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Workplace Learning and IT Competency in External Auditors: Moderating Effects of Organisational Culture

Maria Schulz[1]*, Patrick Mayer[1], Sofia Klein[1]

1. Department of Leadership and Innovation, School of Business, ETH Zurich, Zurich, Switzerland.

Abstract

This research aims to explore how workplace learning, organisational culture, and individual factors—specifically self-efficacy and motivation to learn—affect the information technology (IT) proficiency of external auditors. Additionally, the study investigates whether organisational culture moderates the connection between workplace learning and IT competency. Using simple random sampling, 220 external auditors in Yemen completed a self-administered survey. The relationships proposed in the study were analysed through partial least squares structural equation modelling (PLS-SEM). Findings indicate that workplace learning, self-efficacy, motivation to learn, and organisational culture positively and significantly enhance auditors' IT proficiency. Moreover, organisational culture plays a significant moderating role in the link between workplace learning and IT competency. These results provide valuable insights into how auditors' learning experiences, personal characteristics, and organisational environment collectively contribute to their IT capabilities.

Keywords: Information technology proficiency, Personal traits, Competency framework, Workplace learning, Self-efficacy, motivation to learn.

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Corresponding author: Maria Schulz
E-mail ✉ m.schulz.study@yahoo.com

Introduction

The audit profession is expected to improve efficiency and effectiveness through digital transformation [1]. Businesses increasingly rely on digital technologies to streamline operations, and auditing firms must adapt to this shift [2]. The widespread use of IT in business processes generates digital accounting records, placing demands on auditors to review and verify them accurately. As a result, audit firms are pressured to enhance their technological capabilities and improve auditors' IT knowledge to meet client expectations [3]. Auditors are tasked with providing assurance that clients' financial statements are fairly presented and free from material errors [4]. To perform this role effectively, auditors must utilise appropriate IT tools to manage electronic and paperless records [5].

Professional bodies such as the American Institute of Certified Public Accountants (AICPA, 2001) and the Information Systems Audit and Control Association (2014) have issued IT auditing guidelines, encouraging auditors to adjust procedures in line with client IT systems. Nonetheless, auditors often rely on traditional audit techniques when forming opinions [5-7]. Previous studies highlight generally low IT proficiency among auditors [8-10]. In Yemen, auditors' lack of IT knowledge and skills contributes to limited effectiveness in IT-based auditing [11, 12]. Consequently, IT auditing practices in Yemen remain basic or underdeveloped [13, 14]. The value of the auditing profession relies on practitioners' ability to deliver competent services that meet stakeholder expectations and adapt to changing environments [15].

IT competency refers to knowledge, skills, and attitudes regarding technology that determine performance within a work context [16, 17]. Within accounting, it encompasses a combination of IT and non-IT skills along with practical experience

needed to effectively apply technology in auditing tasks [18]. Auditors should develop expertise in digital systems, data analysis, hardware and software, and information system operations [19]. The International Accounting Education Standards Board [20] emphasises that auditors must achieve high IT proficiency to execute tasks efficiently. Competency theory posits that enhancing task-specific competencies improves performance beyond merely relying on innate skills [21]. Additionally, individuals lacking advanced IT skills are often aware of their limitations and do not overestimate their abilities [22]. Competence is therefore developed through deliberate acquisition of knowledge and practical skills in a specialised domain [23].

Recognizing how essential information technology proficiency has become in the accounting field, several global professional bodies have introduced different competency models to direct the growth of accountants' digital and professional abilities. For instance, in 1995, the International Federation of Accountants (IFAC) released International Education Guideline No. 11 (IEG11) titled "Information Technology for Professional Accountants" to ensure accountants were well prepared for technology-driven environments [24]. Later, in 1999, the American Institute of Certified Public Accountants (AICPA) presented a framework identifying the basic skills and attributes expected of newcomers to the accounting profession. This model highlights the three dimensions of entry-level competence—personal, functional, and broad business insight. It emphasizes lifelong skill enhancement as practitioners advance in their careers [25]. Similarly, the Institute of Management Accountants (IMA) introduced its Management Accounting Competency Framework [26], outlining six major areas of knowledge and expertise needed for accountants and finance specialists to stay relevant in the digital era: technology and analytics, reporting and control, strategy, planning and performance, leadership, professional ethics and values, and business acumen and operations [26]. In a related effort, the Chartered Global Management Accountants (CGMA) issued its CGMA Competency Framework [27], enabling finance and accounting professionals—and their employers—to determine the required skills for current and future positions. First launched in April 2014, this model identifies five domains: digital, people, business, technical, and leadership capabilities.

Earlier investigations on IT competence among accountants have generally explored topics such as their IT knowledge level, the perceived significance of IT skills, identification of IT-related requirements, how IT knowledge aligns with its importance, and how IT competencies can be incorporated into accounting education [8, 9, 28, 29]. However, relatively few studies have analyzed the underlying factors influencing accountants' IT abilities [16, 30, 31]. For instance, Bahador and Haider [31] examined methods for improving IT skills among accounting professionals in Malaysian firms, finding that workplace learning activities substantially affected IT competence. Yet, to date, there appears to be no direct empirical work investigating how workplace learning shapes IT proficiency.

According to Alainati *et al.* [32], individual traits contribute significantly to employee performance and must be considered when analyzing factors affecting competency. Competency theory also suggests that personal attributes—such as motivation to learn and self-efficacy—may play a key role in shaping auditors' professional capacity. Consistent with this view, Alkhaffaf *et al.* [16, 30] explored how features like motivation and goal-setting relate to accountants' IT competency in Iraq. They called for more studies to identify additional variables that might influence IT skills across different contexts. Empirical studies exploring the link between personality characteristics (e.g., motivation to learn, self-efficacy) and auditors' IT competency remain limited. Thus, the current research aims to fill this theoretical gap by analyzing how workplace learning, motivation to learn, self-efficacy, and organizational culture collectively affect IT competence among external auditors in developing nations such as Yemen. In this model, organizational culture acts as a moderating factor between workplace learning and IT competence.

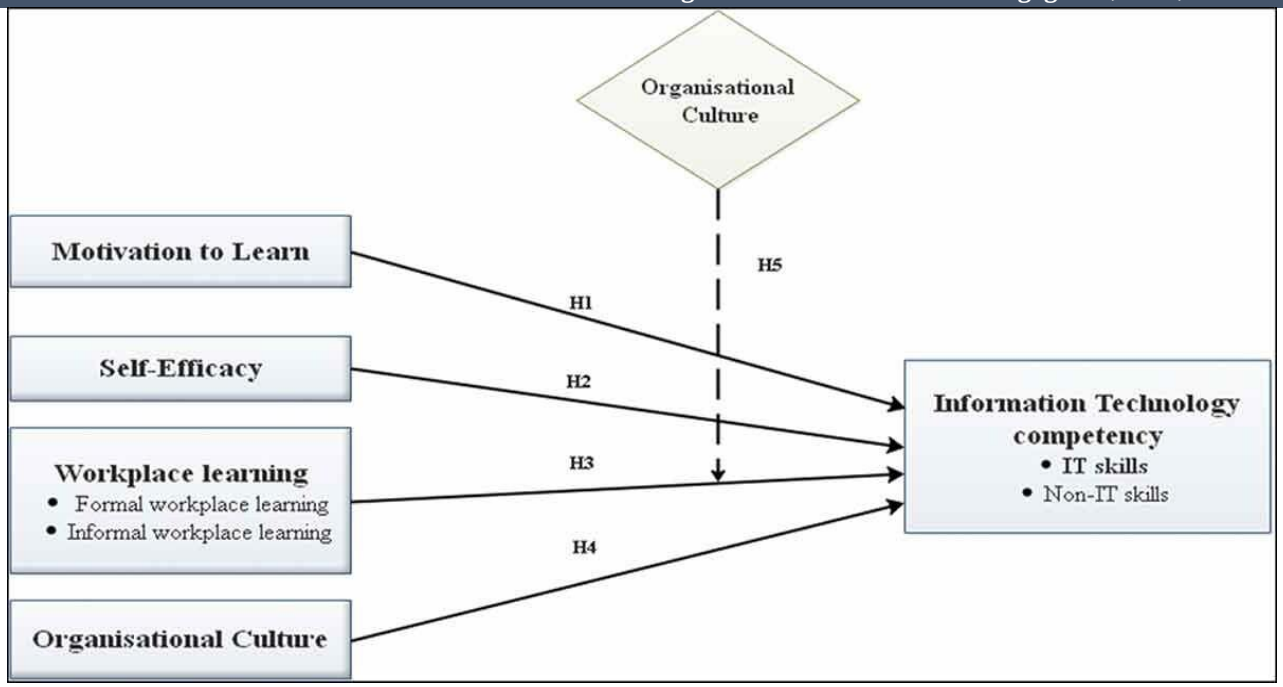

Figure 1. Theoretical framework

The study's findings highlight that strong IT competence is vital for external auditors, as it helps safeguard investors and promotes a stable and appealing investment environment—ultimately supporting national economic growth. This work makes several key contributions to the literature. First, it provides original empirical evidence showing how workplace learning, motivation, and self-efficacy together shape IT competency among external auditors. Second, it identifies workplace learning as the most effective means of strengthening IT proficiency, suggesting that Yemeni audit firms should nurture both formal and informal learning environments. Third, the results confirm that organizational culture can reinforce the connection between workplace learning and IT competency.

This paper is structured into seven major parts: an introduction, background, theoretical literature review, empirical literature review, hypothesis formulation, research design, results and discussion, and finally, the conclusion and summary.

Background

The shortage of information technology expertise among auditors in Yemen has been linked to errors and inconsistencies in company audit reports [11]. Several major firms—such as Marib Poultry, National Bank for Trade and Investment, Paint Production Company, Alberh Cement Factory, and the spinning and weaving factory—have faced bankruptcy [11, 33]. These organisations were primarily reviewed by external auditors who relied on outdated, manual approaches with minimal technological integration [11, 34]. For instance, the downfall of the National Bank for Trade and Investment, one of Yemen's largest financial institutions, was the result of internal fraud by its board of directors. The auditors struggled to retrieve, interpret, and evaluate client data systems because of insufficient IT competence [11]. Despite these limitations, they still released an unqualified audit report [33]. In light of such cases, scholars like Awolowo and Garrow [35] and Gibran [36] have argued that external auditors share accountability for corporate misconduct and financial losses.

Yemen was selected as the focus of this research on auditors' IT capability for several reasons. Firstly, there is intense competition within the private sector to adopt and apply digital information systems in everyday operations. Moreover, approximately 85% of public institutions in Yemen utilize the Accounting and Financial Management Information System (AFMIS) [37]. AFMIS serves as an integrated platform combining multiple governmental financial management functions. As organizations increasingly employ IT systems, external auditors in Yemen must continually upgrade their technical auditing skills to operate effectively in a fast-changing, technology-driven environment [38]. Secondly, empirical investigations on IT auditing—particularly those focusing on auditors' technological competence in developing economies such as Yemen—remain limited [12, 13, 39]. Therefore, identifying the determinants that shape auditors' IT competence is crucial.

External auditors were specifically chosen for this study because they face greater IT proficiency demands than other accounting professionals, as their work often spans numerous clients using diverse information systems [40]. In Yemen, an external auditor is an individual licensed by the Yemen Association of Certified Public Accountants (YACPA) and authorized under national legislation to conduct independent audits.

Theoretical literature review

Competency theory

Competency refers to a set of interconnected knowledge, skills, and attitudes that influence an individual's performance, enabling them to achieve excellence in a particular task or profession [41]. The concept is applied across various disciplines such as management, psychology, education, human resources, and information systems [42]. Competency theory posits that individuals lacking adequate competence often misjudge their abilities and remain unaware of their limitations [23]. Conversely, when IT-related skills are involved—especially those requiring high expertise—gaps in competency become easily visible, preventing individuals from overestimating their abilities [22].

Competency development occurs through four progressive stages: conscious incompetence, unconscious incompetence, unconscious competence, and conscious competence [43].

- In the conscious incompetence stage, individuals are unaware of how to perform a task correctly and may dismiss the value of acquiring the required skill [43, 44].
- In unconscious incompetence, the person recognizes the gap in their knowledge and begins learning through trial and error, simple problem-solving, or interaction with colleagues. At this phase, self-efficacy becomes critical for progression to the next level, and the duration spent at each stage is influenced by the individual's motivation to learn [45].
- During unconscious competence, the learner knows how to execute the task effectively but requires continual practice and reinforcement to internalize the skill [43].
- Finally, in the conscious competence phase, the individual can perform tasks proficiently and also train others to do so [43].

These developmental processes often take place within workplace learning environments.

A comparable four-step framework for skill acquisition was introduced by Schoonenboom *et al.* [46]. The stages include:

1. Orientation, where employees determine which competencies to enhance;
2. Engagement, which involves undertaking learning activities or collecting evidence to assess current proficiency;
3. External evaluation, where others assess the employee's performance; and
4. Re-development, where individuals return to skill improvement if earlier competence levels are deemed insufficient. This cycle of workplace skill development is continuous and iterative.

Review of empirical studies and hypothesis formulation

Information technology competency

Information technology (IT) generally encompasses computing systems, digital programs, and communication tools. However, IT competency extends beyond this, encompassing the practical application of such tools to address an organisation's operational requirements [47].

In alignment with Bahador and Haider [48], this study interprets IT competency as a blend of both technical and non-technical proficiencies that accounting professionals must develop to employ IT resources effectively in their work. The concept is viewed here through two interrelated components: IT skills and non-IT skills.

IT skills relate to a person's proficiency in managing technological resources such as software, databases, and computing systems to achieve professional and personal objectives [48].

Non-IT skills, as defined by the Department of Education, Employment and Workplace Relations [49], refer to "the essential non-technical knowledge and abilities that support effective participation in the workplace." Within the accounting context, the IAESB [50] characterises these skills as including organisational, interpersonal, cognitive, and communication abilities. When integrated with IT capabilities, ethical conduct, and professional values, these non-technical skills form the foundation of professional competence.

Learning motivation and IT competency

Learning motivation can be viewed as the inner drive that prompts an individual to acquire knowledge and develop abilities for personal growth and career advancement [51, 52]. The extent of this motivation can often be evaluated through the learner's engagement and absorption of new material [53]. Motivation has also been described as "the direction, strength, and persistence of behaviour that aims toward learning in training environments" [54].

According to competency theory, progress through skill development stages is influenced by the learner's motivational level [45]. Researchers agree that motivation is crucial for the success of training and professional development. For instance, Kontoghiorghes [55] highlighted that even well-structured training programs are ineffective when motivation to learn is absent. Conversely, Major *et al.* [56] and Tharenou [57] observed that the degree of motivation determines how much individuals participate in educational or training initiatives.

Motivation has been consistently connected to skill acquisition, knowledge improvement, and behavioural transfer during training [52, 58]. As suggested by Sambrook [59], motivation at work fosters decisiveness and continuous learning. Moreover, training effectiveness can increase when programmes are designed to enhance job-relevant skills and motivation [60].

Empirical evidence demonstrates a positive correlation between motivation to learn and learning outcomes, including declarative knowledge and acquired abilities [54, 61, 62]. Lau and McLean [63] further identified learning motivation as a

major predictor of transferable skill development. Employees exhibiting higher motivation levels typically deliver superior performance outcomes [52], as confirmed by Barba *et al*. [64], who found motivation to be the strongest performance determinant.

Despite this evidence, few investigations have explored the connection between learning motivation and IT-related competencies. Hence, this study focuses on auditors in Yemen to examine that link. The hypothesis proposed is as follows:

H1: Motivation to learn has a positive impact on IT competency.

Self-efficacy and IT competency

Self-efficacy refers to one's self-assessment of capability and effectiveness in performing particular tasks successfully [65]. It is not dependent solely on actual ability but rather on the individual's belief in their ability to complete specific actions [65, 66].

From a theoretical standpoint, competency theory suggests that during the second developmental stage—unconscious incompetence—employees often perceive their lack of capability and, with low self-efficacy, may withdraw from further learning. Thus, self-efficacy becomes essential for maintaining engagement and building competency throughout this stage.

Within training environments, self-efficacy positively correlates with participation and learning intent [67]. Individuals with low self-belief tend to underestimate their problem-solving ability and, therefore, may fail to develop new competencies, whereas those with high self-efficacy exert more effort to overcome obstacles and advance their skills [67, 68]. Learners who feel confident in their capabilities are more inclined to absorb new material, practise new skills, and pursue challenging goals. In contrast, individuals with weak self-efficacy are less likely to apply training in the workplace [69].

Complex IT systems often introduce cognitive strain for users [70]. Research has shown that self-efficacy strongly influences users' reactions to such technologies [71, 72]. Studies by Burton-Jones and Hubona [73] and Klopping and McKinney [74] found that computer self-efficacy significantly predicts actual system usage.

Although the role of self-efficacy is well recognised, its direct association with IT competency remains underexplored. This study, therefore, examines how self-efficacy affects the IT competency of auditors in Yemen. Based on this rationale, the following hypothesis is suggested:

H2: Self-efficacy has a positive relationship with IT competency.

Workplace learning and information technology competency

Learning that occurs within the work setting plays a crucial role in improving staff expertise, capability, and performance outcomes [75]. The workplace provides a natural context for individuals to gain experience through collaboration, observation, and interaction with colleagues, while internal training programs generally cost the organisation less than formal external courses [76].

In accordance with competency theory, development programs carried out inside the organisation constitute a main component in the process of building and enhancing professional competencies [46]. The acquisition of practical abilities in such environments often takes place through solving simple and complex tasks repeatedly and through peer engagement until specific skills are mastered [77].

Empirical research consistently supports the contribution of workplace learning to employee competence. For instance, Moon and Na [78] analysed the relationship between learning within the workplace and psychological aspects of learning capability. Their findings demonstrated that the level of workplace learning in medium-sized industrial enterprises exceeded expectations and correlated positively with employee competency. Similarly, Brandão *et al.* [79] observed a strong association between learning at work and employee skills, while Kunjiapu and Yasin [80] reported a moderate yet positive connection between workplace learning and skill growth among Malaysian SMEs in the tourism sector. Daryoush *et al*. [81] also confirmed that workplace learning significantly improved employees' task performance.

Information technology has been identified as a major factor behind shifts in work processes and job functions across industries [82]. Whether applied in management, production, or administration, IT drives organisational transformation, creating a need for employees to adapt continuously through workplace-based learning [83].

Researchers have classified workplace learning through various lenses—planned versus spontaneous, formal versus informal, on-the-job versus off-the-job [84, 85]. However, both formal and informal learning usually occur together, reinforcing one another [86, 87]. Because of this overlap, it is often difficult to label a learning experience as purely formal or informal. Choi and Jacobs [88] also highlighted that knowledge development frequently results from the integration of both modes, which jointly enhance employee capability.

Based on the literature, workplace learning is viewed as a determining factor influencing IT competence. It equips accountants to respond effectively to technological and professional demands. Thus, the following hypothesis is proposed:

H3: Workplace learning is positively related to IT competency.

Organisational culture and information technology competency

Culture represents the shared norms, assumptions, and behavioural expectations among individuals. Organisational culture refers to the set of collective values and philosophies designed by humans to create unity and encourage higher performance and engagement in their roles [89].

Previous studies have shown that organisational culture affects several employee attitudes and behaviours, such as commitment, satisfaction, collective belief systems, and self-efficacy [90, 91].

Within organisations, culture serves as the foundation for defining what counts as competence and determining how skills are developed [92, 93]. Consequently, culture influences competency formation and growth [94]. Empirical evidence suggests that a strong, cohesive culture enhances both employee competency and job performance [95].

Studies concerning workplace learning have also revealed a significant and positive relationship between culture, employee competency, and professional growth [80, 96, 97]. Nonetheless, other investigations have reported inconsistent findings; for example, Brandão *et al.* [79] discovered that learning through written documents showed a weak link with competency enhancement.

Because of these inconsistencies, researchers have argued that other factors may influence the relationship between workplace learning and IT competence. Daryoush *et al.* [98] proposed that organisational culture directs and strengthens workplace learning, improving both task-related and contextual performance. Similarly, Lee *et al.* [99] stated that culture could either support or obstruct the processes of learning and knowledge sharing.

Organisational culture has been widely studied as a moderating factor connecting variables such as personality and managerial competency, learning and job performance, and leadership and role effectiveness [98, 100, 101]. Most of these studies confirmed its moderating impact on competence development.

However, no empirical work has yet investigated the moderating role of organisational culture in the relationship between workplace learning and IT competency. This absence highlights the need for deeper research on how culture shapes such interactions in the context of IT-driven environments.

Accordingly, this study assumes that organisational culture significantly affects how learning occurs within a workplace and can consequently strengthen IT competence among auditors. Hence, the following hypotheses are suggested:

H4: Organisational culture has a positive association with IT competency.

H5: Organisational culture moderates the relationship between workplace learning and IT competency.

Research design

This research adopted a quantitative methodology, employing a cross-sectional survey to obtain responses from participants through a structured questionnaire format.

Data collection procedure

Information for this study was gathered through a questionnaire, with all measurement items derived and modified from earlier validated studies. The surveys were disseminated among external auditors in both public and private organizations throughout Yemen. These auditors were specifically chosen because they work with multiple clients who use diverse information systems, which means their IT proficiency tends to be higher than that of most other accounting professionals [40]. To ensure high-quality data and a strong participation rate, a self-administered questionnaire was utilized.

Population, sampling, and sample size

The target population included 592 external auditors registered under YACPA [102]. According to the Krejcie and Morgan [103] table, the required sample size was 234 respondents. To reduce sampling error and account for potential nonresponses, this study followed the advice of Baruch and Holtom [104] and expanded the sample size by 40%, bringing it to 328 participants.

The questionnaires were distributed using a simple random sampling approach, considered suitable when the population is clearly identified. Over a three-month period (January–March 2019), a total of 233 completed questionnaires were retrieved. Of these, eight were discarded because of missing responses [105], and another five were removed after outlier testing as suggested by Tabachnick and Fidell [106]. This left 220 valid cases for analysis, producing an effective response rate of 67%.

Survey instrument and validation

Measurement tools for each construct were adapted from established literature. The IT competency construct was assessed through 35 items based on Bahador [107] and Greenstein & McKee [9]. This construct encompassed two main aspects:

- IT skills (23 items) – for instance: “Generalized audit software allows auditors to retrieve and process client data for audit analyses.”
- Non-IT skills (12 items) – such as: “I cooperate effectively with others to achieve shared organizational objectives.”

Workplace learning was evaluated using 20 items from Choi [108], divided into:

- Formal learning (8 items) – e.g., “I have received structured guidance from a supervisor to improve my job performance.”

- Informal learning (12 items) – e.g., "I often exchange work-related ideas with colleagues during informal interactions."

Motivation to learn was measured by 7 items developed by Tharenou [57], such as "I am motivated to enhance my IT capabilities through training opportunities."

Self-efficacy comprised 6 items from Chen *et al.* [109], for example: "I am confident in my ability to use IT to handle various challenges."

Organizational culture was represented by 16 items taken from Al-Swidi and Mahmood [110], such as "Our organization values human capability as a vital source of competitive strength."

Two five-point Likert scales were applied: one ranging from 1 (Very poor) to 5 (Excellent) to evaluate IT competency, and another ranging from 1 (Strongly disagree) to 5 (Strongly agree) for all other constructs.

Because participants were Arabic-speaking, a back-translation process was conducted following Brislin [111] to translate the questionnaire from English to Arabic and back to ensure conceptual consistency. After translation, pre-testing, and a pilot study were performed, confirming the instruments' reliability and validity.

Respondent profile

As detailed in **Table 1**, 71.8% of respondents held a bachelor's degree. Most auditors (76.8%) lacked professional certification. Nearly half (47.7%) had 11–19 years of experience, while 54.5% reported no prior IT audit experience. Regarding their workplace, 40.9% were employed in public sector audit institutions.

Table 1. Demographic Profile

Construct	Category	Frequency	Percentage (%)
Qualification			
	Bachelor	158	71.8
	Master	47	21.4
	Doctoral	15	6.8
Professional Qualification			
	None	169	76.8
	CPA	20	9.1
	ACCA	4	2.0
	CMA	2	1.0
	CISA	3	1.4
	CIA	5	2.3
	Other	17	7.7
Experience in Auditing (Years)			
	1–5	36	16.4
	6–10	41	18.6
	11–19	105	47.7
	20–29	33	15.0
	30 and above	5	2.3
Experience in Systems Auditing (Years)			
	No experience	120	54.5
	1–5	55	25.0
	6–10	33	15.0
	11–20	11	5.0
	20 and above	1	0.5
Category of Firm			
	Big-Four	22	10.0
	International firm but non-Big-Four	49	22.3
	Local firm	24	10.9
	Sole Practitioner (Independent office without partners)	35	15.9
	Public auditing (Governmental Organisation)	90	40.9

Source: Author's compilation, analyzed using SPSS version 26.

Results and Discussion

Empirical results

Descriptive statistics

The descriptive results of all latent variables are presented in **Table 2**. The IT competency construct recorded a mean of 3.786 and a standard deviation of 0.640, suggesting that external auditors generally possess a solid foundation of IT-related knowledge and capabilities. Mean values for workplace learning, motivation to learn, self-efficacy, and organizational culture

were 3.879, 4.176, 4.212, and 3.806, respectively. These findings indicate that most respondents agreed that these elements play an essential role in strengthening their IT competency.

Table 2. Descriptive Statistics for Latent Variables (n = 220)

Variable	Number of Items	Mean	Standard Deviation
IT Competency	35	3.786	0.640
Workplace Learning	20	3.879	0.419
Motivation to Learn	7	4.176	0.551
Self-Efficacy	6	4.212	0.484
Organisational Culture	16	3.806	0.646

Source: Author's analysis using SPSS version 26.

Empirical results

Following Cain *et al.* [112], multivariate normality was assessed using web-based software for survey data. Results showed that Mardia's multivariate skewness = 6.527 (t = 239.326, p < 0.00) and kurtosis = 42.634 (t = 6.767, p < 1.31), indicating a violation of multivariate normality. Given this, the study applied Partial Least Squares Structural Equation Modelling (PLS-SEM).

A two-stage procedure was conducted using SmartPLS 3.3.3, due to the multidimensional nature of workplace learning and IT competency, with differing numbers of items per dimension [113]. This necessitated the use of latent variable scores for evaluating the structural model [114].

PLS-SEM includes two primary components:

1. Measurement model: examines how well indicators represent each construct and how effectively these indicators collectively capture the construct [115] — see **Figure 2**.
2. Structural model: evaluates the relationships between constructs [116].

The next subsections provide detailed analyses of these two components.

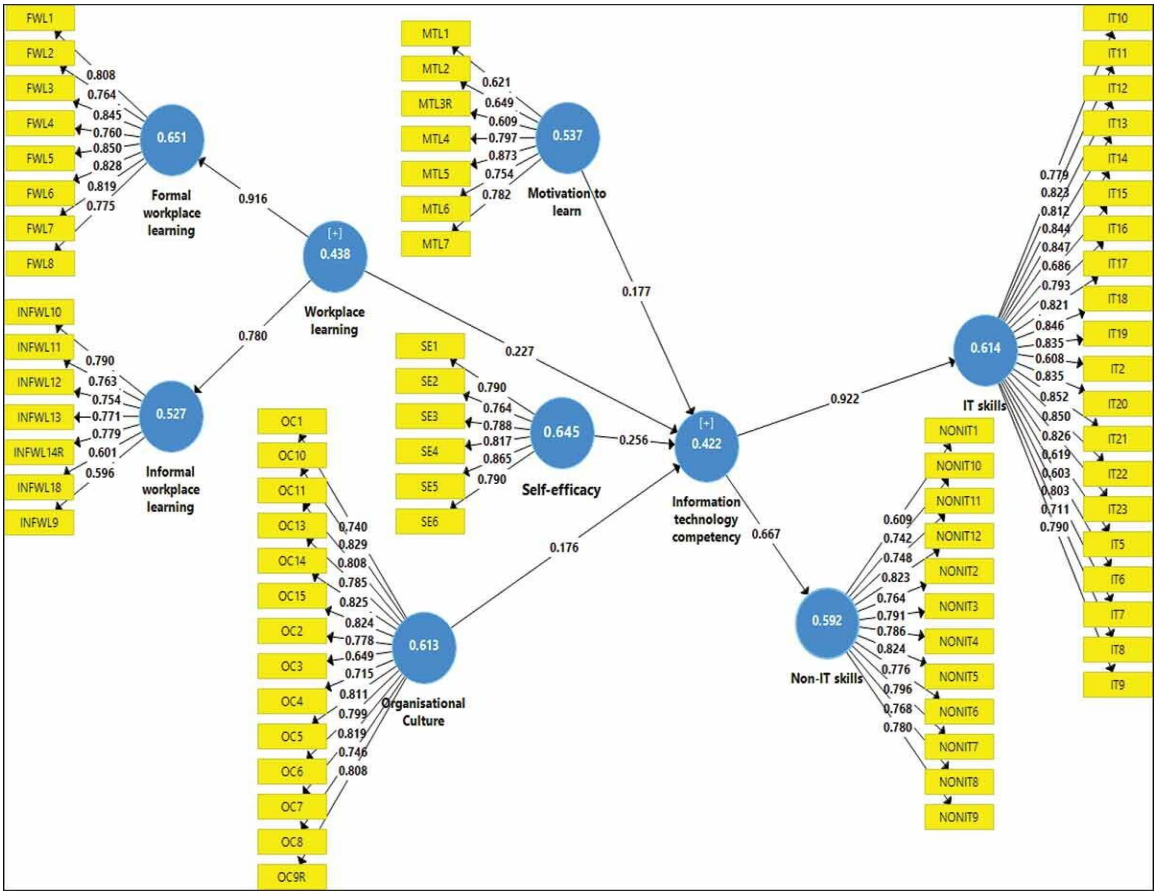

Figure 2. Measurement Model

Measurement model

Establishing the validity and reliability of the constructs is a prerequisite for PLS-SEM. Evaluation included indicator reliability, internal consistency, convergent validity, and discriminant validity [115, 116].

Outer loadings were inspected to determine indicator reliability. According to Hair *et al.* [117], items with loadings between 0.40 and 0.70 require careful evaluation and should only be removed if this increases AVE and CR. Following this rule, eight items (IT1, IT3, IT4, INFWL15, INFWL16, INFWL17, INFWL19, INFWL20) were eliminated from the total of 68 items, as their loadings were below 0.50. Removing these items improved both CR and AVE **(Table 3)**.

Table 3. Construct Reliability and Validity

First-Order Construct	Second-Order Construct	Item	Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)
Formal Workplace Learning				**0.937**	**0.651**
		FWL1	0.808		
		FWL2	0.764		
		FWL3	0.845		
		FWL4	0.760		
		FWL5	0.850		
		FWL6	0.828		
		FWL7	0.819		
		FWL8	0.775		
Informal Workplace Learning				**0.885**	**0.527**
		INFWL9	0.596		
		INFWL10	0.790		
		INFWL11	0.763		
		INFWL12	0.754		
		INFWL13	0.771		
		INFWL14R	0.779		
		INFWL18	0.601		
Workplace Learning				**0.843**	**0.729**
		FWL	0.886		
		INFWL	0.821		
Information Technology Skills				**0.969**	**0.614**
		IT2	0.608		
		IT5	0.619		
		IT6	0.603		
		IT7	0.803		
		IT8	0.711		
		IT9	0.790		
		IT10	0.779		
		IT11	0.823		
		IT12	0.812		
		IT13	0.844		
		IT14	0.847		
		IT15	0.686		
		IT16	0.793		
		IT17	0.821		
		IT18	0.846		
		IT19	0.835		
		IT20	0.835		
		IT21	0.852		
		IT22	0.850		
		IT23	0.826		
Non-Information Technology Skills				**0.945**	**0.592**
		NONIT1	0.609		
		NONIT2	0.764		
		NONIT3	0.791		
		NONIT4	0.786		
		NONIT5	0.824		
		NONIT6	0.776		
		NONIT7	0.796		
		NONIT8	0.768		
		NONIT9	0.780		
		NONIT10	0.742		
		NONIT11	0.748		
		NONIT12	0.823		

Information Technology Competency			**0.797**	**0.662**
	IT Skills	0.778		
	Non-IT Skills	0.848		
Motivation to Learn			**0.889**	**0.537**
	MTL1	0.621		
	MTL2	0.649		
	MTL3R	0.609		
	MTL4	0.797		
	MTL5	0.873		
	MTL6	0.754		
	MTL7	0.783		
Self-Efficacy			**0.916**	**0.645**
	SE1	0.790		
	SE2	0.764		
	SE3	0.788		
	SE4	0.817		
	SE5	0.865		
	SE6	0.790		
Organisational Culture			**0.957**	**0.613**
	OC1	0.740		
	OC2	0.778		
	OC3	0.649		
	OC4	0.715		
	OC5	0.811		
	OC6	0.799		
	OC7	0.819		
	OC8	0.746		
	OC9R	0.808		
	OC10	0.829		
	OC11	0.808		
	OC13	0.785		
	OC14	0.825		
	OC15	0.824		

Source: Author, based on SmartPLS 3 analysis

Internal consistency, measured using CR, requires values above 0.70 [118]. In this study, CR ranged from 0.796 to 0.969, confirming satisfactory reliability. AVE values all exceeded 0.50, demonstrating acceptable convergent validity [117].

Discriminant validity ensures constructs measure unique concepts. Traditional methods like Fornell-Larcker and cross-loadings have been criticized for low sensitivity [119, 120]. Thus, HTMT ratios were employed. As recommended by Henseler *et al.* [120], HTMT values should be below 0.85 (strict) or 0.90 (lenient). All constructs in this study had HTMT < 0.85 **(Table 4)**, confirming strong discriminant validity.

Table 4. HTMT Discriminant Validity

Variable	IT Competency	Motivation to Learn	Organisational Culture	Self-Efficacy	Workplace Learning
IT Competency	—				
Motivation to Learn	0.428	—			
Organisational Culture	0.488	0.128	—		
Self-Efficacy	0.722	0.341	0.259	—	
Workplace Learning	0.815	0.336	0.613	0.505	—

Source: Author, based on SmartPLS 3 analysis

Structural model assessment

After confirming the measurement model, the structural model was evaluated in five steps. Since data were obtained from a single source, Common Method Bias (CMB) was tested using Full Collinearity VIF [121]. All VIF values — motivation to learn (1.275), self-efficacy (1.415), organizational culture (1.414), workplace learning (1.611), IT competency (1.567) — were below 3.3, indicating no single-source bias.

Hypothesis testing followed Hahn and Ang [122]: p-values alone are insufficient. A combination of effect sizes, t-values, and confidence intervals was considered **(Table 5)**.

The structural model results indicate positive and significant effects:

- Motivation to learn → IT competency: $\beta = 0.118$, $t = 2.172$, $p < 0.015$

- Self-efficacy → IT competency: β = 0.340, t = 7.063, p < 0.000
- Workplace learning → IT competency: β = 0.299, t = 5.949, p < 0.000
- Organizational culture → IT competency: β = 0.170, t = 2.869, p < 0.002
- Organizational culture × Workplace learning → IT competency: β = 0.117, t = 2.447, p < 0.007

Therefore, hypotheses H1–H5 were fully supported, as illustrated in **Figure 3**.

Table 5. Direct Effects Hypothesis Testing

Relationship	Beta (β)	Standard Error	T-Value	P-Value	95% Bias-Corrected Confidence Interval		Effect Size (f^2)	Finding
					Lower Limit (BCI LL)	Upper Limit (BCI UL)		
Motivation to Learn → IT Competency	0.145	0.052	2.799	0.003	0.061	0.232	0.027	Supported
Self-Efficacy → IT Competency	0.287	0.053	5.452	0.000	0.211	0.373	0.101	Supported
Workplace Learning → IT Competency	0.230	0.056	4.082	0.000	0.137	0.314	0.055	Supported
Organisational Culture → IT Competency	0.170	0.059	2.869	0.002	0.064	0.262	0.034	Supported
Workplace Learning × Organisational Culture → IT Competency	0.117	0.048	2.447	0.007	0.035	0.168	0.024	Supported

Source: Author, based on SmartPLS 3 analysis

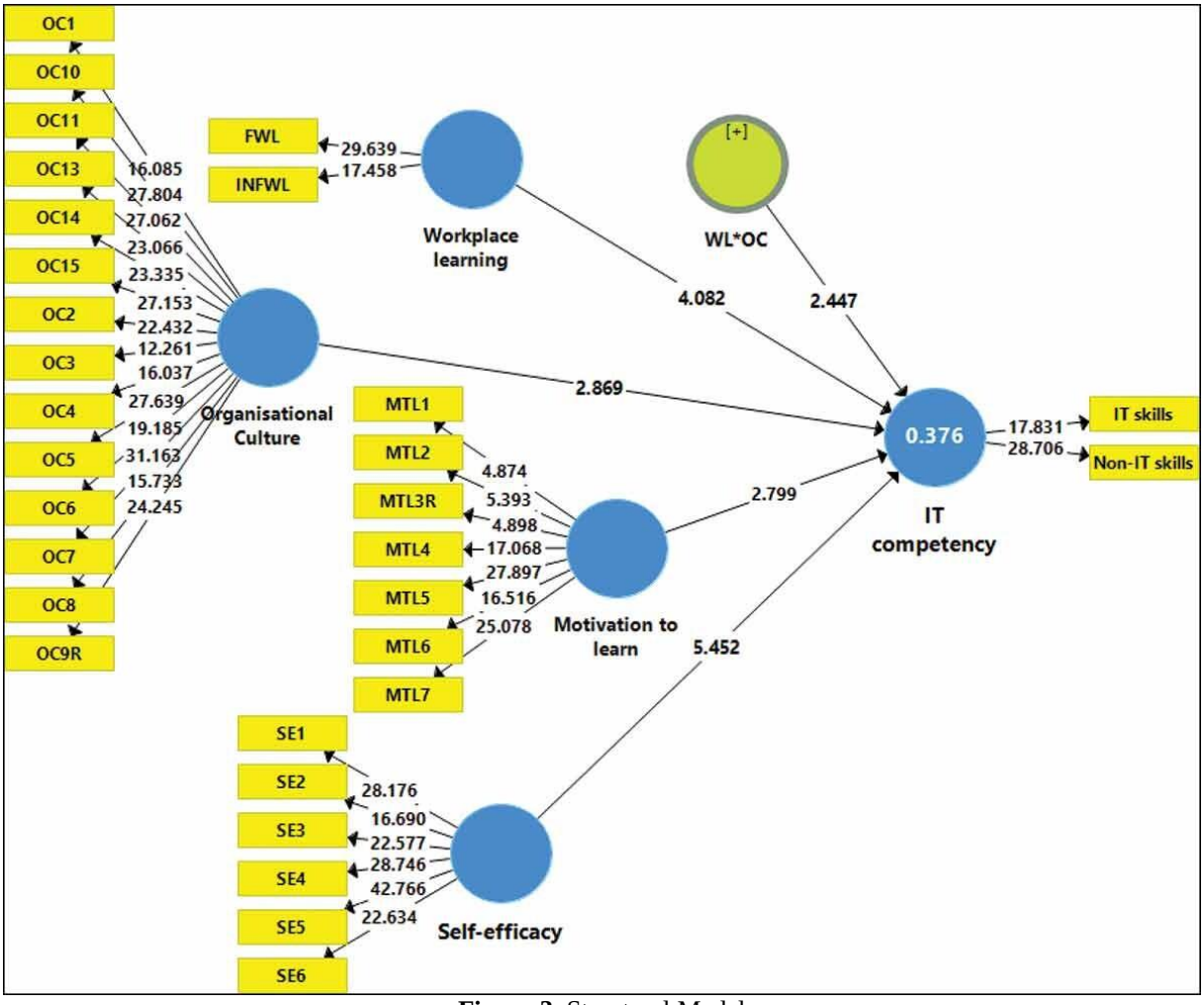

Figure 3. Structural Model
Source: Author, based on SmartPLS 3 analysis

The determination coefficient (R^2) was recorded at 0.376, showing that the set of independent factors—motivation to learn, self-efficacy, workplace learning, and organisational culture—collectively account for 37.6% of the variance in IT

competency. The effect size (f^2) was then calculated to verify each variable's relative impact. The individual results were: motivation to learn ($f^2 = 0.027$), self-efficacy ($f^2 = 0.101$), workplace learning ($f^2 = 0.055$), and organisational culture ($f^2 = 0.034$), each reflecting a minor effect on IT competency [123].

To verify the model's predictive relevance (Q^2), Shmueli *et al.* [124] recommended using PLS-Predict, a modern procedure suited for assessing the predictive strength of PLS-SEM. This method employs a 10-fold holdout approach, generating predictions for each case at either the construct or indicator level to determine predictive validity [124]. The procedure begins by checking whether the Q^2 value of a latent construct is greater than zero before examining individual items. When all differences between the PLS and LM models are smaller, the model is said to have strong predictive ability; when most are smaller, the ability is moderate, and when few are smaller, it is considered weak [124].

The Q^2 value for IT competency was 0.207, which is greater than zero, signifying that the construct has meaningful predictive relevance. As shown in **Table 6**, all Q^2 statistics exceed zero, and the prediction errors from the PLS model are consistently lower than those of the LM model, indicating strong predictive power. The model fit was further assessed using the standardized root mean square residual (SRMR), which must fall below 0.10 to be acceptable [125]. The model's SRMR value of 0.083 confirms that it meets this requirement and can be considered a good fit.

Table 6. PLS-Predict

Item	PLS Q^2_predict	LM Q^2_predict	PLS-LM	PLS RMSE	LM RMSE
IT skills	0.921	0.934	−0.013	0.159	—
Non-IT skills	0.870	0.890	−0.020	0.251	—

Source: Author's computation using PLS 3 software

The study's results reveal that workplace learning has a positive and significant relationship with external auditors' IT competency, confirming H1. This finding implies that an environment that encourages on-the-job learning allows auditors to strengthen their expertise and technical abilities. Such learning is promoted by collaboration and information sharing among colleagues in auditing settings.

This link corresponds with competency theory, which suggests that skills are developed through continuous learning cycles—solving problems, learning from mistakes, and interacting with peers [77]. The result aligns with earlier research showing that learning in the workplace improves both skills and professional competence [79, 80, 96]. Hence, workplace learning contributes significantly to enhancing auditors' IT skills.

The study also found that motivation to learn has a positive and significant effect on IT competency, confirming H2. Given the fast-paced changes in IT within auditing, auditors are motivated to participate in training and development activities to keep their skills current. Many external auditors in Yemen attend such programs voluntarily, recognizing that training helps them strengthen their competencies to match evolving technological demands.

This outcome aligns with the competency theory perspective that individuals' willingness to engage in development programs depends on their learning motivation [45, 97]. Thus, motivation acts as a major factor in encouraging auditors to seek opportunities for growth. Prior findings [62, 63] also confirm that motivation positively influences competence and knowledge acquisition.

Furthermore, self-efficacy was shown to have a positive and significant impact on IT competency, supporting H3. This suggests that auditors who believe in their capacity to meet personal goals are better equipped to handle demanding tasks confidently. Such confidence enables them to use their IT knowledge and skills effectively in their professional roles.

According to competency theory, individuals with lower self-efficacy tend to doubt their abilities and avoid learning new skills, while those with higher self-efficacy persevere and continue developing their capabilities [43]. Therefore, self-efficacy is a key factor that drives auditors to pursue ongoing learning, leading to enhanced competence—particularly in audit-related processes.

The present outcomes are consistent with the majority of earlier investigations, which identified a positive and significant connection between self-efficacy and competency [126-128]. This suggests that self-efficacy serves as an essential element in predicting an individual's drive to succeed in professional growth and learning activities.

Regarding organisational culture, the findings indicate that it exerts a significant and positive effect on the IT competency of external auditors, thereby confirming H4. This implies that a well-established organisational culture helps address challenges faced within auditing firms, supports auditors, and fosters better cooperation among employees. These outcomes are in line with prior evidence [95, 129] showing that organisational culture positively affects job performance and employee competency.

The analysis further reveals that organisational culture moderates the connection between workplace learning and IT competency, thereby supporting H5. This means that within Yemeni auditing firms, the prevailing culture values individual expertise and treats mistakes as opportunities for reflection and improvement.

Taken together, these findings imply that the interaction between workplace learning and IT competency is stronger among external auditors employed in firms characterized by supportive organisational cultures. This observation corresponds with

prior work [92, 130], which emphasized that organisational culture functions as a kind of genetic code, shaping the creation of competencies and guiding how capability is defined within a particular organisation.

Conclusion

The study successfully met its research aims by confirming that workplace learning, motivation to learn, self-efficacy, and organisational culture all have significant positive impacts on IT competency. Moreover, the results verified the moderating role of organisational culture in strengthening the link between workplace learning and IT competency. The model demonstrated solid accuracy and provides valuable insights into improving IT competency—an ability that enables auditors to protect investors and enhance the investment climate, thereby contributing to economic development.

This research also makes several theoretical contributions. It empirically tested how workplace learning, learning motivation, self-efficacy, and organisational culture shape external auditors' IT competency. Unlike earlier descriptive works that typically adopted an organisational-level perspective and relied on the resource-based view, this study applies competency theory to illustrate how these factors jointly explain the development of auditors' IT capabilities. Consequently, the findings enrich and extend the existing literature by highlighting key variables influencing Yemeni auditors' IT competencies. Furthermore, the inclusion of organisational culture as a moderating factor broadens understanding of how internal cultural elements enhance the connection between workplace learning and technological competency, ensuring auditors remain adaptive and relevant in their profession.

From a managerial perspective, the findings offer practical insights for audit firms aiming to strengthen auditors' competencies in competitive environments. High IT competency can be achieved when auditors are encouraged to learn both IT-related and non-IT-related skills. Therefore, firm leaders should implement policies and initiatives that stimulate employees' motivation to learn. Another managerial implication is that workplace learning represents one of the most effective means for developing technical expertise. Thus, audit firms are encouraged to foster a learning-oriented environment—through methods such as on-the-job training, coaching, mentoring, vendor or in-house training, peer learning, and self-practice—to enhance both IT and non-IT professional abilities. In addition, nurturing a strong organisational culture will reinforce teamwork, improve communication, and help auditors manage internal and external challenges more effectively while boosting productivity.

Limitations and suggestions

This study was conducted using a sample composed exclusively of external auditors who met YACPA membership criteria in 2018. Future investigations could be broadened to encompass both external and internal auditors for more generalised findings. Since the present research used a cross-sectional approach, later studies are encouraged to employ longitudinal designs to examine changes over time. Furthermore, the IT competency measure was based on self-reported data, which might introduce common method bias; therefore, subsequent research could use multiple data sources for validation.

Future work might also explore workplace learning as a mediating variable in explaining auditors' IT competency. Researchers could examine how leadership style functions as an additional moderator, potentially strengthening the relationships among key variables. Finally, future studies should extend the model framework to include other relevant constructs and test it not only in Yemen but also in different national contexts, to further verify its generalisability.

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