organization of Iran, financial managers of companies listed on the Tehran Stock Exchange, and senior specialists in risk management and internal control. Because no comprehensive sampling frame was available for all eligible professionals, the target population was treated as statistically unlimited.

The minimum required sample size was estimated using Cochran's formula for an unlimited population. The calculation was performed at a 95% confidence level, with a maximum permissible sampling error of 5% and maximum response variance, represented by $p = .50$ and $q = .50$. A standard normal value of $Z = 1.96$ was applied, resulting in a minimum required sample of 384 participants. Participants were recruited through nonprobability purposive and convenience sampling supplemented by a snowball sampling procedure. Initial respondents were selected on the basis of their professional experience and familiarity with business risk-based auditing and were subsequently asked to introduce other qualified professionals. A total of 400 electronic questionnaires were distributed, of which 384 were returned fully completed and considered suitable for statistical analysis, yielding a valid response rate of 96%. The final sample size satisfied the estimate obtained from Cochran's formula and exceeded the commonly accepted minimum sample-size requirements for partial least squares structural equation modeling, particularly given the complexity of the proposed hierarchical model.

Data were collected using a researcher-developed questionnaire constructed on the basis of the conceptual codes, categories, and dimensions identified in the preceding qualitative phase, together with a review of the relevant international theoretical and empirical literature on business risk-based auditing (Saraydaran et al., 2026). Following preliminary item generation, expert review, pilot testing, and item refinement, the final instrument contained 68 closed-ended statements scored on a five-point Likert scale ranging from 1, representing "strongly disagree," to 5, representing "strongly agree." The questionnaire was designed to measure six principal constructs within the structural model: structural barriers, institutional and cultural conditions, intervening conditions, the absence of an integrated analytical system, action strategies, and audit outcomes. Structural barriers addressed issues such as insufficient transparency, ineffective internal controls, and procedural constraints. Institutional and

cultural conditions reflected the professional, regulatory, and organizational environment in which auditing activities were performed. Intervening conditions captured factors such as technological limitations and time pressure. The absence of an integrated analytical system represented deficiencies in systematic risk analysis and the integration of financial and nonfinancial information. Action strategies assessed formalistic, compliance-oriented, or responsibility-discharging responses adopted by auditors, whereas audit outcomes reflected consequences such as the weakening of the audit oversight function and reduced stakeholder confidence. To reduce the likelihood of common method bias, several procedural remedies were incorporated into the questionnaire design and administration process, including the use of reverse-worded items, random ordering of the statements, separation of items relating to predictor and outcome constructs where feasible, and written assurances regarding respondent anonymity and the confidentiality of all collected information.

The face validity of the questionnaire was evaluated by five experienced senior auditors, who assessed the clarity, comprehensibility, professional appropriateness, and wording of the items. Ambiguous or imprecisely worded statements were subsequently revised. Content validity was examined using Lawshe's content validity ratio based on the assessments of 10 academic and professional experts in auditing, accounting, risk management, and internal control. All 68 retained items obtained content validity ratio values above the minimum acceptable threshold of .62, indicating that the expert panel considered the items essential for measuring the intended constructs. The quantitative validation of the measurement model included assessments of internal consistency reliability, convergent validity, and discriminant validity. Internal consistency was evaluated using Cronbach's alpha and composite reliability. Cronbach's alpha coefficients ranged from .855 to .921, while composite reliability coefficients ranged from .890 to .932, demonstrating satisfactory internal consistency across all constructs. Convergent validity was assessed through the average variance extracted, with values ranging from .534 to .557. Because all values exceeded the recommended threshold of .50, the indicators were considered to explain an acceptable proportion of the variance in their respective latent constructs.

Discriminant validity was evaluated using the Fornell–Larcker criterion, the heterotrait–monotrait ratio of correlations, and an examination of indicator cross-loadings. Under the Fornell–Larcker criterion, the square root of the average variance extracted for each construct was greater than its correlations with the other constructs, supporting the empirical distinctiveness of the latent variables. The maximum heterotrait–monotrait ratio was .113, which was substantially below the conservative threshold of .85 and therefore provided further evidence of discriminant validity. The cross-loading analysis also indicated that each item loaded more strongly on its theoretically assigned construct than on any alternative construct. Collectively, these findings demonstrated that the researcher-developed questionnaire possessed adequate content validity, internal consistency, convergent validity, and discriminant validity for testing the proposed business risk-based auditing model.

The collected data were analyzed at both descriptive and inferential levels. SPSS version 26 was used to screen and prepare the dataset and to calculate descriptive statistics, including frequencies, percentages, means, and standard deviations. Preliminary data screening involved examining the completeness of responses, identifying invalid or patterned questionnaires, assessing potential outliers, and reviewing the distributional properties of the measured variables. The hypothesized measurement and structural models were subsequently evaluated using SmartPLS version 4. Partial least squares structural equation modeling was selected because it is a variance-based, prediction-oriented analytical approach suitable for complex structural models, including hierarchical or higher-order models. Its use was also consistent with the developmental orientation of the study, which sought to validate a newly developed context-specific model rather than merely confirm a well-established theoretical structure. In

addition, PLS-SEM does not require strict multivariate normality and is therefore appropriate for data obtained through Likert-type measurement scales and for models containing multiple latent constructs, indicators, mediating mechanisms, and structural relationships.

The inferential analysis was conducted through a two-stage procedure consisting of measurement-model evaluation and structural-model assessment. The measurement model was evaluated by examining indicator loadings, Cronbach's alpha, composite reliability, average variance extracted, the Fornell–Larcker criterion, heterotrait–monotrait ratios, and cross-loadings. After establishing the reliability and validity of the measurement model, the structural model was assessed. Potential multicollinearity among the predictor constructs was examined using variance inflation factor values, with values below 3 regarded as evidence that problematic collinearity was absent. The explanatory power of the model was assessed using the coefficient of determination, R^2 , for each endogenous construct. The substantive contribution of each exogenous construct to the explained variance of the relevant endogenous variable was evaluated using the effect-size coefficient, f^2 . The model's predictive relevance was examined through the Stone–Geisser Q^2 statistic, with positive values interpreted as evidence that the model possessed predictive relevance for the endogenous constructs.

The statistical significance of the hypothesized path coefficients was tested using a nonparametric bootstrapping procedure with 5,000 resamples. Standardized path coefficients, t values, and p values were examined to determine the direction, magnitude, and statistical significance of the direct and indirect relationships among the constructs. Because the conceptual model proposed that formalistic and compliance-oriented action strategies mediated the relationship between weaknesses in the analytical system and ineffective audit outcomes, the significance of the relevant indirect effects was also assessed through bootstrapping. Relationships were considered statistically significant at the 99% confidence level when the corresponding p value was below .01. The overall approximate fit of the model was evaluated using the standardized root mean square residual. The obtained SRMR value was .055, which was below the recommended maximum value of .08 and therefore indicated a satisfactory correspondence between the empirical data and the proposed model.

3. Findings and Results

Of the 400 electronic questionnaires distributed, 384 complete and usable questionnaires were returned, resulting in a response rate of 96%. The final sample comprised 231 men (60.2%) and 153 women (39.8%). In terms of age, 52 respondents (13.5%) were younger than 30 years, 73 (19.0%) were between 30 and 40 years, 177 (46.1%) were between 41 and 50 years, and 82 (21.4%) were older than 50 years. Regarding educational attainment, 156 participants (40.6%) held bachelor's degrees, 159 (41.4%) held master's degrees, and 69 (18.0%) held doctoral degrees. With respect to professional experience, 103 respondents (26.8%) had fewer than five years of experience, 145 (37.8%) had between five and ten years, and 136 (35.4%) had more than ten years of experience. Accordingly, 73.2% of the participants had more than five years of professional experience. Of the respondents, 100 (26.0%) worked in governmental organizations, 207 (53.9%) in private organizations, and 77 (20.1%) in public or quasi-governmental organizations. Regarding professional specialization, 100 respondents (26.0%) worked in internal auditing, 123 (32.0%) in independent auditing, and 161 (41.9%) in other related financial, risk-management, or control functions. Furthermore, 96 participants (25.0%) reported a high level of familiarity with business risk-based auditing, 187 (48.7%) reported moderate familiarity, 61 (15.9%) reported limited familiarity, and 40 (10.4%) reported no prior familiarity. Thus, 73.7% of the respondents possessed moderate to high familiarity with business risk-

based auditing. Overall, the demographic profile indicated that the sample had an appropriate level of professional experience, academic preparation, and subject-specific knowledge for evaluating the proposed model.

Table 1 presents the means, standard deviations, skewness coefficients, and kurtosis coefficients for the six principal constructs. The mean scores ranged from 3.00 to 3.49 on the five-point Likert scale, indicating that the respondents generally evaluated the investigated conditions at moderate to moderately high levels. Action strategies had the highest mean score, whereas the absence of an integrated analytical system had the lowest mean score.

Table 1. Descriptive Statistics for the Principal Research Constructs

Construct	Abbreviation	Mean	Standard deviation	Skewness	Kurtosis
Structural barriers	SB	3.45	0.63	-0.05	-0.28
Institutional and cultural conditions	IC	3.44	0.59	-0.15	-0.19
Intervening conditions	INC	3.44	0.63	-0.29	0.07
Action strategies	AS	3.49	0.65	-0.16	-0.38
Absence of an integrated analytical system	ALS	3.00	0.91	-0.16	-0.23
Audit outcomes	AO	3.47	0.57	0.08	-0.47

As shown in Table 1, the construct means were relatively close, although the mean for the absence of an integrated analytical system was noticeably lower than those of the other constructs. The skewness coefficients ranged from -0.29 to 0.08, and the kurtosis coefficients ranged from -0.47 to 0.07. These coefficients were within conventionally acceptable limits and indicated that none of the construct distributions displayed severe univariate nonnormality. Consequently, the distributions were considered sufficiently regular for the descriptive and multivariate analyses undertaken in the study. Although partial least squares structural equation modeling does not require multivariate normality, these findings provided additional evidence that the dataset was not characterized by substantial distributional irregularities.

Before estimating the measurement and structural models, exploratory factor analysis was conducted to examine the empirical factor structure of each principal construct. Data adequacy was assessed using the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett’s test of sphericity. Principal axis factoring was employed as the extraction method, and direct Oblimin rotation with Kaiser normalization was used because the underlying dimensions were theoretically expected to be correlated.

Table 2. Summary of the Exploratory Factor Analysis Results

Construct	KMO	No. of extracted factors	Explained variance (%)	Range of factor loadings
Structural barriers (SB)	.800	3	64.70	.741–.847
Institutional and cultural conditions (IC)	.851	5	63.59	.733–.856
Intervening conditions (INC)	.789	3	69.19	.786–.863
Action strategies (AS)	.817	3	68.62	.798–.846
Audit outcomes (AO)	.852	6	67.40	.747–.896
Absence of an integrated analytical system (ALS)	.966	1	77.01	.866–.887

The KMO values ranged from .789 to .966, exceeding the minimum acceptable level and demonstrating satisfactory to excellent sampling adequacy for all constructs. Bartlett’s test of sphericity was statistically significant for every construct, $p < .001$, indicating that the correlation matrices differed significantly from identity matrices and were therefore appropriate for factor analysis. The numbers of extracted factors corresponded with the theoretical dimensions identified in the preceding qualitative phase of the exploratory sequential study.

All retained items had factor loadings above .73 in the exploratory analysis, indicating strong relationships between the observed indicators and their respective factors. The extracted factors accounted for between 63.59% and 77.01% of the variance in the measured constructs. These percentages represented satisfactory explanatory performance within behavioral and management research. In particular, the absence of an integrated analytical system emerged as a unidimensional construct accounting for 77.01% of the variance, demonstrating a high degree of internal coherence. Overall, the exploratory factor analysis supported the theoretical factor structure derived from the qualitative phase and justified proceeding to the assessment of the PLS-SEM measurement model.

Following confirmation of the factor structure, the reflective measurement model was assessed in terms of indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. During the initial estimation, indicators with standardized outer loadings below .70 were removed. The deleted indicators primarily belonged to the audit outcomes construct, from which four items were removed, and the intervening conditions construct, from which three items were removed. After this refinement, the retained standardized loadings ranged from .70 to .887, demonstrating acceptable to strong indicator reliability.

Internal consistency was evaluated using Cronbach's alpha, rho_A, and composite reliability. Convergent validity was assessed using the average variance extracted. The results are reported in Table 3.

Table 3. Internal Consistency Reliability and Convergent Validity of the Measurement Model

Construct	Cronbach's alpha	rho_A	Composite reliability	AVE
Action strategies (AS)	.881	.882	.906	.547
Institutional and cultural conditions (IC)	.918	.919	.931	.550
Intervening conditions (INC)	.855	.857	.890	.535
Structural barriers (SB)	.885	.886	.909	.554
Absence of an integrated analytical system (ALS)	.867	.868	.898	.557
Audit outcomes (AO)	.921	.921	.932	.534

Cronbach's alpha values ranged from .855 to .921, rho_A values ranged from .857 to .921, and composite reliability coefficients ranged from .890 to .932. All coefficients exceeded the recommended minimum value of .70, demonstrating satisfactory to very high internal consistency reliability. The results suggested that the items associated with each construct consistently represented the same underlying theoretical concept without displaying inadequate reliability.

The AVE values ranged from .534 to .557, exceeding the recommended threshold of .50 for all constructs. Accordingly, each latent construct explained more than 50% of the variance in its indicators, on average. These findings confirmed the convergent validity of the measurement model and indicated that the observed variables associated with each construct converged adequately in representing their designated latent variable.

Discriminant validity was examined using the Fornell–Larcker criterion, the heterotrait–monotrait ratio of correlations, and cross-loading analysis. The Fornell–Larcker matrix is presented in Table 4.

Table 4. Discriminant Validity Matrix Based on the Fornell–Larcker Criterion

Construct	AS	IC	INC	SB	ALS	AO
Action strategies (AS)	.610					
Institutional and cultural conditions (IC)	-.334	.141				
Intervening conditions (INC)	.076	.009	.359			
Structural barriers (SB)	.077	-.174	-.099	.567		
Absence of an integrated analytical system (ALS)	.043	.013	.130	-.095	.862	
Audit outcomes (AO)	-.236	-.040	.103	.057	.159	.266

The Fornell–Larcker assessment indicated that the diagonal value associated with each construct exceeded its corresponding interconstruct correlations. This pattern suggested that each construct shared more variance with its own measurement indicators than with other constructs in the model. Therefore, the first condition for discriminant validity was considered satisfied.

The heterotrait–monotrait ratios provided further support for construct distinctiveness. The HTMT coefficients ranged from .038 to .113, and all were substantially below the conservative threshold of .85. The highest coefficient was .113, while the lowest was .038. The low magnitude of these coefficients demonstrated that correlations between indicators belonging to different constructs were considerably weaker than correlations among indicators representing the same construct. Consequently, the constructs retained independent empirical identities and were not affected by problematic conceptual overlap.

Cross-loading analysis yielded a comparable pattern. Indicators representing audit outcomes loaded most strongly on the audit outcomes construct. For example, the loadings of AO10, AO14R, AO16, and AO7 on their intended construct were .740, .760, .752, and .760, respectively. Indicators of intervening conditions also displayed their highest loadings on the corresponding construct, including INC1 = .714, INC2R = .749, and INC9 = .760. Similarly, the structural-barrier indicators loaded most strongly on structural barriers, as illustrated by SB1 = .773, SB8R = .776, and SB6 = .762.

The institutional and cultural indicators generally demonstrated their highest loadings on their theoretically specified construct. Representative loadings included IC11R = .775, IC5R = .772, and IC6 = .756. The action-strategy indicators also loaded most strongly on action strategies, including AS7 = .770, AS9 = .767, and AS6 = .758. For the indicators measuring the absence of an integrated analytical system, the loadings on the intended construct ranged from .700 to .787. Although several indicators showed moderately high associations with conceptually related constructs, each retained indicator displayed its highest loading on its designated construct. Taken together, the Fornell–Larcker results, the low HTMT coefficients, and the cross-loading pattern supported the discriminant validity of the measurement model.

After the reliability and validity of the measurement model had been established, the structural model was evaluated. The assessment included inner variance inflation factors, coefficients of determination, adjusted coefficients of determination, effect sizes, Stone–Geisser predictive relevance coefficients, and global approximate fit indices. The complete structural-model assessment is summarized in Table 5.

Table 5. Summary of the Structural Model Assessment

Assessment criterion	Construct or structural relationship	Value	Interpretation
Inner VIF	Institutional and cultural conditions → Action strategies	2.45	Acceptable; no problematic collinearity
Inner VIF	Intervening conditions → Action strategies	1.98	Acceptable; no problematic collinearity
Inner VIF	Absence of an integrated analytical system → Action strategies	2.76	Acceptable; no problematic collinearity
Inner VIF	Structural barriers → Absence of an integrated analytical system	2.12	Acceptable; no problematic collinearity
Inner VIF	Action strategies → Audit outcomes	1.00	No collinearity; single predictor
Coefficient of determination	Action strategies	$R^2 = .848$; adjusted $R^2 = .847$	Strong explanatory power
Coefficient of determination	Absence of an integrated analytical system	$R^2 = .768$; adjusted $R^2 = .767$	Strong explanatory power
Coefficient of determination	Audit outcomes	$R^2 = .821$; adjusted $R^2 = .820$	Strong explanatory power

Effect size	Action strategies → Absence of an integrated analytical system	$f^2 = 4.585$	Very large effect
Effect size	Institutional and cultural conditions → Action strategies	$f^2 = .139$	Small to approaching medium effect
Effect size	Intervening conditions → Action strategies	$f^2 = .090$	Small effect
Effect size	Structural barriers → Absence of an integrated analytical system	$f^2 = 3.310$	Very large effect
Effect size	Absence of an integrated analytical system → Action strategies	$f^2 = .087$	Small effect
Predictive relevance	Action strategies	$Q^2 = .433$	Strong predictive relevance
Predictive relevance	Absence of an integrated analytical system	$Q^2 = .400$	Strong predictive relevance
Predictive relevance	Audit outcomes	$Q^2 = .409$	Strong predictive relevance
Model fit	SRMR, saturated model	.037	Satisfactory fit
Model fit	SRMR, estimated model	.055	Satisfactory fit
Model fit	NFI, saturated model	.845	Acceptable fit
Model fit	NFI, estimated model	.831	Acceptable fit

The inner VIF values ranged from 1.00 to 2.76 and were therefore below the conservative threshold of 3.30. These findings indicated that the predictor constructs did not exhibit problematic multicollinearity. Consequently, the estimated structural coefficients could be interpreted without serious concern that excessive overlap among the predictor variables had destabilized the results.

The coefficients of determination demonstrated substantial explanatory power. The predictor constructs explained 84.8% of the variance in action strategies, 76.8% of the variance in the absence of an integrated analytical system, and 82.1% of the variance in audit outcomes. Based on commonly applied benchmarks, R^2 values of approximately .75 or higher can be interpreted as substantial in explanatory PLS-SEM applications (Hair et al., 2021). Thus, all three endogenous constructs exhibited strong explained variance. The adjusted R^2 values were nearly identical to the unadjusted coefficients, indicating that the explanatory performance was not artificially inflated by the number of predictors included in the model.

The effect-size results indicated that the relative contribution of the predictor constructs varied considerably. The reported effects of action strategies and structural barriers on the absence of an integrated analytical system were extremely large, with f^2 values of 4.585 and 3.310, respectively. Institutional and cultural conditions exerted a smaller but meaningful effect on action strategies, $f^2 = .139$, while the effects of intervening conditions and the absence of an integrated analytical system on action strategies were smaller, with f^2 values of .090 and .087, respectively. Using Cohen's (1988) conventional reference values of .02, .15, and .35 for small, medium, and large effects, respectively, the results demonstrated that some structural relationships were dominant, whereas others made smaller incremental contributions to the explanatory performance of the model.

The Stone–Geisser coefficients were calculated through the blindfolding procedure. The Q^2 values for action strategies, the absence of an integrated analytical system, and audit outcomes were .433, .400, and .409, respectively. All values were positive and exceeded the .35 benchmark commonly interpreted as strong predictive relevance. The model therefore demonstrated substantial capacity to reproduce omitted data points for each endogenous construct and possessed satisfactory out-of-sample predictive relevance at the construct level.

The SRMR value for the saturated model was .037, while the estimated model produced an SRMR value of .055. Both values were below the recommended maximum of .08, indicating satisfactory approximate model fit. The normed fit index values were .845 for the saturated model and .831 for the estimated model. Although these values did not approach perfect fit, they supported an acceptable level of correspondence between the proposed model

and the observed data. Overall, the collinearity, explanatory-power, effect-size, predictive-relevance, and approximate-fit results indicated that the structural model possessed satisfactory statistical quality.

The hypothesized structural relationships were tested using the PLS-SEM bootstrapping procedure with 5,000 resamples. Standardized path coefficients were used to evaluate the direction and magnitude of the relationships, while the corresponding t statistics and p values were used to assess statistical significance. Relationships with t values greater than 1.96 and p values below .05 were regarded as statistically significant. The graphical outputs of the PLS algorithm and bootstrapping analysis are identified by the following figure:

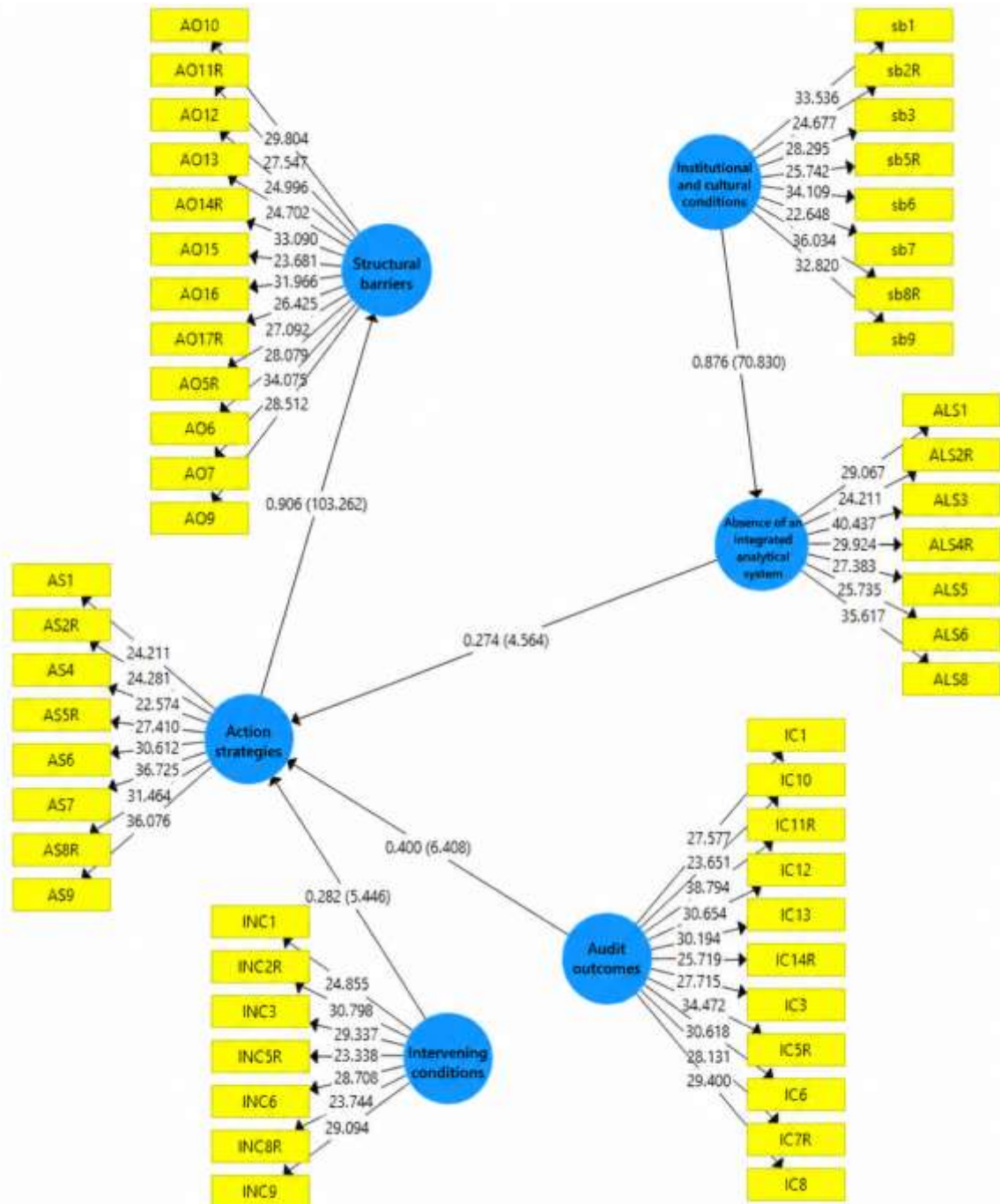


Figure 1. Results of Hypothesis Testing Based on Standardized Path Coefficients and Bootstrapped t Statistics

The detailed results of the hypothesis tests are presented in Table 6.

Table 6. Results of Hypothesis Testing for the Structural Relationships

Hypothesis	Structural relationship	Path coefficient (β)	<i>t</i> statistic	<i>p</i> value	Decision
1	Structural barriers → Absence of an integrated analytical system	.876	70.830	< .001	Supported
2	Institutional and cultural conditions → Action strategies	.400	6.408	< .001	Supported
3	Intervening conditions → Action strategies	.282	5.446	< .001	Supported
4	Action strategies → Audit outcomes	.906	103.408	< .001	Supported
5	Absence of an integrated analytical system → Action strategies	.274	4.564	< .001	Supported

As reported in Table 6, all five structural relationships were positive and statistically significant at the 99% confidence level. The first hypothesis was supported because structural barriers had a strong positive effect on the absence of an integrated analytical system, $\beta = .876$, $t = 70.830$, $p < .001$. This was the strongest upstream relationship involving the structural and analytical dimensions of the model. The finding indicated that increased weaknesses in transparency, internal controls, audit procedures, and organizational structures were associated with a substantial increase in the fragmentation or absence of an integrated analytical system for business risk-based auditing.

The second hypothesis was also supported. Institutional and cultural conditions had a positive effect on action strategies, $\beta = .400$, $t = 6.408$, $p < .001$. Thus, institutional pressures, professional norms, regulatory arrangements, and organizational culture significantly influenced the strategies adopted by auditors when responding to business-risk requirements. The positive coefficient indicated that the intensification of unfavorable institutional and cultural conditions was associated with greater reliance on the action strategies represented in the model, including formalistic and compliance-oriented responses.

The third hypothesis proposed a positive relationship between intervening conditions and action strategies. This relationship was statistically significant, $\beta = .282$, $t = 5.446$, $p < .001$. Accordingly, conditions such as technological limitations, time pressure, resource constraints, and other contextual factors contributed to the adoption of the specified action strategies. Although the magnitude of this path was lower than that of the institutional and cultural path, the relationship remained statistically and practically relevant.

The fourth hypothesis received strong empirical support. Action strategies had a very strong positive effect on audit outcomes, $\beta = .906$, $t = 103.408$, $p < .001$. This was the largest path coefficient in the model. The finding demonstrated that the adoption of formalistic, superficial, or responsibility-discharging strategies was closely associated with unfavorable audit outcomes, including a weakened oversight function, diminished audit effectiveness, and reduced stakeholder confidence. The magnitude of the coefficient also confirmed the central role of action strategies in translating contextual and analytical weaknesses into observable auditing consequences.

The fifth hypothesis was supported because the absence of an integrated analytical system exerted a positive and statistically significant effect on action strategies, $\beta = .274$, $t = 4.564$, $p < .001$. This result indicated that deficiencies in the systematic integration and analysis of financial, nonfinancial, strategic, operational, and environmental risk information increased the likelihood that auditors would adopt formalistic or compliance-oriented strategies rather than analytically substantive responses.

Taken together, the hypothesis-testing results confirmed the proposed sequence of relationships in the business risk-based auditing model. Structural barriers significantly contributed to the absence of an integrated analytical system, while institutional and cultural conditions, intervening conditions, and analytical-system deficiencies shaped auditors' action strategies. In turn, action strategies strongly predicted audit outcomes. The results therefore supported the theoretical proposition that ineffective audit outcomes arise not merely from isolated technical

deficiencies but through an interconnected process in which structural, institutional, cultural, technological, and analytical conditions influence auditors' behavioral and professional responses.

4. Discussion and Conclusion

The present study empirically validated a business risk-based auditing model in Iran and examined the structural relationships among structural barriers, institutional and cultural conditions, intervening conditions, the absence of an integrated analytical system, action strategies, and audit outcomes. The results demonstrated that the proposed model possessed satisfactory measurement quality, strong explanatory and predictive power, and acceptable overall fit. The measurement model showed adequate internal consistency, convergent validity, and discriminant validity, while the structural model explained 84.8% of the variance in action strategies, 76.8% of the variance in the absence of an integrated analytical system, and 82.1% of the variance in audit outcomes. Moreover, all five hypothesized structural paths were positive and statistically significant. These findings indicate that the challenges associated with business risk-based auditing in Iran do not arise from a single technical deficiency; rather, they emerge from an interconnected system of structural, institutional, cultural, technological, analytical, and behavioral factors.

The first major finding showed that structural barriers had a strong positive effect on the absence of an integrated analytical system. This relationship had a standardized path coefficient of .876 and represented one of the strongest relationships in the model. The result suggests that weaknesses in information transparency, ineffective internal controls, fragmented organizational processes, limited access to reliable data, and insufficient coordination among organizational units substantially impede the development of an integrated analytical framework for business risk auditing. In practice, auditors cannot systematically connect strategic, operational, financial, and environmental risks when organizational structures do not provide timely, coherent, and credible information. In such conditions, risk assessment is likely to remain fragmented and dependent on routine checklists rather than being grounded in a comprehensive understanding of the client's business model.

This finding is consistent with Iranian studies that have identified structural and procedural deficiencies as major obstacles to the implementation of risk-based auditing. Mirbabaei and Ghorban Hosseini found that the establishment of risk-based auditing in the value-added tax system was constrained by organizational, informational, and procedural barriers [26]. Similarly, Shahverdi et al. identified infrastructural weaknesses, inadequate professional systems, and deficiencies in organizational processes as important impediments to implementing risk-based auditing in Iran [27]. The result is also aligned with Poursaeid and Mohammadipour, who emphasized that organizational readiness, managerial support, appropriate control systems, and access to risk information are essential for establishing a risk-based internal auditing system [25]. Taken together, these studies support the conclusion that an integrated analytical system cannot be created merely by modifying audit forms or introducing risk-related terminology. It requires fundamental improvements in information architecture, internal control quality, data accessibility, and organizational coordination.

The strong effect of structural barriers can also be explained through the logic of business risk auditing itself. This audit approach depends on the auditor's ability to understand the client's business model, critical processes, strategic objectives, and sources of operational exposure. Wright demonstrated that auditors' assessment of process-level business risks affects their evaluation of the risk of material misstatement, particularly in revenue-related judgments [1]. Shen et al. likewise showed that auditors' sensitivity to business risk shapes their responses under business risk auditing [3]. These analytical judgments require consistent information across organizational

levels. When information is incomplete, controls are ineffective, and processes are poorly documented, auditors may be unable to trace the relationship between business risks and financial-reporting consequences. Thus, structural deficiencies weaken not only audit efficiency but also the conceptual foundation upon which business risk auditing depends.

The second major finding indicated that institutional and cultural conditions had a significant positive effect on action strategies, with a path coefficient of .400. This result implies that professional norms, regulatory expectations, organizational culture, attitudes toward accountability, and prevailing conceptions of auditing influence how auditors respond to the requirements of business risk-based auditing. When the institutional environment encourages substantive analysis, professional skepticism, and evidence-based judgment, auditors are more likely to employ meaningful risk-oriented strategies. Conversely, when the environment prioritizes formal compliance, administrative completion, or protection against inspection risk, auditors may adopt symbolic or responsibility-discharging strategies that satisfy procedural expectations without producing a genuinely integrated assessment of business risk.

The significance of institutional and cultural conditions is consistent with legitimacy-based explanations of auditing change. Van Buuren et al. found that auditors' legitimacy experiences shaped the process through which business risk auditing was adopted, particularly among non-Big 4 audit firms [12]. Their findings suggest that auditors do not adopt new approaches solely because such approaches are technically superior; adoption also depends on whether the practices are viewed as legitimate, professionally acceptable, and compatible with organizational expectations. Rostami Ostad Kalayeh et al. similarly showed that the efficiency of business risk auditing in Iran is related to dimensions of legitimacy theory [13]. Accordingly, the present finding indicates that institutional support and professional culture are not peripheral factors but central determinants of auditors' behavioral responses.

The result is also compatible with research on regulatory oversight and auditor behavior. Bhaskar demonstrated that risk-based inspections can influence auditors' decisions and work behavior by altering their expectations regarding regulatory review and potential consequences [11]. This implies that auditors may adapt their strategies to what they believe inspectors, regulators, or professional bodies will reward. If inspection systems emphasize documentation volume or formal compliance, auditors may direct effort toward defensible paperwork rather than substantive risk analysis. The quality of audit documentation remains essential, but it should reflect genuine professional reasoning rather than become a substitute for it. The grounded theory model developed by Homsian Kashani et al. showed that audit documentation quality is shaped by organizational, professional, and contextual factors [14]. Therefore, institutional and cultural conditions can determine whether documentation supports analytical judgment or merely provides formal evidence that procedures were completed.

The third finding showed that intervening conditions had a positive and statistically significant effect on action strategies. This relationship, with a path coefficient of .282, indicates that technological limitations, time pressure, shortages of specialized personnel, resource constraints, and difficulties in accessing and analyzing data influence the strategies adopted by auditors. Although this effect was weaker than that of institutional and cultural conditions, it remained substantively important. Business risk auditing requires auditors to analyze a large volume of financial and nonfinancial information and to connect this information to strategic and process-level risks. Under severe time pressure or with insufficient technological resources, auditors may rely on simplified judgments, prior-year procedures, or standardized templates.

This finding aligns with studies emphasizing the technological and resource-intensive nature of modern risk-based auditing. Eulerich et al. showed that continuous auditing technologies can support risk-based audit planning by improving access to timely risk information [17]. Wang et al. demonstrated that structured analytical techniques can improve project selection and resource allocation in risk-based internal audit planning [16]. Such approaches, however, require suitable data, analytical infrastructure, and technical competence. Where these resources are absent, the auditor's capacity to prioritize risks and allocate procedures efficiently is reduced. The finding is also consistent with De Martinis and Houghton, who linked business risk auditing to audit production efficiency and showed that the benefits of this approach depend on the effective allocation of audit effort [8]. Chang et al. similarly demonstrated that technical and allocative inefficiencies influence audit pricing and the use of audit resources [9].

Technological readiness has become even more important as auditing increasingly incorporates data analytics, artificial intelligence, robotic process automation, and machine learning. Torroba et al. found that the adoption of data analytics and artificial intelligence by audit professionals depends on organizational support, perceived usefulness, competence, and technological conditions [22]. Kassar and Jizi also concluded that artificial intelligence and robotic process automation offer significant potential for improving audit efficiency and analytical capacity, while simultaneously creating barriers related to skills, governance, and organizational readiness [19]. Jain emphasized that artificial intelligence is transforming accounting and auditing activities and changing the competencies required from professionals [20]. The transition from traditional to digital accounting similarly requires intelligent infrastructures and organizational transformation [18]. These studies explain why technological limitations function as intervening conditions: they shape whether auditors can undertake meaningful analysis or must resort to simplified strategies.

The fourth finding indicated that the absence of an integrated analytical system had a significant positive effect on action strategies, with a path coefficient of .274. This result means that when auditors lack a coherent system for integrating strategic, operational, financial, control, and environmental information, they are more likely to adopt formalistic, superficial, or compliance-oriented strategies. An integrated analytical system enables auditors to identify relationships among risks, rank those risks according to their significance, and design procedures that respond directly to the client's risk profile. Without such a system, audit planning may become fragmented, and business risk analysis may be treated as a separate preliminary exercise rather than as a foundation for audit execution.

This result is supported by Olfati and Ohadi, who demonstrated the potential of machine-learning techniques for predicting business risk [21]. Their study illustrates how systematic analytical tools can improve the identification of complex risk patterns. It is also aligned with the risk-based planning approach proposed by Wang et al., in which analytical decision methods were used to integrate risk prioritization with resource allocation [16]. Risk-management-based internal audit controls likewise depend on connecting organizational risks with control assessment and audit planning [15]. The present study extends these insights by showing that the absence of integration has a behavioral consequence: it encourages auditors to rely on strategies that may appear compliant but do not fully operationalize business risk auditing.

The fifth and strongest direct relationship showed that action strategies had a very strong positive effect on audit outcomes, with a path coefficient of .906. This finding indicates that auditors' chosen responses are the most immediate determinants of the consequences produced by the audit process. Where action strategies are formalistic, responsibility-discharging, or narrowly compliance-oriented, the resulting outcomes include a weakened oversight role, reduced audit effectiveness, diminished stakeholder confidence, and potentially lower

audit quality. The strength of this relationship confirms that structural and contextual barriers do not affect outcomes only in a direct manner; rather, their effects are translated into consequences through auditors' professional and organizational responses.

This finding is consistent with the behavioral implications of regulatory and risk-based auditing research. Bhaskar showed that oversight mechanisms can shape auditor behavior and thereby influence audit work [11]. Al-Qudah found that the business risk-based audit approach can reduce audit risk when it is implemented effectively [2]. The present results imply the reverse as well: when the approach is implemented through superficial or defensive strategies, its risk-reduction benefits may not be realized. Rostami Ostad Kalayeh et al. emphasized that execution efficiency within business risk auditing depends on the quality of planning, auditor competence, risk identification, and resource allocation [28]. Thus, the consequences of business risk auditing are determined less by the formal existence of the approach than by the substantive strategies through which it is implemented.

The strong relationship between action strategies and outcomes can also be interpreted in relation to audit pricing, efficiency, and stakeholder confidence. Higher levels of client risk generally increase the audit effort and resources required, thereby influencing audit fees [10]. However, additional effort does not necessarily produce better outcomes if it is allocated inefficiently. De Martinis and Houghton showed that business risk auditing can improve production efficiency, while Chang et al. demonstrated that technical and allocative inefficiency can undermine audit performance [8, 9]. Therefore, action strategies determine whether professional effort is directed toward analytically important risks or consumed by routine and defensive procedures. When resources are used primarily to demonstrate compliance, audit costs may increase without a corresponding improvement in assurance quality.

The findings also have implications for the credibility of risk disclosure and integrated reporting. Chen et al. showed that investors' responses to risk-factor disclosures can vary according to organizational context and perceived credibility [7]. Siti and Chariri highlighted the role of governance characteristics and audit committee expertise in integrated reporting [6]. If audit strategies fail to critically evaluate business risks and related disclosures, stakeholders may receive formally complete but substantively weak information. This can reduce the monitoring value of auditing and undermine confidence in corporate reporting. In contrast, a genuinely integrated business risk audit can improve the credibility of financial and nonfinancial risk information and strengthen the relationship between governance, disclosure, and accountability.

The high values of R^2 and Q^2 provide additional support for the explanatory adequacy of the proposed model. The model explained a substantial proportion of the variance in all three endogenous constructs and demonstrated strong predictive relevance. These results suggest that the selected constructs capture central mechanisms shaping the implementation and consequences of business risk auditing in Iran. The satisfactory SRMR value further indicated that the proposed relationships were reasonably consistent with the observed data. Methodologically, this provides quantitative support for the constructs generated during the preceding qualitative phase. The use of qualitative synthesis and structured conceptual development is appropriate for identifying complex context-dependent categories [29], while expert-based methods can contribute to construct refinement where conceptual consensus is limited [30]. The present quantitative findings demonstrate that the qualitatively derived categories possess empirical coherence and can be integrated into a statistically defensible model.

Overall, the findings show that successful implementation of business risk-based auditing in Iran requires more than the adoption of technical standards or new audit terminology. It requires reliable organizational data, effective controls, integrated analytical infrastructure, supportive institutional arrangements, professional legitimacy,

appropriate technological resources, and action strategies grounded in substantive risk analysis. The results reinforce the argument that business risk auditing is simultaneously a technical, behavioral, organizational, and institutional innovation. Without coordinated reforms across these dimensions, the approach may be implemented symbolically and fail to improve audit quality, efficiency, or stakeholder trust.

This study was subject to several limitations. First, the data were collected using a cross-sectional survey, which limits the ability to establish temporal causality among the constructs despite the theoretically specified directions of the structural paths. Second, the use of purposive, convenience, and snowball sampling was necessary because no comprehensive sampling frame was available, but this procedure may restrict the generalizability of the findings to all auditors and financial professionals in Iran. Third, the study relied on self-reported perceptions, which may be affected by social desirability, recall error, and respondents' differing interpretations of business risk-based auditing. Although procedural measures were used to reduce common method bias, it cannot be eliminated completely. Fourth, the sample included professionals from several organizational and occupational settings, and the model did not separately estimate potential differences among internal auditors, independent auditors, financial managers, governmental organizations, and private-sector entities. Finally, the study validated a model developed within the Iranian institutional environment; therefore, its applicability to other regulatory, economic, and professional contexts should be assessed cautiously.

Future studies should employ longitudinal designs to examine how structural reforms, technological investments, and changes in professional regulation influence the implementation of business risk-based auditing over time. Multi-group analyses could be conducted to compare internal and independent auditors, public- and private-sector organizations, large and small audit firms, and professionals with different levels of technological competence. Researchers could also test the model in other countries to assess its cross-cultural and institutional invariance. The integration of survey data with interviews, audit-file reviews, inspection findings, and objective audit-quality measures would provide a more comprehensive assessment of the relationships identified in this study. Future research should also examine additional mediators and moderators, including auditor experience, professional skepticism, ethical climate, leadership support, firm size, digital maturity, inspection intensity, and client complexity. Experimental studies could determine whether integrated analytical systems, artificial intelligence tools, and structured risk-assessment protocols improve auditors' judgments and reduce reliance on formalistic strategies.

Professional accounting bodies, audit firms, regulators, and audited organizations should treat business risk-based auditing as an integrated reform rather than a limited methodological adjustment. Audit firms should develop standardized systems that connect strategic risks, operational processes, internal controls, financial assertions, audit procedures, and documented conclusions. Training programs should focus on business-model analysis, data analytics, professional judgment, risk prioritization, and the interpretation of nonfinancial information. Regulators should revise inspection criteria so that substantive analytical quality is emphasized alongside documentation compliance. Organizations should strengthen internal controls, improve information transparency, and provide auditors with timely access to reliable financial and operational data. Investments in continuous auditing, secure data platforms, artificial intelligence, and risk-monitoring tools should be accompanied by clear governance, ethical safeguards, and staff development. Finally, audit-firm incentive systems should reward high-quality risk analysis and defensible professional judgment rather than the mechanical completion of procedures.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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References

- [1] W. F. Wright, "Client Business Models, Process Business Risks and the Risk of Material Misstatement of Revenue," *Accounting, Organizations and Society*, vol. 48, no. 4, pp. 43-55, 2016, doi: 10.1016/j.aos.2015.11.005.
- [2] L. A. Al-Qudah, "The Impact of the Business Risk-Based Audit Approach on Reducing Risk," *Journal of Asian Finance, Economics and Business*, vol. 8, no. 1, pp. 343-352, 2021.
- [3] H. Shen, L. Wu, and J. Z. Xiao, "Auditors' Sensitivity to Business Risk under Business Risk Auditing," *Journal of Accounting and Public Policy*, vol. 42, no. 6, p. 107113, 2023, doi: 10.1016/j.jaccpubpol.2023.107113.
- [4] T. Z. Kalender and O. Vayvay, "The Fifth Pillar of the Balanced Scorecard: Sustainability," *Procedia - Social and Behavioral Sciences*, vol. 235, no. 1, pp. 76-83, 2016, doi: 10.1016/j.sbspro.2016.11.027.
- [5] M. Namazi and M. Ghadirian Arani, "Reputation as the Fifth Perspective of the Balanced Scorecard," *Accounting Reviews*, vol. 3, no. 12, pp. 83-110, 2016.
- [6] F. Siti and A. Chariri, "Independent Audit Committee, Audit Committee Expertise, Types of Industry, and Integrated Reporting Index: A Study of the Johannesburg Stock Exchange in 2015," ed, 2017.
- [7] F. Chen, Y. Yao, and M. Zhao, "Do Investors Turn a Blind Eye to Risk-Factor Disclosures by State-Supported Firms?," *Journal of Accounting and Public Policy*, vol. 41, no. 1, pp. 1-27, 2022, doi: 10.1016/j.jaccpubpol.2022.106939.
- [8] M. De Martinis and K. Houghton, "The Business Risk Audit Approach and Audit Production Efficiency," *Abacus*, vol. 55, no. 4, pp. 734-782, 2019, doi: 10.1111/abac.12178.
- [9] H. Chang, Y. C. Kao, R. Mashruwala, and S. M. Sorensen, "Technical Inefficiency, Allocative Inefficiency, and Audit Pricing," *Journal of Accounting, Auditing & Finance*, vol. 33, no. 4, pp. 580-600, 2018, doi: 10.1177/0148558X17696760.
- [10] K. Azinfar, A. Ghodrati Zovarem, and M. Norouzi, "The Effect of Risk Dimensions on Audit Pricing," *Financial Accounting and Auditing Research*, vol. 11, no. 44, pp. 155-174, 2019.
- [11] L. S. Bhaskar, "How Do Risk-Based Inspections Impact Auditor Behavior? Experimental Evidence on the PCAOB's Process," *The Accounting Review*, vol. 95, no. 4, pp. 103-126, 2019, doi: 10.2308/tar-2016-0007.
- [12] J. Van Buuren, C. Koch, N. Van Nieuw Amerongen, and A. Wright, "Evaluating the Change Process for Business Risk Auditing: Legitimacy Experiences of Non-Big 4 Auditors," *Auditing: A Journal of Practice & Theory*, vol. 37, no. 2, pp. 249-269, 2018, doi: 10.2308/ajpt-51748.
- [13] S. Rostami Ostad Kalayeh, M. A. Aghaei, and K. Biglar, "The Efficiency of the Business Risk Audit Approach in Iran Based on the Dimensions of Legitimacy Theory," *Management Accounting and Auditing Knowledge*, vol. 13, no. 52, pp. 121-136, 2024.
- [14] Z. Homsian Kashani, Z. Hajiha, H. Jahangirnia, and R. Gholami Jamkarani, "Developing an Audit Documentation Quality Model Using a Grounded Theory Approach," *Financial Accounting and Auditing Research*, vol. 13, no. 52, pp. 151-183, 2021.
- [15] A. Sabbaghian Tousi, M. Rezaei Kamalabad, M. Ahadi, and S. H. Mousavi, "Risk Management-Based Internal Audit Controls," in *First National Conference on Innovation in Management, Accounting, and Economics Research*, Tehran, Iran, 2022.

- [16] X. Wang, T. Zhao, and C. T. Chang, "An Integrated FAHP-MCGP Approach to Project Selection and Resource Allocation in Risk-Based Internal Audit Planning: A Case Study," *Computers & Industrial Engineering*, vol. 152, p. 107012, 2021, doi: 10.1016/j.cie.2020.107012.
- [17] M. Eulerich, C. Georgi, and A. Schmidt, "Continuous Auditing and Risk-Based Audit Planning: An Empirical Analysis," *Journal of Emerging Technologies in Accounting*, vol. 17, no. 2, pp. 141-155, 2020, doi: 10.2308/JETA-2020-004.
- [18] S. Oyarhossein and S. Oyarhossein, "Presenting an artificial intelligence model for the transition from traditional accounting to digital accounting," *Accounting and Management Auditing Knowledge*, vol. 17, no. 65, pp. 397-413, 2026.
- [19] M. Kassar and M. Jizi, "Artificial intelligence and robotic process automation in auditing and accounting: A systematic literature review," *Journal of Applied Accounting Research*, vol. 27, no. 1, pp. 217-241, 2026, doi: 10.1108/JAAR-05-2024-0175.
- [20] P. Jain, "Artificial intelligence in accounting, taxation and auditing," *International Journal of Scientific Research in Engineering and Management*, 2026, doi: 10.55041/ijrsrem56033.
- [21] S. Olfati and F. Ohadi, "Designing a Business Risk Prediction Model Using Machine Learning Techniques," *Management Accounting and Auditing Knowledge*, vol. 11, no. 42, pp. 121-134, 2022.
- [22] M. Torroba, J. R. Sanchez, L. Lopez, and A. Callejon, "Investigating the impacting factors for the audit professionals to adopt data analysis and artificial intelligence: Empirical evidence for Spain," *International Journal of Accounting Information Systems*, vol. 56, p. 100738, 2025.
- [23] A. M. A. F. Zaky and R. Widuri, "How Does Risks And Ethical Issues Impact The Adoption Of Artificial Intelligence In Auditing?," *Journal of Theoretical and Applied Information Technology*, vol. 103, no. 5, pp. 1877-1890, 2025. [Online]. Available: <https://jaitit.org/volumes/Vol103No5/18Vol103No5.pdf>.
- [24] T. T. Le and T. M. A. Nguyen, "The Adoption of the Risk-Based Audit Approach in Independent Audit Firms: A Case Study of Vietnam," *Journal of Asian Finance, Economics and Business*, vol. 7, no. 2, pp. 89-97, 2020, doi: 10.13106/jafeb.2020.vol7.no2.89.
- [25] A. Poursaeid and R. A. Mohammadipour, "Assessing the Feasibility of Establishing a Risk-Based Internal Auditing System at Islamic Azad University," *Financial Accounting and Auditing Research*, vol. 11, no. 41, pp. 229-255, 2019.
- [26] S. M. Mirbabaei and M. Ghorban Hosseini, "Identifying Barriers to Establishing Risk-Based Auditing in the VAT System," in *National Conference on Global Scientific Research in Management, Accounting, Law, and Social Sciences*, Tehran, Iran, 2016.
- [27] M. Shahverdi, M. F. Fallah, H. R. Kordlouei, and H. Badiei, "Identifying Barriers to Implementing a Risk-Based Auditing System in Iran," *Management Accounting and Auditing Knowledge*, vol. 12, no. 47, pp. 43-58, 2023.
- [28] S. Rostami Ostad Kalayeh, M. A. Aghaei, and K. Biglar, "Designing an Audit Execution Efficiency Model Based on the Business Risk Audit Approach," *Financial Accounting and Auditing Research*, vol. 14, no. 55, pp. 41-78, 2022.
- [29] H. Abedi Jafari and M. Amiri, "Meta-Synthesis: A Method for Synthesizing Qualitative Studies," *Humanities Methodology Quarterly*, vol. 25, no. 99, pp. 73-87, 2019.
- [30] B. D. Lund, "Review of the Delphi Method in Library and Information Science Research," *Journal of Documentation*, vol. 76, no. 4, pp. 929-960, 2020, doi: 10.1108/JD-09-2019-0178.