

AN EMPIRICAL STUDY OF FACTORS INFLUENCING ACCOUNTING INFORMATION SYSTEMS ADOPTION

Complete Research

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Abstract

This study investigates the factors that influence accounting information systems (AIS) adoption among accountants. Drawing on the unified theory of acceptance and use of technology (UTAUT), the task–technology fit (TTF) model and the institutional theory, we developed a research model for AIS adoption by accountants. Data was collected from 216 accountants and multiple linear regression was employed to test the research model. The results showed that five key factors, namely effort expectancy, perceived technology fit, facilitating conditions, self-efficacy and coercive pressure are able to influence the likelihood that accountants would adopt the AIS. This research confirms the need to integrate UTAUT, TTF and institutional theory when studying AIS adoption factors. The findings from this study are useful for senior management, technology consultants, software vendors and accounting professional bodies in promoting the adoption of AIS.

Key words: Accounting information system, Adoption, Factors

1 Introduction

An accounting information system (AIS) is a software package that is operated on a computer system and used to accomplish all accounting tasks, including recording, storing, retrieving, sorting, analysing, presenting and transferring accounting information to different stakeholder groups. It enhances the quality of accounting information and promotes transferring efficiency between organisations' departments and between organisations' branches and their different users or stakeholder groups (Hunton, 2002, Spathis, 2006). Mauldin and Ruchala (1999, p. 317-18) assert that '*now, as IT grows more advanced, AIS applications are recognised as fundamentally changing task processes and providing complex decision support, as opposed to simply increasing the speed and accuracy of traditional accounting tasks*'. However, the successful implementation of the AIS depends on its actual adoption by accountants within organisations (Aoun et al., 2010, Pulakanam and Suraweera, 2010). As a consequence, organisations are increasingly seeking ways to ensure AIS will be adopted by accountants, rather than only focusing on decision makers' decisions to adopt the system (Caglio, 2003, Dowling, 2009). Although accountants' involvement plays an important role in the successful implementation of the AIS (Hunton, 2002, Caglio, 2003), factors affecting accountants' behavioural intention towards the adoption of the AIS has not been studied thoroughly (Aoun et al., 2010). Existing research has mainly focused on issues related to the design, development and performance effects of AIS (e.g. Grabski et al., 2011, Vaassen and Hunton, 2009, Vasarhelyi and Alles, 2008). Prior research on the adoption of contemporary accounting technology and/or techniques—such as activity-based costing (Askarany and Yazdifar, 2012, Hopper and Major, 2007) and target costing (Yazdifar and Askarany, 2012)—has largely focused on instructors and

administrators, rather than accountants, even though accountants play a key role in the diffusion dynamics of the AIS. Further, from organisations' point of view, understanding factors that contribute to accountants' behaviour towards the AIS adoption remained relatively undeveloped (Aoun et al., 2010).

Prior research has shown that the successful adoption of new technology by end-users is mainly determined by their behavioural intention (Davis et al., 1989, Venkatesh et al., 2003, Igarria, 1994). Past studies have emphasised the importance of individual, technological, organisational and institutional aspects in influencing or forming, to varying degrees, the behavioural intention of end-users (Lee et al., 2003, Oliveira and Martins, 2011, Venkatesh et al., 2003). According to these aspects, end-users develop intention that reflect their true beliefs and perceptions of the new technology, and will subsequently react positively or negatively to adopting or rejecting the technology (Oliveira and Martins, 2011). Accordingly, in order to benefit from an introduced AIS, it is not enough to simply deploy the AIS and make it available for use (Aoun et al., 2010, Pulakanam and Suraweera, 2010). Attaining a complete understanding of the factors that will form or affect accountants' behavioural intention towards adopting the AIS is thus a prerequisite to reduce the risk of the system not being adopted (Aoun et al., 2010, Caglio, 2003).

The examination of factors related to behavioural intention of end-users towards IT adoption has resulted in the emergence of several adoption theories and models. A number of researchers recommend that integrating factors from different theoretical perspectives can provide a holistic understanding of the potential influential factors of IT adoption (Cheng et al., 2009, Oliveira and Martins, 2011, Venkatesh et al., 2003). Further, to better understand accountants' adoption of the AIS, a range of adoption factors related to individual, technological, organisational and institutional aspects need to be considered (Breen et al., 2003, Gonzalez et al., 2012, Oliveira and Martins, 2011). Yet, the existing literature reveals limited research involving a broader perspective that considers multifaceted factors. While the three prominent IS/IT adoption theories—the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al., 2003), task–technology fit (TTF) model (Goodhue and Thompson, 1995) and institutional theory (DiMaggio and Powell, 1983)—have been used independently in prior studies to examine the adoption of various IT applications, few studies have applied these three theories together to examine the behavioural intention of individuals within organisations. Therefore, this study fills the existing research gap by considering individual, technological, organisational and institutional factors and employs UTAUT, TTF and institutional theory in investigating the factors that influences AIS adoption by accountants.

2 Theoretical Framework

The research model of this study was principally built on the modified UTAUT model of Venkatesh et al. (2003). The UTAUT model is one of the most highly-cited IT adoption models describing how IT is adopted by end-users. However, to enable a broader perspective, the UTAUT model was extended by incorporating other important influential factors not previously examined, particularly in AIS adoption research. These factors were derived from the TTF model (Goodhue and Thompson, 1995) and institutional theory (DiMaggio and Powell, 1983). This is because it is argued that, although UTAUT is a powerful theory, it is limited (Dishaw et al., 2004). Venkatesh et al. (2003) suggest that UTAUT needs to be strengthened by including additional factors in its structures. Several studies (e.g. Dishaw et al., 2004, Klopping and McKinney, 2004, Zhou et al., 2010) suggest that UTAUT's ability to explain the adoption and usage of new systems could be enhanced by extending or combining it with other theories or models to account for more potentially important factors that might affect end-users' behavioural intention. Furthermore, the combined theoretical perspectives are more effective in measuring individuals' intention regarding factors that influence the adoption of new technology (Dishaw and Strong, 1999, Venkatesh et al., 2003, Zhou et al., 2010).

2.1 Research Model

Drawing on the modified UTAUT model, the research model included factors derived from TTF and the institutional theory. TTF hypothesises that the adoption of IT by individuals is based on the fit

between the technology’s characteristics and task requirements. Likewise, introducing new accounting technologies can be influenced by institutional actors. Two main institutional pressures—coercive and mimetic—reflect accountants’ perceptions of how the institutional environment affects AIS adoption. Accordingly, an integrated research model that considers the perceptions of these three theories together was developed in this research.

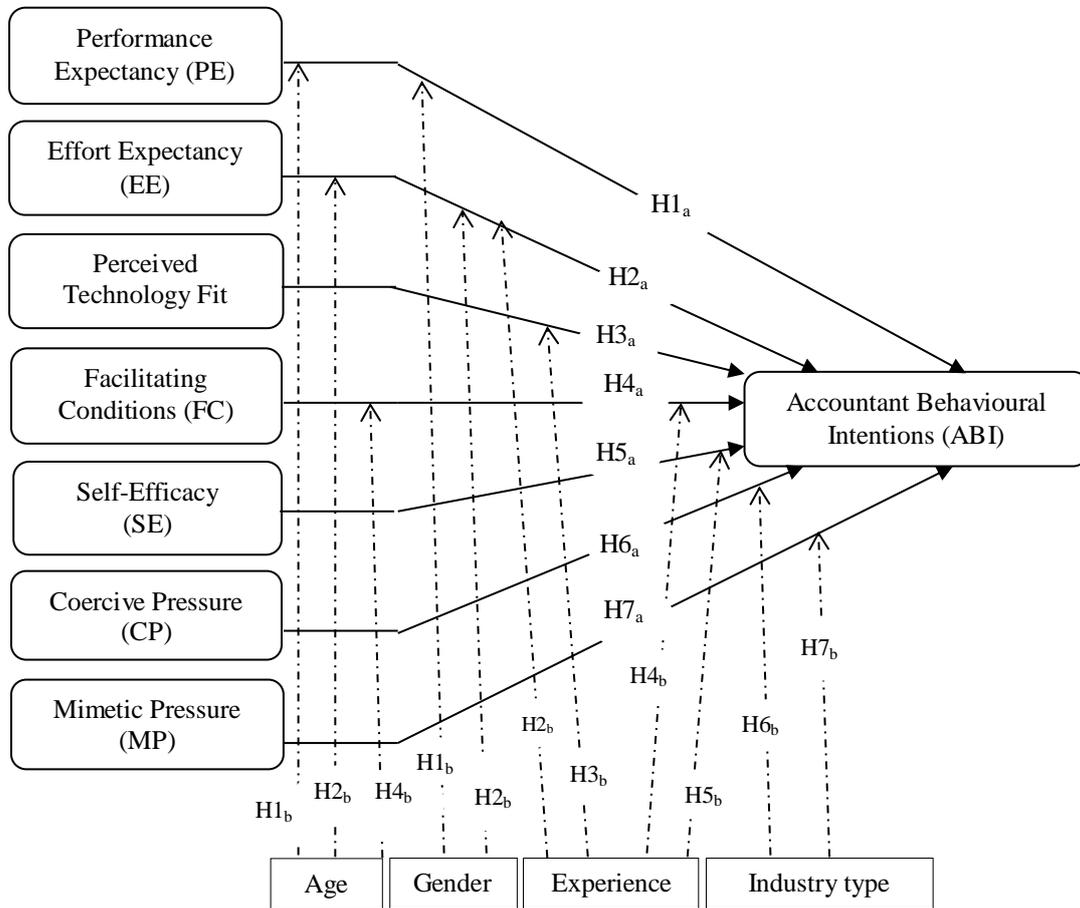


Figure 1. Research Model

As shown in the research model (Figure 1), accountant’s behavioural intention (ABI) is the dependent variable. Behavioural intention measures the determination of a person to act in a certain way (Davis et al., 1989). According to the UTAUT (Venkatesh et al. 2003), four factors are likely to influence end-users’ behavioural intention towards the adoption and use of technology. These factors are performance expectancy (PE), effort expectancy (EE), facilitating conditions (FCs) and social influence (SI). The first three factors consistently influence behavioural intention to adopt technology, and could be important for AIS adoption (Aoun et al., 2010). However, previous studies (Forward, 2009, Muthusamy et al., 2010) indicate that the social influence factor did not emerge as significant and therefore this factor was excluded in this study. Furthermore, the TTF model has been applied extensively in various IT adoption studies and has gained considerable empirical support. The focus of TTF is the fit between the attributes of technology and current practices and values. This concept has been found to significantly and positively influence the adoption of IT. The majority of available accounting technology applications are pre-packaged and inflexible to change their attributes easily to meet specific local or organisational requirements (Pulakanam and Suraweera, 2010, Grabski et al., 2011). Therefore, it is logical to theorise and study the effect of fit issues on the adoption of the AIS. Thus, the perceived technology fit (PTF) factor was also included in our research model. This is a measure of how accountants perceive that the attributes of AIS fit well or align with their current accounting practices and values.

Along with institutional perspectives, external pressures can also influence accountants' responses to their surrounding environment (Burns and Baldvinsdottir, 2005). Several studies have demonstrated that external pressures influence the likelihood of facilitating the adoption of IT applications (e.g. Khalifa and Davison, 2006, Son and Benbasat, 2007) and accounting practices (Carpenter and Feroz, 2001, Hopper and Major, 2007). In this regard, institutional theory has been used alongside IT acceptance theories to examine how institutional pressures affect individuals' adoption of technology (Khalifa and Davison, 2006, Teo et al., 2003). Moreover, from the institutional theory perspective, external pressures include coercive pressures (CPs), mimetic pressures (MPs) and normative pressures (NPs) (DiMaggio and Powell, 1983). Given the theoretical and empirical difficulty in differentiating the effects of CPs and NPs, particularly from an accounting perspective (Carpenter & Feroz, 2001), the focus of this research was on CPs and MPs only. Accordingly, CPs and MPs were included in the research model. This assumes that institutional pressures—particularly coercive and mimetic—might influence the adoption of AIS (Gullkvist, 2011). CPs can be exerted on accountants by decision makers, other organisational stakeholder groups or accounting regulatory bodies (Bernal et al., 2005). MPs generally stem from competitors in uncertain environments. For example, accountants might imitate other accountants who adopt AIS to attain benefits and success. Researchers have emphasised the importance of these particular pressures in shaping individuals' behavioural intention towards adopting new technology (Teo et al., 2003).

This research also examined the effect of an individual's personality. Investigating the role of personality is important when studying the adoption of technology because studies have found that individuals' behaviours differ. One factor of individual behaviour is self-efficacy (SE). Researchers have found it to be a significant and important determinant of individuals' behavioural intention for IT adoption (Compeau and Higgins, 1995), including in the accounting discipline (Dowling, 2009). This research added this factor to investigate whether accountants' SE influences their behavioural intention to adopt the AIS. SE is a measure of accountants' belief of capability to adopt an AIS. Further, in line with UTAUT, this research also examined the moderating effects of four variables: accountants' age, gender and experience, and the type of industry in which the accountants' company belonged. These were chosen because age might moderate the influence of PE, EE and FCs on ABI. Gender might moderate the influence of PE and EE on ABI. Experience might moderate the influence of EE, PTF, FC and SE on ABI. Finally, industry type might moderate the influence of CPs and MPs on ABI. In short, the research model takes a comprehensive approach and includes a broader range of factors that might influence AIS adoption by accountants. The list of hypotheses is provided in Table 4 below.

3 Methodology

3.1 Sample Organisations

To date, it appears that academic research on the factors influencing AIS adoption is still relatively scarce. Existing research provides limited scope with studies focused mainly on developed countries (e.g. Bernal et al., 2005, Gomes et al., 2008, Aoun et al., 2010). It is widely acknowledged that theories are always developed based on the most industrialised contexts and there is a need to re-examine such theories in the context of developing countries (Grabski et al., 2011). Libya, a developing and moderately liberal Islamic country in North Africa, forms an interesting sample in this study. Libya is one of the most prominent petroleum-producing countries in the world today. Creating a strong IT infrastructure has been one of the priorities of the Libyan economic plan (Verma et al., 2012). Great effort has been recently made by the Libyan government to move towards a contemporary and digital business environment by establishing e-government, e-commerce (B2B) and e-banking systems and facilities (Al-Mabrouk and Soar, 2009). This has resulted in attempts to increase IT usage among Libyan organisations. As part of this strategy, several AIS systems have been introduced to a variety of Libyan organisations in different sectors, with the aims of improving work performance and promoting accountability (Husain, 2008, Al-Mabrouk and Soar, 2009). Hence, Libyan organisations represent a timely and useful set of samples for this research.

3.2 Procedure

A survey questionnaire was used for this study. The questionnaire was developed by consolidating established instruments from prior related research (Venkatesh et al., 2003, Goodhue and Thompson, 1995, Teo et al., 2003) to adequately reflect the underlying theoretical factors identified. A five-point Likert-type scale ranging from 1 (strong disagree) to 5 (strongly agree) was used in this study. The questionnaire was initially created in English. However, as the target population were mainly Arabic speakers, the final version was translated into Arabic by a professional translator and reviewed by six academics with expertise in the fields of accounting and IT at a Libyan university, who also speak both Arabic and English. The questionnaire was pre-tested with 30 accountants in Libya. The questionnaire was posted to a total of 400 accountants in Libya's four major cities—Tripoli, Benghazi, Misurata and El-Zawia. A total of 216 usable responses were received after few reminders and analysed using SPSS software.

3.3 Validation of the Measures

The analysis indicates that all the research factors are considered normally distributed. The skewness values ranged from -0.834 to 0.360, while the kurtosis values ranged from -0.996 to 0.619. As a result, the parametric statistics that rely on the assumption of normality were justified. Moreover, a Cronbach's alpha (α) was used to assess the reliability of the factors. The Cronbach's α value for the research factors was ranging from 0.702 to 0.877, thus exceeded the recommended threshold of 0.7 for reliability (Tabachnick and Fidell, 2007). This means that the items developed to measure the factors were considered internally consistent and acceptable measures. Furthermore, the construct validity was assessed using factor analysis (FA). FA using principle axis factoring extraction was performed on all 33 items used in the questionnaire. (Hair et al., 2006) suggest that loadings over 0.3 meet the minimal level. However, if an item had cross loadings with more than one factor or did not load properly on the intended factor, it was dropped from the analysis and the analysis was run again (Pallant, 2010). Along these lines, the result of the FA indicated a clear solution of seven factors with eigenvalues greater than one (see Table1). Nonetheless, five items were dropped. EE3, FC1 and SE4 were dropped because of cross loadings, while PE1 and PE2 were dropped because they did not load highly on their respective factor—the PE. Consequently, the final run of the FA indicated that all the extracted factors had eigenvalues of greater than one, and the items loaded cleanly on their associated factors and did not cross-load, therefore establishing discriminant validity. This result implies that the instrument provided a valid measure of the theoretical factors incorporated into the model.

Factor	Initial eigenvalues*			Extraction sums of squared loadings			Rotation sums of squared loadings
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
PTF	7.587	30.348	30.348	7.244	28.975	28.975	3.778
FC	4.173	16.693	47.042	3.837	15.348	44.323	3.290
PE	2.110	8.440	55.482	1.708	6.831	51.154	3.976
MP	1.390	5.562	61.044	1.073	4.293	55.447	4.591
CP	1.138	4.552	65.596	0.794	3.175	58.621	2.847
SE	1.123	4.492	70.088	0.740	2.960	61.581	3.737
EE	1.002	3.867	73.955	0.588	2.354	63.935	2.362

*Extraction method: Principal axis factoring

Table 1. Total Variance Explained in the FA for the Independent Variable

3.4 Analysis Method

Multiple linear regression (MLR) and hierarchical multiple regression (HMR) were used to test the hypotheses. These techniques have been widely used in previous IT adoption studies (Tan et al., 2010). Since all the independent variables were considered important, a simultaneous enter method of

MLR was chosen to perform the analysis (Pallant, 2010). Based on this method, the relative contribution of each independent variable was identified. This also showed which independent variable or set of independent variables were the best predictors.

In addition, HMR was used to test whether the direct effect of the independent variable/s on the dependent variable was moderated by the demographic measures of age, gender, experience and industry type of the organisations in which the accountants belonged.

3.5 Hypotheses Testing

As shown in Table 2, the MLR analysis indicated that the model was statistically significant: $F(7, 208) = 39.736$ and $p < 0.001$. The R^2 was 0.572, indicating that 57.2% of the variance in ABI towards the adoption of the AIS was explained. The adjusted R^2 (0.558) was very close to R^2 . This indicates that the model would reasonably explain the dependent variable if a different sample was used, thereby establishing generalisation (Tabachnick & Fidell 2007).

Table 3 shows the MLR results of the factors influencing AIS adoption. It also presents the result of the HMR analysis for each of the significant variables to determine the effect of the moderating variables. The findings suggest that EE, PTF, FC, SE and CP are able to influence the likelihood that accountants would adopt AIS. The overall findings are provided in Table 4.

Sources	Sum of squares	df	Mean square	F	R ²	Adj. R ²	P
Regression	55.279	7	7.897	39.736	0.572	0.558	0.000 ^a
Residual	41.337	208	0.199				
Total	96.617	215					

a. Predictors: (constant), MP, PE, CP, SE, FC, EE and PTF

b. Dependent variable: ABI

Table 2. Significance of Overall Regression Relationship

Model	B	Beta	t	Sig.	Tolerance	VIF
(Constant)	1.354		5.488	0.000		
PE	0.011	0.012	0.226	0.821	0.724	1.382
EE	0.316	0.364	5.507	0.000	0.470	2.126
PTF	0.244	0.329	4.743	0.000	0.429	2.334
FC	0.136	0.164	2.662	0.008	0.543	1.843
SE	0.183	0.173	3.024	0.003	0.628	1.591
CP	0.124	0.158	2.823	0.005	0.657	1.523
MP	-0.007	-0.009	-	0.888	0.501	1.996
			0.141			

Note: $R^2 = 0.572$; $Adj. R^2 = 0.558$; $F(7, 208) = 39.736$; $p < 0.001$

Table 3. Coefficients of MLR for Factors Explaining ABI

Relationship	Hypothesis	Description	Outcome
PE→ABI	H1 _a	The perceived PE of the AIS has a significant positive effect on ABI to adopt the AIS.	Unsupported
	H1 _b	The influence of PE on ABI is moderated by gender and age.	Not tested
EE→ABI	H2 _a	The perceived EE of the AIS has a significant positive effect on ABI to adopt the AIS.	Supported
	H2 _b	The influence of EE on ABI is moderated by age, gender and experience.	Unsupported
PTF→ABI	H3 _a	PTF has a significant positive effect on ABI to adopt the AIS.	Supported
	H3 _b	The influence of PTF on ABI is moderated by experience.	Unsupported
FC→ABI	H4 _a	The perceived FCs of using the AIS has a significant positive effect on ABI to adopt the AIS.	Supported
	H4 _b	The influence of FCs on ABI is moderated by age and experience.	Unsupported
SE→ABI	H5 _a	The perceived SE of using the AIS has a significant positive effect on ABI to adopt the AIS.	Supported
	H5 _b	The influence of SE on ABI is moderated by experience.	Unsupported
CP→ABI	H6 _a	The perceived CP has a significant positive effect on ABI to adopt the AIS.	Supported
	H6 _b	The influence of CP on ABI is moderated by industry type.	Unsupported
MP→ABI	H7 _a	The perceived MP has a significant positive effect on ABI to adopt the AIS.	Unsupported
	H7 _b	The influence of MP on ABI is moderated by industry type.	Not tested

Table 4. Summary of the Hypotheses Testing

4 Discussion

Overall, the results support the applicability of the UTAUT, TTF and institutional theory together to explain the AIS adoption factors. More importantly, five out of the seven proposed factors were found to significantly influence the accountants' decision to adopt the AIS. These findings are discussed in the following.

Given the results of prior research in technology adoption, surprisingly, performance expectancy (PE) was found to be an insignificant factor in the adoption of the AIS by accountants in Libya. This inconsistent result may be due to the early stage of AIS implementation in many Libyan companies, during which time, this factor plays a small role in technology adoption, as is suggested in the literature (AbuShanab et al., 2010). On the other hand, effort expectancy (EE) was found to be the most significant factor influencing the AIS adoption. Since the AIS is a relatively new accounting application in the Libyan context, it is not surprising that accountants' perceptions of whether the AIS is easy or difficult to adopt emerged as the most significant factor for its adoption. ABI to adopt the AIS may be compromised when they perceive an inability to do so. That is, accountants with lower EE perceptions towards adopting the AIS have a higher intention to adopt the AIS than those with higher EE perceptions. This finding provides empirical support for the influence of EE on the adoption of the AIS. Perceived technology fit (PTF) emerged as another significant factor influencing the AIS adoption. As most of the AIS applications are developed outside of the studied country (Libya), it was found that the fit between the attributes of the AIS and the current accounting practices

was one of the greatest concerns of accountants for adopting this system. That is, the AIS will be highly adopted if its attributes fit well with the current accounting practices that accountants perform. Facilitating conditions (FC) were also found to be a significant antecedent of influencing the AIS adoption. The main observation was the lack of related resources, such as AIS training courses in the Libyan environment. This was seen as critical in facilitating the adoption of the AIS. That is, accountants with a higher perception of FC towards adopting the AIS have a higher intention to adopt the AIS than accountants with a lower perception of FC. Moreover, accountants' self-efficacy (SE) towards adopting the AIS was found to be a statistically significant factor influencing ABI to adopt the AIS. This suggests that the adoption of this system is highly driven by an accountant's own capabilities to deal with the system. That is, accountants with a higher SE perception will have a higher intention to adopt the AIS than accountants with a lower SE perception.

In addition, coercive pressure (CP) has been found to be an influencing factor for AIS adoption. This implies that accountants rely on stakeholder groups and accounting regulative bodies' perceptions of the AIS when forming their behaviour towards adopting the system. When accountants are taught by accounting information users who possess a positive view of the AIS and promote its use, they probably also develop a similar way of thinking. In addition, accountants are generally influenced in their behaviour by what their stakeholders may expect of them. For example, the company's management, as one user of accounting information, may decide to introduce an AIS and require accountants to adopt this. Accountants are more likely to comply with this request, even if they do not perceive it positively. Moreover, the recent successful Libyan legal reform regarding the use of electronic accounting systems may be seen by accountants as a form of encouragement to adopt the AIS. On the contrary, the absence of peers or low number of accountants who used AIS has led to the insignificant effect of mimetic pressure (MP) on the AIS adoption. Accordingly, accountants are more likely to adopt the AIS based on the needs or encouragement of their organisations' stakeholder groups, rather than the influence of other successful accountants. Previous studies emphasise that investigating the possible role of moderators offers more information on the strength of a relationship of interest (Aguinis et al., 2011). Interestingly, this study's findings indicate that there is no difference in the influence of the significant determinants of ABI resulting from accountants' age, gender, experience or industry type. This finding is in line with Curtis and Payne (2008) who similarly found that individual characteristics have a significant influence only in the absence of external moderators.

5 Concluding Remark

This research investigated the factors that influence accountants' behavioural intention to adopt AIS. The study indicated that five major factors (i.e., effort expectancy, perceived technology fit, facilitating conditions, self-efficacy, and coercive pressure) play a significant role in AIS adoption. The results also showed that none of the control variables moderated the relationship between the independent variables and the dependent variable. Furthermore, the findings largely support the combination of the three theoretical perspectives, the UTAUT, TTF and the institutional theory, in explaining the adoption of the AIS by accountants. The findings also support the research argument that a broader perspective—that simultaneously considers individual, technological, organisational and institutional factors—should be used when investigating AIS adoption.

The findings have a number of important implications that will assist accounting professional bodies, managers, technology consultants and software vendors to facilitate the adoption of the AIS by accountants. For example, to ensure a high level of adoption, some issues associated with the attributes of the AIS, such as its ease of use and fit with current accounting practices, should be keenly considered. One key barrier to end-user adoption of a new IT application is the lack of user-friendly features in the application (Al-Gahtani et al., 2007, Aoun et al., 2010). In dealing and interacting with a new AIS, if accountants perceive the AIS to be difficult, they might be deterred from adopting the system. Eventually, they may become reluctant to adopt the system, hence defeating the goal of introducing it. User-friendly interfaces and features of the AIS application can maximise its adoption and subsequently its use. Efforts should be made to foster accountants' perceptions of the ease of use of the system. When designing or selecting an appropriate AIS system,

its ease of use should be a priority. Moreover, since the perceived technology fit was found to be a significant influential factor towards the AIS adoption, the fit of the AIS with current accounting practices should be highly considered. This would encourage accountants to feel favourably towards adopting the AIS. Thus, vendors and developers should consider providing AIS applications that are more suited to the country's accounting practices because this could increase its adoption rate.

This research makes several contributions to the literature of AIS, accounting and IS adoption. The literature review revealed that, despite a great deal of attention being focused on the adoption of various IT applications, very little has been specifically related to the AIS. Therefore, this research expands this knowledge by providing a comprehensive research model grounded in prominent IS theories and models that can be used to explain how several interrelated factors influence accountants' behavioural intention to adopt the AIS in their workplace. As there has previously been no available research, work was undertaken to incorporate the UTAUT, TTF and institutional theory as a theoretical framework to explain individuals' behavioural intention towards the adoption of AIS. This research successfully integrates the core constructs of these three theoretical notions. The results provide important insights into the roles of several factors that relate to individual, technological, organisational and institutional aspects simultaneously when investigating individuals' adoption of technology.

As with any research work, this research had some limitations too. One limitation is that the population was confined to one developing country in North Africa—Libya. A possible future study would be to replicate the research in other countries. Also, a longitudinal study could be conducted to better understand the factors underlying the adoption of the AIS over time.

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