



Evaluating the Role of Artificial Intelligence and Blockchain Technology on Companies' Internal Accounting and Audit Reports

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Abstract

The research design in this thesis was based on a mixed exploratory design and tool development consisting of two stages. In the first stage, qualitative data were collected using the thematic analysis method, and the role of artificial intelligence and blockchain technology on companies' internal accounting and audit reports was presented. Then, the quantitative data were used to determine the relationships between the qualitative and quantitative data. Thus, this study was applied in its quantitative phase and developmental in its qualitative phase. The study population was divided into two qualitative and quantitative parts of the research. In the qualitative part, all the articles and theses related to the subject in recent years were studied in Persian and English (2017 onwards). In the quantitative part, all experts and accountants of financial and auditing companies based in Tehran (1500 people) were considered the statistical population. The results showed that 24 categories were identified as influential factors in the role of artificial intelligence and blockchain technology in Iranian auditing companies' accounting and internal audit reports.

Keywords: blockchain technology, artificial intelligence, accounting reports, internal audit, company

Introduction

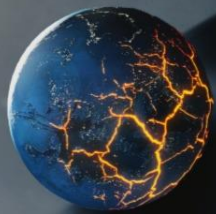
In recent years, blockchain technology has gained much attention for its creative capabilities and has started to expand widely. Organizations are contemplating implementing this technology due to its potential advantages. Saving money, being more transparent, and improving sustainability are possible benefits (Kshetri, 2018). The digital currency Bitcoin helped spread the word about blockchain technology, created by Nakamoto (2009). Despite blockchain's revolutionary characteristics first drawing attention to digital currency and financial applications (Crosby et al., 2016), non-financial sectors have been quick to embrace this "game-changer" (Johnson, 2018). The current body of knowledge presents the many problems that blockchain technology can solve. Angraal et al. (2017) and the energy sector (Ahl et al., 2020; Andoni et al., 2019; Burger et al., 2016) are two examples of possible uses. Iansiti and Lakhani (2017) state that blockchain technology's trustless environments are made possible by its properties, including data immutability, traceability, and smart contracts. A



blockchain is a decentralized ledger containing transactions as data blocks connected to previous blocks using cryptographic pointers. The first block, or genesis, is where the chain starts again. Linkages are established between blocks whenever they are added to the system (Dinh et al., 2018). Rosby et al. (2016) emphasized the importance of distributed consensus, secure information, traceability, verification, and transparency.

Since accounting departments centrally authorize what is recorded in Accounting Information System (AIS) databases, they are responsible for the credibility of financial reports (Tan & Low, 2019). Delays in financial reporting can lead to the age-old problem of 'document fabrication' by some managers who manipulate or falsify financial information to gain unfair advantages over creditors or investors (Dong et al., 2018). Organizations maintain their ledgers in various formats, necessitating extensive reconciliation (Brown et al., 2016). Given the opacity in accounting, auditors often spend significant time gathering and validating transactions. Such paper-based procedures for document verification are tedious and, thus, potentially prone to human error and fraud (Hughes et al., 2019).

Additionally, current Enterprise Resource Planning (ERP) systems lack multi-faceted validation (Cong et al., 2018). Therefore, the current accounting and auditing processes need improvements and should adapt to digital transformation. Accounting experts and researchers are becoming more acquainted with blockchain-based accounting transactions due to the technology's growing popularity in industries such as healthcare, government services, supply chains, and financial services. As a bonus, blockchain technology could solve some of the present problems in accounting by making financial records more transparent, traceable, and timely and providing proof of manipulation (Yu et al., 2018). The Institute of Chartered Accountants in England and Wales (ICAEW, 2018) refers to blockchain as an accounting technology. Deloitte (2016) argues that blockchain is a trump card in accounting because it ensures the integrity of records by providing fully traceable audit trails that enable fully automated auditing. Yermack (2017) states that blockchain has advanced financial record-keeping more than any technology since the introduction of double-entry accounting centuries ago. Its innovative technology allows an accounting ecosystem to inherently validate transactions (Dai & Vasarhelyi, 2017). As many industries are currently exploring various structures in which blockchain can be applied, a set of acceptable models and standards for its use may eventually emerge (Kokina et al., 2017). Blockchain technology, emphasizing access rights and permissions for transaction validation, can be configured differently to grant different access rights to various users, allowing transaction records to be logged, updated, and validated. Public and private blockchains are typically distinguished based on network scale (i.e., the number of involved nodes), network joining permissions, and transaction validation approaches. Given the abovementioned points, this study seeks to evaluate the role of artificial intelligence and blockchain technology in companies' internal accounting and auditing reports.



Theoretical Foundations of Research

The Role of Blockchain Technology in Companies' Internal Accounting and Auditing Reports

Tan and Low (2019) argue that blockchain technology impacts the database engine of Accounting Information Systems (AIS) by digitizing paper-based verifications. This technology can securely store accounting data such as accounts payable and receivable (Dai & Vasarhelyi, 2017) and can enhance the efficiency of transaction accounting (ICAEW, 2018). Deloitte (2017) and McWaters et al. (2016) have identified how blockchain technology addresses current accounting challenges. These methods can streamline operations, reduce transaction settlement times and counterparty risk, minimize fraud, and improve regulatory compliance and capital liquidity. The primary goal of employing blockchain technology for maintaining accounting records is establishing trust (Smith, 2019) and creating a trust network with or without a trusted intermediary (FRC, 2018). Blockchain collects verified information regarding the transaction amount, the payer, and the payee, then hashes the block and adds it to the existing chain (Fanning & Centers, 2016). The combination of hashing algorithms, public and private keys, and decentralized ledgers is what makes blockchain powerful in the modern internet (Hughes et al., 2019) because its immutability, traceability, and visibility enable participants to view fully encrypted transactions (Deloitte, 2016; PwC, 2018). The distributed network, digital signatures, and consensus validation rules make blockchain secure and reliable (Boillet, 2017). According to the Financial Reporting Council, the trust derived from blockchain occurs because records are resistant to tampering and immutable, rooted in their distribution and presentation. Hashes are unique like fingerprints because any change, no matter how minor, causes the hash to change from one unique identity to another when adding information, as such changes mean the block is no longer the same. The consensus mechanism makes it difficult to tamper with blockchain (FRC, 2018). The unique hashing feature of blockchain provides a source of trust to create resilience (Deloitte, 2017). Additionally, the technology can lead to increased auditability and information transparency (Ølnes et al., 2017).

The role of artificial intelligence on Companies' Internal Accounting and Auditing Reports

Artificial intelligence (AI) refers to the science of building intelligent machines through algorithms or rules that the machine follows to mimic human cognitive functions such as learning and problem-solving. In addition, *artificial intelligence systems* are defined as machine intelligence versus human intelligence, which has the potential to anticipate problems or deal with them when they occur and thus act intelligently and adaptively. Artificial intelligence's power lies in learning and recognizing patterns and relationships from large multidimensional and multimodal data sets. Furthermore, AI systems are dynamic and autonomous, learning and adapting as more data becomes available (Bajwa et al., 2021). Artificial intelligence refers to the science and engineering of building intelligent machines through algorithms or rules that the machine follows to mimic human cognitive functions such



as learning and problem-solving (Lee et al., 2019). Companies worldwide are experiencing industry disruption with new technologies leading to business model innovation. Artificial intelligence represents the most essential technological advancement. AI is disrupting industries and companies when companies use it to create innovative business models. Companies such as Amazon, Uber, Tesla, Google, Alibaba, UPS, and many others have reinvented their business models and enhanced their competitive advantages using artificial intelligence. To be competitive and ensure the long-term viability of their firms, senior managers should embrace an entrepreneurial spirit and spread a spirit of innovation and creativity throughout their teams (Lee et al., 2019). Artificial intelligence enhances companies' ability to increase revenue in two distinct ways. First, AI's ability to detect weak signals helps companies develop, refine, and generate multiple forecasts (such as demand, supply, inventory, price, and logistics). Second, the speed at which AI works enables companies to analyze large volumes of data to make real-time decisions. According to Candelion et al. (2020), AI helps businesses increase their revenue by making forecasts more accurate and allowing them to make real-time decisions.

Method

The research design of this thesis is an exploratory mixed-methods approach based on tool development. This type of research design comprises two stages. Stage one involves collecting qualitative data through theme analysis and presenting it to understand how blockchain and AI fit into the bigger picture of internal audits and accounting reports for companies. Afterward, quantitative data is utilized to ascertain the interrelationships among the qualitative data, converting the former into the latter. The quantitative part of the study is more practical, whereas the qualitative part is more concerned with development. The research design for the qualitative part is sequential exploratory mixed-methods. Initially, qualitative data are gathered, followed by quantitative data collection to test the research model.

Given that the qualitative part of the research moves from specifics to generalities and aims to generate hypotheses, the qualitative research approach is inductive. Conversely, in the quantitative part, the research moves from generalities to specifics to test hypotheses, making the quantitative research approach deductive. Both the qualitative and quantitative aspects of this study take the target group into account. The population for the qualitative phase consists of all pertinent Persian (from 2018 onwards) and English (from 2017 onwards) publications and theses published in the last several years on the subject. One thousand five hundred people, all accountants, and specialists employed by Tehran's financial and auditing organizations, make up the population for the quantitative phase. The primary focus of sampling in thematic analysis is on ideas rather than individuals. Generally, sampling in thematic analysis is theoretical sampling, a type of data collection based on developing concepts. This type of sampling relies on the concept of comparison, meaning we must seek out locations, individuals, and events that maximize the discovery of variations and enrich the categories. According to Cochran's formula, the sample size for the quantitative part of the study was estimated at 306



individuals. Considering some responses might not be returned, the researcher distributed 320 questionnaires, of which 314 were returned and used for analysis. A stratified random sampling method was used to determine the sample members, dividing the city into four regions: north, south, east, and west. A library research method was used to gather information related to the literature review and theoretical discussions on the topic, including books and articles in Persian and English, and internet sources. In the qualitative part of this study, a document review was utilized, while in the quantitative part, a researcher-made questionnaire was employed. Face and content validity were used to assess the validity of the questionnaires. In a preliminary test, the questionnaire was distributed among the statistical population, and respondents were asked to provide feedback on the appropriateness of the questions for measuring the intended indices and any ambiguities. Their corrective suggestions were incorporated. Based on the obtained articles, the Kappa coefficient was 0.78, indicating the validity of the extracted codes, as shown in Table 1.

Table 1. Kappa coefficient

Description		Value	Standard Error	Approximate T-statistic	Significance Level
Agreement scale	Kappa	0.782	0.271	2.416	0.04
	Number of valid items	63			

Based on the concepts from the previous stage, in this phase, multiple rounds of study and re-examination were conducted, and an iterative process between concepts and categories was employed. By considering studies specific to each category, the primary and fundamental findings related to that category were compiled together. The role of various factors was examined, and the relationships between categories and factors were identified and analyzed. Cronbach's alpha method was used to measure the reliability of the research questionnaire. The reliability was calculated using the questionnaires and SPSS software data.

Findings

This study searched two international databases, Scopus and Proquest, and three Iranian databases, CIVILICA, Magiran, and SID, to identify and collect various studies. Approximately 208 studies were found for review as a result of this search and by applying inclusion criteria. The total number of articles found, considering the inclusion criteria, was 208 studies (both Persian and English). After reviewing them and considering the exclusion criteria based on content relevance or lack of access, 56 sources were ultimately extracted. These included 16 Persian and 40 English sources, which were reviewed and coded.



Table 2. Extracted resources

Source Code	Author(s)	Source Code	Author(s)
C001	Dehghanian (2021)	C029	Ganawan & Angrush (2017)
C002	Delavari et al. (2021)	C030	Dargahi, Alipour & Heidari Qarabaghi (2021)
C003	Shahrokhi Nejad (2022)	C031	Berghennoen, Horn & Mueijman (2017)
C004	Mehrabi et al. (2020)	C032	Ritva & Rita (2017)
C005	Abtahi & Montazeri (2021)	C033	Aze & Naomi (2018)
C006	Imani & Ghodrati (2021)	C034	Tang & Kwang (2019)
C007	Saghazadeh, Naghash Toosi & Sebt (2022)	C035	Lindholm et al. (2018)
C008	Clardy (2020)	C036	Rocha, Pasador & Shinyashiki (2017)
C009	Chen & Chan (2020)	C037	Vermeeren et al. (2020)
C010	Khorshidi & Akrami (2021)	C038	Ozcelik & Ferman (2019)
C011	Ahmadi, Darvish & Sobhani (2023)	C039	Wu (2020)
C012	Rasool (2018)	C040	Marskaous, Vinz & Seles (2018)
C013	Moradi, Arbabi & Goldust Juybari (2022)	C041	Sandberg (2021)
C014	Ambrosini & Bowman (2018)	C042	Behlouli et al. (2020)
C015	Mozaffari, Moshref Javadi & Nadrian (2020)	C043	Shavelson (2022)
C016	Abili, Nikkhah & Saleh Nia (2019)	C044	Behlouli et al. (2020)
C017	Aref & Moradi Shirazi (2017)	C045	Michel, Obidat & Brey (2019)
C018	Holland & Tura (2018)	C046	Mishra & Akman (2020)
C019	Sanchez & Levin (2020)	C047	Theodorescu (2020)
C020	Hijazeh (2019)	C048	Savanovisin & Stankovisit (2018)
C021	Mulder & Collins (2020)	C049	Ganawan, Angrush & Fischer (2018)
C022	Sinkovics (2018)	C050	Behlouli, Ansari & Fathi (2019)
C023	Haj Karimi, Rezaeian & Hadizadeh (2020)	C051	Draganidis & Georgia (2018)
C024	Vlachos (2020)	C052	Huang, Zheng & Ong (2018)
C025	Capaldo, Iandoli & Zollo (2020)	C053	Delamardlist & Winterton (2018)
C026	Audenaert et al. (2017)	C054	Rozofsky et al. (2019)



C027	Mahmoudi, Zarei Matin & Bahiraei (2018)	C055	Lindgren, Henfridsson & Schultz (2023)
C028	Dubois et al. (2020)	C056	Ganawan, Angrush & Fischer (2019)

Studies possess acceptable validity, reliability, and objectivity; qualitative studies and systematic reviews are no exception. In systematic review studies, comprehensive searches can lead to the discovery of many relevant studies. However, since not all of these studies are of sufficient quality, they must be re-reviewed, and the results of each study must be extracted. Each study should be evaluated using appropriate tools and criteria before inclusion in the synthesis, and only those of desirable quality should be included in the analysis. This research used a checklist containing various criteria for assessing the high, medium, and low quality of each primary study. At this stage, the extracted sources were independently reviewed and examined by at least two "reviewers," if a source was rejected, the reason was also recorded. In case of disagreement between the reviewers, a "third reviewer" acted as the arbitrator.

The meta-synthesis method is appropriate for integrating studies from the systematic review of this research topic. By selecting the meta-synthesis method, and since its goal is to analyze the findings of each study, uncover critical insights, and synthesize the results into a broader framework, the process begins with the open coding method suggested by Glaser (1992). Initially, all key points and factors extracted from the documents are considered codes. Then, considering the meaning of each code, they are compared and grouped into similar categories based on their commonalities as perceived by the researcher. In the next phase, the coding method links categories and factors after repeatedly reviewing the studies and accurately identifying the concepts and their interrelations to combine the results, creating a new way of connecting the information. Finally, after examining the studies from various perspectives and determining the relationships between categories and factors, the axial coding phase is completed, leading to the final step of selective coding and the creation of the proposed final model. According to Creswell (2005), the final model can be presented as a diagram.

The extraction of concepts, coding, and categorization were conducted using MAXQDA software. Upon comparing various concepts, the terms "blockchain" and "artificial intelligence" referenced in different studies pertained to a single topic. After continuous comparisons and conceptualization at a higher level of abstraction, the label "blockchain technology" was assigned to it. This process was applied to all studies, and the key points derived from each of the previous studies' researchers were ultimately tabulated as follows:



Table 3. Input categories

Feature	Open Code	Category	Page	Feature	Open Code	Category	Page
1	C1:001	Perceptual Skill	20	110	C22:001	Employee Competency	5
2	C1:002	Human Skill	14	111	C22:002	Job Competency	12
3	C1:003	Professional Skill	25	112	C22:003	Self-management Competency	27
4	C1:004	Technical Skill	24	113	C23:001	Strategic Skill	6
5	C1:005	Design and Problem-solving Skill	18	114	C23:002	Personal Capability	17
6	C2:001	Managerial Roles	25	115	C23:003	Process and Change Competency	9
7	C2:002	Managerial Abilities	32	116	C23:004	Human Resources Communication Skill	29
8	C2:003	Managerial Skills	7	117	C24:001	Change Implementation Competency	16
9	C2:004	Managerial Personality Traits	23	118	C24:002	Adaptability to Change	19
10	C2:005	Managerial Philosophical Mindset	17	119	C24:003	Change Leadership	27
11	C3:001	Interpersonal Skills	8	120	C25:001	Transformational Skill	7
12	C3:002	Personal Attitudes	30	121	C25:002	Transformational Spirit	31
13	C3:003	People Management	22	122	C25:003	Change Management	14
14	C3:004	Duties and Philosophical Foundations	28	123	C26:001	Crisis Management	21
15	C4:001	Communication Skills	17	124	C27:001	Research and Development Competency	6



16	C4:002	Self-awareness	23	125	C27:00 2	Project-oriented Thinking	21
17	C4:003	Executive Management	7	126	C27:00 3	Performance Metrics Management	10
18	C4:004	Leadership	18	127	C27:00 4	Obstacle Management Competency	32
19	C4:005	Environmental Awareness	6	128	C28:00 1	Enhanced Performance	10
20	C4:006	Decision Making	17	129	C28:00 2	Performance Focus	17
21	C4:007	Organizational Values	3	130	C28:00 3	Meritocracy	12
22	C5:001	Perceptual Skill	25	131	C29:00 1	Responsibility Acceptance	3
23	C5:002	Decision Making	29	132	C29:00 2	Result-oriented	27
24	C5:003	Communication Skill	3	133	C29:00 3	Work Standards Clarification	17
25	C5:004	Teamwork	8	134	C29:00 4	Results Evaluation	19
26	C5:005	Performance Management	7	135	C30:00 1	Effectiveness Skill	15
27	C5:006	People Management	14	136	C30:00 2	Optimal Perspective	24
28	C5:007	Personality Traits	9	137	C30:00 3	Efficiency- oriented	8
29	C5:008	Professional Ethics	4	138	C31:00 1	Task Classification Competency	3
30	C5:009	Leadership	3	139	C31:00 2	Interpersonal Culture Effectiveness	24
31	C6:001	Change Attitude	4	140	C32:00 1	Optimal Use of Administrative Resources	15
32	C6:002	Strategic Thinking	19	141	C32:00 2	Avoiding Unnecessary Expansion	7
33	C6:003	Leadership	25	142	C33:00 1	Procurement Competency	22



34	C6:004	Conflict Management	30	143	C33:002	Cost Management	9
35	C6:005	Emotional Intelligence	20	144	C33:003	Documentation	30
36	C7:001	Specialized Competency	15	145	C33:004	Effective System Creation	32
37	C7:002	Behavioral Competency	23	146	C34:001	Planning Competency	31
38	C7:003	Conceptual Competency	23	147	C34:002	Program-oriented	23
39	C8:001	Operational Competency	20	148	C34:003	Realistic Planning	9
40	C8:002	Strategic Competency	23	149	C35:001	Prioritization Competency	6
41	C8:003	Managerial Competency	18	150	C35:002	Goal Setting Competency	12
42	C9:001	Personality	30	151	C35:003	Planning Skill	18
43	C9:002	Philosophical Foundations	4	152	C36:001	Appropriate Action Competency	28
44	C9:003	Executive Skill	27	153	C36:002	Organizational Skills	24
45	C9:004	Interpersonal Skill	26	154	C36:003	Organizational Design Ability	14
46	C10:001	Management Knowledge and Skill	17	155	C37:001	Technical Information Possession	27
47	C10:002	Individual Characteristics	19	156	C37:002	Psychological Information Possession	29
48	C10:003	Organizational Competency	26	157	C37:003	Specialized Knowledge	3
49	C11:001	Value Criteria	16	158	C37:004	People Management Knowledge	29
50	C11:002	Knowledge Criteria	16	159	C37:005	Communication Knowledge	12
51	C11:003	Ability and Skill Criteria	6	160	C38:001	Technical Skill	3
52	C12:001	Executive Capabilities	18	161	C38:002	Professional Competency	25



53	C12:00 2	Strategic Capabilities	3	162	C39:00 1	Innovation Competency	25
54	C12:00 3	Expertise	22	163	C39:00 2	Organizational Creativity Development	12
55	C12:00 4	Planning Capability	17	164	C39:00 3	Creative Thinking	23
56	C12:00 5	Organizational Capability	24	165	C40:00 1	Strategic Thinking Competency	13
57	C12:00 6	Control Ability	13	166	C40:00 2	Strategic Planning	28
58	C12:00 7	Human Skill	21	167	C40:00 3	Strategic Vision Development	30
59	C12:00 8	Personal Skill	24	168	C40:00 4	Strategic Analysis	5
60	C12:00 9	Value Orientation	20	169	C41:00 1	Foresight Competency	7
61	C13:00 1	Intellectual and Mental Ability	17	170	C41:00 2	Policy Compliance	22
62	C13:00 2	Performance and Executive Traits	18	171	C41:00 3	Flexible Goals Formulation	27
63	C13:00 3	Knowledge and Awareness	5	172	C41:00 4	Organizational Structure Understanding	14
64	C13:00 4	Communication Skill	6	173	C42:00 1	Environmental Awareness	22
65	C13:00 5	Interpersonal Communication	30	174	C42:00 2	Social Responsibility Understanding	20
66	C13:00 6	Personality Traits	18	175	C42:00 3	Environmental Awareness	21
67	C14:00 1	Mental Ability	12	176	C43:00 1	Stakeholder Expectations Understanding	16
68	C14:00 2	Personality Ability	7	177	C43:00 2	Legitimizing Human Resources	29
69	C14:00 3	Communication Competency	30	178	C43:00 3	Human Resources Empowerment	29



70	C14:00 4	Leadership	13	179	C44:00 1	Strategic Thinking Competency	21
71	C14:00 5	Result-oriented	4	180	C44:00 2	Broad Thinking	9
72	C14:00 6	Specialized Competency	5	181	C44:00 3	Holistic Thinking	16
73	C15:00 1	Perceptual Skill	29	182	C45:00 1	Goal Collectivism	9
74	C15:00 2	Decision- Making Competency	8	183	C46:00 1	Problem Identification	3
75	C15:00 3	Teamwork Skill	24	184	C46:00 2	Problem Recognition	22
76	C15:00 4	Leadership Skill	18	185	C47:00 1	People Judgment Competency	21
77	C15:00 5	Personality Competency	4	186	C47:00 2	Decision- Making Skill	30
78	C15:00 6	Ethical Values	20	187	C47:00 3	Inference Competency	17
79	C15:00 7	People Management Competency	31	188	C47:00 4	Goal Identification Competency	27
80	C15:00 8	Performance Management	28	189	C48:00 1	Solution Evaluation	15
81	C16:00 1	Goal-oriented Competency	21	190	C48:00 2	Problem Analysis Skill	17
82	C16:00 2	Operational Skill	15	191	C48:00 3	Problem Confrontation Competency	20
83	C16:00 3	Leadership	19	192	C49:00 1	Problem and Obstacle Reduction Skill	26
84	C16:00 4	Employee Guidance	10	193	C49:00 2	Problem Root Cause Analysis	18
85	C16:00 5	Human Resource Focus	25	194	C49:00 3	Issue Analysis	19
86	C16:00 6	Specialized Knowledge	16	195	C49:00 4	Organizational Issue Analysis Competency	31
87	C17:00 1	Result-oriented	23	196	C50:00 1	Social Competency	29



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88	C17:00 2	People-oriented	27	197	C50:00 2	Mental and Spiritual Competency	19
89	C17:00 3	Judgment Competency	17	198	C50:00 3	Intellectual Creativity	18
90	C17:00 4	Flexibility	25	199	C51:00 1	Verbal Communication Competency	5
91	C18:00 1	Executive Skill	28	200	C51:00 2	Expression Effectiveness	14
92	C18:00 2	Communication s	14	201	C51:00 3	Presentation Skill	17
93	C18:00 3	Supervision and Diagnosis	13	202	C52:00 1	External Communication Skill	15
94	C19:00 1	Communication s	6	203	C52:00 2	Internal Communication Skill	12
95	C19:00 2	Development and Participation	14	204	C53:00 1	Sustained Employee Relationships	14
96	C19:00 3	Action-oriented	28	205	C53:00 2	Interpersonal Communication Skill	12
97	C19:00 4	Technical Expertise	13	206	C53:00 3	Organizational Unit Interactions	21
98	C19:00 5	Organizational Effectiveness	20	207	C53:00 4	Easy Communication with Superiors and Subordinates	20
99	C19:00 6	Personal Effectiveness	28	208	C54:00 1	Evaluation Competency	6
100	C20:00 1	Interpersonal Skills	32	209	C54:00 2	Evaluation Method Presentation	22
101	C20:00 2	Leadership Skill	17	210	C54:00 3	Human Resource Problem Identification	19
102	C20:00 3	Management Skill	21	211	C55:00 1	Persuasion Skill	5



103	C20:00 4	Personality Traits	6	212	C55:00 2	Face-to-face Communication with Employees	31
104	C21:00 1	Personality Competency	25	213	C56:00 1	Respect for Others	29
105	C21:00 2	Personal Capacity	6	214	C56:00 2	Employee Understanding	16
106	C21:00 3	Goal Focus	15	215	C56:00 3	Workplace Acceptability	27
107	C21:00 4	Interpersonal Skill	6	216	C56:00 4	Trust Building	14
108	C21:00 5	Leadership	32	217	C56:00 5	Motivation Creation	7
109	C21:00 6	Change Implementation Competency	18	218	C56:00 6	Teamwork Ability	20

Table 4 shows the processed skills based on managers' qualifications.

Table 4. Categorization and content code and reference

Code	Theme	Category	Content Code
C19:002	Development and Participation	Development and Participation of Others	Development and Participation of Others
C16:005		Focus on Human Resources	Focus on Human Resources
C39:002	Transformational	Organizational Creativity Development	Organizational Creativity Development
C25:002		Transformational Spirit	Transformational
C24:003		Change Leadership	Change Leadership
C24:001		Change Implementation Skill	Change Implementation Competency
C21:006		Change Implementation Skill	Change Implementation Competency
C24:002		Adaptability to Change Skill	Adaptability to Change Competency
C6:001		Change Attitude	Change Attitude
C23:003		Change Process Skill	Process and Change Competency
C25:003		Change Management	Change Management
C26:001	Crisis Management	Crisis Management Skill	Crisis and Its Management



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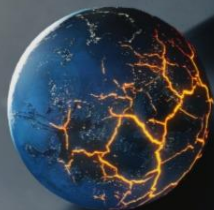
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C49:001		Problem and Obstacle Reduction Skill	Problem and Obstacle Reduction Skill
C27:002	Project Management	Project-oriented Thinking	Project-oriented Thinking
C48:001		Solution Evaluation	Solution Evaluation
C12:001		Executive Capabilities	Executive Capabilities
C35:002		Goal Setting Competency	Goal Setting Competency
C16:001		Goal-oriented Competency	Goal-oriented Skill
C28:002	Goal Orientation	Performance Focus	Performance Focus
C8:003		Managerial Competency	Managerial Competency
C28:001		Enhanced Performance	Enhanced Performance
C21:003		Goal Focus	Goal Focus
C27:003		Performance Metrics Management	Performance Metrics Management
C32:001	Productivity	Optimal Use of Administrative Resources	Optimal Use of Administrative Resources
C33:004		Effective System Creation	Effective System Creation
C45:001	Resource Management	Goal Collectivism	Goal Collectivism
C33:002		Cost Management	Cost Management
C31:001		Task Classification Competency	Task Classification Competency
C47:003		Inference Competency	Inference Competency
C34:002	Planning	Program-oriented	Program-oriented
C12:004		Planning Capability	Planning Capability
C34:001		Planning Competency	Planning Competency
C36:003		Organizational Design Ability	Organizational Design Ability
C29:004		Results Evaluation	Results Evaluation
C54:002		Evaluation Method Presentation	Evaluation Method Presentation
C35:003		Planning Skill	Planning Skill
C41:004	Organization	Organizational Structure Understanding	Organizational Structure Understanding
C36:002		Organizational Skills	Organizational Skills
C12:005		Organizational Capability	Organizational Capability
C19:004	Technical Knowledge	Technical Expertise	Technical Expertise
C13:003		Knowledge and Awareness	Knowledge and Awareness



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C37:003		Specialized Knowledge	Specialized Knowledge
C37:001		Technical Information Possession	Technical Information Possession
C12:003	Specialization	Specialized Ability	Specialized Ability
C9:002		Philosophical Foundations	Philosophical Foundations
C13:002		Performance and Executive Traits	Performance and Executive Traits
C38:001		Technical Ability	Technical Ability
C1:001, C5:001, C15:001	Perceptual Skill	Perceptual Skill	Perceptual Skill
C50:003	Creativity	Intellectual Creativity	Intellectual Creativity
C39:001		Innovation Competency	Innovation Competency
C11:002		Knowledge Criteria	Knowledge Criteria
C39:003		Creative Thinking	Creative Thinking
C6:002	Strategic Thinking	Strategic Thinking	Strategic Thinking
C40:002		Strategic Planning	Strategic Planning
C40:004		Strategic Analysis	Strategic Analysis
C40:003		Strategic Vision Development	Strategic Vision Development
C40:001, C44:001		Strategic Thinking Competency	Strategic Thinking Competency
C8:002		Strategic Competency	Strategic Competency
C23:001		Strategic Skill	Strategic Skill
C44:003		Holistic Thinking	Holistic Thinking
C34:003	Business Understanding	Realistic Planning Presentation	Realistic Planning Presentation
C48:002		Problem Analysis Skill	Problem Analysis Skill
C32:002	Systems Thinking	Avoiding Unnecessary Expansion	Avoiding Unnecessary Expansion
C29:003		Work Standards Clarification	Work Standards Clarification
C54:001		Evaluation Competency	Evaluation Competency
C35:001		Prioritization Competency	Prioritization Competency
C27:001		Research and Development Competency	Research and Development Competency
C4:006, C5:002	Problem-Solving	Decision Making	Decision Making
C46:001		Problem Identification	Problem Identification



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C1:005	Mental Ability	Design and Problem-Solving Skills	Design and Problem-Solving Skills
C15:002		Decision-Making Competency	Decision-Making Competency
C49:003		Issue Analysis	Issue Analysis
C30:002		Optimal Perspective	Optimal Perspective
C14:002		Personality Ability	Personality Ability
C51:002		Expression Effectiveness	Expression Effectiveness
C14:003		Communication Competency	Communication Competency
C51:003	Effective Communication and Facilitation	Presentation Skill	Presentation Skill
C53:003		Organizational Unit Interactions	Organizational Unit Interactions
C53:004		Accessible Communication with Superiors and Subordinates	Accessible Communication with Superiors and Subordinates
C4:005, C42:001		Environmental Awareness	Environmental Awareness
C53:002		Interpersonal Communication Skill	Interpersonal Communication Skill
C4:001, C5:003, C13:004	Work Environment Acceptance	Communication Skill	Communication Skill
C52:002		Internal Communication Skill	Internal Communication Skill
C23:004		Human Resources Communication Skill	Human Resources Communication Skill
C56:003		Work Environment Acceptance	Work Environment Acceptance
C41:002		Policy Compliance	Policy Compliance
C56:004		Trust Building	Trust Building
C21:001		Trust Creation	Trust Creation
C13:001	Learning	Intellectual and Mental Ability	Intellectual and Mental Ability
C44:002		Broad Thinking	Broad Thinking
C17:003	Commitment and Conscientiousness	Judgment Competency	Judgment Competency
C47:004		Goal Identification Competency	Goal Identification Competency
C50:002		Mental and Spiritual Competency	Mental and Spiritual Competency
C11:001		Value Criteria	Value Criteria



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C3:004		Duties and Philosophical Foundations	Duties and Philosophical Foundations
C36:001	Commitment to Excellence and Quality	Appropriate Action Competency	Appropriate Action Competency
C22:002		Job Competency	Job Competency
C14:006		Specialized Competency	Specialized Competency
C50:001	Social Orientation	Social Competency	Social Competency
C43:001		Stakeholder Expectations Understanding	Stakeholder Expectations Understanding
C43:002		Legitimizing Human Resources	Legitimizing Human Resources
C15:006	Ethical Orientation	Ethical Values	Ethical Values
C5:008		Professional Ethics	Professional Ethics
C47:001		People Judgment Competency	People Judgment Competency
C41:003	Flexibility	Flexible Goals Formulation	Flexible Goals Formulation
C17:004		Flexibility	Flexibility
C41:001		Foresight Competency	Foresight Competency
C6:005		Emotional Intelligence	Emotional Intelligence
C29:001	Responsibility	Responsibility Acceptance	Responsibility Acceptance
C42:002		Social Responsibility Understanding	Social Responsibility Understanding
C22:003		Self-management Competency	Self-management Competency
C10:002	Understanding Tasks Mentally	Individual Characteristics	Individual Characteristics
C2:005		Managerial Philosophical Mindset	Managerial Philosophical Mindset
C5:007, C13:006, C20:004		Personality Traits	Personality Traits
C19:003		Action-oriented	Action-oriented
C33:003		Documentation	Documentation
C2:004		Managerial Personality Traits	Managerial Personality Traits
C31:002	Assertiveness and Openness to Criticism	Interpersonal Culture Effectiveness	Interpersonal Culture Effectiveness
C12:006		Control Ability	Control Ability
C22:001		Employee Competency	Employee Competency



C42:003		Environmental Awareness	Environmental Awareness
C21:002		Personal Capacity	Personal Capacity
C55:001		Persuasion Skill	Persuasion Skill
C3:002		Personal Attitudes	Personal Attitudes
C14:005, C17:001, C29:002		Result-oriented	Result-oriented

As mentioned, the role of artificial intelligence and blockchain technology in companies' internal accounting and auditing reports is a set of operations carried out continuously within an organization to create value. This model can be used to categorize and identify the factors influencing the role of artificial intelligence and blockchain technology in companies' internal accounting and auditing reports. When an organization can accurately identify, analyze, and manage the role of artificial intelligence and blockchain technology in these reports, it can determine the impact of each category and take informed actions to eliminate or develop specific skills with a clear understanding of the current situation and future outcomes. In this research section, the researcher aims to examine the validity and reliability of the data collection instrument constructs. Four indices are considered: factor loadings, average variance extracted (AVE), composite reliability, and Cronbach's alpha. These indices are provided for each of the variables in Table 5.

Table 5. Construct validity of the research tool

Variable	Factor Loadings	AVE	Composite Reliability (C.R)	Cronbach's Alpha
Technical Knowledge	0.466	0.544	0.911	0.888
Creativity	0.410	0.560	0.927	0.817
Business Understanding	0.457	0.507	0.933	0.837
Systems Thinking	0.491	0.588	0.901	0.822
Problem-Solving	0.484	0.611	0.847	0.777
Mental Ability	0.920	0.601	0.888	0.791
Work Environment Acceptance	0.574	0.527	0.924	0.837
Social Orientation	0.776	0.533	0.901	0.843
Transformational	0.734	0.542	0.900	0.833
Crisis Management	0.850	0.555	0.837	0.729
Performance Competency	0.814	0.627	0.911	0.864
Productivity	0.848	0.511	0.927	0.891
Organization	0.783	0.500	0.867	0.818
Perceptual Skill	0.874	0.637	0.827	0.739
Strategic Thinking	0.568	0.528	0.811	0.768



Planning	0.913	0.555	0.888	0.738
Resource Management	0.888	0.538	0.842	0.761
Specialization	0.904	0.533	0.844	0.783
Project Management	0.881	0.541	0.861	0.800
Learning Competency	0.929	0.544	0.900	0.859
Commitment to Excellence and Quality	0.504	0.611	0.905	0.862
Ethical Orientation	0.755	0.621	0.855	0.791
Flexibility	0.852	0.674	0.888	0.753
Responsibility	0.882	0.574	0.927	0.841

Discussion and conclusion

In accounting research, agency theory appears to be a standard approach to emphasize conditions of uncertainty, which leads to potential information asymmetry between executives managing the company and external investors. Information asymmetry occurs when managers privately, confidentially, or strategically hold or disclose information to influence the outcome of a decision or transaction. Internal managers are in a position to possess more information, which they can manipulate to maximize their benefits at the expense of the owner. Information asymmetry has created moral hazards that have led to numerous global financial scandals. Consequently, accounting and auditing activities must reduce information asymmetry in favor of transparency and accountability. This review argues that blockchain and AI can provide new technological tools to control and monitor accounting information, reducing information asymmetry and agency problems because blockchain offers shared, verified, and agreed-upon data while AI detects anomalies.

Additionally, smart contracts automate processes that can also reduce managerial manipulation and opportunistic behavior. Under current accounting practices, external financial information users cannot see a company's transactions and accounting processes. Vasarhelyi (2012) indicated that the accounting literature has primarily focused on how users interpret financial reporting standards and market effects but has failed to include diverse stakeholders with different information needs under the current model. He suggests that accounting is shifting to a more segmented approach to information disclosure. Dai and Vasarhelyi (2017) proposed a blockchain-based accounting ecosystem where managers, accountants, business partners, and investors can collaborate to validate transactions, enabling organizations to serve broader interests.

Given that the distributed nature of blockchain technology can be more inclusive, this paper argues that it can be a valuable tool for promoting collaboration and engagement among various individuals within its extensive networks. Companies, along with using AI technology, can foster an open and inclusive organizational culture to enhance decision-making by utilizing shared and mutually verified blockchain data. The previous literature review has indicated that



blockchain technology can address current accounting practices' challenges by providing a new method of recording, updating, validating, and sharing data, including auditing enhanced by advanced AI tools. This paper explored emerging issues and findings related to blockchain applications in accounting to explain how it can change under the blockchain approach and what organizations should consider when adopting the technology. The study detailed the scope of the review and methodology; however, a new and evolving technology can challenge organizations that are facing potential risks from adopting blockchain in accounting. Therefore, further research is needed to explore more instances of blockchain-based accounting usage.

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