“Determinants of effectiveness of computer-assisted audit techniques in the public sector”

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DETERMINANTS OF EFFECTIVENESS OF COMPUTER-ASSISTED AUDIT TECHNIQUES IN THE PUBLIC SECTOR

Abstract

The increasing complexity of transaction processes in every organization, both private and public, has led auditors to develop computer-assisted audit techniques (CAATs). However, potential risks, difficulties, and challenges can hinder the effective implementation of CAATs. The purpose of this study was to examine the factors that influence the effectiveness of the implementation of CAATs in the auditor public sector. The study collected the data by distributing questionnaires to respondents. The sample comprised 225 government auditors in Indonesia, namely the Audit Board of the Republic of Indonesia (BPK). The data were analyzed using the least squares structural equation modeling and importance performance matrix analysis (IPMA). The results show that auditor competence and system quality support the effectiveness of using CAATs. In addition, policies and audit evidence do not affect the effectiveness of CAATs' use. Other test results using IPMA show that the most critical variable influencing performance is competence in support of increasing the effectiveness of CAATs. These findings indicate that the effectiveness of CAATs use in BPK as a government audit agency requires the support of auditor competence and system quality.

Keywords auditing, auditor, computer-assisted audit techniques, effectiveness, government auditors, public sector

JEL Classification C88, M42, H83

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INTRODUCTION

Organizations have used avant-garde technology to develop support for their business processes and improve their information processing activities. This affects accountants and auditors to collect information by utilizing information technology to support their activities in fulfilling their review and monitoring tasks effectively. Highly sophisticated computerized accounting systems have several implications for today's audit activity, leading to new audit techniques to assess controls in reducing new business risks. Auditors can benefit from implementing computer-assisted audit techniques (CAATs) in the form of audit effectiveness and efficiency.

However, potential risks, difficulties, and challenges may arise with the application of CAATs. There is evidence of slower adoption of technology-related audits from previous studies. Until now, there has been no adequate achievement in technology-related audit competence, and the use of analytics in auditing is still low. The main factors in IT failure are poor information technology governance, management support, and inadequate instructions. Therefore, measuring the factors that are important and influential in implementing CAATs as a condition for running effectively is vital.

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1. LITERATURE REVIEW

Studies on the use of technology in supporting the audit process have been an important subject of research using different testing techniques. This literature review presents studies on the use of technology in audit support by looking at the factors that are important in influencing the effectiveness of technology support in auditing.

The use of technology to support the implementation of the audit begins with the development of technology to support the implementation of the company's business activities. Therefore, in recent years, it can be seen that the use of technology in supporting the audit process has increased rapidly. The development of the audit process with audit support occurs in both the public and private sectors (Lala et al., 2014). However, the application of information technology in business processes cannot be fully implemented by auditors. The use of information technology by external auditors in small accounting firms is lower than that of large accounting firms. In the end, the need for the use of information technology in the audit process, which should increase in line with digitalized business processes, may be influenced by the auditor's characteristics as a user (Abou-El-Sood et al., 2015). The literature shows that technology acceptance affects the use of technology (Dowling, 2009; Dowling & Leech, 2007). Computer-assisted audit techniques (CAATs) are an example of a tool used for audit purposes. However, many other software programs are also used (Debreceny et al., 2005; Omitogun & Al-Adeem, 2019; Rafi, 2019; Yan, 2015).

CAATs are computer tools that assist auditors in carrying out audit work and completion (Braun & Davis, 2003) by processing audit data (Sayana & Cisa, 2003) and assisting in the assessment of financial statement assertions, such as validity, completeness, ownership, assessment, accuracy, classification, and disclosure (Debreceny et al., 2005). Auditing can become more effective and efficient (Banker et al., 2002; Braun & Davis, 2003; Zhao et al., 2004), and spending costs if CAATs are used (Bierstaker et al., 2014; Saygili, 2010). In addition, other benefits of using CAATs include reducing auditor time, improving audit quality through audit automation, and eliminating specific audit procedures (Janvrin et al., 2008). Data analysis software, network security evaluation software or utilities (Sayana & Cisa, 2003), business intelligence audit software, database applications, and electronic audit worksheets are some examples of the software that can be used in CAATs (Janvrin et al., 2008; Mahzan & Veerankutty, 2011). However, in many developing countries, CAATs are still not widely used (Al-Hiyari et al., 2019; Mahzan & Lymer, 2014; Omonuk & Oni, 2015; Widuri et al., 2016).

Furthermore, the main point of using CAAT for auditors is to provide added value in the form of a significant positive impact in simplifying and accelerating the audit process. However, the effectiveness of using CAATs will increase if the auditors' competence in using CAATs can be employed to elaborate audit practice work in examinations (Aslan, 2021; Ebimobowei et al., 2013). Auditor competence includes knowledge, skills, abilities, and suitability of personal behavior to carry out duties with good and objective results (Supriadi et al., 2019). In the empirical literature, it illustrates that the level of audit work using information technology has been tested in various countries and is still in the development stage both in utilization skills (Chen, 2005), technology adoption (Hamdoun & Hamdan, 2008), and improving information technology training (Janvrin et al., 2008). Hence, using information technology in audits, which can be in the form of CAATs, is a good choice for auditors in developing effective business environments and instruments to improve audit productivity and processes (Aslan, 2021; Ebimobowei et al., 2013).

In a networked environment, auditing needs to be supported by the right policies. This is due to the fact that legislation affects the management of archives, including those produced by digital systems (Zulu et al., 2017). In keeping with this, the use of CAATs by internal auditors demonstrates the necessity for policymakers to adopt the correct use of CAATs in order for its use to be appropriately adopted (Al-Hiyari et al., 2019; Awuah et al., 2022). In addition, company policies must also support the policy on using CAATs in organizations (Curtis & Payne, 2014; Ghani et al., 2016; Widuri et al., 2016; Widuri et al., 2017).

In the use of CAATs, auditors need to be more cautious when dealing with digital evidence and

should examine its adequacy and competence (Nearon, 2005) and how the criteria for digital evidence can be relied upon and its authenticity can be determined to support the audit process (Jacobs, 2012). Only via complete, actual, and dependable information can an audit opinion be shaped during the audit. It is now accepted that the financial audit process relies on the availability of records to form a valuable audit opinion (Ngoepe & Ngulube, 2014).

Digital-based auditing becomes a problem if the evidence of digital records is deemed insufficient to support the audit query. In the end, the auditor will reject the evidence (Mulaudzi et al., 2015). In addition, the criteria used by auditors in determining reliable digital record evidence are less clear (Conway et al., 2006). Risks in the digital sphere pose the risk of digital records being more easily destroyed and altered without leaving a trail. Moreover, the information generated from volatile digital record evidence may result in inaccurate or incomplete information, which could be misused in audits.

The existence of risks in carrying out the audit process using the assistance of the system encourages the need to improve the quality of the system in minimizing the risks that arise in the CAAT system used. System quality is the availability of technical explanations of the information system interface (DeLone & McLean, 2003, 2016; Seddon, 1997) and has reliability, timeliness, ease of access, and flexibility (Nelson et al., 2005; Wixom & Todd, 2005). Therefore, the quality of the right information system will have a significant effect on the quality and performance of software (Subramanian et al., 2007).

The auditee profile also influences the implementation of CAATs by the auditors. The auditee profile may include age, gender, and experience. Evidence suggests that employees' previous experience with existing systems can help them quickly become familiar with similar systems that are more recently being used in the organization (Dholakia & Kshetri, 2004; Kuan & Chau, 2001). In addition, the more experience internal auditors have in using CAATs, the more effective they are (Eulerich et al., 2021), which also applies to external auditors. In the end, the proper implementation of CAATs requires auditor competence, policy support, audit evidence, system quality, and an excellent profile of the auditors who use CAATs.

2. AIMS AND HYPOTHESES

This study aims to determine indicators that support the use of CAAT's in the public sector audit sector more effectively. The aim of the study is to empirically determine the most influential factors in supporting the effectiveness of the use of CAAT's for auditors in carrying out audits in the public sector. It also identifies the most important factors in supporting the effective use of CAAT's in the public sector. The implementation of CAATs by auditors can be supported by financial resources, partners' expertise, the nature of the client's operations (Ghani et al., 2016), and information technology governance mechanisms that can significantly affect audit technology performance (Kong & Nelson, 2020). Furthermore, information technology-related units must be able to monitor the implementation of technology-based audits following auditing standards (Kong & Nelson, 2020).

Until now, research on CAATs is still limited to the behavior of using and adopting CAATs in the private and public sectors (Bierstaker et al., 2014; Curtis & Payne, 2014; Debreceny et al., 2005; Gonzalez et al., 2012; Mahzan & Lymer, 2008, 2014; Purnamasari et al., 2022). Therefore, this study will enrich the evidence on the effectiveness of CAAT application in auditing practices in the public sector, especially in Indonesia. Therefore, this study proposes the following hypotheses:

H_1: *Audit competence positively affects the effectiveness of CAAT use in the public sector.*

H_2: *The policy on the application of CAAT positively affects the effectiveness of CAAT use in the public sector.*

H_3: *Audit evidence positively affects the effectiveness of CAAT use in the public sector.*

H_4: *System quality positively affects the effectiveness of CAAT use in the public sector.*

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3. METHODOLOGY

This study uses a survey method by distributing questionnaires as a data collection tool. Questionnaires were distributed to government auditor respondents who met the criteria as auditors at the head and regional offices with the highest number of auditees and corruption cases in Indonesia. This study combines a scale derived from the technology acceptance model and adaptive structuring theory for effectiveness (Dowling, 2009; Purnamasari et al., 2022; Venkatesh et al., 2003; Wixom & Todd, 2005; Yan, 2015). At the same time, the system quality variables, auditor competence, and audit findings are only based on the development of the adaptive structuring theory (Dowling, 2009; Dowling & Leech, 2007). The specific indicators used to measure each construction are shown in Table 1.

The study uses structural equation modeling (SEM) to examine the relationship between factors that affect the effectiveness of e-audits by using moderated respondent profiles (gender, age, and experience). The paper employed

Table 1. Variable operation

Variable	Construct/Indicators
Competency Audit (cmpt)	Adequate independence, integrity, and professionalism support the implementation of the audit support system
	Continuous education supports the implementation of an audit support system
	Training in the field of audit support systems supports auditors in using audit support systems
	Examiner's ability and knowledge support the implementation of the audit support system
Policy in CAAT (plcy)	The use and application of the audit support system have been stated in the regulations
	The obligation to apply an audit support system for auditors has been regulated in government regulations
	The obligation to report evidence for auditees in the audit support system has been regulated in government regulations
	There are sanctions for auditors in the examination if they do not use the audit support system
	There are sanctions for the auditee if they do not report evidence or documents to the auditee in the audit support system
Evidence Audit (evdn)	Sufficient audit evidence supports the implementation of the CAAT system
Quality system (qlty)	The CAAT system used to carry out inspection work is always accessible to me without any issue
	I can easily understand the existing CAAT features
	CAAT system that is used to carry out inspection work is not easily error
	CAAT system used to perform inspection work helps me in terms of effectiveness and efficiency over time and cost
Effectiveness of CAAT (efty)	How would you rate the ease of an audit support system?
	How would you assess the adequate instructions of an audit support system?
	How would you rate sufficient input from the audit support system?
	How would you rate the precise structure of the audit support system?
	How would you rate the sufficient function of an audit support system?
	The audit support system improves audit quality better
	The audit support system makes the audit process faster

Table 2. Descriptive statistics of respondents

Measure	Item	Frequency
Gender	Male	151 (67.1 %)
	Female	74 (32.9%)
Qualification	Bachelor	123 (54.7%)
	Magister	101 (44.9%)
	Doctoral	1 (0.4%)
Offices Area	Head Office/Secretariat-General	44 (19.6%)
	East Java Regional	85 (37.8%)
	Central Java Regional	50 (22.2%)
	West Java Regional	46 (20.4%)

partial least squares (PLS) to analyze the data. Respondents in this study are government auditors, i.e., auditors at the head and regional offices with the highest number of auditees and corruption cases in Indonesia. Regional offices, referred to as the BPK representatives in this study, include BPK Regional Offices of Central Java, West Java, and East Java. The number of respondents obtained is as many as 225 respondents. Descriptions of respondents in this study are shown in Table 2, with the most distribution being male (67.1%), aged between 36-40 (30.2%), and the majority of respondents having a bachelor's educational background (54.7%).

4. RESULTS

The study uses a structural model analysis that begins with testing reliability and validity tests, multicollinearity tests, and discriminant validity tests. At the end of the test, a regression analysis was performed with structural model analysis and an Importance Performance Matrix Analysis (IPMA) test using smartPLS.

Reliability and validity tests were carried out to determine the suitability of the constructs using structural model analysis. Reliability testing was carried out using Cronbach's alpha (CA) and composite reliability (CR) scores of the Fornell-Larcker measure. Validity testing was carried out using the mean-variance extracted (AVE). CA and CR scores for each construct were above 0.70 (Fornell & Larcker, 1981; Nunnally, 1975), and the AVE scores for all factors meet 0.5 and above (Hair Jr et al., 2014). The CA, CR, and AVE test results are presented in Table 3. The results of the CA and CR tests deduce that CA and CR scores for each construct are above 0.70, within the acceptable reliability range. The AVE test results show that all factors meet the recommended threshold of 0.5 and above.

The multicollinearity test was carried out using variance inflation factors (VIFs). The results of the multicollinearity test presented in Table 3 show that the structural model of the study is not negatively affected by the collinearity problem because the VIF value for construction is below the maximum threshold of 10 (O'brien, 2007).

Table 3. Reliability, validity, and multicollinearity tests

Factor	CA	CR	AVE	VIF
Cmpt	0.827	0.885	0.658	1.679
Plcy	0.74	0.809	0.561	1
Evdn	1	1	1	1.81
Qlty	0.803	0.869	0.625	1
Efty	0.857	0.889	0.502	1.869
Edu	1	1	1	1.37
Reg	1	1	1	2.139
Age	1	1	1	2.406
Expa	1	1	1	1.97
Expe	1	1	1	2.106
Gender	1	1	1	1
edu*cmpt	1	1	1	1
edu*plcy	1	1	1	1.803
edu*evdn	1	1	1	1
edu*qlty	1	1	1	2.03
reg*cmpt	1	1	1	1
rgg*plcy	1	1	1	1
reg*evdn	1	1	1	1
reg*qlty	1	1	1	1
age*cmpt	1	1	1	1.999
age*plcy	1	1	1	2.136
age*evdn	1	1	1	2.569
age*qlty	1	1	1	1.882
expa*cmpt	1	1	1	1.627
expa*plcy	1	1	1	1.452
expa*evdn	1	1	1	1.857
expa*qlty	1	1	1	1.254
expea*cmpt	1	1	1	2.104
expea*plcy	1	1	1	1.575
expea*evdn	1	1	1	1.452
expea*qlty	1	1	1	1
gender*cmpt	1	1	1	1
gender*plcy	1	1	1	1
gender*evdn	1	1	1	1
gender*qlty	1	1	1	1

The discriminant validity test in this study is seen from the square root of the AVE factor score, which must be greater than the cross-correlation between these factors (Fornell & Larcker, 1981). The results of the discriminant validity test shown in Table A1 indicate that discriminant validity is guaranteed because the AVE score for these factors is greater than the squared cross-correlation. The proposed hypotheses were tested using the Bootstrap Smart-PLS procedure. Figure 1 and Table 4 present the results of a structural model based on the PLS algorithm.

Moderation analysis infers that gender, age, education, and work experience have no role in mediating the relationship between auditor quality,

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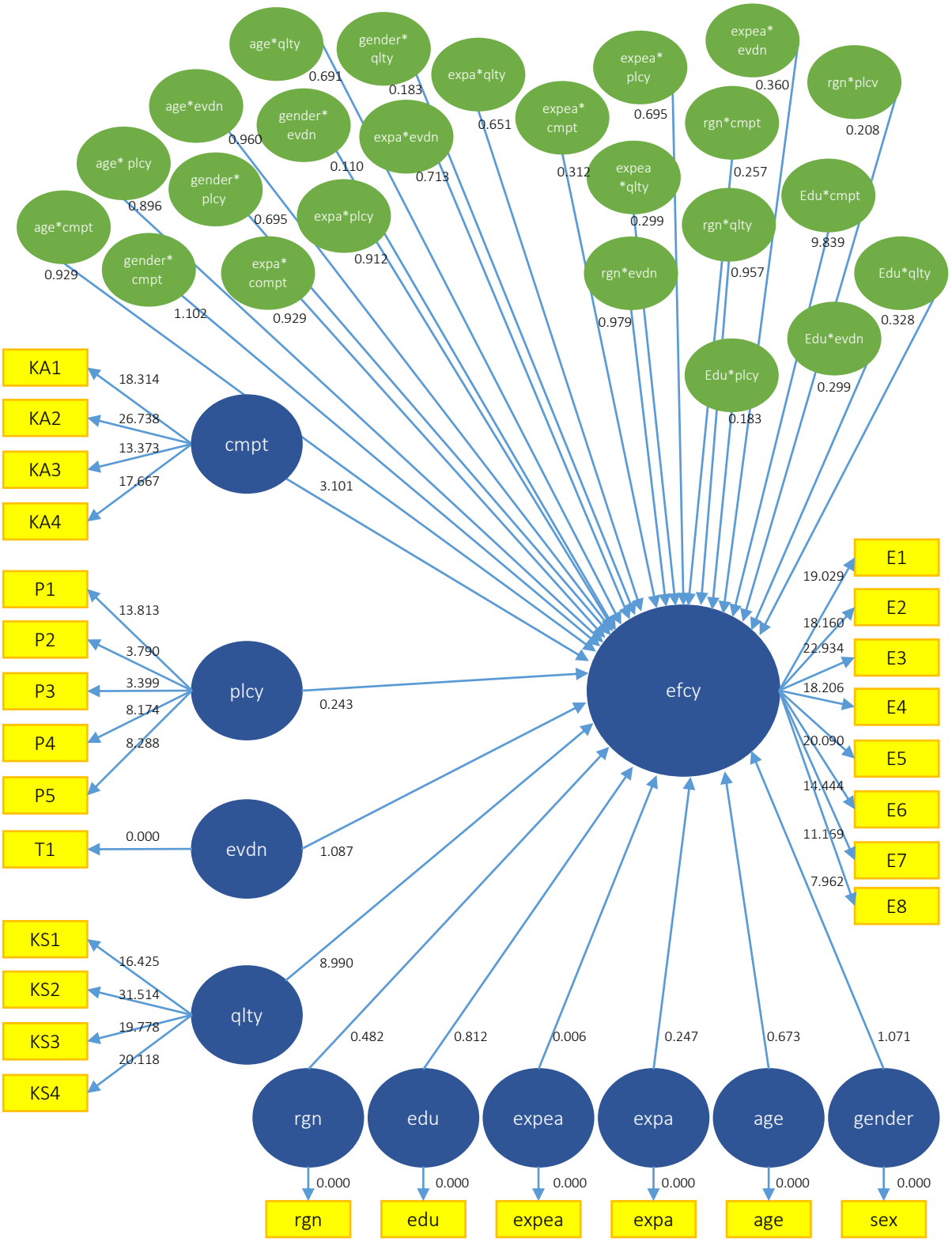

Figure 1. Result of research model

CAAT policies, and system quality on the effectiveness of CAAT application ($p > 0.05$). The results show that auditor competence and system quality positively affect the effectiveness of using CAATs. In contrast, there is no effect of CAAT policy and audit evidence.

Table 4. Regression results

Hypothesis	Sample Mean	St. Dev.	T-Statistics	p-value	Result
cmpt –> efty	0.253	0.104	2.428	0.016	Accepted
plcy –> efty	0.018	0.09	0.188	0.851	Rejected
evdn –> efty	0.089	0.115	0.739	0.461	Rejected
qlty –> efty	0.597	0.088	6.839	0.000	Accepted
R^2			0.538		
Q^2			0.260		

Table 5. Importance-performance results

Construct	Importance	Performances
Cmpt	0.267	74.483
Plcy	0.015	52.94
Evdn	0.061	66.815
Qlty	0.454	61.339
Reg	–0.011	54.222
Age	0.003	40.383
Edu	–0.04	23.111
Expa	–0.033	95.556
Expe	0	48.222
Gender	–0.052	32.889

The model quality test in this study used the coefficient of determination (R2) test (Hair Jr et al., 2021). R2 estimation is 0.538 (53.8%), indicating that the exogenous variable is explained by 0.538 (53.8%) in the endogenous variable "effectiveness of using CAATs." The fit model test of this study uses a cross-validated redundancy (Q2), which should be greater than zero to be fit (Hair Jr et al., 2021; Owusu et al., 2019). With the Q2 result of 0.260, the model can be deduced as fit.

Furthermore, the study conducted a test using IPMA to see the most important and useful performance of each attribute and the gap between the performance of these attributes (Ahmad & Afthanorhan, 2014; Hair Jr et al., 2014). The results from the rescaled analysis and the original rescaled analysis (total effects) are combined in Table 5. The results from the plot of each value in the IPMA are presented in Figure 2.

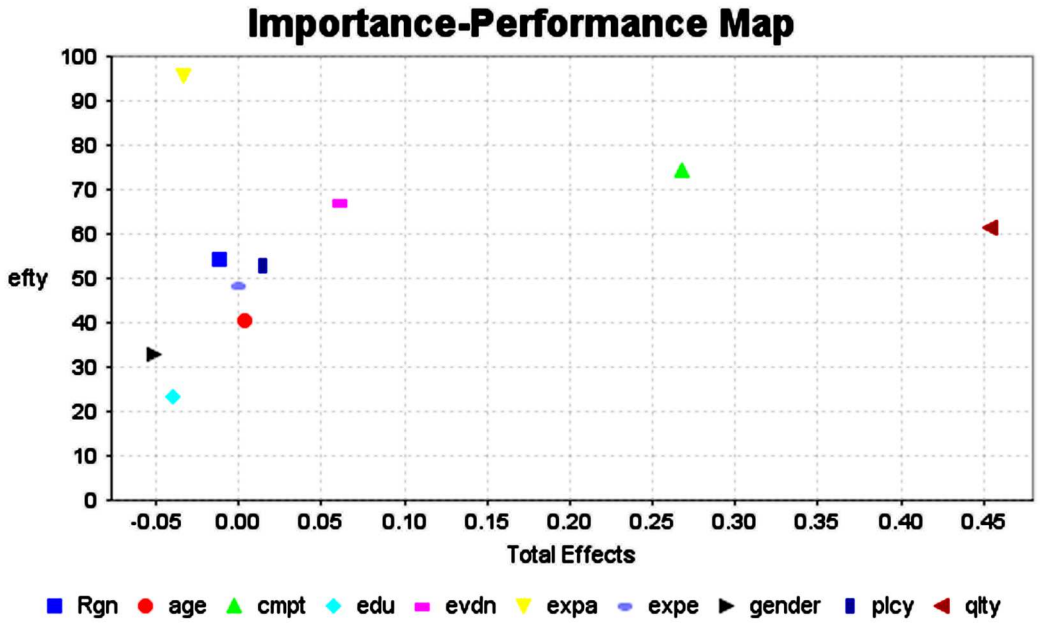

Figure 2. Importance-performance matrix analysis

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5. DISCUSSION

Auditor competence has a significant and positive effect on the effectiveness of CAAT implementation. These findings indicate that competence is vital in using information technology for continuous audits (Ahmad & Afthanorhan, 2014; Hair Jr et al., 2014). The test results show that the successful implementation of the e-audit system effectiveness is in line with the competence of the auditors who use it (Aslan, 2021; Ebimobowei et al., 2013; Supriadi et al., 2019). This implies that the competence of auditors is needed to increase the ability to use audit tools in the form of CAATs. Therefore, auditors must consistently fulfill their roles by having the knowledge, skills, and abilities to carry out their work competently (Tripathi & Agrawal, 2014). The quality of information systems has a significant and positive effect on the effectiveness of CAAT implementation (Subramanian et al., 2007). This finding is in line with Thottoli and Thomas (2022), who stated that the implementation of software for auditing practices will be better if there is support from staff availability, competence, and adequate training.

However, the test results differ for the policy variable constructs and audit evidence, which infer an insignificant relationship. The findings that there is no relationship between policy and CAAT effectiveness are not in line with Owino and Musuva (2021), who found that CAATs in audits need integration between system-based audit policies using computerized techniques. This can mean that an auditor has a conscious desire that CAATs must be used to support audit implementation more efficiently. Hence, whether with or without policies, auditors have used CAATs in carrying out their audit duties.

The test results on audit evidence show no effect on the effectiveness of CAATs, which means that auditors still combine the application of auditing through CAATs or manual audits. Considering that BPK auditors are spread across various islands in Indonesia with conditions in many areas having slow internet networks, thus, there are still audits that rely more on manual audits (Purnamasari et al., 2022).

Additional test results using moderating variables in the form of auditor profiles, namely the regional origin of the BPK office, gender, age, audit experience, experience using CAATs, and education, showed insignificant results and did not affect their effectiveness. These results are in line with Purnamasari et al. (2022). IPMA analysis makes it possible for a leader, either a director or a manager, to improve the management strategy because it shows the main factors that require an immediate response (Wyród-Wróbel & Biesok, 2017). Concerning the implementation of CAATs, it was found that competence is the most valuable variable to increase their effectiveness.

In general, these findings confirm previous studies of CAAT implementation in various sectors showing that competence has a positive influence on the effectiveness of CAATs (Aslan, 2021; Ebimobowei et al., 2013; Supriadi et al., 2019). Specifically, auditors with more competence can be more effective in using CAATs when conducting the audit process. However, in the end, there is a need for other research to better understand the aspects that can be evaluated and improved by auditors to encourage increased effectiveness of using CAATs using the least squares structural equation modeling and importance performance matrix analysis (IPMA).

CONCLUSION

This paper was conducted to examine the most influential factors in the effectiveness of using CAATs in the public sector. CAATs that have been developed and used by auditors in the public sector simplify and speed up the audit process. However, the introduction of CAATs faces challenges in optimizing the use of CAATs in the public sector, whether individual auditors or the government audit agency. This study provides evidence that implementing CAATs in the public sector can run effectively if several factors support it.

In line with the hypotheses in this study, there is a positive relationship between competence and system quality on the effectiveness of using CAATs. Ultimately, a better understanding of the underlying

factors for the effective use of CAATs is a step that will significantly assist in the broader development of this technology in the public sector. On the other hand, other variables (CAAT policy, audit evidence, and model moderation in the form of auditor profiles (age, education, experience, gender) do not affect the effectiveness of using CAATs. Therefore, auditors need to improve their competence, knowledge of current issues, conceptual skills in defining techniques, and competence in implementing CAATs.

However, the findings of this study are limited in several respects. First, CAATs in testing at BPK Indonesia still use an understanding of all CAATs that consist of 4 types. This can affect the interpretation results because the implementation and development of CAATs are different. Second, this study did not use in-depth interviews related to CAATs at BPK Indonesia. Interviews can provide an understanding of the effectiveness of CAAT implementation. To sum up, these limitations can be considered in future research.

AUTHOR CONTRIBUTIONS

Conceptualization: Pupung Purnamasari, Rudy Hartanto.
Data curation: Pupung Purnamasari, Rudy Hartanto.
Formal analysis: Pupung Purnamasari.
Investigation: Pupung Purnamasari, Rudy Hartanto.
Methodology: Pupung Purnamasari, Rudy Hartanto.
Project administration: Rudy Hartanto.
Resources: Pupung Purnamasari, Rudy Hartanto.
Software: Rudy Hartanto.
Supervision: Pupung Purnamasari.
Validation: Pupung Purnamasari, Rudy Hartanto.
Visualization: Pupung Purnamasari, Rudy Hartanto.
Writing – original draft: Pupung Purnamasari, Rudy Hartanto.
Writing – review & editing: Pupung Purnamasari, Rudy Hartanto.

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APPENDIX A

Table A1. Discriminant validity results

	Rgn	age	age* cmpt	age* evdn	age* plcy	age* qlty	cmpt	edu	edu* cmpt	edu* evdn	edu* plcy	edu* qlty	efty	evdn	expa	expa* cmpt	expa* evdn	expa* plcy
Rgn	1.00																	
age	0.01	1.00																
age*cmpt	–0.02	0.12	1.00															
age*evdn	0.09	0.02	0.43	1.00														
age*plcy	–0.08	0.13	0.17	0.17	1.00													
age*qlty	–0.02	0.06	0.28	0.15	0.48	1.00												
cmpt	0.17	0.09	–0.03	–0.01	0.09	0.08	0.81											
edu	0.13	0.28	–0.02	0.00	0.09	0.07	0.16	1.00										
edu*cmpt	0.00	–0.03	0.26	0.09	0.19	0.13	0.06	0.02	1.00									
edu*evdn	0.05	0.00	0.09	0.30	0.14	0.05	0.03	0.02	0.40	1.00								
edu*plcy	0.02	0.09	0.20	0.16	0.31	0.24	–0.01	0.00	0.20	0.22	1.00							
edu*qlty	0.04	0.07	0.11	0.05	0.23	0.25	–0.09	0.00	0.25	0.17	0.43	1.00						
efty	–0.01	0.07	0.01	0.03	0.14	0.11	0.47	0.05	0.03	–0.08	0.04	–0.06	0.71					
evdn	–0.03	–0.12	–0.01	–0.16	–0.03	0.04	0.41	0.15	0.03	–0.20	0.01	–0.14	0.28	1.00				
expa	0.02	–0.02	–0.07	–0.06	–0.09	–0.13	0.13	0.08	0.03	–0.05	–0.02	–0.01	0.10	0.06	1.00			
expa*cmpt	–0.05	–0.08	0.25	0.13	0.03	0.05	0.00	0.03	0.03	0.05	–0.08	–0.02	0.05	0.01	–0.47	1.00		
expa*evdn	–0.01	–0.07	0.15	0.27	0.17	0.14	0.01	–0.06	0.08	0.08	0.08	0.10	–0.02	0.09	–0.30	0.26	1.00	
expa*plcy	–0.02	–0.09	0.05	0.13	0.27	0.26	0.01	–0.02	–0.09	0.06	0.18	0.12	–0.07	–0.04	–0.31	0.20	0.53	1.00
expa*qlty	0.01	–0.13	0.05	0.11	0.27	0.41	0.03	–0.01	–0.03	0.07	0.13	0.09	–0.04	–0.01	–0.45	0.18	0.41	0.70
expe	0.01	0.25	0.12	0.00	0.03	0.03	0.11	0.04	0.15	0.01	0.13	0.06	0.16	0.12	0.39	–0.17	–0.10	–0.11
expea*cmpt	–0.04	0.12	0.51	0.25	0.17	0.11	–0.02	0.13	–0.02	–0.05	0.07	0.04	0.02	–0.03	–0.14	0.32	0.08	0.09
expea*evdn	0.07	0.00	0.26	0.34	0.05	0.07	–0.03	0.01	–0.06	0.01	0.04	0.02	–0.02	–0.09	–0.08	0.06	0.29	0.19
expea*plcy	0.06	0.03	0.19	0.06	0.25	0.17	0.11	0.13	0.06	0.02	0.09	0.14	0.11	0.11	–0.12	0.09	0.25	0.39
expea*qlty	0.03	0.03	0.11	0.05	0.15	0.34	0.16	0.06	0.03	0.00	0.16	0.07	0.13	0.10	–0.14	0.09	0.18	0.27
gender	–0.08	0.12	–0.06	–0.01	0.01	0.06	–0.07	0.05	–0.04	–0.01	0.06	–0.02	–0.05	0.01	0.02	–0.04	0.05	0.05
gender*cmpt	–0.11	–0.07	–0.02	–0.07	0.01	–0.01	–0.18	–0.04	–0.05	–0.02	0.14	0.10	–0.15	0.00	–0.05	–0.08	–0.03	0.08
gender*evdn	–0.14	–0.01	–0.07	0.02	–0.03	–0.02	0.00	–0.01	–0.03	0.01	–0.02	0.06	–0.01	–0.06	0.04	–0.03	–0.14	–0.10
gender*plcy	–0.05	0.01	–0.01	–0.03	0.07	0.05	0.06	0.06	0.13	–0.03	0.15	0.03	0.06	0.10	0.05	0.06	–0.12	–0.03
gender*qlty	–0.12	0.06	–0.01	–0.02	0.06	–0.02	–0.04	–0.02	0.09	0.06	0.04	–0.08	0.08	0.00	0.05	0.07	–0.05	–0.02
plcy	0.07	0.23	0.08	–0.03	0.04	0.12	0.21	0.04	–0.01	0.01	0.19	–0.02	0.35	0.22	0.06	0.01	–0.05	0.02
qlty	–0.03	0.01	0.07	0.04	0.13	0.12	0.27	0.05	–0.09	–0.14	–0.02	–0.10	0.69	0.19	0.10	0.03	–0.01	–0.04
rgn*cmpt	–0.06	–0.02	–0.07	0.04	–0.07	–0.02	0.02	0.00	0.11	0.08	–0.07	0.05	–0.05	0.06	–0.05	0.08	–0.06	0.07
rgn*evdn	0.02	0.10	0.06	–0.14	0.04	0.11	0.07	0.05	0.11	0.11	0.02	0.04	–0.05	0.33	–0.01	–0.04	–0.01	0.02
rgn*plcy	0.12	–0.07	–0.03	0.02	–0.06	–0.04	–0.05	0.02	–0.07	0.01	0.13	–0.02	–0.05	0.12	–0.02	0.08	0.02	0.03
rgn*qlty	0.06	–0.02	–0.01	0.11	–0.04	–0.10	–0.06	0.04	0.07	0.04	–0.01	0.20	0.00	–0.01	0.01	0.02	–0.02	0.01

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Table A1 (cont.). Discriminant validity results

	expa* qlty	expe	expea* cmpt	expea* evdn	expea* plcy	expea* qlty	gender	gender* cmpt	gender* evdn	gender* plcy	gender* qlty	plcy	qlty	rgn* cmpt	rgn* evdn	rgn* plcy	rgn* qlty	
Rgn																		
age																		
age*cmpt																		
age*evdn																		
age*plcy																		
age*qlty																		
cmpt																		
edu																		
edu*cmpt																		
edu*evdn																		
edu*plcy																		
edu*qlty																		
efty																		
evdn																		
expa																		
expa*cmpt																		
expa*evdn																		
expa*plcy																		
expa*qlty	1.00																	
expe	–0.14	1.00																
expea*cmpt	0.09	0.04	1.00															
expea*evdn	0.14	0.09	0.54	1.00														
expea*plcy	0.27	0.11	0.30	0.22	1.00													
expea*qlty	0.34	0.17	0.27	0.23	0.48	1.00												
gender	0.05	0.04	–0.02	–0.07	–0.08	0.07	1.00											
gender*cmpt	0.09	–0.03	0.14	0.17	0.04	0.09	–0.06	1.00										
gender*evdn	–0.05	–0.07	0.14	0.20	0.01	–0.01	0.01	0.44	1.00									
gender*plcy	–0.03	–0.08	0.02	0.00	–0.09	–0.01	0.02	0.26	0.29	1.00								
gender*qlty	–0.06	0.07	0.06	–0.01	0.00	0.12	–0.02	0.24	0.19	0.43	1.00							
plcy	–0.05	0.15	0.10	0.11	0.08	0.16	0.02	0.07	0.11	0.10	0.04	0.68						
qlty	0.02	0.17	0.13	0.09	0.15	0.06	–0.03	–0.05	0.00	0.04	0.07	0.43	0.79					
rgn*cmpt	0.00	–0.05	–0.05	–0.04	–0.01	0.00	–0.10	0.09	0.09	0.07	0.03	–0.05	–0.06	1.00				
rgn*evdn	–0.02	0.08	–0.02	–0.03	0.11	0.02	–0.14	0.10	–0.15	–0.01	0.00	0.13	–0.01	0.37	1.00			
rgn*plcy	0.00	0.06	0.01	0.09	0.00	0.12	–0.05	0.08	–0.01	–0.13	–0.02	0.06	–0.02	0.24	0.22	1.00		
rgn*qlty	0.01	0.03	0.03	0.02	0.14	0.04	–0.13	0.03	0.00	–0.02	–0.10	–0.03	0.09	0.44	0.28	0.47	1.00	