Modelling computer assisted audit techniques (CAATs) in enhancing the Indonesian public sector [version 2; peer review: 2 approved]

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Abstract

Background: This study aims to examine public sector auditors’ tendency to use computer assisted audit techniques (CAATs) in managing their audit works.

Methods: A total of 400 questionnaires were distributed to auditors working in the public sectors in Central Java, West Java, and East Java. From the total, 225 questionnaires were returned and completed. The Structural Equation Modelling (SEM) and Partial Least Square (PLS) were used to analyze the data.

Results: The empirical findings reveal that performance expectation and facilitating conditions have encouraged auditors to use CAATs in their works. Further, there is a positive influence between the intention to use and CAATs audit. This implies that auditors with an intention will be more open to using the CAATs optimally in achieving effective and efficient work. The utilization of CAATs in public services needs to have strong support from the government and positive attitudes from the auditors as the users of the system.

Conclusion: This study covers broad areas of Central Java, West Java, and East Java. Further, the findings add to the literature on emerging markets specifically for Indonesian government auditors’ intention and appropriateness of using CAATs. The use of CAATs help to provide auditors information on the highest number of auditees involved in corruption.

Keywords
Audit support, Effectiveness, Efficiency, Computer-assisted audit techniques (CAATs), Public sector
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Introduction

Many organizations prefer to use information technology to effectively develop and enhance their business. The use of information technology has also been an effective tool in increasing the quality of public services. In addition to its positive impact, such effective information technology in business, public, and private sectors can bring risks and new vulnerabilities in a fully automatic setting. With the use of a novel auditing method, such risk and vulnerability can be recognized, mitigated, and controlled. As a result, the development of the audit profession must keep abreast with the evolution of its surroundings. A new audit technique includes the use of computer-assisted tools and technologies.

Examining auditors’ acceptance of the use of computer-assisted audit tools (CAATs) is significant because researchers and practitioners believe that using CAATs will improve an audit’s efficiency, effectiveness, and functionality.

CAATs are used by auditors in various nations, both internally and externally, in public and commercial sectors. CAATs have been used in the private sector to keep up with technological advancements in large corporations. The adoption of CAATs by public-sector auditors has coincided with the shift to information technology-based public-sector auditing, or what is known as e-government. The use of CAATs by auditors in public sectors has been in parallel with the change of information technology-based public service. E-Government refers to any government or institution’s use of information technology to modify how they communicate and interact with citizens, businesses, and other government entities.

The CAATs involve technologies like electronic audit-working papers, applications of the dataset, as well as business intelligence audit software. Primarily, customers having the complicated AIS are more expected to appoint bigger audit firms with the ability and enough investments in IT resources and knowledge. The competitive pressure for CAATs acceptance is even complicated as compared to other industries. Audit firms confront increased pressure for meeting their financial plans, the need to collect enough verifications, and offer a competitive audit within their assigned budget and time.

The issue is that CAATs can help auditors to minimize audit expenses, improve audit characteristics and efficiency, support suitable reports of the auditing, and increase audit efficiency for auditors and firms that use them. Despite its merits, auditors do not use it regularly or constantly for either external auditors or public sector auditors. The reason for such limited acceptance of CAATs is the audits that are conducted unproductively, or even worst, requiring quality. An investigation on the limitation of CAATs acceptance in such framework is required. Even though the study on CAATs and further technology’s acceptance have concentrated on the organizational aspects (i.e., size of the firms, IT capability of employees, and top administration commitment) and atmospheric aspects (i.e., competitive burdens), however, such elements exclude crucial atmospheric variables which are exclusive for CAATs acceptance.

The CAATs acceptance is diverse compared to the other technological acceptance typically seen in specific businesses such as industrial and marketing. Three aspects are exclusive for the outer auditing atmosphere: customer’s AIS environment’s complication, the competence pressure from the other auditing firms for CAATs acceptance, and lastly, the degree of support from the qualified accounting organizations for CAATs acceptance.

In relation to the above issue, The International Organization of Supreme Audit Institutions (INTOSAI) began to produce a guidance book on using audit information technology in 2014 for the government audit board in the context of the use of CAATs in public or governmental sectors. Indonesia as a member of INTOSAI has developed the CAATs specifically for Indonesia. The government audit board in Indonesia is known as the Indonesian Audit Board (BPK), has established four types of CAATs systems for the audit process, which are: Audit Management System (SMP), Audit Application System (SIAP), E-audit, and Follow-up Monitoring Information System (SIPTL).

An established system’s availability has encouraged Indonesian government auditors to adopt the newest or most recent audit technique known as CAATs. However, several studies have found the inclination in the acceptance of CAATs, as well as a low level of the use of CAATs by auditors. Thus, the low adoption of CAATs usage among Indonesian auditors has motivated the researchers to study the gap. Thus, the objective of this study is to examine how effective CAATs are in assisting BPK auditors in doing their audit works in Indonesian public services. This study employed a model for predicting information technology adoption, namely, the use of technology acceptance and use of
technology (UTAUT). Acknowledging the factors responsible for the acceptance enables the examiners and audit firm administration to perceptively develop involvements aimed at the auditors who are unlikely to accept and employ novel systems. As per the UTAUT, four aspects effects user acceptance: (1) the user’s expectancy of a system to enhance their performance, (2) the efforts required to function the new structure, (3) the feedback of the structure by the worker’s trusted sources (e.g., societal impact), and lastly (4) the user’s expectancy about the presence of a technical and organizational set-up, supporting the system’s use (e.g., service settings).

The contribution of this study is that by having new findings from the Indonesia settings, it may help Indonesian government and regulators to come out with training and education awareness on the importance of using IT software and gadgets in speeding up public services in Indonesia. It can enhance the efficiency, effectiveness and economy of public services in Indonesia at large. These findings are also useful for researchers to know the current stage of CAATs usage in Indonesia public sector.

The structure of this paper starts with the introduction section and followed with the literature review section. Next, details on the with research methodology section. Analyses of findings and discussion are in the next section. Last section is the conclusion, followed with limitation of the study and future study to be addressed in the next research.

**Literature review**

**The importance of information technology**

The use of information technology (IT) has gained much attention in many organizations in recent years. This enlightened that computers and information systems become a necessity for business to complete their daily tasks. With the use of technology, businesses have evolved to collect and disclose their financial data. This helps organizations spend less time in paper-based presentation of their financial data and spend more time on their firms’ performance. Consequently, many businesses are now attentive towards e-business (electronic business) and investing in complex IT software. Various research emphasize explicitly PC-based audit support networks. For instance, Mansour recorded the effect of innovation on review arranging in five huge audit firms and stated that innovation could be utilized to give customers direct internal controls that help the inspector recognize the defects in the client’s frameworks. He additionally found that innovation is helpful for breaking down the client’s business measures, decide, and survey the degree of controls, and prescribe tests that should be performed. Moreover, innovation ensures consistency with review principles and other review-related guidelines.

Bierstaker, Burnaby portrayed the utilization of innovation on the review cycle by talking to IT experts from four of the five biggest US bookkeeping firms. Bierstaker, Burnaby studies were graphic in nature and zeroed in on a particular audit application from one audit firm; consequently, the two examinations are not generalizable to the external auditor’s actual utilization of innovation. The examined auditors’ view of the significance of CAATs and the degree of CAATs use. They additionally analyzed how the apparent significance and degree of IT use vary by firm size and over the long run. They discovered firm size had been displayed to be critical in deciding CAATs utilization. Auditors from Big 4 firms (the leading players in the accountancy industry, with their services spanning advisory, audit and assurance, tax, risk consulting and management consulting, and capital and transaction management) were almost certain that more modest firms to utilize IT review applications. The investigation likewise discovered that the gap between IT use for Big 4 and Non-Big 4 firms has been shutting contrasted with the 2004 information. The Non-Big 4 firms’ CAATs utilization nearly looked like that of the Big 4 firms. Earlier CAATs learns at the singular level utilized the Technology Acceptance Model (TAM) and Unified Theory of Acceptance, furthermore, Use of Technology (UTAUT) hypothesis. These hypotheses center around innovation trademark factors like performance expectancy, social impact, working with conditions, and perceived usefulness.

Studies have analyzed the aspects affecting the acceptance of CAATs. The previous studies on CAATs discover its acceptance from the specific level of auditors but not among the audit firms from the organizational perspective. The adoption of CAATs should initiate from an organization’s choice to obtain the technology, invest fundamentally, and offer the services for acceptance for individual auditor’s use. Hence, the firm’s degree of audit technology investment might adequately denote audit technology adoption instead of the individual auditor’s viewpoints.

Just few studies have examined CAATs’ acceptance from the organizational point. Ismail and Abidin described the outcomes of the descriptive analysis regarding IT knowledge and the significance of audit technology across Malaysian audit firms. Ramen, Jugurnath postulated several aspects influencing the CAATs acceptance and analyzed the association and the major differences among the individual and organizational-standard aspects. A qualitative study was conducted to discuss the elements capable of influencing the CAATs and recognized Prescribed Accountancy Body (PAB) support as one of them. The auditor’s identification of the CAATs significance and the degree of CAATs usage...
using CAATs in their assessing space will quite affect the assumption to embrace and use them. Execution anticipation to guarantee that all controls and execution measures expected to assess every business interaction are set up. As to big business-wide figuring stages regularly. In these circumstances, examiners should work with their customers registering stages. Respondents show that it takes a few years for an organization to totally move their old programming keep pace electronically with their customers. Customers need help in introducing and overhauling their enterprise-wide processing frameworks can serve to electronically screen. Not performing up to norms. Evaluators can utilize CAATs in creating quantifiable targets and execution markers that will be more likely to use Computer Assisted Audit Techniques (CAATs) if it is simple to use. Execution expectancy has been widely used in the private sector in several nations. CAATs are used to combat and detect fraudulent activity and dangers. The E-Audit system model can be applied through a specific electronic audit program and information technology tools. The usage of E-Audit or CAATs has been investigated by. It was also inspected that in which ways the recognized cruciality and scope of IT usage differs from the size of the firm and time. The observation revealed that it was the firm’s size that is vital in considering CAATs use. The auditors from the Big 4 firms were most likely to employ the IT audit applications. The research also revealed that the gap between IT usage for the Big 4 and Non-Big 4 firms was filling, as per the former information. The earlier individual-level CAATs studies have utilized TAM and the UTAUT model. The theories concentrate on the technology features, such as performance expectations, societal impacts, service-providing situations, and recognized practicality. The majority of the studies analyzed if the variables in the present UTAUT theoretical context might be implemented to CAATs acceptance in the exterior assessment settings. UTAUT model UTAUT is a basic theory that can be used to determine e-audit or electronic audit acceptance by individual auditors, which can impact an organization’s technological acceptance. Venkatesh, Morris initially proposed UTAUT, which contains four essential predictors of intention and usage: performance expectancy, effort expectancy, social influence, and facilitating condition. Furthermore, UTAUT is a theory that takes genders, age, and experiences into account. The use of information technology in the form of an application would be more readily accepted by its users, even if the UTAUT model assumes that auditors, particularly those who have received training on the use of information technology, will be more likely to use Computer Assisted Audit Techniques (CAATs) if it is simple to use. E-Audit/CAATs E-Audit is a technology-based information system that allows auditors to commit to their auditing tasks easily. The usage of E-Audit or CAATs has been widely used in the private sector in several nations. CAATs are used to combat and detect fraudulent activity and dangers. The E-Audit system model can be applied through a specific electronic audit program and information technology tools. According to Liang, Lin, the Internet’s massive rise has prompted the development of various modern information technologies, including object-oriented middleware’s, Internet security technology, and smart agents. Computer-Assisted Audit Techniques (CAATs) can be employed more successfully with information technology that emerges from a new approach to Electronic Data Processing (EDP) audits. Shaikh proposed using CAATs, which is built on an electronic audit framework that incorporates most of the present capabilities of audit software but can be designed and distributed independently of the EDP auditors. CAATs, according to Zhao, is required to conduct ongoing audits in the electronic audit process. Because the auditor is a significant actor who has access to the party’s database being audited, the auditor’s capacity and competency are required. Implementation of CAATs at BPK The usage of e-audit was included in BPK’s strategic planning (Renstra) for 2011 to 2014 as the first step in establishing CAATs. The four major components of the e-audit implementation are BPK’s internal information system (e-BPK), BPK’s data warehouse (BPK data warehouse), BPK’s center of access and analysis (BPK Command Centre), and BPK’s internal information system (e-BPK). For BPK, e-audit can be utilized as an early warning system in the event of fraud in public finance management, which will eventually inspire accountability in managing state finances. Auditors should keep pace electronically with their customers. Customers need help in introducing and overhauling their endeavor-wide registering stages. Respondents show that it takes a few years for an organization to totally move their old programming to big business-wide figuring stages regularly. In these circumstances, examiners should work with their customers to guarantee that all controls and execution measures expected to assess every business interaction are set up. As examining programming is coordinated into the review interaction, evaluators will have more opportunities to resolve their customers’ perplexing issues in the worldwide commercial center. Customer, the board, should foster techniques that fuse the organization’s targets and objectives into execution estimates that can rapidly feature when an interaction is not performing up to norms. Evaluators can utilize CAATs in creating quantifiable targets and execution markers that enterprise-wide processing frameworks can serve to electronically screen. Performance expectancy How much somebody accepts that taking on a specific apparatus would assist him with accomplishing more prominent importance is referred to as Performance expectancy. Execution hope insinuates the degrees to which an individual acknowledges that using the device can accomplish work execution gains. According to Jakšič and Saygi, who acknowledge that the gathering of CAATs might overhaul their audit convenience and the idea of survey work ought to have uplifting objectives to take on the advancement. They found that the audit specialists’ dynamic communication was updated by electronic demonstration of accounting information. Also, analysts’ conviction that using CAATs will chip away at coordinating audit preliminaries of controls and impressive testing will likely have significant standards to accept CAATs as shown by Bedard, Jackson and Loras and Wolfe. Withstanding these benefits, the researcher acknowledges that analysts’ perspective on the support and productivity they desire to gain from using CAATs in their assessing space will quite affect the assumption to embrace and use them. Execution anticipation
alludes to the degree to which an individual accepts that utilizing the device can support accomplish gains in work execution. Banker, Chang found that utilizing CAATs in large review firms diminishes the review time required for working paper arrangement. They likewise tracked down that the review experts’ dynamic interaction was upgraded by the electronic show of bookkeeping data. Besides, examiners’ conviction that utilizing CAATs will work on the productivity of leading review trial of controls and meaningful testing is probably going to have high aims to embrace CAATs as indicated by and Loraas and Wolfe. Withstanding these advantages, the specialist accepts that examiners’ impression of the convenience and usefulness they hope to acquire from utilizing CAATs in their reviewing area will certainly impact the expectation to take on and use them. In sum, the past research demonstrates that the effect of IT on the review cycle has been huge in numerous ways. This adds to the improvement of the audit interaction.

For example, an auditor might feel that utilizing CAATs will help him fulfill his audit time budget because it minimizes the number of hours spent on substantive testing and controlling, which will lead to an increase in audit time efficiency. Many studies show that the use of General Audit Software (GAS) by internal auditors, external auditors, and legal auditors is influenced by performance expectancy. Based on the following studies, it is hypothesized that:

\[ H_1 = \text{Performance expectancy influences the intention to use CAATs.} \]

Effort expectancy
Effort expectancy refers to ‘the ease level related to the use of tools.’ Janvrin, Bierstaker illustrated how comfortable those auditors who have received training are using CAATs. Hoque, Saif also found that users can accept an application if it is easy to use. Research by showed that effort expectancy influences the use of CAATs by legal auditors. Venkatesh, Morris contend that effort expectancy is relied upon to be more notable in the beginning phases of another conduct when interaction issues address obstacles to survive and later become superseded by instrumentality concerns. Payne and Curtis note that since inspectors may settle on the choice to take on innovation and be answerable for carrying out the innovation, the work associated with innovation reception might be more notable to evaluators than to other IT experts. Hence, Payne and Curtis contend that work hope will be related to a social goal. Furthermore, a study by revealed that the expectation of work also influences the use of CAATs by internal auditors. The second hypothesis presumed that:

\[ H_2 = \text{The effort expectancy influences the intention of using CAATs.} \]

Social Influence
Social influence can be defined as ‘the extent to which someone perceives the importance of others to use the new tool.’ In the context of an audit, this study expects the extent to which auditors perceive their direct managers’ support the use of CAATs can influence whether they adopt CAATs or not. The earlier examination has demonstrated that social influence affects the client’s aim to acknowledge and use an innovation. In a review setting, we expect that the more noteworthy examiners see that their immediate administrators support CAATs utilization, the more certain inspectors are to take on CAATs. Loraas and Wolfe find that help from companions and support from managers decisively impacts social aim. Hence, we foresee that social impact will positively influence CAATs use. Several studies have reported that the use of General Auditing Software (GAS) by external auditors is influenced by social influence. Based on past studies, this study hypothesized that:

\[ H_3 = \text{Social influence affects the intention of using CAATs.} \]

Facilitating condition
Facilitating condition is defined as ‘the extent to which people believe that the existing organizations have infrastructure and technique to support the use of tools.’ In the context of the Indonesian public sector of auditing, infrastructures may involve Kantor Akuntan Publik (KAP) providing services based on human resources of CAATs and the support of computers for staff such as special instructions, support center, hotline, and the use of guidance. Many studies have demonstrated that the use of General Auditing Software by internal auditors, external auditors, and legal auditors are influenced by the facilitating condition. Therefore, based on the above arguments, this study hypothesized that:

\[ H_4 = \text{Facilitating condition influences the appropriate use of CAATs.} \]

The intention of usage
Individual motivation to do an activity is captured by intention. Despite the fact that various circumstances influence how auditors want to utilize auditing support systems, the theory of planned behavior suggests that auditors who want to use the system properly will be more likely to do so. Ajzen showed that business intelligence (BI) is the most general
indicator of conduct and is proposed to be a predecessor of genuine use. UTAUT’s goal to embrace and utilize CAATs is the reliant variable in the exploration model and is an element of execution anticipation, exertion, hope, social impact, and working with conditions. This build puts the first ‘goal to utilize’ develop in the CAATs’ setting. Furthermore, found that purpose and external factors influence the optimal usage of supporting auditing systems. Thus, the following hypothesis presumed that:

\[ H_3 = \text{Intention of using CAATs influences the use of appropriate use of CAATs.} \]

Moderation model of CAATs acceptance

Additionally, Curtis and Payne discovered that the budget period’s variables and the risk priorities of auditors substantially impact the intention of using CAATs in the UTAUT. The majority of the following research was conducted in technologically advanced states, whose assessment set-up might be distinct from the evolving states (Greenstein-Prosch et al., 2008). Such as the US setting, where the audit firms are parted among the Big 4, national, local, and regional firms. Whereas in Malaysia, apart from the Big 4 and middle-sized regional and national firms, most of the audit firms are individual administrators or contains fewer than five local-based associates. Hence, the audit firms of Malaysia are likely to be partitioned into the ones focusing on the national or local extent.

Besides, the former studies have limitations since just the technologically featuring aspects were determined there, leaving the atmospheric and organizational impacts untouched. The Technology-Organization-Environment (TOE) context was utilized to remove those limitations, allowing the investigators to scrutinize multiple elements associated with technology, organizations, and the environment. Tornatzky, Fleischer established the TOE, an acceptance context at the firms-level. The TOE projected the significance of several relevant aspects in adopting novel technologies. The TOE context is largely used in the IT or IS works and is utilized in considering the acceptance characteristics in many IT frameworks. This context is also suitable for studying CAATs acceptance as it ranges over the technological models for involving the standpoints of organizations and the environment. However, a query about the range over which the variables might impact CAATs acceptance rises here. Therefore, a CAATs acceptance paradigm was proposed to combine the technical aspects of Diffusion of Innovation (DOI) theory to involve the elements of organization and environment.

The profile of auditees has an impact on auditors’ acceptance of audits. Age, gender, and experience are the elements contained in the profile of an auditee. The term “age” refers to a person’s chronological age as measured in years. A Bachelor’s degree was found to have a direct, significant, and moderate effect on age on user behavior and adoption. The sexual classifications of users, both males, and females are referred to as gender. Gender was found to substantially impact technology adoption in businesses in previous research by Venkatesh, Morris. Gender moderates the effect of believed benefits on behavioral intention. The number of years that an auditing firm has been in operation is referred to as experience. Previous behavior is influenced by previous experiences. Thus, the auditor’s information technology experience is considered in this study. Like Bierstaker, Janvrin and Mahzan and Lymer, we discover proof supporting the thought that working with condition emphatically impacts the inward evaluators’ expectations to utilize and acknowledge CAATs. The outcome recommends that organizations ought to put sufficient cash in cutting edge foundation to relieve the hindrance of inspectors from tolerating and using CAATs. Besides, firms might expand CAATs use however growing new arrangements in regard to recruiting and advancement of examiners. These arrangements ought to devote more weight to inspector’s capacity to utilize information examination in their everyday review exercises.

Methods

Ethical approval

This study was approved by Universitas Islam Bandung Ethical Clearance Committee (Protocol Number 718/B.04/Bak-k/XII/2020) after due consultation, consent letter had been provided by the researchers to all respondents. Respondents had provided their consent without any force from anyone. Subsequently, to protect the rights and privacy of the respondents, all forms of data were acquired will remain confidential. Written, informed consent was obtained from participants.

Design and data collection techniques

A quantitative study using a survey method has been utilized in this study. Questionnaires were distributed from June 2021 to September 2021 to the targeted respondents, BPK personnel, who worked as auditors in the Indonesian public sectors using an online survey. There were 3600 auditors located in the central and regional offices of Indonesia.
The criteria used to select the location sites were based on those offices with a significant number of corruption cases and auditees. In addition, the selected sample is a BPK office that has auditors who already use CAATs. A total of 400 questionnaires model e-audit were distributed to the targeted respondents. From the 400 questionnaires, 225 surveys were returned and completed. This study combines both studies by Venkatesh, Morris on technology adoption and Dowling on the use of the system to help do audit works.

The UTAUT model usage from Venkatesh, Morris was adopted in this study because it combines several models that predict technology usage, including TAM, planned behavior theory, the idea of innovation diffusion, and the theory of social cognitive learning. Furthermore, the UTAUT model has explained 70 percent of the intention variants to use technology and outperform each high-level model. The definition for each of the constructs is listed in Table 1. Table 1 is a summary table made by researchers based on several previous studies.

The respondents

The criteria for respondents in this study were auditors who work at the central and regional offices with a high number of auditees and a high level of corruption cases. BPK’s regional offices or representations include BPK’s Central Java, West Java, and East Java. Regional office with low cases and with a low number of auditees do not include the criteria of respondents. The final sample consists of 225 respondents who were the auditors working in the public sector of Indonesia. The distribution of respondents is depicted in Table 2, with the majority of the respondents being men (67.1 percent), aged 36 to 40 (30.2 percent), and having Bachelor’s educational backgrounds (54.7 percent).

Data analysis

This study has adopted Structural Equation Modelling (SEM) to examine the correlations between factors influencing intention and behavior using CAATs. Respondents’ profile (gender, age, and experience) has been used as a moderator in this study. The Partial Least Squares (PLS) method was used to analyze the data. The SmartPLS 3 was used to analyze the data for correlations between factors influencing intention and behavior of using CAATs.

| Variable                  | Construct/Indicators                                                                 |
|---------------------------|--------------------------------------------------------------------------------------|
| Performance expectancy (PE) | CAATs appear to be useful in carrying out my auditing duties.                        |
|                           | I was able to complete my audit swiftly thanks to the utilization of CAATs.          |
|                           | The use of CAATs improves the efficiency of my auditing work.                       |
|                           | The use of CAATs allows me to complete audits in a short amount of time.             |
|                           | My auditing efficiency improves when I employ CAATs.                                |
| Effort Expectancy (EE)    | The application of CAATs is quite clear and simple to comprehend.                   |
|                           | It is simple for me to learn how to use CAATs.                                      |
|                           | CAATs are simple to use in my opinion.                                              |
|                           | For me, learning how to use CAATs is simple.                                         |
| Social influence (SI)     | People in my immediate environment influence my decision to use CAATs.              |
|                           | My office’s most powerful person says that I should use CAATs.                      |
|                           | In the use of CAATs, my team’s chief auditor is helpful.                             |
|                           | Overall, my workplace has been supportive of the use of CAATs.                      |
| Facilitating condition (FC)| I have the human resources required to use CAATs.                                  |
|                           | I have the necessary skills to use CAAT’s IT. If I have any problems utilizing CAATs, technicians are always. |
|                           | I intend to use CAATs in the future, and I will most likely use CAATs in the future. |
| Intention to use CAATs (BI)| In the future, I intend to use CAATs.                                              |
|                           | I will most likely use CAATs in the future.                                         |
|                           | There have been occasions in the previous 3-4 months when I have not used CAATs as effectively as I should have. |
| Appropriate use of CAATs (AU)| I am now using CAATs in my audit.                                                  |

Source: Venkatesh, Morris and Dowling.
Results

Reliability and validity tests

The purpose of the reliability and validity tests was to determine whether the construct matched the structural model domain analysis. Cronbach Alpha (CA) was used to measure the reliability test, and the Fornell-Larcker measure was calculated from the composite reliability score (CR). The mean-variance extracted was used to conduct a validity test (AVE). The recommended score of the CA and CR for each construct is above 0.70,63,64 and the AVE score of all factors should meet the recommended cutting-off point of 0.5 and above.65 Table 3 shows the results of the CA, CR, and AVE tests. The value of CA and CR scores for each construct is more significant than 0.70, and it is within the allowable reliability range. All factors in the AVE satisfy the recommended cutting-off point of 0.5 and higher.

Table 2. Descriptive statistics on respondents.

| Measure               | Item                  | Frequency | (%)  |
|-----------------------|-----------------------|-----------|------|
| Gender                | Male                  | 151       | 67.1 |
|                       | Female                | 74        | 32.9 |
| Age                   | 26-30                 | 10        | 4.4  |
|                       | 31-35                 | 70        | 31.1 |
|                       | 36-40                 | 68        | 30.2 |
|                       | 41-45                 | 47        | 20.9 |
|                       | 46 and above          | 30        | 13.3 |
| Education             | Bachelor              | 123       | 54.7 |
|                       | Magister              | 101       | 44.9 |
|                       | Doctoral              | 1         | 0.4  |
| Audit Board Regional Offices | Center/Secretariat General | 44 | 19.6 |
|                       | East Java Regional    | 85        | 37.8 |
|                       | Central Java Regional | 50        | 22.2 |
|                       | West Java Regional    | 46        | 20.4 |

Source: Statistical Processing Results, 2022.

Table 3. The results testing of CA, CR, AVE, dan VIF.

| Factor  | CA     | CR     | AVE   | VIF AU | BI |
|---------|--------|--------|-------|--------|----|
| PE      | 0.892  | 0.920  | 0.698 | 2.241  |
| EE      | 0.897  | 0.928  | 0.763 | 2.264  |
| SI      | 0.830  | 0.888  | 0.665 | 2.310  |
| FC      | 0.764  | 0.864  | 0.680 | 1.473  |
| BI      | 0.872  | 0.921  | 0.796 | 1.453  |
| AU      | 1.000  | 1.000  | 1.000 |        |
| PE_age  | 1.000  | 1.000  | 1.000 | 2.322  |
| PE_sex  | 1.000  | 1.000  | 1.000 | 2.048  |
| EE_age  | 1.000  | 1.000  | 1.000 | 2.394  |
| EE_edu  | 1.000  | 1.000  | 1.000 | 1.555  |
| EE_exp  | 1.000  | 1.000  | 1.000 | 7.937  |
| EE_sex  | 1.000  | 1.000  | 1.000 | 1.736  |
| SI_age  | 1.000  | 1.000  | 1.000 | 1.743  |
| SI_edu  | 1.000  | 1.000  | 1.000 | 1.704  |
| SI_exp  | 1.000  | 1.000  | 1.000 | 8.764  |
**Multicollinearity test**

The variance inflation factor (VIF) was used to test for multicollinearity problems. It is used to identify the correlation between independent variables and the strength of the correlation. Because the value of VIF for the constructs is less than the maximum cutting-off point of 10, the structural study model is not negatively affected by the issue of collinearity.66

The results are depicted in Table 3. As the results indicate, the value of variance inflation factor for all variables are higher than 1, which demonstrates the moderate correlation between variables.

**Discriminant validity**

The square root of the AVE score is used to determine the validity of this model. A factor must be higher than the factors’ cross-correlation.63 Figure 1 shows the results of the discriminant validity test, which shows that discriminant validity is reliable because the AVE scores for those factors are higher than the square cross-correlation for those factors.

**Structural model analysis**

The structural model was carried out after testing the constructs for reliability test, validity, discriminant, and multicollinearity tests. Next, the hypotheses were tested using the Bootstrap Smart-PLS technique. As shown in Figure 2 and Table 4, the structural model results indicate the correlation between exogenous and endogenous factors using an algorithm of PLS.

**Findings**

Gender, education, and audit experience do not play a role in moderating the links between effort expectancy, performance expectancy, and social influence in facilitating behavior intention and usage intention (p>0.05). Interestingly, there is a favorable association between the intention of using CAATs and the act of using CAATs appropriately.67

Performance expectancy is positively related to the intention to use CAATs, and facilitating conditions are positively associated with the appropriate use of CAATs. The coefficient determinant (R²) is used to assess the model quality test.65 The estimated R² for correctly using CAATs is 0.447 (44.7 percent), indicating that exogenous factors are 0.447 (44.7 percent) in the endogenous variables of appropriately using CAATs. Meanwhile, the calculated R² for the intention of using CAATs is 0.507 (50.7 percent), indicating that exogenous factors are 0.507 (50.7 percent) in the endogenous variables of “Intention to use CAATs.” A good model is where the fit model test employs cross-validated redundancy (Q2), more significant than zero.65,68 In sum, this model is fit or has a predictive interest based on the results of Q2AU, which is 0.377, and Q2BI, which is 0.353 (Table 4).

**Discussion**

Performance expectancy has a positive and significant influence on the intention to use CAATs. Thus, H₁ is accepted. Auditors agree that employing CAATs in auditing will help them execute tasks more efficiently. This also indicates that BPK’s auditors believe and decide that CAATs help assist their auditing works. The positive association between performance expectations and the intention to use CAATs has also been observed in previous studies.6,24,44,48

However, the results of different tests for the variable constructs of effort expectancy (H₂) on the use of CAATs indicate no statistically significant association. This finding differs from past studies.1,48 The existence of four CAATs applications given by BPK still requires more intense training to the staff, which may explain why effort expectancy does not stimulate the intention to utilize CAATs. Another possibility is that evaluated entities (auditees) are considered

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**Table 3. Continued**

| Factor | CA  | CR  | AVE  | VIF |
|--------|-----|-----|------|-----|
|        | AU  | BI  |      |     |
| SI.sex | 1.000| 1.000| 1.000| 2.055|
| FC_age | 1.000| 1.000| 1.000| 1.397|
| FC_edu | 1.000| 1.000| 1.000| 1.333|
| FC_exp | 1.000| 1.000| 1.000| 1.499|
| age    | 1.000| 1.000| 1.000| 1.151|
|        | 1.115| 1.169|
|        | 1.473| 1.685|
|        | 1.000| 1.000| 1.000| 1.064|

Source: Statistical Processing Results, 2022.
sufficient to audit without CAATs, which is more likely to occur. However, these are not found in this study, implying that more research and exploration are required to uncover relevant essential elements. The finding reveals that effort expectancy is unrelated to using CAATs is consistent with previous research by Mahzan and Lymer.

The significance of the CAATs job in the review interaction is generally perceived. However, notwithstanding their normal advantages and ideas from researchers, various inward reviewers do not right now embrace these instruments when directing different inward review capacities. Acquiring from data frameworks research, we utilize the UTAUT model to analyze the determinants of CAATs reception by inward examiners in Jordan. After reviewing 105 inward examiners, this investigation discovers that the significant variables which might influence inside inspectors’ goals to

**Figure 1. The results of discriminant validity test.**
utilize CAATs are working with conditions and execution anticipation. Both exertion hope and social impact are observed to be inconsequential.

As discussed before, firms can grow CAATs utilization by instructing inside evaluators concerning the advantages of utilizing these automated devices, by devoting more response to put resources into the specialized foundation, by working on their abilities through expanded CAATs preparing programs, and by creating reward frameworks that urge reviewers to utilize CAATs. Second, considering that the choice to acknowledge and use CAATs is willful, firms ought to perceive the results of their strategies and culture on inner reviewers’ aim to take on CAATs.14 In conclusion, this study proposes the putting resources into review programming without thinking about the hindrances to the reception of CAATs, may restrict the ideal impacts of these robotized devices.

The result of variable construct testing of social influence on the intention of CAATs usage (H3) is not significant, consistent with previous studies.6,43,44 In BPK, social influence on the intention of CAATs usage is insignificant because their location is far from each entity, and they have low access to internet connection. According to the Speedtest Global Index, Indonesia is among the Asia Pacific countries with a standard internet connection.69

In particular, the relapse investigations show that the impact of execution hope, as predicted by H1, was genuinely huge in clarifying the expectation of internal auditors to adopt on CAATs. This outcome is predictable.6,11,44 This outcome recommends that internal evaluators be more ready to use CAATs when they know that the advantages acquired from

Figure 2. Research structural model. (Source: the results of the author’s analysis using the SmartPLS software).
utilizing these mechanized apparatuses would further develop their work productivity. Accordingly, the board that looks to expand CAATs utilization ought to prepare projects to instruct inward reviewers about the advantages of using such devices and assist them with staying current with evolving innovation.\textsuperscript{44}

The variable construct of the facilitating condition (H4) was found to be significant and has a positive influence on the appropriate use of CAATs.\textsuperscript{1,6,24,44,48} Additionally, the construct of the intention of using audit (H5) has a positive association with the appropriate use of CAATs.\textsuperscript{52} This implies that the facility of information technology is available to support the proper use of CAATs.

As per past research,\textsuperscript{6,11} we find that work expectancy is irrelevant. The reasons behind the irrelevant outcome might be that the more significant part of inward inspectors in our example are youthful and have an undeniable degree of capability in data innovation. Hence, interior evaluators might see that the level of straightforwardness with the utilization of CAATs is generally irrelevant to their choice. One more translation for the irrelevant outcome is that in an examining setting, the viability of review strategies is given a high need by inside evaluators when settling on innovation use choices instead of the individual inclinations concerning the endeavors needed to utilize the innovation.\textsuperscript{44} Despite our assumption, the discovering shows that social impact is inconsequential, implying that the choice to utilize CAATs is not influenced by the prevailing difficulty emerging from the head of the inside review division, their friends inside the organizations, or from the expert bookkeeping bodies. Venkatesh, Morris\textsuperscript{22} state that the social impact factor is huge in an acute setting, though it is not huge in an intentional setting. In Jordan, CAAT’s use is willful, despite various researchers and expert guidelines urging reviewers to utilize CAATs.

Mahzan and Lymer\textsuperscript{6} noticed that the level of requirement and checking of consistency with CAATs utilization is powerless, thus making internal auditors allowed to perform setting explicit choices on reception. Therefore, the willfulness of utilization has no impact on the goal to utilize CAATs. The proof is conflicting with Curtis and Payne\textsuperscript{11} and Gonzalez, Sharma,\textsuperscript{70} yet is in accordance with previous studies.\textsuperscript{6,11,44}

### Table 4. Regression result.

| Hypothesis          | β     | STDEV | T Statistics | p-value | Result |
|---------------------|-------|-------|--------------|---------|--------|
| PE -> BI            | 0.464 | 0.092 | 5.052        | 0.000   | Accepted |
| EE -> BI            | 0.116 | 0.175 | 0.664        | 0.421   | Rejected |
| SI -> BI            | 0.175 | 0.159 | 1.106        | 0.269   | Rejected |
| FC -> AU            | 0.202 | 0.091 | 2.226        | 0.027   | Accepted |
| BI -> AU            | 0.538 | 0.073 | 7.341        | 0.000   | Accepted |
| PE_age -> BI       | -0.061| 0.098 | 0.623        | 0.533   | Rejected |
| PE_sex -> BI       | -0.048| 0.098 | 0.490        | 0.624   | Rejected |
| EE_age -> BI       | -0.041| 0.102 | 0.400        | 0.689   | Rejected |
| EE_edu -> BI       | 0.029 | 0.073 | 0.402        | 0.688   | Rejected |
| EE_exp -> BI       | -0.008| 0.645 | 0.012        | 0.991   | Rejected |
| EE_sex -> BI       | -0.027| 0.067 | 0.408        | 0.684   | Rejected |
| SI_age -> BI       | 0.031 | 0.093 | 0.331        | 0.741   | Rejected |
| SI_edu -> BI       | 0.073 | 0.090 | 0.813        | 0.417   | Rejected |
| SI_exp -> BI       | 0.008 | 0.554 | 0.015        | 0.988   | Rejected |
| SI_sex -> BI       | 0.032 | 0.120 | 0.268        | 0.789   | Rejected |
| FC_age -> AU       | 0.023 | 0.081 | 0.285        | 0.776   | Rejected |
| FC_edu -> AU       | 0.017 | 0.072 | 0.241        | 0.810   | Rejected |
| FC_exp -> AU       | -0.022| 0.064 | 0.349        | 0.727   | Rejected |
| R2 AU               | 0.447 |       |              |         |        |
| R2 BI               | 0.507 |       |              |         |        |
| Q2 AU               | 0.377 |       |              |         |        |
| Q2 BI               | 0.353 |       |              |         |        |

R2 AU 0.447
R2 BI 0.507
Q2 AU 0.377
Q2 BI 0.353
Also, multiple studies concentrate significantly on computer-based audit support systems. Thompson, Higgins recognized the technology’s influence on audit preparation in five big audit firms and stated that technology might offer consumer-specific interior controls that help the auditor identify the customer’s system lacking. Additionally, it was also revealed that technology helps to examine the business procedures of clients, for considering and measuring the degree of control, as well as suggests trials being required to conduct. Moreover, the technology assures concurrence with audit standards and further guidelines associated with the audit. Bierstaker, Burnaby explained the technology used in the audit procedure by interviewing IT experts from four of the five biggest accounting firms in the US. The studies of Bierstaker, Burnaby were descriptive by nature and concentrated on an individual audit application from an audit firm; therefore, both studies cannot be generalized to the exterior auditor’s proper technology usage.

Like Bierstaker, Janvrin and Mahzan and Lymer, we discover that working with conditions impacts the inward evaluators’ expectations to utilize and acknowledge CAATs. The outcome recommends that organizations ought to put sufficient cash in a cutting-edge foundation to relieve the hindrance of inspectors from tolerating and using CAATs. Besides, firms might expand CAATs use, however, growing new arrangements regarding recruiting and advancement of examiners. These arrangements ought to devote more weight to inspector’s capacity to utilize information examination in their everyday review exercises.

Both scholars and practitioners will benefit from these discoveries. The audit profession is “developing rapidly as a result of innovation in its environment,” according to Solomon and Trotman. As a result, the audit profession is under pressure to increase audit efficiency and effectiveness. Because both researchers and practitioners contend that CAATs will improve audit efficiency and effectiveness, our findings may aid both parties in their efforts to boost CAATs acceptability. Furthermore, previous research only looked at a small number of CAATs with small sample sizes and an emphasis on the prevalence of CAATs rather than the underlying reasons for their usage.

In contrast, our study aims to examine public sector auditors’ tendency to use CAATs. This study covers broad areas of Central Java, West Java, and East Java. Further, the findings add to the literature on emerging markets specifically for Indonesian government auditors’ intention and appropriateness of using CAATs. The use of CAATs help to provide auditors information on the highest number of auditees involved in corruption. The empirical findings reveal that performance expectation and facilitating conditions have encouraged auditors to use CAATs in their works. Further, there is a positive influence between the intention to use and CAATs audit. This implies that auditors with an intention will be more open to use the CAATs optimally in achieving effective and efficient work. The utilization of CAATs in public services need to have strong support from the government and positive attitudes from the auditors as the users of the system.

**Conclusion**

The use of CAATs in today’s audits has become a critical issue in achieving efficiency and effectiveness. This study examines the use of CAATs by auditors in the public sector of Indonesia. The UTAUT model was utilized to measures the performance expectancy, effort expectancy, social influence, facilitating conditions, the intention of CAATs usage, and the appropriate use of CAATs. Findings evidence that the performance expectations and the facilitating conditions have shown a positive association with the use of CAATs in doing audits. There is a positive influence between the intention to use and CAATs audit. Individual with a strong intention will be more inclined and excited to utilize the CAATs to be used appropriately and optimally based on its goal. The readiness of the CAATs system and the support of both facilitating conditions will increase an auditor’s desire to use CAATs. Furthermore, a detailed and extensive audit will improve performance expectancy by examining the role of CAATs. It can improve audit performance by being faster, more effective, and efficient.

Limitations of this study is that CAATs in the BPK Indonesia are still new and are still in the undergoing process. The impacts may not be stable and cannot be justified to large group. Next, there is no in-depth interview conducted in this study to gain a comprehensive insight on the CAATs employed at BPK. Supposedly, the interview can provide a better view of the respondents’ perceptions on the effectiveness of CAATs implementation. Thus, future study may consider all these factors to be researched in detail.

**Data availability**

**Underlying data**

Figshare: Dataset of Questionnaire Result from the respondents of Modelling Computer Assisted Audit Techniques (CAATs) in Enhancing Indonesian Public Sector, [https://doi.org/10.6084/m9.figshare.19642374.v2](https://doi.org/10.6084/m9.figshare.19642374.v2)
This project contains the following underlying data:

- Response from 225 respondents in Model E-audit Indonesia.csv

Extended data

Figshare: List of questions and descriptions of questionnaire of the Modelling Computer Assisted Audit Techniques (CAATs) in Enhancing Indonesian Public Sector, https://doi.org/10.6084/m9.figshare.19642437.v1.

This project contains the following extended data:

- List of questions.csv

Figshare: The Respondent characteristics of the Modelling Computer Assisted Audit Techniques (CAATs) in Enhancing Indonesian Public Sector, https://doi.org/10.6084/m9.figshare.19642425.v2.

This project contains the following extended data:

- The Respondent characteristics.csv

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Acknowledgements

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Open Peer Review

Current Peer Review Status: ✅ ✅

Version 2

Reviewer Report 25 November 2022

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Ellis Kofi Akwaa-Sekyi
Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

The authors have incorporated most of the suggestions and comments made in the initial edition. However, these observations are worth considering:

The authors must be specific with the exact contribution of the study. Show in what ways specific findings contribute to research. What you have written is a generic statement.

There are too many redundant references. You may consider reducing the references to 50. It has unnecessarily bloated the word count.

The work still requires proofreading

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Corporate governance, Internal controls, Venture capital finance, Bank risk

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 28 September 2022

https://doi.org/10.5256/f1000research.133566.r147101

© 2022 Akwaa-Sekyi E. This is an open access peer review report distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
The paper examines how computer assisted audit techniques enhances the auditor's work in the Indonesian public sector. This is a trending subject in modern day auditing and financial reporting. The introduction of ICT into the auditing profession calls for studies of this nature to unearth the intricacies involved in this transformation agenda. In spite of the effort exerted in the writing of this manuscript, it is believed that if the authors pay attention to these suggestions, the quality of the paper will improve tremendously:

- Rewrite the conclusion section of the abstract. It is only the last sentence which looks like a conclusion.
- The introduction is too long. It should specifically cover the purpose of study, research gaps, problem statement, motivation for the study, brief methodology and results (optional), the contribution of the study and structure of the paper. What is it that is missing in research that is necessitating this paper?
- The authors should use the literature review section to amplify the research gaps. Show from the literature review that there is still a missing link in spite of the plentiful research on the topic. This will strengthen the significance of the study. Otherwise, an impression is created that there is nothing more to research about.
- The voice of the literature review section should not sound like a recommendation.
- Why do you have only one question on the actual use of CAATs? It gives the impression that the study is focused on intention more than behavior.
- The authors fail to show a scientific approach to the determination and selection of the respondents.
- The discussion component should not be mixed with the limitations, implications and conclusions. It is good practice to use the discussion to relate the findings to existing literature and proposed underlying theories. The authors should strengthen why most of their hypotheses were rejected. Is that not a cause for concern?
- The authors should use the conclusion section to answer the research questions. After a brief summary of the work, the key research questions should be answered. How were the limitations addressed such that they did not affect the results of the study?
- The work heavily relies on literature that is a bit old. Even though the topic is a current issue, a significant number of the references are old. The authors may consider beefing up the references with current ones.
- The manuscript requires thorough proofreading and editing.

Is the work clearly and accurately presented and does it cite the current literature? Partly
Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Corporate governance, Internal controls, Venture capital finance, Bank risk

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 15 Oct 2022

Pupung Purnamasari, Universitas Islam Bandung, Bandung, Indonesia

Dear reviewers,

We have made revisions according to your suggestions.

Competing Interests: No competing interests were disclosed.

Reviewer Report 02 August 2022

https://doi.org/10.5256/f1000research.133566.r145799

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Agung Nur Probohudono ID
Department of Accounting, Universitas Sebelas Maret Surakarta, Surakarta, Indonesia
I have read this paper and I believe it deserves to be published. This is intended to provide further information to all parties related to reporting in the public sector to improve their performance in terms of strengthening audits.

The problems that arise are in accordance with the real conditions and the given background is logical. The author has described that many organizations have used information technology to develop and improve the effectiveness of their performance. Utilization of information technology is also an effective means of improving the quality of public services. However, its utilization in Indonesia is still minimal, so it needs encouragement from various parties, especially from the government.

In the future, it is necessary to provide data on how much or the current level of usage in Indonesia.

The method offered is good although it can still be enforced by sensitivity analysis. Respondents have covered the minimum needs of data analysis and are able to represent the desired conditions in this study.

The sensitivity analysis we mean is to be able to find out more about the difference between the results obtained with the analysis carried out by analysis with other methods, whether it will show the same results.

The results of the analysis are presented completely and clearly, and show that there are still many factors that have no effect. This is the reason that this research is important to be developed again in the future so that the implementation of CAATs can be optimized.

The conclusions that have been drawn are good for reference by various interested parties, where the use of CAATs in today's audits has become an important issue in achieving efficiency and effectiveness, especially in the public sector. The conclusions in this study have also provided a clear direction for future research.

**Is the work clearly and accurately presented and does it cite the current literature?**
Yes

**Is the study design appropriate and is the work technically sound?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**
Yes

**Are all the source data underlying the results available to ensure full reproducibility?**
Partly

**Are the conclusions drawn adequately supported by the results?**
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Public sector, Financial reporting, Financial statement analysis, Internal control, Corporate governance

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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