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DETERMINANTS OF COMPUTER ASSISTED AUDIT TOOLS AND TECHNIQUES (CAATs) ADOPTION

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Abstract:

Determinants of the adoption of CAATs in the Internal Audit Departments are examined in this study by employing the Unified Theory of Acceptance and Use of Technology (UTAUT). The attributes that were taken from the UTAUT theoretical model are performance expectancy, organisation readiness, effort expectancy and social influence. Apart from UTAUT's attributes, this study has taken individual factors to be examined together with the model. They are also considered an external factor that was established through the Theory of Acceptance Model (TAM) in previous literature. Using a quantitative approach, questionnaires were administered to internal auditors, followed by IT auditors and others such as Compliance officers and Quality auditors who use CAATs in their routine tasks; they work in multinational companies, government link companies and government agencies. The companies were chosen because they have in-house Internal Audit Departments. The results show that performance expectancy and individual factors are the most supported attributes that influence the adoption of CAATs. This study offers insights into the effect of individual factors on CAATs adoption. This paper expands the existing literature on factors that influence CAATs adoption among internal auditors.

Keywords:

CAATs, Technology-Based Auditing, Audit Data Analytics, UTAUT, In-House Internal Audit Departments.

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Introduction

Computer Assisted Audit Tools and Techniques (CAATs) are computer tools and techniques that an auditor (external or internal) uses as part of his or her audit procedures in processing data in an entity's information systems. As stated in the International Professional Practices Framework (IPPF) Standards that were issued by the Institute of Internal Auditors (2017); technology-based audit techniques can be explained as, *"Any automated audit tool, such as generalized audit software, test data generators, computerized audit programs, specialized audit utilities and computer-assisted audit techniques (CAATs)"*. CAATs may include the usage or adoption of data analytics tools and techniques such as ACL Analytics, IDEA software and others. The usage of CAATs will increase audit coverage up to 100% rather than selecting sample; it will also improve the audit efficiency and effectiveness (Bierstaker, Janvrin, & Lowe, 2014). Nowadays, data visualisation tools like Tableau are growing in popularity as an audit tool (Alles & Gray, 2016). In today's world of Big Data and Data Analytics as well as advanced business technology, CAATs such as ACL Analytics and IDEA software can be used in audit procedure to identify business risks, audit focus areas and detection of fraudulent activities, and to assist on evaluating going concern. Massive volumes of data are currently available inside and outside of organisations, meanwhile the data analytics tools are beneficial to change audit (Ramlukan, 2015). Big data is increasingly important as part of the audit assurance practice as it transforms from financial data to non-financial data, and from structured to unstructured data (Alles & Gray, 2016).

As business world is changing rapidly with the growth of latest technology and supported by professional standards, internal auditors are urged to use technology-based audit techniques in their audit activities. There are some of the firms that limit the usage of CAATs, and there is still a lack of acceptance from audit personnel (Curtis & Payne, 2014). In Yemen environment, external auditors have faced new challenges in keeping pace with technological development in the accounting profession, which is how to audit the outputs of advanced electronic accounting systems; as a result, several electronic systems and applications like CAATs have emerged to aid their audit tasks (Khalil & Olfa, 2020). According to Pennington, Kelton, and DeVries (2006), they find that auditors tend to not using CAATs when they are not well trained to use the tools or the tasks at hand is too complicated for them. Furthermore, the adoption of CAATs depends on the expectation towards cost effectiveness and trade-offs. These situations are contradicting current internal audit practices as we are in the era of Industry 4.0, the new digital industrial technology. Industry 4.0 is a transformation of industrial production that is in the strength of nine (9) pillars of technological advancement which consist of autonomous robots, big data and analytics, simulation, augmented reality, horizontal and vertical system integration, internet of things, additive manufacturing, cybersecurity and cloud computing (Rüßmann et al., 2015). One of the nine pillars of technological advancement is the big data and analytics, and it is important to the organization's direction in this new industry. Big data consists of four (4) dimensions: volume (amount of data), variety (variety of data), velocity (the speed of generation of new data and analysis) and value (value data). More auditable sources of data have become digital whereby they are computerized and paperless; the appropriate IT tools that should be used by internal auditors as the focus of audit have changed to computerised detection (Ahmi, Saidin, & Abdullah, 2014). Debreceny, Lee, Neo, and Shuling Toh (2005) find that internal auditors used CAATs as a special investigation tool rather than using it in their work routines and practices. The internal auditors did not adopt CAATs because of the lack of knowledge regarding it, and they felt that it is inapplicable to their nature of testing of financial statement assertions or the extent or quality of computerized internal

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controls. Some organisations, for instance, the National Audit Department of Malaysia, have extensively been using CAATs in their routine of audit work as an analysis tool which facilitates auditors in assessing millions of transactions and identifying anomalies (Ahmi et al., 2014). Adopting CAATs in various industries is determined by factors that can be better understood through this study, whereby the relationship between the espousal of the theory among internal auditors with different backgrounds of organisations in Malaysia and its influencing factors is investigated. This study will contribute to the literature of previous studies which applied the UTAUT theoretical model in the adoption of CAATs while getting to test the effects of it on individual factors in the UTAUT model.

Theoretical Framework and Hypothesis Development

The development of UTAUT incorporates the resemblances and variances of components from eight theories that were previously identified: TRA, Motivational Model, Theory of Planned Behaviour, TAM, Model of Personal Computer Utilization, a combined Theory of Planned Behaviour and TAM, Innovation Diffusion Theory and Social Cognitive Theory. UTAUT was formulated with four core constructs that will play a vital role as determinants of user acceptance and usage behaviour. The four constructs are performance expectancy, effort expectancy, social influence and facilitating conditions that have a direct relationship to influence IT usage behaviour (Venkatesh, 2003). The UTAUT theory will be helpful in determining internal auditors' acceptance of CAATs as it would demonstrate the factors that influence the acceptance of information technology in an organisation.

Authors like Gonzalez, Sharma, and Galletta (2012) used the UTAUT in their study on internal auditors' intention in adopting continuous auditing. The authors has found that UTAUT model explains the intention of internal auditors which vary in context in order to adopt CAATs in their organisation. The internal auditors' decision in adopting CAATs to perform continuous auditing were significantly in the perception of effort expectancy and social influence, while performance expectancy and facilitating conditions were not supported in the study. Furthermore, previous researchers (Bierstaker et al., 2014; Mahzan & Lymer, 2009; Mansour, 2016) have studied the behavioural intentions in the adoption of CAATs by using a modified UTAUT model. This theoretical model is widely used by the researchers around the globe as it is suitable to identify what causes people to adopt new technology in their routine job−-specifically audit work.

In this study, the variables influencing the espousal of CAATs are identified of which they are extracted from four variables in the UTAUT theoretical model which comprises of performance expectancy, facilitating conditions, effort expectancy, social influence, as well as one of the TAM model variables of individual factors that was adopted from perceived usefulness.

Performance Expectancy

Performance expectancy can be defined as the degree to which an individual believes that using the technology will assist him or her accomplish improvements in his or her audit work performance (Venkatesh, 2003). A research by Mahzan and Lymer (2009) suggests that one of the variables from UTAUT (performance expectancy) is significantly responsible as the main factor that influences the successful adoption of an audit software. The performance expectancy of CAATs usage in internal audit work can reduce the time spent in conducting substantive test as well as control test. According to Khalil and Olfa (2020), Al-Hiyari, Al Said and Hattab

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(2019), Bierstaker et al. (2014); Mahzan and Lymer (2009); Mansour (2016); and Venkatesh (2003), the performance expectancy has a positive relationship with the adoption of CAATs. Performance expectancy is one of the constructs that was formulated in the UTAUT model. Many authors used this construct to test whether it had a significant, direct relationship towards CAATs adoption. The performance expectancy of CAATs adoption has a positive influence and the most significant factor whereby people will adopt CAATs in their audit work as it assists and facilitates them in accomplishing their work in an efficient and effective way. Therefore, in this study, it is hypothesized as follows:

H1: There is a positive relationship between performance expectancy and the adoption of CAATs.

Organization Readiness (Facilitating Conditions)

Facilitating conditions is the existence of an organizational infrastructure equipped to facilitate the computer system (Bierstaker et al., 2014). Many studies suggest that the relationships between perceived behavioural control, facilitating conditions and compatibility are similar to each other (Venkatesh, 2003). Moreover, the most recent studies (Pedrosa, Costa & Aparicio, 2020; Khalil & Olfa, 2020) found that facilitating conditions is one of the main drivers of the adoption and use of CAATs in a European country. However, according to Ojaide, Jugu and Agochukwu (2018), facilitating condition has no effect on CAATs usage based on their empirical evidence in the Nigerian environment.

The facilitating conditions are prepared by an organisation in terms of readiness of the purchased or developed technology, appropriate trainings, available financial resources for the technology adoption and software maintenance updates, and the top management's commitment in adopting technology towards betterment of the organisation; these are crucial factors of the intention of adopting technology into audit practice of the organisation. Positive attitude of the top management towards technology adoption is an indicator of the organisation readiness, whereas negative attitude will lead to the resistance on the technology adoption (Razi & Madani, 2013). Facilitating conditions are related to technical availability, monetary for training support and other resources that are available to internal auditors in performing their audit activity. The system used must also be compatible with the systems that are currently used by the auditors (Gonzalez, Sharma, & Galletta, 2012). Organisation readiness and facilitating conditions that are derived from the UTAUT model are identified as the significant determinants of the adoption of CAATs. Therefore, in this study, it is hypothesized as follows:

H2: There is a positive relationship between organization readiness and the adoption of CAATs.

Effort Expectancy

One of the constructs of UTAUT, effort expectancy, is defined as the degree of perceived ease of use of CAATs or technology in their audit work, and can be easily learnt on how to use it without facing any difficulties (Mahzan & Lymer, 2009). CAATs in today's situation, for instance, the audit software of ACL Analytics, has undergone an evolution into an upgraded version for easier use with user-friendly commands and function buttons along with the help of 24 hours live chat and peer community forum to provide assistance on any problems. A previous study by Pennington et al. (2006) depicts that auditors are not only responsible for the adoption of technology but also for the implementation of technology; the efforts involved in

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technology adoption are more important for internal auditors than other IT professionals. According to Handoko and Chu (2021), Bierstaker et al. (2014), Mansour (2016), and Pedrosa, Costa and Laureano (2015), effort expectancy is one of the constructs in the UTAUT theoretical model. It explains the perceived ease of use of CAATs and audit technology which can be used and trained easily without difficulties (Mahzan & Lymer, 2009). The evolvement of CAATs in recent years has motivated internal auditors to use CAATs in performing audit assignment. It is proven in prior studies that a positive association occurs between the construct and the adoption of CAATs. Therefore, in this study, it is hypothesised as follows:

H3: There is a positive relationship between effort expectancy and the adoption of CAATs.

Social Influence

Social influence can be defined as the degree to which an individual thinks that he or she should use the new system when anyone else or their peers distinguish that new system as important for them. Social influence is an external variable of the belief towards others in using a technology. In audit perspective, the internal auditors are more likely to adopt CAATs in their organisation if more support is contributed by the top management in regards to CAATs usage in audit activities. Moreover, the behavioural intention of adopting technology can be positively influenced by peer influence as well as encouragement from their managers (Bierstaker et al., 2014). According to Venkatesh (2003); Mahzan and Lymer (2009); Pedrosa, Costa and Laureano (2015); and Bierstaker et al. (2014), social influence is also one of the constructs in the UTAUT model which is a variable that makes up one's belief in others for the use of technology in their working life. The most recent studies (Handoko & Chu, 2021; Khalil & Olfa, 2020) also found that social influence has a significant impact on auditor's intention in adopting CAATs. The peers or people around them who influence them in the use of technology comprise of their colleagues or superiors in higher ranking positions (Gonzalez et al., 2012). It is also proven in previous studies that social influence has positive association with the adoption of CAATs. Therefore, in this study, it is hypothesised as follows:

H4: There is a positive relationship between social influence and the adoption of CAATs.

Individual Factors

Factors of individuals, for example, job relevance, quality of output and result demonstrability are the salient factors of technology acceptance and influenced by the perceived usefulness construct (Kim, Mannino, & Nieschwietz, 2009). Individual factor is also an external variables that was tested through the TAM theoretical model of perceived usefulness. The addition of this construct to the rest of UTAUT constructs affects the externalities that cover the motivation of the adoption of CAATs among internal auditors. Previous studies by authors like Bierstaker et al. (2014), and Mahzan and Lymer (2009) are more focused on individual factors that influence the behavioural intention of the use of CAATs as well as technology acceptance. This individual factor may bring about higher likelihood of the acceptance of technology among auditors in their profession as they may be fully cognizant of the relevance and fundamental of technology in the context of auditing as stated in internal audit standards and frameworks. It also depends on the auditors' professional judgement. CAATs is an important tool that will influence and impact audit judgement through the level of assurance they need to obtain (Kelechi, 2007). It is also important for internal auditors to be exposed to the knowledge of current issues with regard to internal audit where continuous auditing and 100% audit coverage are relevant in the internal audit profession. Continuous auditing and wider coverage of audit

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through the use of audit technology will improve the quality of audit output which are apparent to the auditors.

According to Kim, Mannino, and Nieschwietz (2009); and Talukder (2012), individual factor is the construct that was taken and tested in previous study through the TAM theoretical model which is directly related to perceived usefulness, one of the variables in the TAM model. Job relevance, quality of output and result demonstrability are salient factors of the technology acceptance and influenced by the perceived usefulness construct (Kim et al., 2009). Apart from the four main constructs of UTAUT, we add this construct to cover the effect of externalities of the motivations of CAATs adoption as several authors focus more on individual factors that influence the intention of adopting CAATs. Therefore, in this study, it is hypothesised as follows:

H5: There is a positive relationship between individual factors and the adoption of CAATs.

This study measures the actual situation where internal auditors adopt CAATs in their audit work in terms of behavioural intentions and motivations. The proposed research framework was modified to fit the objectives in this study which are derived from UTAUT, a previous theoretical research model, as well as from one of the constructs of the TAM theoretical model. It certainly measures the adoption of CAATs as a dependent variable by looking at five different factors influencing the adoption of CAATs as independent variables.

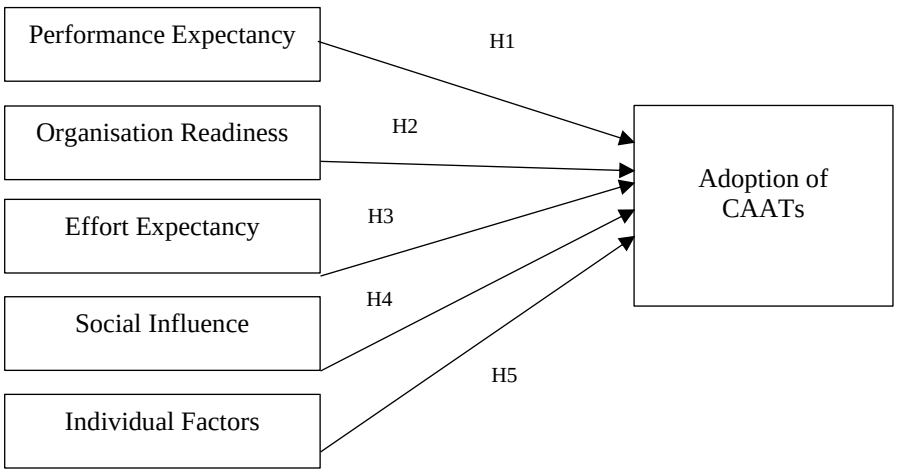

Figure 1: Proposed Research Framework

Source: Own

Methodology

The proposed hypotheses in this study, which were established earlier in relation to the research objectives and questions, were tested through conducting a cross-sectional quantitative study whereby the questionnaire method was used. Due to the limitations of time and resources in performing this research, the cross-sectional quantitative study was the best option available because of its simplicity, rapid data collection and cost-effective. Also, survey method offers

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greater anonymity as there is no face-to-face interaction, and when it comes to sensitive questions, it surely helps to increase the likelihood of obtaining accurate information (Kumar, 2005).

Questionnaire Design

In the research objective mentioned earlier, influencing factors are determined in relation to the CAATs adoption. The variables in this study were taken from reputable previous literature and the proposed variables comprise of Performance Expectancy (PE); Organisation Readiness (OR); Effort Expectancy (EE); Social Influence (SI); and Individual Factor (IF). In measuring the responses to the questionnaires prepared, 7-points Likert scale was used. As to cover the framework of this study, the survey questions were derived from prior literature. The variables or concepts were further operationalised into observable and measurable elements. The operational definitions of variables are presented in Table 1 below:

Table 1 is here.

Based on Table 1, the questionnaire is categorised into seven (7) sections whereby six (6) of them comprises questions concerning the variables; meanwhile, the questions in the remaining section are regarding the demographics of the respondents. The questionnaire starts with Section A, which measures the respondents' Performance Expectancy, followed by Section B which measures the respondents' Organisation Readiness towards adopting CAATs. For Section C, we measure the respondents' Effort Expectancy which explains their understanding and has the necessary knowledge on CAATs. Next, Section D measures the respondents' Social Influence in using CAATs either from their personal references or their organisation's Senior Management as well as their organisation's commitment in adopting CAATs. Section E measures the respondents' Individual Factors in regards to adopting CAATs whereby they feel that CAATs is one of the important technologies that they should have in their internal audit jobs. Whereas, Section F measures respondents' intention in considering the adoption of CAATs in their daily internal audit jobs as well as increasing their CAATs skills by attending courses or trainings. The questionnaire consists 7-points Likert scales such as: 1- "Strongly Disagree"; 2- "Disagree"; 3- "More or Less Disagree"; 4- "Neutral"; 5- "More or Less Agree"; 6- "Agree"; and 7- "Strongly Agree". At the end of the survey, questions regarding respondents' demographic information are included such as gender, age, education level, organisation, department, CAATs experience, CAATs tools used and position in the current organization.

Pre-test

Pre-test was conducted on 5 respondents preceding the distribution of digital and hard copy questionnaires amounting to 150 copies. During the session, positive feedbacks were received whereby the respondents claimed that they could understand the questionnaires easily, whereas in their opinion, the questions were in line with the subject and objectives. The actual study (main study) was then conducted after completing the pre-test.

Data Collection

The primary data were collected by using both digital and hard copy questionnaires for a period of 2 months. In this research, the questionnaires were distributed to the respondents who were internal audit officers for both private and government sectors. The reason for this study to be conducted at selected areas as mentioned above because it focuses on Internal Auditors as the

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main respondents, followed by Information System (IS) or Information Technology (IT) Auditors and others such as Compliance Officer and Quality Auditors; they used CAATs in their task routines when working in multinational companies, government link companies and government agencies.

There are two versions of the questionnaire that were used to gather the data rapidly from the respondents which are the hard copy version that was distributed by hand, whereas the digital version in the form of online survey was developed by using Google Form. The hard copy version of the questionnaire was disseminated to the respective offices of internal audit departments, IT/IS audit departments and compliance offices in various industries in private and government sectors. The digital version of the questionnaire was forwarded through email, LinkedIn messenger, mobile Telegram groups and mobile WhatsApp groups among friends and relatives who worked as internal auditors. From 190 respondents who answered the questionnaires, 117 respondents participated in completing all questions. All of the 117 questionnaires were completed perfectly without missing values and they were usable for further analyses. This is because all of the completed questionnaires were checked by the appointed representative in each of the respondents' offices. The response rate of the distribution of questionnaires was 62% of the 190 questionnaires. As we have insufficient time to conduct this study, we can conclude this study by the number of respondents who participated which is sufficient and adequate for representing the overall population of Internal Auditors in Malaysia. According to Roscoe J.T. (1975), any sample size that is larger than 30 and below than 500 is suitable for most research. Furthermore, Krejcie and Morgan (1970) state that a sample size of 123 subject is sufficient.

Sampling and Data Analysis Techniques

The sample in this study was selected by applying the non-probability convenience sampling technique because the scope of this research was narrowed down to Internal Auditors and other positions that used CAATs in their daily task routines. Convenience sampling is also known as availability sampling; it is usually used for a population that is either unknown or cannot be individually identified.

Three techniques were used in this research in the collection and analysis of the demographic information and quantitative data; the activities were carried out through the IBM's Scientific Program of Social Science (SPSS) Version 24 software. These are included in the software: descriptive statistics, scale of measurement (reliability test), normality test, correlation as well as multiple regression analysis. The results of the analysis of the data are discussed in the next section.

Results and Discussion

The obtained responses were translated into the variables of performance expectancy, organisation readiness (facilitating conditions), effort expectancy, social influence, individual factors and adoption of CAATs. As shown in Table 2, a cross-section of the population of private and public sectors' internal auditors, IS/IT auditors, compliance officer or Quality auditors in Malaysia fairly represents the respondents whereby majority of them aged between 31 and 40 years old (54.4%), following the second largest age group is 21 to 30 years old (25.6%). The participation of the respondents aged more than 61 years is the lowest which consists of only one person while the second lowest participation of respondents aged between 51 to 60 years which consists of 3 respondents or 2.6% of the total population. Majority of the

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respondents are members of Generation Y, and this survey was conducted indiscriminately without taking each respondent's age into account. The dominant gender in the HEI internal auditing sector is female, which represents 55.6% of the total respondents, whereas male respondents participated in this study are only 52 (44.4%).

Based on Table 2, it is shown that the respondents' education background that has the highest frequency is the Bachelor's Degree which is represented by 91 respondents or 77.8% of the total population. There are 19 respondents (16.2%) participated in this study who held a Master's Degree, whereas the remaining 7 respondents (6%) held a Diploma. There is no respondent who was a PhD holder. In terms of the respondents' type of organisation they worked for, it is depicted that majority are the employees who worked in private sector (77.8%), whereas Government's sector employees who participated in this study only contribute 22.2% to the total population. The targeted respondents for this study are those who worked with the Internal Audit and IS or IT Audit Departments which contribute the highest frequency with a total of 102 respondents or 87.2% of overall respondents. Meanwhile, the other departments such as compliance and other audit departments like Quality Audit and External Audit Firms contribute only 15 respondents which represent 12.8%. By looking into the respondents' years of experience of using CAATs, majority of the respondents had between 4 to 6 years of experience, which is 34 respondents or 29.1% of the total respondents. The second highest frequency of the respondents' experience of using CAATs is between 1 to 3 years of experience with a total of 33 respondents which constitutes 28.2% of the whole respondents. Followed by 27 respondents who had experience of between 7 to 9 that makes up 23.1%. Majority of the respondents used ACL Analytics as their main CAATs to analyse audit data sources with a total of 65 respondents representing 55.6%. Apart from that, the IDEA software was also used by respondents in conducting their audit exercise with a total of 28 respondents representing 23.9 %. Other than that, respondents also used the ACTIVE data for Excel for a total of 21 respondents representing 17.9% and other CAATs tools such as the Teammate audit management software with a total of 3 respondents making up 2.6% of overall respondents. Most of the them who participated in this study were in the position of Senior Executive with a total of 63 respondents which constitutes 53.8%. Whereas, respondents in the position of Junior Executive ranked as the second highest with 29 respondents representing 24.8%, and respondents who were in the Middle Management position ranked as the third highest with 25 respondents representing 21.4%. There was no respondent with a Top Management position involved in this study.

Table 2 is here.

Descriptive Statistics

Descriptive analysis shows us the value of mean and standard deviation for each of the independent variables and the dependent variable which was extracted from the questionnaire. Table 3 provides us the detailed results of the attributes of the 117 responses. The results from the table above depict that the mean value of each variable is mostly all above 5.00 except for the variable of Social Influence. It is demonstrated in the result that the influencing factors of the espousal of CAATs in the respondents' respective organisations were more or less agreed, agreed and strongly agreed by majority of the respondents.

Table 3 is here.

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Reliability Analysis

In ensuring that every variable discovered in this study was valid, relevant and not in any kind of errors, reliability analysis was carried out. Besides that, the analysis was for the purpose of measuring whether the relationship between each of the independent variables and the dependent variable was reliable. The most common methodology of analysing the internal consistency or homogeneity among the variables is the Cronbach's Alpha Coefficient. Ideally, Cronbach's alpha coefficient values should be above 0.7 (Pallant, 2007). A few constructs in both independent and dependent variables were ommitted. For the Performance Expectancy variable, a construct of number 3 – "Using CAATs increases my productivity" was removed in this analysis. Correspondingly, the variable of Individual Factor, two constructs of number 3 – "The quality of the output I get from internal audit is high" and 4 – "The results of using internal audit technology are apparent to me" were removed from the analysis. Furthermore, for the dependent variable, the number 1 construct – "I intend to adopt CAATs" also was removed. The results of this analysis after removing the constructs are shown in Table 4 below.

Table 4 is here.

Correlation Analysis

Correlation analysis is conducted to describe the strength and direction of the linear relationship between two variables. While the Pearson correlation is used when we want to explore the strength of relationship between two continuous variables (Pallant, 2007). As suggested by Pallant (2007), we should check the correlation between each of the independent variables so that it is not too high. If the variables are too highly correlated, for instance, above 0.7 in the same analysis, we may need to consider omitting one of the variables or develop a composite variable from the scores of the two highly correlated variables (Pallant, 2007). From Table 5, the result of Pearson correlation involving each variable can be identified as in a range of between -1 and 1. The relationship between the variables is positively correlated, and the strength of the relationship is not too strong as it ranges from 0.474 to 0.693.

Table 5 is here.

Multiple Regression Analysis

The hypothesis statements were tested through multiple regression analysis with the aim of determining their significance to the model of this research. Apart from that, the correlation between the independent variables and the dependent variable was figured out through the analysis. This analysis was conducted with adoption of CAATs as the dependent variable, while performance expectancy; organisation readiness; effort expectancy; social influence; and individual influence as the independent variables. Referring to the 117 respondents, the result shows a significant outcome; ($F(5,117) = 38.622$, $p<0.05$) as shown in Table 6.

Table 6 is here.

The adjusted R Square as shown in the above table is 61.9% and the model p-value is 0.000. Based on the results in Table 7 above, the two independent variables (i.e., performance expectancy and individual factors) have positive relationships with the dependent variable. The other three independent variables of organisation readiness, effort expectancy and social influence do not significantly influence the adoption of CAATs. The table of coefficient above shows the strength of the independent variables that have a significant relationship with the

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dependent variable. The results show that individual factors have the highest value of strength ($\beta = 0.453$), followed by performance expectancy ($\beta = 0.295$) and effort expectancy ($\beta = 0.152$). Individual factors give the strongest contribution as it results to the highest Beta as well as a significant contribution with sig < 0.05 towards the adoption of CAATs.

Hypotheses Testing

Hypothesis testing was conducted to find out whether the hypothesis statements shown earlier were supported or not. If the presented scores (p-value) are greater than 0.05, hence the hypothesis cannot be supported due to their insignificance to this study. The first hypothesis of performance expectancy and the last (fifth) hypothesis of individual factors have significant impacts towards the adoption of CAATs. Majority of the respondents agreed with the statements that were stated in the questionnaires where the two attributes supported the adoption of CAATs in their daily audit work. The other three attributes, which are organisation readiness, effort expectancy and social influence, impacted less significantly towards the adoption of CAATs; they are not the supporting attributes towards the adoption of CAATs. The results of the hypothesis testing are shown in Table 7.

Table 7 is here.

Discussion of Findings

The objective of this study is to investigate the factors influencing the adoption of CAATs among internal auditors. In this study, the adoption of CAATs is the dependent variable, while the independent variables are the performance expectancy; organisation readiness; effort expectancy; social influence; and individual factors.

Performance expectancy is found to be significantly influencing the adoption of CAATs based on the results in Table 7. This is connected to the first hypothesis (H1); this hypothesis is supported. Performance expectancy influences the adoption CAATs with a beta score of 0.295 and p-value of 0.001. The respondents found that CAATs was useful to their job; CAATs enabled them to quickly accomplish tasks and increased their productivity. The performance of CAATs assisted them to spend less time on the task routines of audit and improved the quality of the auditing exercise. This is consistent with the finding in studies by Bierstaker et al. (2014); Mahzan and Lymer (2009); Mansour (2016); and Venkatesh (2003) which prove that performance expectancy has a positive relationship with CAATs adoption. Besides that, the fifth hypothesis (H5) is also supported, which shows that individual factors positively impact the adoption of CAATs. This is the most significant element that influences the adoption of CAATs. As mentioned earlier, most of the respondents felt that technology in audit is important to them and relevant to their audit exercise. This is consistent with the findings in studies by Venkatesh and Davis (2000); Kim, Mannino, and Nieschwietz (2009); and Talukder (2012) whereby it is proven to be an important factor of the technology acceptance, specifically the acceptance of the CAATs adoption.

However, the second hypothesis (H2) is not supported. Organisation readiness is not significant based on the multiple regression analysis of a beta score of -0.012. This contradicts to the findings in Razi and Madani (2013); Bierstaker et al. (2014); as well as in Venkatesh (2003). Organisation readiness is not one of the significant factors that influence the adoption of CAATs because most of the internal audit department had already used CAATs as one of their standard audit practices. The usage of CAATs does not depend on the organisation or top

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management readiness in accepting the technology implementation because currently CAATs is available in every computer such as Microsoft Excel which can easily analyse auditable data. Also, the third hypothesis (H3) is not supported. Effort expectancy is also not significant in this study as the multiple regression analysis shows that this variable scored a beta of 0.152 and p-value of 0.124. This contradicts to the finding in Bierstaker et al. (2014); Mansour (2016); and Pedrosa, Costa, and Laureano (2015). In this study, effort expectancy is not positively significant in influencing the factor of CAATs adoption. In audit perspective, internal auditors should gather all the audit evidence through data analysis, work papers and other sources. They should become competent personnel in performing audit exercise which includes having knowledge on CAATs. This is in line with the item 1210.A3 in the IPPF Standards (2017) which stated that *"Internal Auditors must have sufficient knowledge of key information technology risks and controls and available technology-based audit techniques to perform their assigned work. However, not all internal auditors are expected to have the expertise of an internal auditor whose primary responsibility is information technology auditing".* Personal preference like effort expectancy among auditors may not reflect the decision of CAATs adoption.

Finally, the fourth hypothesis (H4) is also not supported. Social influence is not significant in this study as it has shown that the result of multiple regression analysis of beta score is -0.009. This contradicts to the finding in Venkatesh (2003); Mahzan and Lymer (2009); Pedrosa, Costa, and Laureano (2015); and Bierstaker et al. (2014). This influencing factor is negatively directed or contrary to the objective of influencing the adoption of CAATs. Social influence does not reflect the influencing factor of the adoption of CAATs. The intention or decision on CAATs adoption usually does not depend on social influence factors. This is because CAATs adoption has a financial impact to the organisation, and need to be in line with the organisation's audit capabilities.

Conclusion

This paper is sought to demonstrate the factors that influence the adoption of CAATs among internal auditors in Malaysia. The analysis result as presented earlier shows that the proposed research framework explained the 61.9% of variation in the adoption of CAATs. It is also demonstrated that two of the five factors have a significant relation with the adoption of CAATs. The two variables are individual factors and performance expectancy, whereas the other three factors that are not significant in this study are organisation readiness, effort expectancy and social influence. Auditors who participated in this study are mostly from the private sector. They were more exposed to auditing larger clients whereby the audit data were more complicated, hence they were driven to adopt CAATs in their auditing exercise. The results from this study suggest that the three variables, which are organisation readiness, effort expectancy and social influence, are not significant as the auditors had a vital role in gathering appropriate competent evidence. So, these variables may result in less weight as compared to the variables of performance expectancy and individual factors in influencing the adoption of CAATs because the auditors focused on audit effectiveness and efficiency in performing their tasks.

Prior studies by Bierstaker et al. (2014); Mahzan and Lymer (2009); Mansour (2016); and Pedrosa, Costa, and Laureano (2015) use the UTAUT theoretical model in discussing the factors that influence the adoption of CAATs in an organisation. As an addition to the previous studies, this study adds to the literature and explains more about the factors that will influence

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CAATs adoption in the context of Malaysian organisation. Literatures written by Kim, Mannino, and Nieschwietz (2009); and Razi and Madani (2013) test individual factors in the adoption of CAATs which was taken from the TAM theoretical model of perceived usefulness. Thus, in this study, individual factors were tested in the UTAUT theoretical model to see the effects on the factors that influence CAATs adoption. The results of several analyses in this study have shown that two of the most significant influencing factors of the adoption of CAATs are individual factors and performance expectancy. This study can assist internal auditors to decide on what reasons should they adopt CAATs in their auditing exercise. It can also help the private sector that comprises internal audit departments, government agencies under the Auditor General Department, public universities and others to encourage the CAATs application among internal auditors following the changing of the world towards the big data and analytics in auditing. The efficiency and effectiveness of the audit can be upgraded by using CAATs (Bierstaker et al., 2014). The adoption of CAATs is considered important as the IPPF Standards also encourage the usage of CAATs in performing the auditing exercise.

Finally, this study presents some assistance for internal auditors regardless of their background, either from private or government sector, to leverage on technology in their auditing practices as the audit data varies from time to time. This study also assists in the discovery of motivations that bring about the adoption of CAATs; researchers and internal audit practitioners were identifying them in order to formulate and design their courses and programs related to CAATs, improve the IT system support, and encourage the adoption of CAATs. This study also provides some insights for future research in order to improve the result of the study.

The limitations of the study are that the examined factors is limited; future studies could be to explore environmental factors and the effects of COVID on the use of CAATs. Other theories on technology adoption should be tested in order to investigate the factors that significantly influence CAATs adoption.

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Table 1: Operational Definitions of Variables

Sections	*Variables*	*Questionnaire Items*	*Sources*
A	Performance Expectancy	I find CAATs useful in my job.	Bierstaker, Janvrin, & Lowe, 2014
		Using CAATs enables me to accomplish tasks more quickly.	
		Using CAATs increases my productivity.	
		If I use CAATs, I will increase my chances of getting a raise.	
		CAATs usage will enable me to spend less time on the routine tasks of audit.	Mansour, 2016
		CAATs usage improves the quality of the auditing work I do.	
B	Organisation Readiness	My organisation has the financial resources to adopt audit software / CAATs.	Razi & Madani, 2013
		My organisation has the technological resources to adopt audit software / CAATs.	
		Attitude towards new technology is positive in my organisation.	
		Top management is committed to adopt audit software / CAATs.	
C	Effort Expectancy	My interaction with CAATs is clear and understandable.	Bierstaker, Janvrin, & Lowe, 2014
		It is easy for me to become skilful at using CAATs.	
		I find CAATs easy to use.	
		Learning to operate CAATs is easy for me.	
		I have the necessary knowledge to use CAATs.	Pedrosa, Costa, & Laureano, 2015
D	Social Influence	People who influence my behaviour think that I should use CAATs.	Bierstaker, Janvrin, & Lowe, 2014
		People who are important to me believe that I should use CAATs.	
		Our firm's/department's Senior Managers have been helpful in the use of CAATs.	
		In general, our Organisation has supported the use of CAATs.	
		People in my organization who use the internal audit technology have a high profile.	Kim, Mannino & Nieschwietz, 2009

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		Having the internal audit technology is a status symbol in my organization.	
E	Individual Factors	In my job, usage of internal audit technology is important.	Kim, Mannino & Nieschwietz, 2009
		In my job, usage of internal audit technology is relevant.	
		The quality of the output I get from internal audit is high.	
		The results of using internal audit technology are apparent to me.	
F	Adoption of CAATs	I intend to adopt CAATs.	Razi & Madani, 2013
		I intend to learn more about CAATs.	
		I intend to consider adopting CAATs.	

Table 2: Respondents' Demographic Profile

Demographic Items	*Frequency (n=117)*	*Percentage (%)*
Gender		
Male	52	44.4
Female	65	55.6
Age		
21 to 30	30	25.6
31 to 40	66	56.4
41 to 50	17	14.5
51 to 60	3	2.6
61 and above	1	0.9
Education level		
Diploma	7	6.0
Bachelor	91	77.8
Master	19	16.2
Organisation		
Private	91	77.8
Government	26	22.2
Department		
Internal Audit	84	71.8
IS/IT Audit	18	15.4
Others	15	12.8

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Table 3:

Years of CAATs Experience		
0 to 1 year	11	9.4
1 to 3 years	33	28.2
4 to 6 years	34	29.1
7 to 9 years	27	23.1
More than 10 years	12	10.3
CAATs tools you are using		
ACL Analytics	65	55.6
IDEA Software	28	23.9
ACTIVE Data for Excel	21	17.9
Others	3	2.6
Role in your Organisation		
Middle Management	25	21.4
Senior Executive	63	53.8
Junior Executive	29	24.8

Table 3: Descriptive Statistics

Constructs	*Items*			*Mean*	*Standard Deviation*
Adoption of CAATs	1.	:	I intend to adopt CAATs.	5.75	1.025
	2.	:	I intend to learn more about CAATs.	5.83	0.945
	3.	:	I intend to consider adopting CAATs.	5.75	1.008
	Overall Mean and Standard Deviation			**5.78**	**0.956**
Performance Expectancy	1.	:	I find CAATs useful in my job.	5.74	0.950
	2.	:	Using CAATs enables me to accomplish tasks more quickly.	5.81	0.928
	3.	:	Using CAATs increases my productivity.	5.61	0.965
	4.	:	If I use CAATs, I will increase my chances of getting a raise.	4.44	1.192
	5.	:	CAATs usage will enable me to spend less time on the routine tasks of audit.	5.68	1.032

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	6.	:	CAATs usage improves the quality of the auditing work I do.	5.44	0.951
	Overall Mean and Standard Deviation			**5.45**	**0.806**
Organisation Readiness	1.	:	My organisation has the financial resources to adopt audit software / CAATs.	5.26	1.329
	2.	:	Organisation has the technological resources to adopt audit software / CAATs.	5.33	1.106
	3.	:	Attitude towards new technology is positive in my organisation.	5.39	1.082
	4.	:	Top management is committed to adopt audit software / CAATs.	5.13	1.095
	Overall Mean and Standard Deviation			**5.28**	**0.977**
Effort Expectancy	1.	:	My interaction with CAATs is clear and understandable.	5.28	1.065
	2.	:	It is easy for me to become skilful at using CAATs.	5.18	0.979
	3.	:	I find CAATs easy to use.	5.15	0.952
	4.	:	Learning to operate CAATs is easy for me.	5.11	1.032
	5.	:	I have the necessary knowledge to use CAATs.	5.09	0.974
	Overall Mean and Standard Deviation			**5.16**	**0.893**
Social Influence	1.	:	People who influence my behaviour think that I should use CAATs	4.52	1.171
	2.	:	People who are important to me believe that I should use CAATs.	4.56	1.170
	3.	:	Our organisation's Senior Managers have been helpful in the use of CAATs.	5.09	1.149
	4.	:	In general, our organisation has supported the use of CAATs.	5.20	1.061
	5.	:	People in my organization who use the internal audit	4.80	0.993

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			technology have a high profile.		
	6.	:	Having the internal audit technology is a status symbol in my organization.	4.80	1.077
	Overall Mean and Standard Deviation			**4.83**	**0.816**
Individual Factors	1.	:	In my job, usage of internal audit technology is important.	5.57	1.028
	2.	:	In my job, usage of internal audit technology is relevant.	5.65	0.994
	3.	:	The quality of the output I get from internal audit is high.	5.52	0.915
	4.	:	The results of using internal audit technology are apparent to me.	5.44	1.003
	Overall Mean and Standard Deviation			**5.54**	**0.892**

Table 4: Cronbach's Alpha Coefficient

Variables	*No. of Items*	*Cronbach's Alpha*
Adoption of CAATs	2	0.941
Performance Expectancy	5	0.853
Organisation Readiness	4	0.865
Effort Expectancy	5	0.935
Social Influence	6	0.833
Individual Factors	2	0.927
Overall Cronbach's Alpha	5	0.871

Table 5: Pearson Correlation Analysis

Constructs	PE	OR	EE	SI	IF	Aof CAATs
PE	1	.514**	.685**	.474**	.639**	.670**
OR		1	.693**	.553**	.549**	.506**
EE			1	.490**	.614**	.638**
SI				1	.630**	.492**
IF					1	.675**

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AofCAATs						1

Note: **$p < 0.01$
PE: Performance expectancy
OR: Organisation Readiness
EE: Effort Expectancy
SI: Social Influence
IF: Individual Factors
AofCAATs: Adoption of CAATs

Table 6: Analysis Table of Coefficient and Regression

Independent Variables	*Hypothesis*	*Predicted Sign*	*Coefficient*	*T-Statistics*	*p-value*
Intercept		0.450			
Performance Expectancy	H1	Positive	0.295	3.264	0.001**
Organisation Readiness	H2	Positive	-0.012	-0.139	0.890
Effort Expectancy	H3	Positive	0.152	1.551	0.124
Social Influence	H4	Positive	-0.009	-0.108	0.914
Individual Factors	H5	Positive	0.453	4.523	0.000**
F-Value					38.622
Sig. F *(p-value)*					0.000[b]
R					0.797[a]
R Squared					0.635
Adjusted R Squared					0.619

Note: *$p<0.05$, **p<0.01

Table 7: Hypothesis Analysis

Hypothesis Statements	*Supported*
H1: There is a positive relationship between performance expectancy and the adoption of CAATs.	Yes
H2: There is a positive relationship between Organisation readiness and the adoption of CAATs.	No
H3: There is a positive relationship between effort expectancy and the adoption of CAATs.	No
H4: There is a positive relationship between social influence and the adoption of CAATs.	No
H5: There is a positive relationship between individual factors and the adoption of CAATs.	Yes

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