Interpretive Structural Modeling of Auditor Competencies

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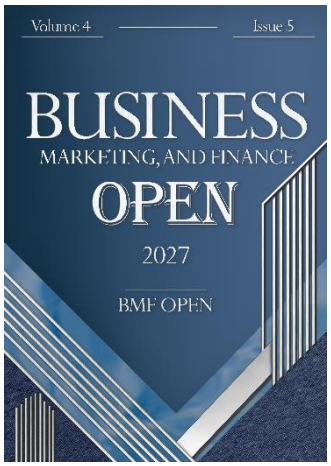

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Abstract: Objective: This study aimed to identify the principal dimensions of auditor competency and develop an interpretive structural model clarifying the hierarchical and directional relationships among these competencies. This applied study employed a qualitative–structural design based on Interpretive Structural Modeling (ISM). The study population consisted of professional auditors in Iraq with at least five years of auditing experience and university professors in Iran and Iraq with at least eight years of teaching experience in accounting, auditing, financial management, or related fields. Using non-probability snowball sampling, 18 experts were selected, including 10 professional auditors and eight university professors. Following expert review and refinement, 12 auditor competency components were retained. Pairwise relationships among the components were assessed using a researcher-developed ISM questionnaire and encoded through the conventional V, A, X, and O symbols. The Structural Self-Interaction Matrix was converted into an initial and then final reachability matrix by applying transitivity rules. Level partitioning was subsequently performed, and driving and dependence powers were calculated using MICMAC analysis. The ISM analysis produced a seven-level hierarchical model. Continuous learning and professional development and adaptability and environmental awareness were positioned at Level VII and showed the highest driving power, with scores of 12 and dependence scores of 2. Professional ethics and integrity and independence and accountability were placed at Level VI, each with a driving power of 8. Professional and technical knowledge and information technology and digital competence occupied Level V, followed by communication competence and teamwork and interpersonal competence at Level IV. Analytical and critical thinking and professional skepticism were positioned at Level III, while risk assessment and fraud detection competence occupied Level II. Decision-making and professional judgment was located at Level I and demonstrated the highest dependence power of 12 and the lowest driving power of 1. MICMAC analysis classified six competencies as independent drivers and six as dependent competencies, with no autonomous components identified. Auditor competency is a hierarchical and interconnected system in which continuous learning, adaptability, ethics, independence, technical knowledge, and digital competence function as foundational drivers, while risk assessment and professional judgment emerge as higher-order outcomes dependent on the development of lower-level competencies.

Keywords: Auditor Competency; Interpretive Structural Modeling; Professional Judgment; Professional Skepticism; Digital Competence; Audit Quality; MICMAC Analysis

1. Introduction

Auditing occupies a central position in contemporary systems of financial accountability, corporate governance, and market transparency. The credibility of financial reporting depends not only on the existence of accounting standards and regulatory requirements but also on the ability of auditors to evaluate evidence independently, identify material misstatements, assess internal controls, and exercise sound professional judgment. As

organizations become more complex and their financial, technological, and governance environments become increasingly dynamic, expectations regarding the auditor's role have expanded considerably. Auditors are no longer expected merely to verify accounting records or confirm compliance with predetermined procedures; rather, they are required to integrate technical expertise, professional skepticism, ethical judgment, digital capabilities, communication skills, risk assessment abilities, and continuous learning in order to respond effectively to emerging forms of financial and operational risk. Consequently, auditor competency has become a strategic determinant of both audit quality and the wider reliability of organizational reporting and governance systems [1-3].

The concept of competency in auditing is inherently multidimensional. It includes the knowledge, skills, attitudes, values, behavioral attributes, and professional capabilities that enable auditors to perform their responsibilities effectively under varying levels of uncertainty and complexity. Traditional approaches tended to emphasize technical accounting and auditing knowledge, professional experience, and familiarity with standards. Although these dimensions remain essential, current audit environments demand a substantially broader competency profile. Auditors must be capable of interpreting complex transactions, assessing business and fraud risks, understanding internal control structures, applying professional skepticism, communicating findings, exercising ethical independence, and adapting to technological and regulatory developments. Empirical research has consistently suggested that auditor competence and professional experience are associated with stronger audit outcomes and more reliable professional performance [4, 5]. Similarly, research examining auditor competence in combination with integrity, due professional care, independence, and personality-related characteristics has demonstrated that competence operates within a broader professional configuration rather than as an isolated technical attribute [3].

The importance of auditor competence is especially evident when audit quality is considered as a multidimensional outcome. High-quality auditing requires the auditor to obtain sufficient and appropriate evidence, evaluate that evidence critically, identify significant risks, comply with professional standards, and communicate conclusions accurately. Competence affects these activities because auditors with stronger knowledge, analytical capacity, and professional expertise are better positioned to recognize anomalies, challenge management representations, and select appropriate audit procedures. Daryaei and Azizi emphasized the interrelationship among ethics, professional experience, auditor competence, and audit quality, reinforcing the view that high-quality auditing emerges from the interaction of technical and behavioral dimensions [2]. Similarly, studies examining competence together with accountability, professional skills, and skepticism have shown that these factors jointly contribute to audit quality, while contextual pressures such as time budget constraints may alter the strength of their effects [6]. This indicates that competency should be examined as a system of interconnected elements rather than as a single measurable trait.

Professional ethics and integrity constitute another fundamental dimension of auditor competency. The value of auditing depends substantially on public confidence in the auditor's objectivity, honesty, independence, and commitment to professional standards. Even highly knowledgeable auditors may fail to provide reliable assurance if their ethical judgment or integrity is compromised. Research in auditing has therefore increasingly integrated competence with professional ethics when explaining financial reporting quality and audit effectiveness. Studies conducted in the context of auditors responsible for signing audit reports have indicated that competence and professional ethics are closely related to the quality of financial reporting [7, 8]. Furthermore, role ambiguity and organizational conditions can influence auditors' integrity and competence, suggesting that professional behavior is partly shaped by the environment within which auditors operate [9]. These findings support a broader

understanding of competency that includes not only what auditors know and can do, but also how consistently they apply professional values when confronted with uncertainty, pressure, or conflicting interests.

Independence is similarly inseparable from professional competence. The traditional conceptual distinction between auditor competence and auditor independence is analytically useful, yet in practice the two are often interdependent. An auditor may possess considerable technical expertise but still produce a weak audit if social, commercial, or organizational relationships impair objective judgment. Conversely, independence without adequate competence cannot ensure that material issues are recognized or appropriately evaluated. Recent evidence regarding auditors' connections with members of clients' business communities demonstrates the importance of considering the balance between competence and independence when evaluating auditor effectiveness [10]. This relationship is particularly important because the contemporary auditor operates within increasingly interconnected business networks, where professional relationships may create both informational advantages and threats to perceived or actual independence. Accordingly, independence and accountability should be understood as structural dimensions of auditor competency rather than as external characteristics disconnected from professional capability.

Another critical element is professional skepticism, which enables auditors to maintain a questioning mind, remain alert to evidence that may indicate misstatement or fraud, and critically evaluate the reliability of information received from clients. Professional skepticism is particularly important in complex or high-risk audit situations where information is incomplete, contradictory, or susceptible to manipulation. The effectiveness of skepticism depends on other competencies, including technical knowledge, professional experience, ethical awareness, analytical reasoning, and risk assessment capability. Evidence indicates that professional skepticism, competence, accountability, and professional skill contribute collectively to the quality of audit performance [6]. Therefore, skepticism should not be treated as an isolated personal disposition; rather, it can be considered a higher-order professional capability that is developed through interaction with knowledge, experience, ethical principles, and the capacity for critical reasoning.

The complexity of audit tasks also highlights the importance of professional judgment and decision-making. Auditors routinely make judgments concerning materiality, audit risk, the sufficiency of evidence, the effectiveness of controls, the likelihood of fraud, and the appropriateness of management estimates. Such judgments often occur under conditions of uncertainty and cannot be reduced to mechanical application of standards. Hanum and Rahmadana demonstrated that auditor competence and experience have implications for audit judgment, with task complexity playing an important role in how these capabilities are translated into actual judgments [11]. This is particularly relevant in environments characterized by complex financial instruments, cross-border transactions, extensive estimation uncertainty, and rapidly changing regulatory requirements. Professional judgment may therefore represent an integrative outcome produced by multiple underlying competencies, including knowledge, analytical thinking, skepticism, ethics, technological literacy, and practical experience.

Internal control evaluation and risk assessment further illustrate why auditor competency must be understood structurally. Auditors are expected to understand organizational processes, identify weaknesses in internal controls, assess control risk, and design audit procedures that respond appropriately to identified risks. Effective internal control auditing requires knowledge of accounting systems as well as the ability to interpret organizational processes, recognize control deficiencies, and evaluate their implications for financial reporting. The auditing of internal controls and control risk has therefore been identified as a significant professional domain requiring specialized competence [12]. At the same time, the increasing complexity of fraud schemes means that auditors

must combine risk assessment expertise with skepticism, technological capability, and contextual knowledge. Research on fraud-risk judgment has shown that auditor competence interacts with audit technology and task structure in shaping fraud-related judgments [13]. Thus, fraud detection and risk assessment are unlikely to be independent competencies; rather, they depend on a broader network of foundational and enabling capabilities.

The digital transformation of auditing has intensified the need to reconsider the competency profile of auditors. Audit engagements increasingly involve enterprise information systems, automated accounting processes, digital documentation, data analytics, artificial intelligence, continuous auditing technologies, and electronically generated evidence. As a result, digital competence has moved from being a supplementary skill to becoming an essential component of contemporary audit practice. Research has shown that information technology can mediate or strengthen the relationship between professional competency and auditor performance, indicating that technical expertise alone may not translate into superior performance unless auditors can effectively use digital tools [14]. Similarly, evidence from the financial sector suggests that information technology usage plays an important mediating role in connecting internal audit processes and auditor competence to internal audit effectiveness [15]. These findings demonstrate that digital competence is increasingly integrated into the broader architecture of professional auditing competency.

The need for digital capability becomes even more pronounced in relation to fraud detection and the sustainability of the auditing profession. The expansion of digital transactions and increasingly sophisticated forms of financial manipulation require auditors to understand data-intensive environments and technology-enabled risks. Razali and colleagues emphasized the importance of competencies and digital technology capabilities in enabling auditors to detect fraud risks and maintain the sustainability of the audit profession in the digital era [16]. Likewise, internal auditor performance in digitally transformed environments is affected by the interaction of competency, professional behavior, and contextual pressures such as time budget constraints [17]. These developments indicate that contemporary auditor competence is dynamic rather than static. Auditors must continuously acquire new technological skills while maintaining ethical standards, professional skepticism, independence, and the capacity to interpret increasingly complex digital evidence.

Continuous learning is therefore an indispensable dimension of auditor competency. Auditing standards, financial reporting frameworks, taxation systems, corporate governance requirements, digital technologies, and fraud techniques evolve continuously. Competencies that were sufficient at one point may rapidly become obsolete if auditors do not engage in ongoing professional development. The importance of competency is also visible in broader governance contexts, where the effective functioning of committees and governance structures depends substantially on the capabilities of their members [18]. Although governance competence and auditor competence are not identical constructs, both reflect a common organizational principle: the effectiveness of oversight mechanisms depends on the quality of the individuals responsible for implementing them. For auditors, this implies that professional competence must involve an enduring capacity to learn, adapt, and respond to changes in organizational expectations, regulatory structures, and emerging risk environments.

Competency also has implications beyond the immediate audit engagement because reliable auditing contributes to financial reporting quality, governance effectiveness, and the information environment of organizations and capital markets. Studies connecting organizational core competencies with broader market-related outcomes, such as stock price synchronicity, illustrate the general importance of competency structures in shaping organizational information processes and market behavior [19]. Within auditing, stronger competence can improve the ability to identify reporting deficiencies, communicate material findings, and support the credibility

of disclosed information. The effect of auditor competence on internal audit quality is also influenced by contextual characteristics such as time budget pressure, professional attitudes, and role conflict [20]. This reinforces the proposition that competency operates within a system and that individual capabilities interact with organizational and task-related conditions.

Despite substantial evidence supporting the importance of auditor competence, many existing studies have examined competency primarily as an independent predictor of outcomes such as audit quality, performance, audit judgment, internal audit effectiveness, or financial reporting quality. Such research is valuable but may not adequately explain the internal architecture of competency itself. For instance, studies demonstrating associations between competence and performance do not necessarily identify which competencies are more foundational, which ones depend on others, or how professional, ethical, cognitive, technological, and behavioral competencies interact. Research examining competency together with experience, professional care, accountability, and skepticism provides evidence of multidimensionality [5, 6], yet these relationships are generally investigated using predictive models rather than hierarchical structural approaches. Consequently, there remains a need to move from identifying individual competency dimensions toward modeling their interdependencies.

This limitation is particularly important because not all competencies occupy equivalent positions in professional development. Some capabilities may function as foundational drivers that facilitate the development or activation of others. For example, continuous professional learning may strengthen technical knowledge and technological competence; ethical integrity and independence may support professional skepticism; technical knowledge and critical thinking may improve risk assessment; and these competencies may collectively contribute to higher-quality professional judgment. An indigenous model developed for the Iranian auditing context has already demonstrated the value of systematically identifying auditor competencies rather than relying exclusively on imported frameworks [1]. However, the next analytical step is to clarify the structural hierarchy among such competencies and identify the pathways through which foundational competencies influence more dependent professional capabilities.

Contextual variation also strengthens the rationale for a structural approach. Auditing takes place within different legal systems, professional institutions, regulatory environments, technological infrastructures, and organizational cultures. Competencies that appear central in one jurisdiction may have different relationships with other competencies in another professional environment. In Iran and Iraq, auditors operate within contexts shaped by local accounting practices, national regulatory structures, organizational characteristics, and varying levels of technological adoption. These contextual differences make it important to integrate academic expertise with the professional experience of practicing auditors when constructing a competency model. A model based on expert judgments can capture practical interdependencies that may not be easily observable through conventional questionnaire-based statistical models. In addition, combining the perspectives of experienced auditors and academics can strengthen the conceptual comprehensiveness of the competency framework by integrating practice-based knowledge with theoretical understanding.

The literature also suggests that the development of auditor competence should be approached as a strategic issue for audit firms, professional bodies, universities, and regulatory institutions. Professional education that focuses exclusively on accounting standards or procedural knowledge may be insufficient if high-quality audit performance also depends on ethics, skepticism, digital literacy, communication, adaptability, and professional judgment. Similarly, recruitment and evaluation systems that treat all competencies as equally important may fail to identify the foundational attributes that generate improvements across multiple other competency domains.

Understanding the structural relationships among competencies can therefore support more efficient professional development by identifying the variables with the greatest driving influence. Such knowledge can guide training priorities, continuing professional education, recruitment standards, performance evaluation, and curriculum design.

Interpretive Structural Modeling provides a particularly appropriate methodological framework for addressing this need because it enables complex relationships among multiple factors to be organized into a hierarchical structure based on expert judgments. Rather than simply determining whether one competency is statistically associated with another, ISM identifies directional relationships and differentiates between driving and dependent elements. This is especially useful for auditor competency because the construct involves technical, behavioral, ethical, cognitive, digital, and contextual dimensions that are theoretically interdependent. A structural model can therefore reveal whether competencies such as continuous learning, ethics, independence, technical knowledge, technological capability, skepticism, risk assessment, and judgment occupy different hierarchical positions within the overall system.

Accordingly, the present study aims to identify the principal dimensions of auditor competency and to develop an interpretive structural model that determines the hierarchical and directional relationships among these competencies based on the judgments of experienced auditors in Iraq and academics in Iran and Iraq.

2. Methodology

The present study was conducted using an applied research design with a qualitative–structural approach based on Interpretive Structural Modeling (ISM). The study was designed to identify the key dimensions and components of auditor competencies and to determine the structural and hierarchical relationships among these components. Interpretive Structural Modeling was selected because auditor competency is a multidimensional construct in which professional, technical, behavioral, ethical, cognitive, and contextual competencies may influence one another rather than operate independently. Accordingly, ISM provides an appropriate methodological framework for converting experts' mental models and judgments concerning such interrelationships into an integrated multilevel structural model. The statistical population consisted of professional auditors with at least five years of work experience in the auditing profession in Iraq and university professors in Iran and Iraq with at least eight years of teaching experience in accounting, auditing, financial management, or closely related academic fields. These groups were selected because their professional and academic experience provided them with sufficient knowledge of auditor competencies and the practical and theoretical requirements of the auditing profession. Their perspectives were therefore considered capable of contributing substantially to the identification of competency components and the determination of the relationships among them. Participants were required to have direct professional or academic familiarity with auditing, sufficient knowledge of the competencies required for effective audit performance, and willingness to participate throughout the expert judgment process. Individuals who did not meet the minimum professional or academic experience requirements or who submitted incomplete expert assessments were excluded from the study.

Because ISM is based on informed expert judgment rather than statistical generalization to a large population, a non-probability sampling strategy was considered appropriate. Participants were recruited using snowball sampling. Initial experts who met the inclusion criteria were identified through professional and academic networks, and these individuals were subsequently asked to introduce other qualified auditors or faculty members with relevant expertise. Recruitment continued until 18 eligible experts had been included in the study and

sufficient convergence was observed in expert judgments. The final expert panel therefore consisted of 18 participants, including 10 professional auditors working in Iraq and eight university professors from Iran and Iraq. The composition of the panel was intentionally designed to integrate professional and academic viewpoints so that the resulting structural model would reflect both the practical requirements of audit work and the theoretical foundations of auditor competency. Prior to participation, the purpose and procedure of the study were explained to all experts, participation was voluntary, and participants were informed that their responses would be used exclusively for research purposes. Confidentiality of individual judgments was maintained throughout data collection and analysis.

Data were collected through an expert-based instrument specifically developed for the requirements of Interpretive Structural Modeling. The data collection process was performed in two interconnected stages. In the first stage, the major dimensions and components of auditor competency were identified and refined. An initial pool of competency indicators was developed on the basis of the conceptual domain of auditing competency and the professional requirements associated with effective audit performance. The preliminary components were then presented to the expert panel for assessment regarding relevance, conceptual clarity, overlap, and suitability for inclusion in the structural model. Experts were asked to examine whether each identified component represented a distinct and meaningful aspect of auditor competency and whether any important competency had been omitted. Similar or conceptually overlapping items were subsequently integrated, ambiguous expressions were revised, and components that were considered insufficiently relevant to auditor competency were removed. This procedure resulted in the final set of competency components used as variables in the Interpretive Structural Modeling analysis. Expert agreement at this stage was used as the principal criterion for establishing the content adequacy of the variables entering the structural analysis.

In the second stage, a researcher-developed pairwise relationship questionnaire was used to determine the contextual relationships among the finalized auditor competency components. For every possible pair of components, the experts were asked to indicate the direction of the relationship between the two variables according to the logic of Interpretive Structural Modeling. Specifically, the respondents determined whether the first competency component contributed to or facilitated the second component, whether the second contributed to the first, whether the two components influenced one another, or whether no meaningful direct relationship existed between them. The conventional ISM symbols V, A, X, and O were used to record these judgments. The symbol V indicated that the component represented by the row influenced the component represented by the column; A indicated that the column component influenced the row component; X indicated a reciprocal relationship between the two components; and O indicated the absence of a meaningful relationship between the two components. Before completion of the instrument, the experts were provided with definitions and explanatory instructions for all competency components and relationship symbols in order to reduce interpretive inconsistency. Where judgments differed substantially, the relationships were reviewed using the dominant expert judgment and the conceptual reasoning offered by panel members. This process enhanced the consistency of the contextual relationship matrix and ensured that the final structural model reflected collective expert knowledge rather than the isolated opinion of a single participant. The final agreed pairwise judgments constituted the Structural Self-Interaction Matrix used as the primary input for ISM analysis.

The data were analyzed using the standard stages of Interpretive Structural Modeling. Following finalization of the auditor competency components, the experts' pairwise judgments were first organized into a Structural Self-Interaction Matrix. The qualitative symbols contained in this matrix were subsequently transformed into binary

values to generate the initial reachability matrix. Transformation was performed according to the conventional ISM rules. When the relationship between two components was represented by V, the corresponding row-to-column cell was assigned a value of 1 and the reverse cell was assigned 0. For A, the row-to-column cell was assigned 0 and the reverse relationship was assigned 1. For X, both corresponding cells were assigned 1 because the relationship was reciprocal. For O, both corresponding cells were assigned 0 because no direct relationship was identified between the two components. Values of 1 were also entered on the main diagonal to represent the accessibility of each competency component to itself.

The initial reachability matrix was subsequently examined on the basis of the principle of transitivity. Transitivity assumes that when one competency component affects a second component and the second component affects a third, an indirect relationship can be inferred between the first and third components. Such indirect relationships were incorporated into the matrix to generate the final reachability matrix. The final matrix was then used to determine the reachability set and antecedent set for each auditor competency component. The reachability set consisted of the competency itself and all other competencies that could be reached from it, whereas the antecedent set consisted of the competency itself and all competencies capable of influencing or reaching it. The intersection between the reachability and antecedent sets was calculated for each component. Components for which the reachability set and intersection set were identical were assigned to the highest level of the model during the corresponding iteration. After identifying a level, the components assigned to that level were removed from subsequent iterations, and the same procedure was repeated until all competency components had been allocated to their respective hierarchical levels.

After level partitioning was completed, the final interpretive structural model was constructed by positioning the identified competency components according to their hierarchical levels and connecting them through the relationships identified in the final reachability matrix. Components located at the lower levels of the model were interpreted as more fundamental or driving competencies because they influenced a larger number of other competencies, whereas components at higher levels were interpreted as more dependent outcomes of the underlying competency structure. Redundant transitive links were removed from the final diagram where necessary to produce a parsimonious representation of the principal structural relationships.

To complement the hierarchical ISM analysis, the competency components were also evaluated according to their driving power and dependence power using cross-impact matrix multiplication applied to classification analysis. Driving power was calculated as the total number of components, including itself, that a particular competency could influence, while dependence power represented the total number of components capable of influencing that competency. On the basis of these two indices, the competency components were classified into four conceptual groups: autonomous components characterized by weak driving and weak dependence power; dependent components characterized by weak driving but strong dependence power; linkage components characterized by strong driving and strong dependence power; and independent or driving components characterized by strong driving but weak dependence power. This complementary analysis facilitated identification of the competencies occupying the most influential positions within the overall system and provided additional interpretation of the structural relationships obtained through ISM. The combination of hierarchical level analysis and driving–dependence analysis was ultimately used to explain how different auditor competencies interact and which competencies constitute the foundational drivers of the competency system.

3. Findings and Results

A total of 18 experts participated in the interpretive structural modeling process. Of these, 10 participants were professional auditors working in Iraq and eight were university professors with academic experience in Iran or Iraq. Among the professional auditors, six participants were employed in private audit firms, three were working in auditing or financial control positions in public-sector organizations, and one had professional experience across both private and public auditing environments. The professional auditors had between 6 and 19 years of work experience, with a mean professional experience of 11.80 years. The academic participants had between 8 and 23 years of teaching and research experience, with a mean academic experience of 14.25 years. Eleven experts held doctoral degrees, five held master's degrees, and two professional participants held bachelor's degrees together with extensive specialized professional experience in auditing. Participants' academic or professional backgrounds were primarily in auditing, accounting, financial management, internal control, and corporate governance. This composition ensured that the expert panel incorporated both practice-oriented and academic perspectives regarding the knowledge, skills, behaviors, and professional attributes required of competent auditors. Following the screening, refinement, and consolidation of the initial indicators, 12 major auditor competency components were retained for inclusion in the Interpretive Structural Modeling analysis.

Table 1. Final Components of Auditor Competency Identified for Interpretive Structural Modeling

Code	Auditor competency component	Operational interpretation
C1	Professional and technical knowledge	Knowledge of auditing standards, accounting principles, financial reporting requirements, internal control systems, and relevant regulatory frameworks
C2	Analytical and critical thinking	Ability to interpret evidence, identify inconsistencies, evaluate alternative explanations, and make reasoned professional judgments
C3	Information technology and digital competence	Ability to use audit software, data analytics, digital information systems, and technology-assisted audit procedures
C4	Professional ethics and integrity	Commitment to honesty, objectivity, confidentiality, independence, and ethical principles in professional decision-making
C5	Professional skepticism	A questioning mindset, alertness to conditions indicating possible misstatement, and critical evaluation of audit evidence
C6	Communication competence	Ability to communicate audit findings clearly, interact effectively with clients and colleagues, and prepare understandable professional reports
C7	Teamwork and interpersonal competence	Ability to cooperate, coordinate, resolve interpersonal issues, and work effectively within multidisciplinary audit teams
C8	Continuous learning and professional development	Commitment to updating professional knowledge, acquiring emerging skills, and adapting to changes in standards, technology, and business environments
C9	Risk assessment and fraud detection competence	Ability to recognize audit risk, identify fraud indicators, assess material misstatement, and determine appropriate audit responses
C10	Decision-making and professional judgment	Ability to integrate evidence, professional standards, risk considerations, and contextual information in reaching defensible audit decisions
C11	Independence and accountability	Capacity to preserve independence of thought and action while accepting responsibility for professional judgments and audit outcomes
C12	Adaptability and environmental awareness	Ability to respond effectively to regulatory, economic, organizational, technological, and institutional changes affecting the audit environment

Table 1 presents the 12 auditor competency components that were retained after expert review and used as the principal variables in the ISM analysis. The identified competencies demonstrate that auditor competence extends beyond technical accounting and auditing knowledge and encompasses cognitive, ethical, behavioral, technological, interpersonal, and adaptive dimensions. Professional and technical knowledge represented the

formal knowledge foundation required for the application of auditing standards and professional procedures, whereas analytical and critical thinking captured the cognitive capacity necessary for evaluating complex evidence and resolving ambiguous audit situations. Information technology and digital competence emerged as an independent domain because contemporary auditing increasingly depends on computerized systems, data analytics, digital records, and technology-supported evidence collection. Professional ethics and integrity, professional skepticism, and independence and accountability represented closely related but conceptually distinguishable dimensions of professional conduct. Ethics and integrity concerned adherence to fundamental ethical principles; skepticism reflected critical evaluation of evidence; and independence and accountability referred to maintaining impartiality while accepting responsibility for audit judgments. Communication and teamwork competencies represented the interpersonal dimension of audit work, while continuous learning and adaptability reflected the dynamic nature of professional competence. Finally, risk assessment and fraud detection and decision-making and professional judgment reflected higher-order applied competencies requiring the simultaneous use of knowledge, cognitive abilities, ethical standards, and contextual understanding. The diversity of the retained components supported the assumption that auditor competency constitutes an interconnected system rather than a collection of isolated abilities.

Table 2. Final Reachability Matrix of Auditor Competency Components

Component	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	Driving Power
C1	1	1	0	0	1	1	0	0	1	1	0	0	6
C2	0	1	0	0	1	0	0	0	1	1	0	0	4
C3	1	1	1	0	0	1	0	0	1	1	0	0	6
C4	0	1	0	1	1	1	1	0	1	1	1	0	8
C5	0	1	0	0	1	0	0	0	1	1	0	0	4
C6	0	0	0	0	0	1	1	0	0	1	0	0	3
C7	0	0	0	0	0	1	1	0	0	1	0	0	3
C8	1	1	1	1	1	1	1	1	1	1	1	1	12
C9	0	0	0	0	0	0	0	0	1	1	0	0	2
C10	0	0	0	0	0	0	0	0	0	1	0	0	1
C11	0	1	0	1	1	1	1	0	1	1	1	0	8
C12	1	1	1	1	1	1	1	1	1	1	1	1	12
Dependence Power	4	8	3	4	7	8	6	2	8	12	4	2	

As shown in Table 2, the final reachability matrix revealed substantial variation in the extent to which individual competencies influenced the remaining elements of the auditor competency system. Continuous learning and professional development (C8) and adaptability and environmental awareness (C12) had the greatest driving power, each obtaining a driving score of 12. These findings indicate that both components were connected, either directly or through transitive relationships, with all other competencies included in the model. Their relatively low dependence scores of 2 further suggested that these competencies were structurally fundamental and were influenced by comparatively few other components. Professional ethics and integrity (C4) and independence and accountability (C11) each had a driving power of 8, indicating that ethical and independence-related qualities also exerted broad influence throughout the competency structure. Professional and technical knowledge (C1) and information technology and digital competence (C3) each obtained a driving score of 6 and were positioned as important enabling capabilities affecting several downstream professional outcomes. By contrast, decision-making and professional judgment (C10) had the lowest driving power of 1 and the highest dependence power of 12, demonstrating that professional judgment represented the most strongly dependent competency in the system. In

other words, effective professional judgment appeared to emerge as the cumulative consequence of the broader competency configuration rather than functioning as an independent foundational determinant. Risk assessment and fraud detection competence (C9) similarly demonstrated low driving power and high dependence, suggesting that it depended on prior development of knowledge, analytical competence, skepticism, ethics, technological capability, and adaptive capacities. Communication competence (C6), teamwork and interpersonal competence (C7), analytical and critical thinking (C2), and professional skepticism (C5) occupied intermediate structural positions, functioning both as outcomes of more fundamental competencies and as mechanisms through which those foundational competencies were translated into effective audit judgment and performance.

Table 3. Level Partitioning of Auditor Competencies Based on Interpretive Structural Modeling

ISM level	Competency code	Auditor competency component	Structural interpretation
Level I	C10	Decision-making and professional judgment	Most dependent outcome competency
Level II	C9	Risk assessment and fraud detection competence	Applied audit competency directly supporting professional judgment
Level III	C2	Analytical and critical thinking	Cognitive processing competency
Level III	C5	Professional skepticism	Critical evidence-evaluation competency
Level IV	C6	Communication competence	Interpersonal and reporting competency
Level IV	C7	Teamwork and interpersonal competence	Collaborative professional competency
Level V	C1	Professional and technical knowledge	Core professional knowledge foundation
Level V	C3	Information technology and digital competence	Technological enabling competency
Level VI	C4	Professional ethics and integrity	Normative and ethical foundation
Level VI	C11	Independence and accountability	Professional responsibility foundation
Level VII	C8	Continuous learning and professional development	Fundamental developmental driver
Level VII	C12	Adaptability and environmental awareness	Fundamental contextual driver

The level-partitioning results presented in Table 3 produced a seven-level hierarchical structure of auditor competencies. At the lowest and most foundational level of the hierarchy, Level VII, continuous learning and professional development (C8) and adaptability and environmental awareness (C12) were positioned as the principal underlying drivers of the overall competency system. Their position indicates that the sustained development of auditor competence begins with the ability and motivation to continually acquire new knowledge and to recognize and respond to changes in the regulatory, technological, economic, and organizational environment. At Level VI, professional ethics and integrity (C4) and independence and accountability (C11) formed the normative foundation of professional conduct. The location of these competencies immediately above the developmental and adaptive drivers suggests that continuous learning and environmental awareness contribute not only to technical development but also to an auditor's capacity to understand changing professional responsibilities, ethical expectations, and independence requirements. Level V consisted of professional and technical knowledge (C1) and information technology and digital competence (C3). These competencies represented the principal knowledge and technological resources required to perform contemporary audit procedures effectively. Level IV included communication competence (C6) and teamwork and interpersonal competence (C7), indicating that professional knowledge and ethical conduct must be translated into collaborative and communicative behavior within audit engagements. Analytical and critical thinking (C2) and professional skepticism (C5) were positioned at Level III and therefore represented higher-order cognitive competencies that

depend on lower-level knowledge, ethical, adaptive, and interpersonal foundations. Risk assessment and fraud detection competence (C9) appeared at Level II, demonstrating that effective identification and evaluation of audit risks require the simultaneous operation of technical knowledge, digital skills, analytical reasoning, skepticism, and professional ethics. Finally, decision-making and professional judgment (C10) was located at Level I, the most dependent level of the hierarchy. This result indicates that professional judgment constitutes the ultimate integrative competency in the proposed model because it reflects the combined effects of virtually all lower-level capabilities.

Table 4. Driving Power, Dependence Power, and MICMAC Classification of Auditor Competencies

Code	Auditor competency component	Driving power	Dependence power	MICMAC cluster
C1	Professional and technical knowledge	6	4	Independent
C2	Analytical and critical thinking	4	8	Dependent
C3	Information technology and digital competence	6	3	Independent
C4	Professional ethics and integrity	8	4	Independent
C5	Professional skepticism	4	7	Dependent
C6	Communication competence	3	8	Dependent
C7	Teamwork and interpersonal competence	3	6	Dependent
C8	Continuous learning and professional development	12	2	Independent
C9	Risk assessment and fraud detection competence	2	8	Dependent
C10	Decision-making and professional judgment	1	12	Dependent
C11	Independence and accountability	8	4	Independent
C12	Adaptability and environmental awareness	12	2	Independent

Table 4 summarizes the results of the driving–dependence analysis and the MICMAC classification of the 12 auditor competency components. Six competencies were located in the independent or driving cluster: professional and technical knowledge (C1), information technology and digital competence (C3), professional ethics and integrity (C4), continuous learning and professional development (C8), independence and accountability (C11), and adaptability and environmental awareness (C12). These competencies were characterized by relatively high driving power and comparatively low dependence, indicating that changes in these variables are likely to generate substantial effects elsewhere in the competency system. Continuous learning and adaptability were particularly influential, each reaching the maximum driving score of 12. This reinforces their interpretation as the deepest structural drivers of auditor competence. Ethics and independence also showed considerable driving influence, illustrating that competence in auditing cannot be explained solely by technical knowledge or cognitive ability; rather, professional behavior is rooted in ethical commitment, objectivity, and accountability. Professional and technical knowledge and digital competence were also classified as independent drivers, reflecting their enabling role in the performance of more complex audit tasks. In contrast, analytical and critical thinking (C2), professional skepticism (C5), communication competence (C6), teamwork and interpersonal competence (C7), risk assessment and fraud detection (C9), and decision-making and professional judgment (C10) were classified in the dependent cluster. These competencies had relatively greater dependence than driving power and were therefore interpreted as manifestations or outcomes of deeper structural competencies. Notably, no competency was classified as autonomous, indicating that all identified competencies maintained meaningful connections with the broader system. Likewise, no component occupied a strongly unstable linkage position characterized simultaneously by very high driving and dependence power. The absence of autonomous variables strengthens the coherence of the

model because it indicates that each retained competency contributed meaningfully to the overall structural configuration.

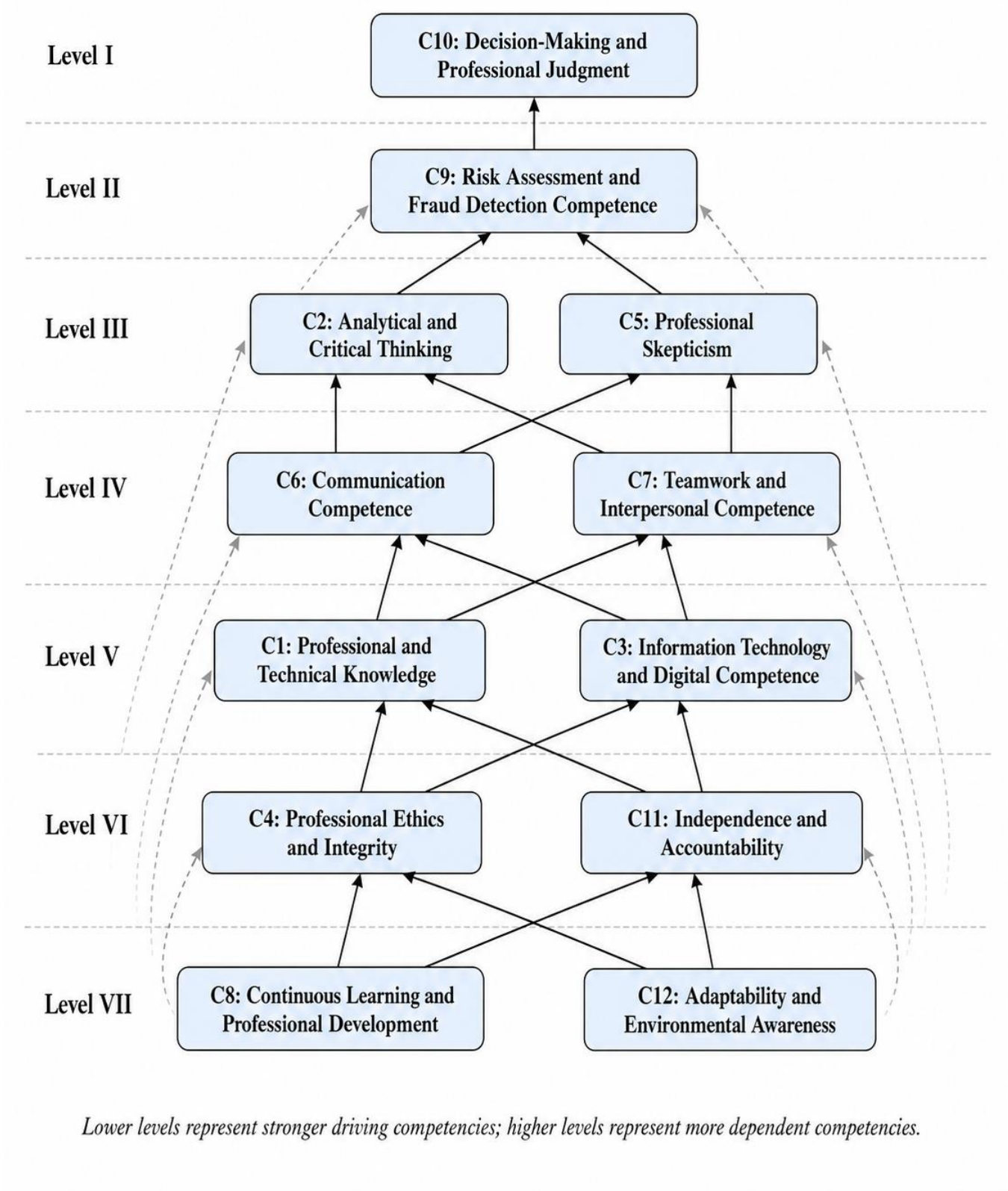

Figure 1. Interpretive Structural Model of Auditor Competencies

The final interpretive structural model shown in Figure 1 illustrates the hierarchical arrangement and directional relationships among the identified auditor competency components. At the base of the model, continuous learning

and professional development and adaptability and environmental awareness function as the primary driving competencies. These factors establish the capacity of auditors to remain professionally current and respond to emerging developments in regulatory requirements, digital technologies, organizational systems, financial reporting practices, and changing risk environments. Their influence extends upward to professional ethics and integrity and independence and accountability, indicating that professional development and contextual awareness strengthen auditors' understanding of evolving ethical duties, accountability expectations, and requirements for independent judgment. The next layer comprises professional and technical knowledge and information technology and digital competence, through which these foundational characteristics are transformed into concrete professional capacity. Communication and teamwork competencies occupy an intermediate position because effective audit practice requires auditors not only to possess knowledge but also to exchange information, coordinate audit procedures, discuss findings, resolve disagreements, and communicate professional conclusions. Analytical and critical thinking and professional skepticism form the subsequent cognitive layer and provide the mechanisms through which evidence is critically evaluated and inconsistencies are identified. These competencies then support risk assessment and fraud detection, which represents a more specific application of the preceding cognitive and professional capabilities. At the highest level, decision-making and professional judgment represents the final integrative outcome of the system. The structure therefore demonstrates that high-quality audit judgment is not generated by a single competency but results from the progressive interaction of developmental, contextual, ethical, technical, technological, interpersonal, and cognitive competencies. The hierarchical arrangement also demonstrates that interventions directed only toward higher-level outcomes such as professional judgment or fraud detection are unlikely to produce sustainable competency improvement unless the deeper driving competencies at the lower levels of the model are simultaneously developed.

Overall, the findings of the Interpretive Structural Modeling analysis indicate that auditor competency is characterized by a clear hierarchical and interdependent structure. The model distinguishes between fundamental driving competencies and more dependent performance-oriented competencies. Continuous learning and professional development and adaptability and environmental awareness constituted the most influential drivers, while professional ethics, independence, technical knowledge, and digital competence formed the second group of structural foundations. Communication, teamwork, analytical reasoning, and professional skepticism served as intermediate mechanisms through which foundational resources were translated into practical audit capability. Risk assessment and fraud detection represented a higher-order applied competency, and decision-making and professional judgment emerged as the ultimate dependent outcome. Consequently, the results suggest that auditor competency should not be conceptualized as a flat set of equally weighted attributes. Instead, it should be understood as a layered system in which lower-level developmental and professional foundations generate the conditions necessary for higher-level cognitive and judgment-related competencies to emerge.

4. Discussion and Conclusion

The present study aimed to identify and structurally model the major competencies required of auditors using Interpretive Structural Modeling. The findings demonstrated that auditor competency is not a flat collection of independent attributes, but rather a hierarchical and interdependent system in which some competencies function as fundamental drivers while others emerge as higher-order outcomes. The final model comprised seven hierarchical levels. Continuous learning and professional development and adaptability and environmental awareness occupied the deepest and most influential level of the model, followed by professional ethics and

integrity and independence and accountability. Professional and technical knowledge and information technology and digital competence formed the next level, while communication competence and teamwork and interpersonal competence occupied an intermediate position. Analytical and critical thinking and professional skepticism were situated at a higher cognitive level, followed by risk assessment and fraud detection competence, whereas decision-making and professional judgment emerged at the highest and most dependent level. The driving–dependence analysis further confirmed this structure, as continuous learning and adaptability exhibited the greatest driving power, while decision-making and professional judgment showed the highest dependence. Collectively, these results indicate that effective audit judgment is generated through the cumulative operation of developmental, ethical, technical, technological, interpersonal, and cognitive competencies rather than through one isolated professional ability.

One of the most important findings was the foundational position of continuous learning and professional development. This competency demonstrated very high driving power and relatively low dependence, indicating that it can influence virtually all other components of auditor competency. This finding is conceptually consistent with the changing nature of the audit profession. Auditors operate in an environment characterized by continuing revisions to accounting and auditing standards, increasing regulatory complexity, technological transformation, changing business models, and the emergence of new forms of financial and nonfinancial risk. Therefore, an auditor who does not continually update professional knowledge and skills may gradually lose the capacity to perform effectively, regardless of prior education or experience. The importance of competency development is also reflected in studies demonstrating that professional competence contributes directly to audit outcomes and performance [4, 5]. In addition, the importance of competent human resources in broader systems of governance has been emphasized by research showing that effective governance mechanisms depend on the competencies of individuals responsible for oversight and decision-making [18]. The present findings extend this literature by showing that learning itself may function as a structural precursor from which several other competencies develop.

Adaptability and environmental awareness occupied the same foundational level as continuous learning and also demonstrated the maximum driving power in the model. This indicates that the ability to understand and respond to contextual changes is not merely a supplementary professional characteristic but a basic condition for the development and effective use of other auditor competencies. Contemporary auditors must adjust to regulatory reforms, emerging technologies, new fraud schemes, organizational restructuring, economic instability, and changing stakeholder expectations. The digitalization of auditing provides a clear example of why adaptability is essential. Research has demonstrated that digital technology capabilities are becoming increasingly important for the sustainability of the auditing profession and the effective detection of fraud risk [16]. Similarly, auditor performance in digital environments depends on the interaction between competence and professional behavior under changing organizational pressures [17]. The foundational position of adaptability found in this study therefore suggests that the value of technical knowledge, skepticism, risk assessment, and professional judgment is partly contingent on the auditor's ability to recognize changes in the environment and modify professional practices accordingly.

Professional ethics and integrity and independence and accountability formed the second foundational layer of the structural model. Their relatively high driving power indicates that ethical and professional responsibility dimensions shape several subsequent competencies. This finding emphasizes that auditor competency cannot be reduced to cognitive or technical expertise. The social value of auditing depends fundamentally on the credibility of the auditor as an independent and ethically responsible professional. Previous studies have similarly reported

that professional ethics and competence are associated with the quality of financial reporting and audit outcomes [7, 8]. Research has also shown that ethics, experience, and professional competence jointly contribute to audit quality [2]. The current model adds a structural interpretation to these findings by suggesting that ethics and integrity are not simply parallel predictors of audit quality but may constitute underlying conditions that facilitate skepticism, responsible communication, risk assessment, and professional judgment.

The structural importance of independence and accountability is also supported by prior literature. Auditors must be capable of maintaining objectivity while simultaneously accepting responsibility for their judgments and conclusions. Defond and colleagues demonstrated the complex relationship between competence and independence in circumstances where auditors have connections with members of client business communities [10]. Such relationships may provide informational advantages but may also create threats to objective judgment. The present findings suggest that independence and accountability occupy an upstream position within the competency structure, influencing several applied and judgment-related capabilities. This result can be explained by the fact that technical expertise cannot generate reliable audit conclusions when the auditor is unwilling or unable to exercise that expertise objectively. Similarly, professional skepticism and risk assessment are meaningful only when they are supported by independence of thought and responsibility for the consequences of professional decisions.

Professional and technical knowledge and information technology and digital competence were positioned at the fifth hierarchical level and classified as independent driving competencies. The placement of professional and technical knowledge is consistent with the longstanding view that knowledge of accounting principles, audit standards, internal controls, financial reporting, and regulatory requirements constitutes a basic prerequisite for competent audit performance. Empirical evidence has repeatedly linked auditor competence and experience with stronger audit outcomes [4, 5]. Moreover, competence has been found to contribute to audit judgment, particularly when auditors face complex tasks [11]. The current findings refine these conclusions by indicating that technical knowledge operates as an enabling competency rather than as the final outcome of professional development. It supports higher-level skills such as communication, critical thinking, skepticism, risk assessment, and judgment.

Information technology and digital competence showed a similarly influential structural position. This finding is particularly important given the rapid technological transformation of audit work. Increasing reliance on automated accounting systems, digital documentation, data analytics, artificial intelligence, continuous auditing, and technology-assisted evidence collection means that auditors must be able to understand and use digital tools effectively. Hatami and colleagues found that information technology plays a mediating role in the relationship between professionalism, competence, and auditor performance [14]. Likewise, Zhang and colleagues showed that information technology usage mediates the effects of internal audit processes and auditor competence on internal audit effectiveness [15]. Research on fraud-risk judgments has also demonstrated that audit technology interacts with auditor competence and task structure in shaping performance [13]. These studies strongly support the current finding that digital competence is a driving rather than peripheral capability. In contemporary audit practice, technical auditing competence increasingly requires technological competence for its effective application.

Communication competence and teamwork and interpersonal competence occupied the middle of the ISM hierarchy. Their position suggests that they function as mechanisms through which foundational competencies are translated into effective professional action. Audit engagements are rarely completed by isolated individuals. They typically involve coordination among audit team members, discussions with management, communication with audit committees, interactions with internal auditors, and documentation of professional conclusions. Therefore,

even technically knowledgeable and ethically responsible auditors may not perform effectively if they are unable to communicate evidence, coordinate tasks, resolve disagreements, or explain findings clearly. This intermediate positioning is consistent with the broader conceptualization of auditor competence developed in competency-oriented research, which increasingly incorporates behavioral and interpersonal elements rather than limiting competence to technical knowledge [1]. It is also consistent with the finding that professional attitudes and contextual conditions can influence internal audit quality [20]. Effective communication and teamwork can be viewed as channels through which individual competence is transformed into collective audit performance.

Analytical and critical thinking and professional skepticism appeared at the third level of the model and were classified as relatively dependent competencies. These findings suggest that such higher-order cognitive abilities depend on a combination of technical knowledge, professional values, digital competence, communication, and experience. Professional skepticism is often regarded as one of the defining characteristics of auditing because it requires auditors to question evidence, remain alert to inconsistencies, and avoid uncritical acceptance of management assertions. However, skepticism is unlikely to be effective without sufficient technical understanding and ethical independence. Cahyono and Hastuti showed that competence, accountability, professional skills, and professional skepticism jointly contribute to audit quality [6]. The present structural model supports this relationship but adds that skepticism may emerge downstream from more foundational competencies. In other words, the capacity to question evidence meaningfully requires prior knowledge of what constitutes reliable evidence, ethical willingness to challenge questionable information, and analytical ability to identify inconsistencies.

The position of analytical and critical thinking can be explained in similar terms. Auditing involves continuous interpretation rather than mechanical procedure. Auditors must compare alternative explanations, evaluate contradictory evidence, determine the significance of deviations, and assess whether identified patterns suggest error, manipulation, or legitimate business variation. Such analytical capability becomes especially important under conditions of task complexity. Hanum and Rahmadana found that competence and experience influence audit judgment in a context where task complexity plays an important role [11]. The current results indicate that analytical thinking is one of the cognitive mechanisms through which foundational technical and professional resources ultimately influence judgment. It is therefore more appropriately viewed as a developed professional capability than as an isolated personal characteristic.

Risk assessment and fraud detection competence occupied the second-highest level of the model, immediately below decision-making and professional judgment. Its high dependence and relatively low driving power suggest that effective risk and fraud assessment is generated by the coordinated operation of multiple lower-level competencies. This finding is theoretically plausible because auditors cannot identify meaningful fraud indicators without technical knowledge, skepticism, analytical reasoning, digital capability, contextual awareness, and ethical commitment. Nandemar found that fraud-risk judgment is shaped by the interaction among audit technology, task structure, and auditor competence [13]. Similarly, auditing internal controls and evaluating control risk require specialized knowledge of organizational processes and the capacity to interpret weaknesses within control systems [12]. The current model indicates that fraud detection should therefore not be treated simply as a standalone technical skill. Instead, it is an applied professional capability that depends on the integration of several more fundamental competencies.

The highest level of the model consisted of decision-making and professional judgment, which also displayed the greatest dependence and the lowest driving power. This is one of the central findings of the study. It indicates

that professional judgment should be understood as the culminating expression of auditor competence. Auditors make judgments concerning materiality, risk, evidence sufficiency, accounting estimates, internal control deficiencies, going concern, fraud indicators, and the appropriateness of reporting conclusions. Such judgments require the integration of nearly all other competencies identified in the model. Prior research has demonstrated that competence and professional experience influence audit judgment [11], while studies of audit quality have shown the combined importance of competence, independence, integrity, professional care, and experience [3]. The current findings provide a structural explanation for these associations: judgment is dependent because it is produced through the integration of knowledge, ethics, independence, technology, communication, skepticism, analytical reasoning, and risk assessment.

Another important finding was the absence of autonomous competencies in the MICMAC analysis. All components demonstrated meaningful relationships with other elements of the competency system, confirming that the retained dimensions belong to an integrated professional architecture. This is consistent with evidence indicating that auditor effectiveness reflects combinations of competence, ethics, experience, accountability, skepticism, professional behavior, and technological capability rather than isolated determinants [2, 6, 17]. The multidimensional character of the model is also consistent with research emphasizing organizational core competency as a broader determinant of organizational information outcomes [19]. The present study therefore contributes to the literature by showing that auditor competencies can be differentiated not only conceptually but structurally according to their relative driving and dependence positions.

The findings also have implications for understanding contextual pressures affecting audit performance. Role ambiguity, time budget pressure, role conflict, and task complexity may prevent auditors from fully translating competence into high-quality performance. Momeni and colleagues showed that role ambiguity can affect auditors' integrity and competence [9], while Nurmawanti and colleagues identified the importance of time budget pressure, professional attitudes, and role conflict for internal audit quality [20]. Cahyono and Hastuti likewise considered time budget pressure as a moderating condition affecting the relationship between auditor attributes and audit quality [6]. These studies help explain why the present structural model should not be interpreted as mechanically deterministic. Even where foundational competencies are strong, organizational conditions may facilitate or obstruct their translation into skepticism, risk assessment, and judgment. Nevertheless, the hierarchical structure provides a useful basis for identifying where professional development efforts should begin.

Overall, the results support a systemic conceptualization of auditor competency. The strongest drivers were continuous learning, adaptability, ethics, independence, technical knowledge, and digital competence, whereas skepticism, analytical thinking, risk assessment, and professional judgment were more dependent. This pattern is highly consistent with contemporary developments in auditing, particularly the increasing need for adaptive professionals capable of integrating technical expertise with technology, ethical responsibility, and complex judgment. Prior studies have demonstrated the importance of competence for audit performance, quality, financial reporting, internal audit effectiveness, and fraud-risk detection [1, 15, 16]. The contribution of the present study lies in organizing these competencies within a hierarchical causal structure and distinguishing the foundational capabilities from the higher-order outcomes that emerge from them.

Several limitations should be considered when interpreting the findings of this study. First, the model was developed using expert judgments from a relatively small purposively selected panel of 18 participants, which is appropriate for Interpretive Structural Modeling but limits the statistical generalizability of the findings to the broader population of auditors. Second, the professional participants were drawn from the auditing profession in

Iraq, while the academic participants were selected from Iran and Iraq; therefore, the identified hierarchy may partly reflect the institutional, regulatory, educational, and professional characteristics of these contexts. Third, ISM relies on subjective judgments regarding the direction and existence of relationships between variables, and although the use of experienced experts enhances the credibility of such judgments, different expert panels may produce somewhat different structures. Fourth, the study modeled relationships among broad competency components and did not examine the relative importance of specific subdimensions or behavioral indicators within each competency. Finally, the cross-sectional expert-based design does not provide longitudinal evidence concerning how these competencies develop over time or how changes in foundational competencies subsequently affect higher-level outcomes in actual audit engagements.

Future studies should validate the proposed structural model using larger and more diverse samples of auditors from different countries, organizational sectors, audit firm sizes, and professional ranks. Quantitative methods such as structural equation modeling could be used to test empirically whether the directional relationships proposed by the ISM model are supported in larger datasets. Researchers could also combine ISM with techniques such as DEMATEL, analytic network process, fuzzy MICMAC, or partial least squares modeling to determine both the strength and direction of relationships among competencies. Longitudinal research would be particularly valuable for examining whether improvements in continuous learning, adaptability, ethics, or digital competence lead over time to stronger skepticism, fraud detection, and professional judgment. Future research could also investigate competency differences between external and internal auditors, junior and senior auditors, public-sector and private-sector auditors, and auditors working in technologically advanced versus less digitized environments. Finally, further studies should develop and psychometrically validate detailed measurement instruments based on the competency dimensions identified in the present model so that the framework can be tested across different professional and cultural contexts.

Audit firms, professional associations, universities, and regulatory bodies should design competency-development programs according to the hierarchical structure identified in this study rather than treating all professional competencies as equivalent training priorities. Continuing professional education should place particular emphasis on continuous learning habits, adaptability to regulatory and technological changes, ethical integrity, professional independence, accountability, technical knowledge, and digital capability because improvements in these foundational areas are likely to influence several higher-order competencies simultaneously. Audit organizations should incorporate these dimensions into recruitment, promotion, performance appraisal, mentoring, and professional development systems. Universities and professional training institutions should integrate data analytics, audit technologies, ethical decision-making, communication, teamwork, skepticism, risk analysis, and judgment exercises into accounting and auditing curricula. Audit firms should also use simulation-based training, fraud scenarios, case-based decision exercises, multidisciplinary team activities, and technology-supported audit projects to strengthen the transition from foundational competencies to applied judgment. Finally, competency assessment should be conducted periodically so that professional development plans can be updated in response to emerging technologies, regulatory reforms, evolving fraud risks, and changes in the wider business environment.

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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