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Adoption of Audit Data Analytics - The Moderation Effect of Audit, Firm Size, and Voluntariness to Use

Menna Tarek[1*], Ehab. K. A. Mohamed[2], Hala M. G. Amin[3]

[*1] *The Egyptian Chinese University (ECU) and The German University in Cairo*
[2,3] *The German University in Cairo, New Cairo, Cairo, Egypt*

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Abstract

The study is one of the first empirical studies that focuses on the evolution of BDAs in the auditing field. This study aims to examine the moderation effect of audit firm characteristics such as audit firm size and voluntariness to use have on the relationships between the factors affecting auditors' ATT towards using ADAs. The study is supported by the TAM model and the UTAUT model. A survey is the main research instrument used in the current study; the survey is administrated on Google forms and in direct collect form as well. The data examined for both Big4 and Non-Big4 auditors and the results shows mixed significance level for the different variables.

Keywords: Auditors' Attitude, Audit Data Analytics, ADAs Adoption, Audit, Firm Size, Voluntariness to Use

1. Introduction

Examining the financial position of a business for internal and external users is one of the main responsibilities of the auditor. The use of computer telecommunication networks helped organizations to have all their transactions in an electronic form through the Internet and the World Wide Web technologies (Venkatesh, Morris, Davis, & Davis, 2003; Vessey, Ramesh , & Glass, 2002).

Auditors play an essential role in evaluating the clients' risk management systems. Under traditional auditing assessments are conducted on a periodic basis only so managers are not able to respond to risks on a real time basis. However, now in this technological age; auditors need to innovate so as to keep pace with the shareholders' expectations. Hence, in order to satisfy the demands of the shareholders for risk- based, automatic, effective, continuous or nearly real-time audit process, audit mechanism needs to be updated. This need highly arises with the emergence of "Big Data" which presents an opportunity for auditors to improve in their data analysis, for example, auditors use data mining techniques to predict trends in large database (Sun , Alles, & Vasarhelyi 2015; Mohammadi, Yazdani, & Maham, 2020).

Murthy and Groomer (2004) suggest that investors need the financial information related to financial performance to be delivered on a real time basis since they do not guarantee the accuracy of the financial statements as well as the privacy and security of IT systems. Hence, the increasing expectation of the public considering audit service as preventive tool for fraud has inserted pressure for the development of auditing practice to include new advanced tools which help improving fraud detection (Bagranoff, Simikin, & Norman, 2005). Especially that meeting the public expectations and demands can be achieved through adopting new audit technological advanced tools by external auditors (Murthy & Groomer, 2004).

Therefore, technology is essential for auditors to access huge amounts of data, especially unstructured data such as text and images especially because now there is high demand on real-time data. Hence, real time financial reporting as well as Continuous Auditing (CA) are highly important as more frequent evaluation of financial information by auditors is needed.

Then, Big Data Analytics (BDAs) emerges as well. This has shed the light on the new audit analytics tools as new audit approaches that are technologically advanced; these tools are needed especially that the advances in information technology (IT) necessitates the inclusion of the technology element in the auditing of financial statements (Tumi, 2013).

* Corresponding author Email: m.tarek@ecu.edu.eg

In mid-2015; the International Auditing and Assurance Standards Board (IAASB) established the Data Analytics Working Group (DAWG). The IAASB's Data Analytics Working Group has its publication in September 2016 named ''Exploring the growing use of technology in the audit, with a focus on data analytics". This publication helps in identifying many of the important factors that affects the adoption of data analytics in an audit engagement. Hence, it explores data analytics and the drivers, opportunities and obstacles that auditors may face during the adoption process; this helps in overcoming any barriers that may be faced by the auditors while adopting data analytics when auditing the financial statements (IAASB, 2016).

When identifying the research objective of the current study, existing audit research is examined to determine the research gaps. However, first the main relationships between the factors affecting attitude towards ADAs adoption need to be examined but this is not the focus of this study, however, these relationships are tested by examining the TAM model. After reviewing previous studies of new technologies adoption within the audit context, it is found that little research is conducted in ADAs context; particularly in developing countries, representing a significant gap in knowledge especially that the use of ADAs is below expectation. It is crucial to fill this gap since many issues are raised from the side of audit firms, and academics which calls for more research in this area.

To the best of my knowledge, literature on data analytics acceptance and adoption in the Middle East especially within the Egyptian context is rare. In previous studies, the interrelationships among the independent variables may be analyzed but no specific focus is given to test the moderation effect on these tested relationships. Hence, the direction of this study is towards examining the moderation effect of some audit firm characteristics such as audit firm size and voluntariness to use. This study tries to deepen the understanding of different issues related to ADAs adoption to fill the gap highlighted in knowledge and literature. A study of the moderation effect on the previously tested relationship of the factors affecting attitude among auditors towards data analytics integration in audit engagements can fill the gap and provide much needed insights.

The study is one of the first empirical studies that focuses on the evolution of BDAs in the auditing field. To the best of the researcher's knowledge, this is the first study that is concerned with testing tested the moderation effect of audit firm characteristics on factors that affect auditors' attitude towards ADAs adoption. Hence, in order to fill the highlighted gap in audit research; this study aims to examine the moderation effect of audit firm characteristics such as audit firm size and voluntariness to use have on the relationships between the factors affecting auditors' ATT towards using ADAs determined by the TAM model. Also, Unified Theory of Acceptance and Use of Technology (UTAUT) shown in figure 1 guided the current study by incorporating some moderators identified in this theory. However, a deep exploration of the impact of all the moderating factors proposed in the UTAUT is not the main focus of the current study, which mainly tries to examine moderation effect of only voluntariness of use and audit firm size.

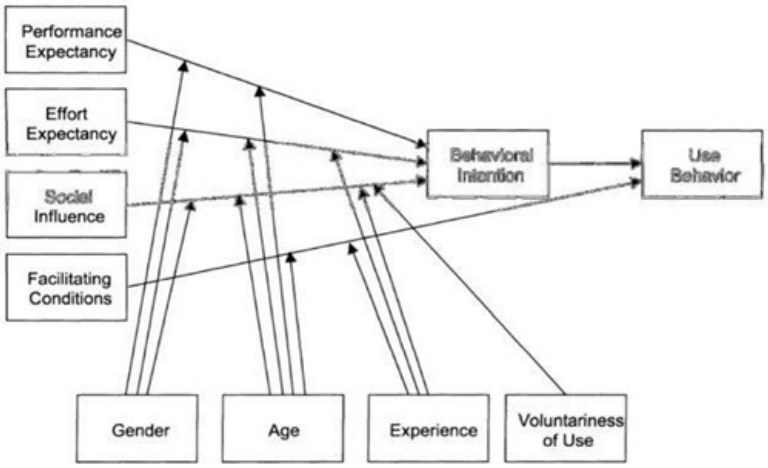

Fig. 1. Unified Theory of Acceptance and Use of Technology (UTAUT) (Source: Venkatesh et al., 2003, p.447)

As per the previously stated objective, the current study is concerned with examining the moderation effect of audit firm characteristics on the relationship between different factors in the TAM model affecting auditor's attitude towards ADAs adoption. Some hypotheses are developed based on audit literature and relative theories/models of technology acceptance in order to meet the research objective of the current study.

The hypotheses developed to meet the objective of the current study; testing the moderation effect of different variables on the relationships between different factors that affect auditor's attitude towards ADAs adoption; these hypotheses are as follows:

H1: *The relation between External Variables and Perceived Usefulness of ADAs is moderated by audit firm characteristics.*

H2: *The relation between External Variables and Perceived Ease of Use of ADAs is moderated by audit firm characteristics.*

H3: *The relation between Perceived Usefulness of ADAs and Attitude towards its adoption is moderated by audit firm characteristics.*

H4: *The relation between Perceived Ease of Use of ADAs and Attitude towards its adoptionis moderated by audit firm characteristics.*

H5: *The relation between Perceived Ease of Use of ADAs and Perceived usefulness of ADAs is moderated by audit firm characteristics.*

The moderation effect of the audit firm characteristics tested in the current study are audit firm size and voluntariness to use.

2. Background and Hypotheses

2.1. ADAS

As per the audit literature, Audit Data Analytics (ADAs) is defined as ''the science and art of discovering and analyzing patterns, identifying anomalies, and extracting other useful information in data underlying or related to the subject matter of an audit through analysis, modeling, and visualization for the purpose of planning or performing the audit '' (AICPA, 2014, p.7).

The main information needed by the auditor exists in in the transactions and balances that appear in the financial statements. ADAs include analytical procedures and traditional file examination; it helps in identifying potential misstatements (AICPA, 2014). According to Swenson Advisors (2015), when ADAs is incorporated in audit engagements, it helps in identifying and assessing the risks related to an audit engagement such as the risks of bankruptcy or high-level management fraud. Also, ADAs helps in understanding the entity and its environment. This is achieved through performing preliminary and substantive analytical procedures as well as evaluating the design and implementation of internal controls.

Furthermore, ADAs help in one of the main audit functions which is identifying and assessing the risks of material misstatement of the financial statements due to fraud (Swenson Advisors, 2015).Also, ADAs aids the auditor in performing analytical procedures near the end of the audit of the financial statements in order to arrive to an overall conclusion for their audit report. Analytics can also help companies in analyzing accounts receivable to create profiles that rank customers based on the likelihood that they pay invoices on time which help a company to customize its credit terms to increase the efficiency of its collection efforts. The most commonly used audit analytics techniques are those that are quantitative, statistical, and based on structured data. Since the main objective of external audit is to provide assurance on the accounting numbers, the quantitative techniques are the most used ones in audit analytics. Thus, the accounting numbers are the quantities audit analytics are mainly concerned with (Vasarhelyi, Kogan, & Tuttle, 2015).

Moreover, ADAsmayhelptheauditortoidentifymattersthatmaybesignificanttotheaudit on a real time basis. ADAs may be used in any phase of the audit: planning, risk assessment, tests of controls or substantive procedures and in arriving to an overall conclusion from the audit planning to the audit report. Furthermore, the external auditor would directly access big data to enhance client knowledge acquisition during the Engagement Phase (Appelbaum, Kogan, A., & Vasarhelyi, 2018). Also, ADAs possess visualization capability; ADAs produce results in many visualization formats such as graphic, patterns, clusters, tables. This visualization capability helps the auditor to identify and respond to matters significant to the audit. Hence, the use of data analytics helps in improving the quality of an audit (CPA Canada, 2016).

Hence, Big Data and its analytics have dramatically changed the business environment. Capturing large amounts of data became an easy process and useful as well, however, the process of analyzing it can be challenging. Hence, the unstructured nature of Big Data lead to greater challenges for the auditors so the auditors may be exposed to various problems in forming their audit judgment. Deriving value from Big Data is a challenge for the auditors to and at the same time ensuring that their audit judgments are based on quality information that is relevant and trustworthy (Alles, 2015). According to Stratopoulos (2016), technology adoption literature related to an emerging technology may be used to predict the adoption of the technology that is of high concern for the current study. Previous experiences with the technology facilitate the adoption process since the adopter can have a good level of understanding the new technology and the requirements for its adoption such as the needed personnel, support required from the suppliers of the technology, etc. (Stratopoulos, 2016).

Data analytics promises to provide better information about whether a sample is representative and the nature and magnitude of identified exceptions. Accordingly, data analytics help in improving practice around audit sampling. Although the auditor is able to test 100% of a population, this does not indicate that the auditor is able to provide more than reasonable assurance. However, this could somehow fill the traditional expectation gap since it may be difficult for

a firm to explain how it failed to identify a fraud in an environment where data analytics allowed it to test 100% of the population (ACCA, 2013).

Although all the benefits BDAs can help organizations to attain, some may find it as a destructive innovation especially from the perspective of the auditors. The audit may be seen as an ''auditor less" audit. However, in practice, Big Data techniques are best used to complement, not replace, human experts (Zhou, Chawla, Jin, & Williams, 2014). Hence, this opinion could be communicated to the auditors to help in overcoming reluctance to use Big Data techniques from the auditors' side. IAASB (2016) supports this view; it is reported that the use of data analytics in an audit engagement does not replace the need for the auditor to exercise professional judgment and professional skepticism (IAASB, 2016).

Researchers and audit firms need to investigate the factors that support auditors' attitude (ATT) towards using ADAs. The use of analytics in the auditing field is encouraged by both practitioners and academia (Li, Dai, Gershberg, &Vasarhelyi, 2018). However, audit field is governed by firm regulations so attention must be paid when it comes to forming attitude towards using new technologies (Haddara, Su, Alkayid, & Ali, 2018). Thus, reviewing the existing models for acceptance and usage of new technologies and theories is necessary but with a specific focus; the auditor in this study. Increasing the knowledge and understanding of the factors that mostly impact audit firm's decision and auditors' ATT towards new technology usage is critical.

2.2. Prior Technology Adoption Research

Technology adoption is one of the most mature streams in Information Systems (IS) research. The benefit of such maturity is the availability of frameworks and models that can be applied to the study of interesting problems (Vessey et al., 2002; Venkatesh et al., 2003).There have been several models/theories explaining technology adoption and use on an individual as well as organizational level, particularly since the late 1980s (Venkatesh et al., 2003). Big Data and its analytics have dramatically changed the business environment. However, the auditor faces challenges in analyzing big data to derive value from it especially for the unstructured nature of Big Data and at the same time ensure that their audit judgments are based on quality information that is relevant and trustworthy. Thus, auditors may be exposed to various problems while forming their audit judgment. (Alles, 2015).

Hence, new technology acceptance is a critical issue; whereby different factors are involved. Personal feelings and beliefs affect a new tool acceptance and adoption. Hence, audit mangers must believe that a new technological tool provides some advantage to accelerate its adoption (Vasarhelyi & Romero, 2014). Karahanna, Straub, & Chervany (1999) suggest that there are important issues related to the innovation-decision process which are innovation's perceived attributes, individual's attitude and beliefs, communications received by the individual from the surrounding social environment about the innovation known as Subjective Norm (SN). Subjective Norms refer to individuals' beliefs about what others expect from them (Karahanna, Straub, & Chervany, 1999).

2.3. Technology Acceptable Model

After a review of the relevant literature and the different technology adoption theories and models, the researcher decided that it is crucial to review the TAM in relation to professional users and to develop a research model and survey instrument that would help in highlighting the importance of the attitudinal variable and examining the factors that may aft forming this attitude. As per the IS and IT adoption literature; it has been found that positive user perceptions are very important for a successful adoption of a new technology (Chau & Tam, 1997).

A range of models and theories are used to evaluate and test individual-level acceptance of technologies. One of the most commonly used models is the TAM model developed by Davis (1989) to explain and predict an individual's acceptance behavior toward a new technology. Hence, TAM is useful for understanding what makes individuals accept certain new technologies.

TAM has been adopted to examine the acceptance of different technologies within different culture in different timings with different control factors such as gender, organizational type and firm size and different samples; this proves its robustness. Hence, many previous studies with different research purposes, and samples applying different research methodologies depend on TAM model within different contexts. Other new variables in other theoretical models have been merged with the existing ones in original TAM model examining their causal relationship with major TAM variables. So, TAM has also been the preliminary stage for many extensions to any competing models of user technology acceptance as stated by Fred Davis (Lee, Kozar, & Larsen, 2003).

Thus, TAM helps in investigating the impact of external factors on internal beliefs, attitude, and intentions. TAM depends on TRA as the theoretical basis for examining the causal relation between two key elements: PU and PEOU as well as users' attitude, intention, and actual computer usage (Davis et al., 1989). Accordingly, TAM studies psychological factors impact on IS and computer adoption. It suggests that PU and PEOU are major drivers of forming ATT towards using the new technology and consequently affect actual use.

As it is previously stated; ATT in TAM is affected by two key elements: PEOU and PU (Davis, 1989). TAM focuses on explaining about40%ofthe variance in usage intentions and behavior (Venkatesh & Davis, 2000). According to TAM, PU affects ATT towards using a new technology. Realizing usefulness of adopting a new technology such as improving performance or efficiency affects attitude towards using this new technology or system (Davis, 1989). It is found that ease of use would have a direct effect on usefulness. Hence, usefulness and ease of use are different but related constructs. However, PU can be affected by different EVs other than ease of use. Also, EVs affect ease of use. These relationships are shown in Figure 2 representing TAM model (Davis, 1989).

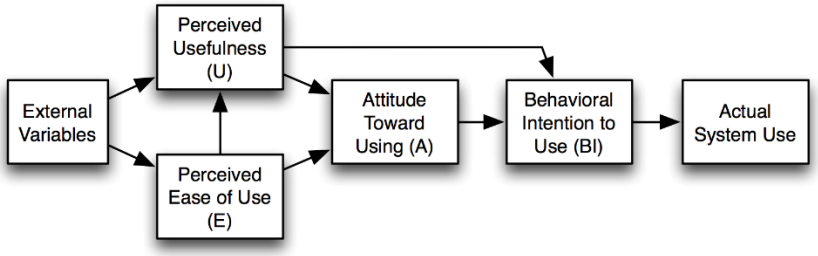

Fig. 2. Technology Acceptance model (TAM) (Source: Davis, Bagozzi, & Warshaw 1989, p.985)

Academic researchers and audit firms must examine how professional users form perceptions towards the ease of use and usefulness of any new technology so as to have auditors who are well prepared with the knowledge needed to have a successful adoption of the new technology. Adopter's perceptions are the key to the widespread adoption of the technologies available by developers or vendors, thus, effective approaches to technology adoption rely on influencing those perceptions.

TAM is extended to explain PU and usage intentions in terms of Social Influence (SI) /Peer Influence ''TAM2" (Venkatesh & Davis, 2000). TAM2 incorporates additional theoretical constructs as the general determinants of PU: subjective norm , image , job relevance , output quality and result demonstrability as shown in Figure 2. The first two factors represent the SI, and the remaining factors represent system characteristics. Also, voluntariness and experience are used in this model as moderating variables to distinguish between different groups of the sample. Voluntariness is defined as ''the extent to which potential adopters perceive the adoption decisions to be not obligatory"(Agarwal & Parasad, 1999; Moore & Benbasat, 1991, p.195).

Previous studies find great impact regarding the addition of extra influencing factors for an improved explanatory power. Further, the more complex the context in which the study is taking place, the more influencing factors are involved in variances; a model with only few factors involved does not have the power of explaining the causal relationships as the one having more vital factors. Especially that, a complex context needs additional factors to cope with the complexity of the context and improve the explanatory power of the model (Chin, Marcolin, & Newsted, 2003). This claim is supported also by the research conducted by Venkatesh et al. (2003) in which the researcher compared the explanatory power of the TAM model before the inclusion of additional variables then after inclusion of some factors as moderating variables. It is found that adding more moderators improve the explanatory power of the model increases with the inclusion of moderators. (Venkatesh et al., 2003).

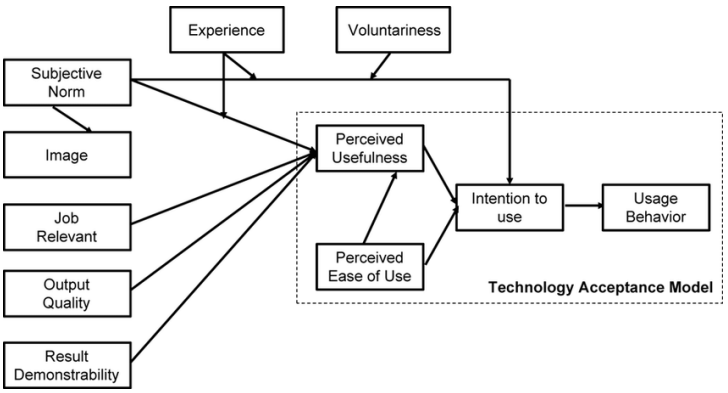

Fig. 3. TAM2-Extention of TAM (Source: Venkatesh & Davis, 2000, p.188)

Furthermore, Unified Theory of Acceptance and Use of Technology (UTAUT) guided the current study by incorporating some moderators identified in this theory. So, this research contributes to extend the literature by investigating ADAs adoption on the individual level. This study is differentiated from others in the main context this study focuses on, ''The Egyptian context". Hence, the study contributes to the context which is the Egyptian market since up to my knowledge; examining the current state of ADAs adoption within the Egyptian context has not been tackled yet. It enriches the Egyptian research agenda in audit studies. This study aims to deepen the understanding related to technological acceptance issues among auditors and audit firms especially for ADAs. The current study is concerned with the most recent trend in the evolution of audit technology which is integrating Big Data and Data Analytics into audit engagements.

2.4. Model and Hypotheses Development

Understanding the situation surrounding the formation of auditor's attitude towards ADAs adoption necessitates examining the role of potential moderators of PU-ATT and PEOU-ATT relationships. A moderator variable divides a main independent variable into subgroups to examine its effectiveness regarding a given dependent variable (Baron & Kenny, 1986). Hence, a full examining the impact of moderating factors proposed is what the current study is concerned with. This study examines whether firm's characteristics may have a moderating influence on the factors affecting auditor's attitude towards ADAs adoption. Hence, the moderating variables such as firm size and voluntariness to use are considered to examine their effect which is the main focus of the current study. There are no confirmed results on the relationship between firm size and having positive ATT towards adoption.

It is postulated that the size of the firm is the most important characteristic in the analysis of technology adoption. However, according to Raymond (1985); technology is similarly adopted in both large and small firms (Raymond, 1985). Older studies suggest that new technology is more adopted in larger than small firms. This can be attributed to the fact that larger firms have greater financial and personnel resources that can accelerate the adoption of new technology. Accordingly, firm size is found to be statistically significant indicating that auditors of the Big 4 may give more importance to Performance Expectancy and some EVs than those of smaller firms (Bierstaker ,Janvrin, & Lowe, F 2014).

On the other hand, some recent studies find that there are more adopters from smaller firms since they may be able to adopt technology due to their flexibility and their quick adaptation to changing environments more than the larger firms (Grover & Teng, 1992). Hence, there are mixed results regarding this issue. Therefore, the researcher is motivated to investigate the effect of firm size as a moderator variable on the main relationships of the research model. Moreover, it is found that voluntariness can affect users' behavioral intention.

Voluntariness may diminish or intensify the relationship between independent and dependent variables. Prior studies find that SI is significant in mandatory setting; voluntariness of use only affects social influence in mandatory settings but is non- significant in voluntary context. Hence, it is found that SI is stronger in mandatory context (Venkatesh et al., 2003).

This may justify the low significance of SI found when users have no pressure from others to use the technology leading to diminishing the solid relationship between this construct with other variables. Generally, it has been perceived that there is some variance in actual use of a new technology in mandatory settings than voluntary one. Hence, caution needs to be taken with regard to voluntariness since voluntary usage results may not be generalized to mandatory usage settings (Bierstaker et al., 2014). There is support from previous studies for the effect of voluntariness of use as a moderator especially for the relationship between SI and intention to use (Gonzalez, Sharma, & Galletta , 2012).Therefore, voluntariness is included in this study to examine its moderating effect. Accordingly, UTAUT adds voluntariness as a moderating variable to examine its effect on the relationships between the main variables.

Based on the above discussion regarding the moderation effect of different audit firm characteristics such as audit firm size and voluntariness on the main relations affecting auditor's attitude towards ADAs adoption, the following hypotheses are developed:

H1: The relation between External Variables and Perceived Usefulness of ADAs is moderated by audit firm characteristics.

H2: The relation between External Variables and Perceived Ease of Use of ADAs is moderated by audit firm characteristics.

H3: The relation between Perceived Usefulness of ADAs and Attitude towards its adoption is moderated by audit firm characteristics.

H4: The relation between Perceived Ease of Use of ADAs and Attitude towards itsadoption is moderated by audit firm characteristics.

H5: The relation between Perceived Ease of Use of ADAs and Perceived usefulness of ADAs is moderated by audit firm characteristics.

Accordingly, Figure 4 presents the research model. Based on the UTAUT, voluntariness to use is studied for its moderation effect on these model's main relationships that were examined in previous research. Also, there are mixed

results regarding the moderation effect of audit firm size on the key relationships of the research model. Therefore, the researcher is motivated to investigate the effect of firm size as a moderator variable. The model is validated in an Egyptian audit context as it is previously mentioned.

2.5. Adoption

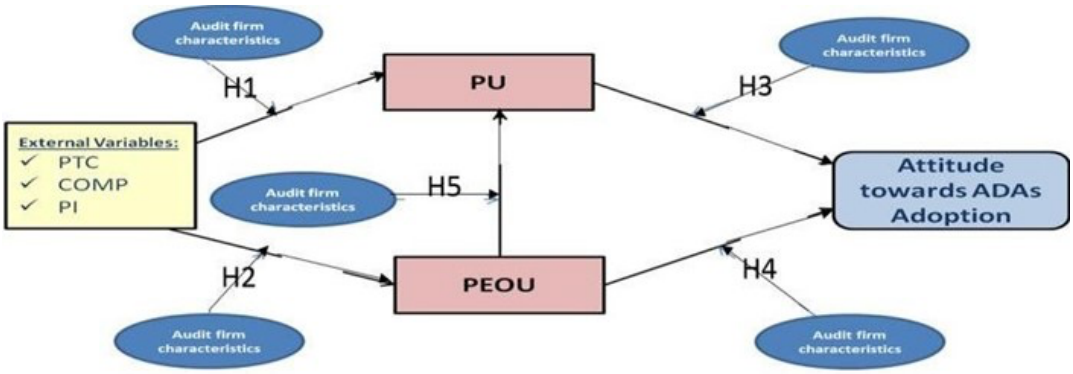

Fig. 4. Conceptual Framework Examining Auditor's Attitude towards ADAs

It is found that by including moderating variables, the explanatory power of TAM2 increases to 53% from about 35% without moderators (Venkatesh et al., 2003). Hence, considering the effect of the moderators improves a model's explanatory power. This proves that including the moderating effects adds more value to the analysis. this study examines whether firm's characteristics may have a moderating influence on the main relationships in the model. Hence, the effect of interesting moderating variables such as firm size and voluntariness to use are considered. There are no confirmed results on the relationship between firm size and having positive ATT towards adoption.

3. Research Methodology

The methodology conducted in the current study to meet the research objectives of the current study. First, the research instrument used in this research is discussed. Then, the measurement of the moderating variables used in the research model are described. Then a brief description of the sample profile participating in the current study is followed.

The data collection process started with a preparation for the sample list. A survey is the main research instrument used in the current study; the survey is administrated on Google forms and a link is sent to the relevant members of the sample through SMS, e-mail, social media platforms (including Facebook and LinkedIn) but the response rate is somehow low even when the researcher sends a message over their Facebook page informing them with the research purpose and the urge of their collaboration , however, some refuses to collaborate and some are un-reachable ; they do not have a correct phone number or e-mail or they did not even answer the Facebook message). Accordingly, the researcher decided to collect the data through personal visits to the firm where questionnaires are handed to the auditors personally at their firm's premises.

3.1. Research Instruments

The survey is one of the most popular methods used in previous technology adoption research. It is also widely used in business and management research (Saunders, Lewis, & Thornhill, 2009). The questionnaire includes a number of statements to which the respondent had to respond using a five point Likert scale that ranges from "strongly disagree" represented by the score of (1) to "strongly agree" represented by the score of (5). At the end of each questionnaire the respondent is asked to respond to a few questions about himself/ herself. The questionnaire is administrated online through Google forms; one of Google's online applications which is easy to use.

Hence, data is collected from auditors in audit firms in Egypt through a questionnaire. This is achieved based on an analysis of prior literature. Essentially, the use of this type of targeted survey allowed data to be gathered from a relevant population of professional auditors. The questionnaire consists of previously adopted scales, used to measure the various constructs of the study. It is used to empirically test the hypotheses previously described that are developed mainly to meet the research objective of the current study.

3.2. Measurement of the Dependent Variable

It is crucial to understand relationships between variables that cannot be directly observed; however, it is extremely difficult to accurately measure these types of "unobserved" constructs such as PEOU and PU associated with technology (Chau & Tam, 1997). That is why, an effective measurement tool is adopted as without the proper methodology, the degree of confidence in the proposed research model as well as the overall research findings is negatively affected.

Examination of the adoption of new technologies should focus on ATT towards adoption (Tornatzky & Klein, 1982). It is influenced by several factors acting as drivers/barriers for the adoption.

Three items are used to measure attitude towards ADAs adoption ; these items are measured on a 1–5 Likert scale where 1:''strongly disagree," 3:''neutral," and 5:''strongly agree."

3.3. Measurement of Independent Variables

The factors affecting auditors' ATT are determined as follows: PU, PEOU, PTC, COMP and PI. According to Chau & Hu (2002), PU and PEOU represent the technological context, more precisely the characteristics of the new innovation from auditor's perspective. COMP and PI represent the implementation context; more precisely the important characteristics of the underlying organizational setting where the investigated innovation is adopted while PTC represent the individual context.

The scales used to measure the main constructs of the study are adopted mainly from Chau & Hu (2002) with necessary modifications in wording tailored to the new innovation that is under investigation ''ADAs" and the targeted professional context "auditors". Chau & Hu's research is within the health-care setting. Thus, the adopted scale items are tailored to the auditing context.

All constructs are measured on a 1–5 Likert scale where 1:''strongly disagree," 3:''neutral," and 5:''strongly agree." See Appendix A for survey questions, constructs measured, and sources for the survey items.

3.4. Moderators

Two moderators are added to moderate the effect of PEOU and PU on auditor's ATT towards the actual use. These two moderators are audit firm size and voluntariness to use as shown in table 1 with their measurement.

Table 1. Audit Firm Characteristics-Moderators

Variable	Measure
Audit Firm characteristics	
Audit Firm Size	It is measured by a dummy variable in which1 denotes ''Big4" and 2 ''Non-Big4'. It differentiates the respondents in the sample between those from the Big4 and those from nonBig4.
Voluntariness	The extent to which users find that the adoption decision is not obligatory". (Venkatesh & Davis, 2000). Voluntariness to use the new innovation ''ADAs" is measured by a dummy variable in which 1 denotes ''Yes" and 2 ''No"; the respondent is asked whether the use of ADAs voluntary (as opposed to require by superiors).

- **Audit Firm Size**

Adding audit firm size as a moderator mainly differentiates the respondents in the sample between those from the Big4 and those from non-Big4. It is found that all of the adopters are from the Big4 while the non- adopters are from non-Big4. It is measured by a dummy variable in which 1 denotes ''Big4" and 2 ''Non-Big4".

- **Voluntariness**

It is defined as ''the extent to which users find that the adoption decision is not obligatory" (Venkatesh & Davis, 2000, p.188). Previous studies suggest that it is possible for social influence; PI in the current study, to affect usage directly through compliance, or indirectly through its effect on ATT (Karahanna, Straub, & Chervany,1999). Compliance represents the level of voluntariness which means that users comply with the organizational rules in a mandatory but not in a voluntary setting (Sun & Zhang, 2006). In this study, voluntariness is added in the model as a moderating variable ''differentiating variable" that divided the sample into two groups those in a mandatory setting environment and other group in a voluntary driven environment (Venkatesh et al., 2003; Sun & Zhang, 2006). Prior studies support this argument;

the moderating effect of voluntariness on actual use; however, in the current study voluntariness is added to moderate the effect of PEOU and PU on auditor's ATT towards the actual use.

Nevertheless, there is empirical evidence of the effect of ATT towards technology usage in a highly voluntary context but less evident in a less volunteer-driven context. In terms of this study, voluntariness to use the new innovation ''ADAs" is measured by a dummy variable in which 1 denotes ''Yes" and 2 ''No"; the respondent is asked whether the use of ADAs is voluntary or required by the management.

3.5. Sample

The main group of interest is the auditors. The auditor is the end user that has to use data analytics during audit engagements. Auditors participated in this study are from the Big4 and the non-Big4 audit firms from geographically different regions of Egypt; specifically, Cairo, Giza and Alexandria. The sample used for this study is representing 289 auditors registered according to the Financial Regulatory Authority in Egypt spread over five governorates which are: Cairo, Giza, Alexandria, Ismailia, and Gharbaya. Their locations varied based on governorates and within governorates.

The collection of questionnaires resulted in a final sample of 194 auditors from Big 4 and non-Big4 This sample is representing 289 auditors registered according to the Financial Regulatory Authority in Egypt. In this study, 285 auditors are contacted, and questionnaires are sent to them, however, only 198 auditors responded making a response rate of 69.4% (Table 2). However, there are 4 unengaged responses that are not considered resulting in a total of 194 used as the current sample size for the data analysis which makes it appropriate. Thus, "194 respondents" is considered satisfactory sample size for the current study carried out.

Table 2. Numbers of Sent and Received Questionnaires

Questionnaires	Numbers	Percentage
Sent	285	100%
Received	198	69.4%
less: Unengaged Responses	(4)	1.4%
Final Sample	194	68%

The demographic characteristics of the sample of this study are explored as shown in Table 3. As it is previously mentioned, the sample size is 194. They are analyzed and described on different two bases: individual base and firm base. The individual analysis includes analyzing the sample based on personal characteristics of the respondent (the auditor), including age, gender, academic qualification, professional qualification, years of experience as external auditor, years of experience as technology auditor, IT expertise and technology adopter classification. On the other hand, the firm level analysis includes analyzing respondents based on size of the firm they belong to in terms of Big4 or non-Big4 audit firm, adoption of ADAs and voluntariness. Table 3 shows an overview of the sample profile.

Table 3. Sample Profile

Categories	Classification	Frequency	Percentage
Age	<25 years	56	28.9%
	25-35 years	135	69.6%
	36-45 years	0	0
	>45 years	3	1.5%
Gender	Male	172	88.7%
	Female	22	11.3%
Educational level "Academic Qualification"	Bachelor's degree	183	94.3%
	Master's Degree	11	5.7%
	PhD Degree	0	0
Professional Qualification	Yes	102	52.6&
	No	92	47.4%

Years of experience as external auditor	<2 years	52	26.8%
	2-5 years	93	47.9%
	6-10 years	31	16.0%
	>10 years	18	9.3%
Years of experience as technology auditor	<2 years	65	33.5%
	2-5 years	43	22.2%
	6-10 years	8	4.1%
	>10 years	5	2.6%
	NA	73	37.6%
IT expertise	Novice	28	14.4%
	Intermediate	133	68.6%
	Expert	33	17.0%
Technology adopter classification	Innovators	18	9.3%
	Early adopters	77	39.7%
	Early majority	83	42.8%
	Late majority	14	7.2%
	Laggards	2	1.0%
Firm Size	Big4	163	84%
	Non-Big4	31	16%
ADAs Adoption	Yes	123	63.4%
	No	71	36.6%
	Mandatory	98	49.5%
	Voluntary	96	50.5%

It is clear from the sample characteristics shown in Table 3 that most of the respondents are male (88.7%) and are from second age bracket "25-35 years" (69.6%). Further, most of the respondents are of intermediate level of IT expertise (68.6%). Moreover, it is found that the majority of the sample is adopting ADAs (63%) and most of the respondents are from the Big4 as well indicating that firm size may play a role in the decision of ADAs adoption.

Through cross-tabulation analysis (Appendix B), 56 of the adopters of ADAs are adopting within a voluntary context in their firm. From the 98 who are within a mandatory setting in their firm, 67 are adopting. This shed light that whether the firm is obliging their auditors to adopt ADAs or leaving it according to their free- will, still the percentage of adoption is high ''nearly the same percentage within the 2 contexts" even within the mandatory setting the percentage of the adopters are slightly higher than those within the voluntary context.

The sample is also divided by age, the majority of the respondents (70%) are within the second age bracket (from 25-35 years); 64% of those respondents are adopting ADAs. On the other hand, 59% from those less than 25 years are adopting indicating that auditors within the second age bracket are more willing to adopt the new innovation more than the other age brackets.

Additionally, it is found that 72% of females participating in this study are adopting ADAs. On the other hand, 62% of the males are adopting ADAs. Surprisingly, this indicates that the percentage of the adopters within the females is higher than the males. Unlike previous research, women have higher computer anxiety and lower computer self-efficacy than men (Sun & Zhang, 2006).

Further, it is discovered that auditors with intermediate level of IT expertise are more willing to adopt ADAs than beginners and even experts. As for technology adopter classification, the percentage of the respondents adopting ADAs are higher for the respondents that are classified as Early Majority according to Roger's adopter categorization for the level of innovativeness.

As for years of experience, in terms of this research there are 2 types of experience either experience as external auditor or experience as technology auditor. The majority of the respondents are possessing experience from 2-5 years as external auditor. However, the percentage of those adopting ADAs is the highest within the third bracket of experience ''6-10 years". On the other hand, the majority of the respondents are possessing less than 2 years of experience as technology auditor. However, the highest percentage of those adopting ADAs is the highest within the fourth bracket of experience ''more than 10 years".

The process of data collection started in May 2018 after the pre-test is conducted in April 2018. The data collection process takes about five months from May 2018 till September 2018. The potential respondents are invited to participate

in the survey via an email describing the intent of the survey and containing a link to the online survey of the current study. The link of the survey is sent either through SMS, e-mail, Facebook, LinkedIn. Moreover, some of questionnaires are handed to the auditors personally at their firm's premises in order to increase the response rate.

The researcher needs to extend the period for data collection in order to obtain greater participation. The response rate is somehow low during the first 2 months because of the high season the auditors pass by during this period of the year, so they are so busy. Besides, the fear the auditors have to declare any information related to their firm. This fear is maximized due to the data breach problems that the world faced by the end of 2017 along with Facebook data breach problem that was in September 2018. By the end of 2017, Forbes was unfortunately expecting that data breach problems may get worse. According to IBM's 2018 Data Breach study, the firms are facing now a Zero Trust World. Hence, people are afraid to give any information related to their firm to protect their privacy, so this makes them reluctant to participate in the survey of the study. They may think that the competitors may want to gather information to achieve a competitive advantage, so they are unwilling to provide any information about their firm. However, there is a follow up for non-responses by sending them reminders during the five-month data collection process. Additionally, the researcher makes visits for the targeted sample ''auditors" in their premises as it is previously mentioned.

4. Findings and Discussions

4.1. Measurement Model

In the first step, measurement model evaluation is conducted, in order to examine the one-dimensionality, validity and reliability of constructs using Confirmatory Factor Analysis (CFA). Auditor's ATT towards ADAs adoption is investigated by adopting Structural Equation Modeling (SEM) using the Analysis Moment of Structures Software (AMOS) to study interrelationships and different paths between the identified main variables in the proposed research model in the current study. The current study contributes to the literature by discussing the challenges facing the external audit profession as business moves towards Big Data and advanced analytics for many aspects of operations and decision making through investigating the moderation effect of different audit firm characteristics such as audit firm size and voluntariness to use. It expands upon the new emerging concerns in the audit community and provides opportunities for future research.

SEM is a group of statistical techniques which incorporates and integrates path analysis and factor analysis. Using SEM software for a model in which each variable has only one indicator is a type of path analysis. On the other hand, using SEM software for a model in which each variable has multiple indicators but there are no direct effects ''arrows" in the model connecting the variables is a type of factor analysis. However, SEM usually refers to a model with both multiple indicators for each variable which is called latent variable as well as paths determined connecting these latent variables.

The current research study uses for data analysis two different statistical software tools; Statistical Package for Social Sciences (SPSS) version 25 for analyzing the preliminary data and AMOS version 23 for SEM for measurement model and structural model analysis to test the hypothesized relations previously mentioned.

4.2. Structural Model

In the next step, a structural model was adopted in order to examine the hypothesized relationships between the observed constructs in the research model of the current study. This structural model assisted in examining the impact of different factors affecting auditor's ATT towards ADAs adoption. SEM acts as a strong validation instrument for unobserved constructs and for the overall research model. The researcher relies on SEM to test the validation of the survey instrument and to assist with the modification of the survey items. Further, SEM allowed the researcher to re-specify the research model for better model fit through multiple CFA runs.

SEM techniques are extensively used in management and behavioral research. Therefore, the researcher selects a quantitative methodology for use with the current study. According to Chau (1997) and Bagozzi (1981); causal models developed using the SEM approach have some advantages: they make the hypothesized relationships in a researcher's adopted theory clear; they make the researcher more confident with the accuracy to the adopted theory as they require clear definitions of constructs, operationalization, and the functional relationships between constructs; a conceptual framework for examining theories. Thus, SEM is a critical component of the current study as it helps the researcher in explaining the relation among variables using certain determined measures (Chau, 1997; Bagozzi, 1981).

The fundamental basis for SEM is the ability to examine multiple regression statements at the same time. It allows for the identification of moderating variables on the relationship between the research model's main variables and auditor's ATT towards ADAs adoption. Hence, the use of SEM allows for a more thorough depiction of complex relationships, and further, the use of path analysis allowed for additional insight into the causal model and helped in testing thoroughly

the strength of the variables' relationships. Kline (2005) states that path analysis is utilized when the researcher has developed hypotheses about causal relations among these variables (Kline, 2005).

The starting point is the identification of a structural model that represents all causal hypotheses, followed by the path model analysis. Path analysis adds value in the SEM field and is a widely used research technique (Hooper, Coughlan, & Mullen, 2008). Hence, all path analysis relationships in the proposed research model are tested while controlling for auditor's age, gender, educational level, IT expertise. All the hypothesized paths are significant as the parameter estimates indicated (p value= 0.01 except for the path between PU and PEOU which is also statistically significant but with p value = 0.036).

However, data analysis using SEM is usually based on the assumption that the data is collected from a single population. However, this assumption of homogeneity is unrealistic since in many real-world applications there are likely to have different sub- populations. This Heterogeneity of responses can threaten the validity of SEM results. Hence, unobserved heterogeneity needs to be considered.

Accordingly, assessing the potential sources of heterogeneity using multi-group analysis is crucial for SEM results (Hair, Black, Babin, & Anderson 2014). Hence, the findings of the multi-group analysis conducted based on the audit firm size and voluntariness are discussed hereunder.

4.3. Moderation Effects-Multi Group Analysis

For more in-depth analysis, the model is analyzed across different groups. First, it runs for auditors from Big4 and non-Big4 to grasp similarities and differences between both groups. Then, a second-round analysis is done based on voluntariness level of firms with regard to ADAs adoption. Since the data include respondents from Big4 and non-Big4 across Egypt, it is of interest to investigate the role played by audit firm size in influencing the relation between auditors' perceptions towards ADAs technological characteristics and their ATT towards its adoption. In addition to, the role played by audit firm size in influencing the relation between EVs and auditors' perceptions towards ADAs technological characteristics is also investigated. The researcher decided to account for these roles by investigating the sample parameters after dividing the sample into distinctive groups of respondents from different firms based on audit firm size whether from Big4 or non-Big4.

In particular, the sample is divided into group of auditors according to their audit firm size. Multigroup analysis is conducted through comparing the two different groups of audit firms: Big4 and non-Big4. Results of hypotheses testing are illustrated in Tables 4 and 5 for every group. Results show that there are no differences between both groups at the model level based on chi-square differences; however, the researcher goes a step further for deep analysis to examine differences between both groups at path level i.e., for every path in the model. This analysis is conducted at one time based on firm size and another time based on firm's voluntary context of innovation adoption.

>> Big4 vs. Non-Bi4

Results shown in Table 4 show the difference in the first hypothesis between the Big4 and non-Big4.

H1 and H2: Results support that there is a direct effect of EVs on the perceived technological characteristics of ADAs. In particular, results show that there is difference in the significance level (p value) between both groups with regard to the effect of EVs on PU of ADAs. In particular, the relationship is found to be significant in Big4 (p=.000), but not significant in non- Big4 (p=0.100). Hence, since there is difference between both groups regarding the effect of EVs on PU as evidenced by z-score as well (ΔZ-score: 2.194,$p<0.05$); this consequently suggests that audit firm size moderates the relationship between EVs and auditor's perception towards ADAs usefulness, supporting H6.On the other hand, there is no difference between both groups; Big 4 and non-Big4 with regard to H7; the effect of the external variables on PEOU of ADAs is still significant in both groups (ΔZ-score: 0.916).

H3 and H4: Results support that there is a direct effect of perceived technological characteristics of ADAs on auditor's ATT towards its adoption. In particular, it is found that there is difference between both groups; Big 4 and non-Big4 with regard to H3; the effect of PU of ADAs on auditor's ATT towards it (ΔZ-score: 3.398, $p<0.01$). On the other hand, despite the difference in the significance level (p value) between both groups with regard to the effect of PEOU of ADAs towards auditor's ATT towards it; z score demonstrates that there is no difference between both groups (ΔZ-score: 0.275). This effect is found to be significant within the Big4 group while it is not significant within the non-Big4. Hence, for the Big4 it is a good predictor while for non-Big4 it is not a good predictor suggesting that audit firm size moderates the relationship between auditor's perception towards ADAs ease of use and ATT towards it within the Big4. In particular, the relationship is found to be significant in Big4 (p=.003), but not significant in non- Big4 (p=0.278).

H5: Results support that there is a direct effect of PEOU of ADAs on its PU. In particular, it is found that there is difference between both groups; Big 4 and non-Big4 with regard to the effect of PEOU on PU of ADAs; the relationship is significant within the Big4 (p= .047) while it is not significant within non-Big4 (p=.671). However, z score indicates that there is no difference between both groups with regard to this relationship. Hence, it can be found to be a good predictor within Big4 but not a good predictor within non-Big4 (ΔZ-score: -0.78).

Table 4. Summary of Hypotheses Testing for audit firms: Big4 and non-Big4

Multi-group Relations	Evidence	Supported? Existence of Difference (Yes/No)
External variables and perceived technological characteristics of ADAs		
H1: External Variables ⟶ Perceived Usefulness	Big4:0.437*** Non-Big4:0.333 ΔZ-score:2.194**	Yes Significant in Big4, but not significant in nonBig4
H2: External Variables ⟶ Perceived Ease Of Use	Big4:0.424*** Non-Big4:0.547*** ΔZ-score:0.916	No (Significant in both)
Perceived technological characteristics of ADAs and Attitude towards its adoption		
H3: Perceived Usefulness ⟶ Attitude	Big4:0.253*** Non-Big4:0.353 ΔZ-score:3.398***	Yes Significant in Big4, but not significant in nonBig4
H4: Perceived Ease Of Use ⟶ Attitude	Big4:0.287*** Non-Big4:0.305 ΔZ-score:0.275	Significant in Big4, but not significant in nonBig4
PEOU and PU of ADAs.		
H5: Perceived Ease Of Use ⟶ Perceived Usefulness	Big4:0.152** Non-Big4:0.097 ΔZ-score:-0.78	Significant in Big4, but not significant in non-Big4[10]

Hence, results indicate that firm size can partially act as a moderator since it moderates the influence of PU of ADAs on ATT towards its adoption as well as the influence of EVs on PEOU of ADAs. These results can be supported by previous studies that added firm size as a covariate in the UTAUT model. It is argued that firm size is statistically significant since there is high probability that auditors of Big 4 firms are to rate Performance Expectancy and EVs higher than those from smaller firms (Bierstaker et al., 2014). Janvrin, Bierstaker, & Lowe (2009) suggest that firm size may affect adoption of CAATs as larger firms are more likely to have resources available for CAATs training and support (Janvrin et al., 2009). This is inconsistent with other studies reporting that there are more adopters from smaller firms since they may be able to adopt technology due to their flexibility and their quick adaptation to hanging environments more than the larger firms (Grover & Teng, 1992). Hence, there are mixed results regarding this issue which opens the floor for extensive research in this area.

Further, according to Rosli, Yeow, & Eu-Gene (2013); the audit technology adoption varies by firm size. It is found that the less advanced audit tools are adopted by most of the non-Big4 audit firms whereas the more advanced level of audit technology are used by the Big4 audit firms (Rosli et al.,2013). However, this latter result is based on research conducted at the organizational level. On the other hand, Amin and Mohamed (2016)state that audit firm type does not have significant effect on the perception of auditors. However, auditors from Big 4 are found to appreciate more the effect of adopting CA on the relevance of reported information with regard to providing real time information (Amin & Mohamed, 2016).

4.4. Voluntary vs. Mandatory Contexts

Results shown in Table 5 demonstrate no difference in the first hypothesis between firms applying voluntary context in the adoption of a new innovation and those adopting a new innovation within a mandatory context.

H1 and H2: Results support that there is a direct effect of external variables on the perceived technological characteristics of ADAs. In particular, results show that there is no difference between both groups with regard to the effect of EVs on PU of ADAs; the relationship is found to be significant in both voluntary-driven firms (p=.000) and mandatory- driven firms (p=0.000). Additionally, there is no difference between both groups; voluntary- driven and mandatory-driven firms with regard to the effect of EVs on PEOU of ADAs. It is found that the relationship between EVs on PEOU of ADAs is still significant in both groups (ΔZ-score: -0.865); the voluntary-driven firms (p=.000) and the mandatory-driven ones(p=.000).

H3 and H4: Results support that there is a direct effect of perceived technological characteristics of ADAs on auditor's ATT towards is adoption. In particular, it is found that there is no difference between both groups. voluntary-driven and mandatory-driven firms with regard to H3; the effect of PU of ADAs on auditor's ATT towards it (ΔZ-score: 0.401). A significant relationship between PU of ADAs and auditor's ATT towards it is found in both groups. On the other hand, despite the difference in the significance level (p value) between both groups with regard to the effect of PEOU of ADAs towards auditor's ATT towards it; z score demonstrates that there is no difference between both groups(ΔZ-score: -1.058). This effect is found to be significant within voluntary-driven firms while it is not significant within mandatory-driven firms. Hence, for the voluntary-driven firms it is a good predictor while for the mandatory-driven firms it is not a good predictor suggesting that voluntariness moderates the relationship between auditor's perception towards ADAs ease of use and ATT towards it within the voluntary driven firms. In particular, the relationship is found to be significant in voluntary driven firms (p=.000), but not significant in mandatory driven firms (p=0.109).

H5: Results support that there is a direct effect of PEOU of ADAs on its PU. In particular, it is found that there is difference between both groups; voluntary-driven and mandatory-driven firms with regard to the effect of PEOU on PU of ADAs (ΔZ-score: 2.383, p<.05). The relationship between PEOU of ADAs and its PU is found to be significant within firms adopting within voluntary context (p= .000) while it is not significant within firms adopting within mandatory context (p = 0.622).

Table 5. Summary of Hypotheses Testing for audit firms: Voluntary and Mandatory Contexts

Multi-group Relations	Evidence	Supported? Existence of Difference (Yes/No)
External variables and perceived technological characteristics of ADAs.		
H1: External Variables → Perceived Usefulness	Voluntary:0.372*** Mandatory:0.506*** ΔZ-score:1.077	No (Significant in both)
H2: External Variables → Perceived Ease Of Use	Voluntary:0.467*** Mandatory:0.369*** ΔZ-score:-0.865	No (Significant in both)
Perceived technological characteristics of ADAs and Attitude towards its adoption.		
H3: Perceived Usefulness → Attitude	Voluntary:0.281*** Mandatory:0.506*** ΔZ-score:0.401	No (Significant in both)
H4: Perceived Ease of Use → Attitude	Voluntary:0.318*** Mandatory:0.17 6 ΔZ-score:-1.058	Significant in firms adopting within voluntary context, but not significant in firms adopting within mandatory context[4] 11
PEOU and PU of ADAs.		
H5: Perceived Ease Of Use → Perceived Usefulness	Voluntary:0.233*** Mandatory:-0.051 ΔZ-score:2.383**	Yes Significant in firms adopting within voluntary context, but not significant in firms adopting within mandatory context

As for the results of the moderation effect of voluntariness to use; the results are partially supported by UTAUT which suggests that voluntariness can act as a good moderator in the technology acceptance decisions since it is found that voluntariness acts as a moderator for the relationship between PEOU and ATT. This result is supported by previous research indicating that voluntariness affects the relationship between independent and dependent variables. Previous studies find that SI is significant in mandatory context; voluntariness of use only affects SI in mandatory context but is non-significant in voluntary context. Hence, it is found that the SI for example may be stronger in mandatory context (Venkatesh et al., 2003; Gonzalez et al., 2012).

5. Limitations and Future Research

There are some limitations in this research that need to be addressed in future research. The current study focuses on only auditors in Egypt. Consequently, generalizability of the results to auditors outside Egypt may be questionable. It is worth noting that the technology adoption procedures differ per culture. Another limitation is the sample size, the data collection period may be extended in order to increase the number of participants and thus, reliability is improved. There is great difficulty in obtaining co- operation from audit firms; some of auditors contacted are not available or not willing to participate. As a result, the sample size is unfortunately low. The reason behind this may be attributed to the fear to give any information that might be confidential about their firm.

Moreover, in the current study, most of the sample are likely much more homogenous in age and gender, thus, it is not clear whether the moderating effects of age or gender may be significant in an audit context. Accordingly, no predictions are made for these moderating factors proposed by UTAUT (gender and age.) They are not examined specifically in this study but could be part of a wider study for future research; in this study they are just included in the statistical analyses as control variables. Hence, continued research is needed to address these limitations.

Taking the findings in this study as a potential base, future studies should continue to investigate the acceptance and adoption of ADAs among audit firms and auditors. It is thought that it could be useful when investigating the adoption of a new innovation to collect multidimensional views from two different countries. Moreover, the adoption of ADAs requires not only adoption by the audit firm but also by the client. Thus, future research could also investigate client characteristics and perceptions under the lens of innovation theory so this would extend researchers' understanding of ADAs adoption. Also, this would provide auditors with effective strategies to encourage client acceptance of ADAs.

The findings of the current study can serve as a benchmark measure of factors affecting new innovation adoption for future researchers. Many factors described in the current study need to be addressed before fully adopting analytics. The current study supports and encourages future research towards addressing these factors to realize benefits of Big Data and its analytics in auditing. In addition, the presented research model in the current study can be the basis of hypotheses development research can use in future any new innovations. Furthermore, few research has addressed the link between user acceptance and organizational usage outcomes. While it is often assumed that adoption of a new technology results in positive outcomes, yet its effect remains to be tested. Hence, future research is needed to focus on the post-adoption stage.

Additionally, longitudinal observation in different settings is encouraged. The results from the current study hold important implications for future research that seek to further explore the reasons behind differences in results of studies conducted in developed countries versus the results of the current study. This would encourage researchers for comparative research. More specifically, the difference in results could be due to many factors such as cultural difference, management style, no appropriate government regulations, or other location specific factors. Moreover, researchers may use the information presented in the current study to develop research in emerging areas that are relevant to the current study's context.

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