

## AIS usage factors and impact among Jordanian SMEs: The moderating effect of environmental uncertainty

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### ABSTRACT

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Small and medium Enterprises (SMEs) are struggling to survive in the present competitive environment. Accounting Information Systems (AIS) has great potentials to facilitate firms in attaining sustainable competitiveness and to survive in such environment. Nevertheless, the use of AIS among Jordanian SMEs has been reported as relatively low, which in turn does not affect SMEs effectively. Drawing upon Technology-Organization-Environment (TOE) framework as well as the Resource-Based View (RBV) theory, authors proposed an integrated model to examine the antecedents and impact of AIS usage in Jordanian SMEs. The proposed model enables incorporation of usage and the performance aspects of AIS in a single model. This study employed self-administered questionnaire survey for data collection purpose. The research model was validated based on the responses from 186 Jordanian SMEs. There are three major findings being observed from this study. First, competitive pressure, compatibility, organizational readiness, owner/manager commitment and government support are found to significantly influence the usage of AIS. Secondly, the study demonstrates significant and positive relationship between AIS Usage and AIS Effectiveness. Finally, contrary to the expectation, environmental uncertainty does not moderate the relationship between AIS usage and AIS effectiveness. The findings provide insights as how firms could improve their AIS usage for better firm performance. The current paper also contributes to the small but emergent stream of literature that examines antecedents and impact of IS/IT usage.

#### Keywords:

AIS usage, AIS effectiveness,  
Technology-organization-environment  
(TOE) framework, Resource-based view  
(RBV) theory, Environmental uncertainty

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## 1. Introduction

SMEs are the most dynamic and active economic growing force in most countries. The SME sector is broadly described by economist as one of the hall marks in terms of a growing and healthy economy [1]. Contributing more than 70% of employment opportunities, 40% of total national gross domestic

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product (GDP) and 45% of the total national export, SMEs have been recognized as the backbone of the Jordanian economy [2]. These indicators bearing the sign on the crucial roles of SMEs to the wealth and prosperity of Jordan.

However, SMEs are facing common difficulties and problems that affect their survival rate and performance [3]. In several countries, statistics advocate that the failure rate of SMEs within their first few years is greater than 50% [4, 5]. Specifically, Jordanian SMEs are no exception. Total number of registered SMEs retreated from 166,000 in 2014 to 154,800 in 2016 [6]. One of the crucial concerns from this situation is an explanation of why some SMEs succeeded while others failed. Given the importance of SMEs for the strength and stability of the economy, understanding of why SMEs succeed and fail is essential [5].

With this regard, [7] stress that one of the critical factors contribute to the success/failure of the SMEs is due to inadequate financial information, accounting record and poor management. Other researchers also agreed that poor financial management as well as accounting record is the major causes of SME failure [5, 8]. On the same vein, [9] emphasizes that improved management as important as financial information aid. [10] also pointed out that whether the causes are characterized as financing, competition or marketing, SMEs could avoid failure if good record keeping and good financial management are in position.

Improved financial management and accounting records in SMEs are made possible by upgrading the firms' accounting system [11, 12]. [13] pointed out that most startling distinctions and the clearest border between discontinued and successful SMEs lie in their approach and usage of accounting information. AIS plays a very crucial role in enhancing and supporting various parts of the business operations. Specifically, AIS has been well regarded as one of the effective means to attain sustainable competitiveness and firm's survival [14]. The effective use of AIS ensures timely financial information reporting, accurate and proper accounting records and produces reliable financial information for more informed decision making by managers for better firms' performance [15]. In another respect, AIS helps firms to save on operating cost, to improve profitability over time, to enable greater competitiveness and to increase productivity [16]. Effective deployment of AIS could also lead to greater users' satisfaction of the system and in turn gives impact to overall business's operations.

Despite the theorized performance benefits of AIS deployment, several studies in Jordan found that not all SMEs are using AIS. For instance, [17] pointed out poor data quality in AIS usage among Jordanian SMEs. This is reinforced by [18] who concurred that only 14% of Jordanian SMEs prepare accounting information internally by using accounting application. Therefore, it can be concluded that the use of AIS among Jordanian SMEs is relatively low. The low level of AIS usage resulted to poor data quality that ultimately affects decision making as well as restricts Jordanian firms' capability to improve business productivity and to sustain competitiveness [15].

In spite of numerous studies on AIS from an organizational perspective [3, 19, 20], there is currently no unified view or empirical research of how firms can weigh the possible impact and value of AIS [21]. Although the AIS brings wide range of potentials to the firms, there remains necessary to further justify and validate its usefulness, viability and impact for business [22].

Therefore, it is imperative to conduct further study to recognize the potential and issues of AIS usage on the effectiveness of AIS amongst SMEs [21]. While several attempts have been dedicated to investigate AIS usage at the initiation stage (pre-adoption) and its formal adoption stage [23], very little effort has been given to the usage and implementation stage (post-adoption issues), particularly in the context of emerging economies [19, 81]. As part of an effort to fully understand the impact of AIS usage in SMEs, a full-scale deployment at the post-adoption stage and its impact on AIS

effectiveness particularly in an emerging economy such as Jordan stand out as a significant and important topic for research.

Apart from investigating the post-adoption stage of AIS, this study further investigates the contingent effect of external (environmental) factors that likely moderate the relationship between IS/IT usage and IS/IT impact as suggested by [24, 25]. Specifically, environmental uncertainty (EU) tends to shape technology (AIS usage) - impact (AIS effectiveness) relationships [26]. Thus far, technologies impact under different level of EU is still an open issue as recommended by [25]. As such, how EU shapes the technology-impact relationships deserves further attention. The outcome would help researchers to ascertain why several factors yield inconsistent findings in terms of the associations between many independent latent variables and IS effectiveness [27, 28].

As the AIS environment continues to grow, it is essential for both practitioners and researchers to recognize how the AIS create value and impact to the firms. Hence, this current study attempts to address this issue by proposing and validating a comprehensive AIS usage and impact framework from SMEs viewpoint. The aforementioned discussion then leads to the following key research objectives: (1) to examine the antecedents of AIS usage, (2) to identify the impact of AIS usage on AIS effectiveness. (3) to investigate the moderating effect of environmental uncertainty on the relationship between AIS usage and AIS effectiveness.

This study offers several contributions to researchers and practitioners. For researchers, this study has incorporated Technology-Organizational-Environmental (TOE) framework and Resource-based View theory in attempt to understand antecedents to AIS usage and its likely impacts to AIS effectiveness. Moreover, the study has validated applicability of the proposed framework in the context of AIS practices among SMEs in developing country. This study further validated perceived AIS effectiveness for firms operating under different level of EU. As for the practitioners, this study highlights crucial factors that promote greater use of AIS and how does it correspond to the firm's effectiveness and ultimately translated into better firm performance.

This paper is organized as follows: the following section presents the review of prior works on AIS effectiveness, a review of theoretical foundation, followed by the research framework and proposed hypotheses. The subsequent sections describe the methodology employed in the study and results of the data analysis. This paper ends with discussion of the results and conclusion of the study.

## 2. Literature review

SMEs are commonly categorized by the limited scale of their processes [29]. It plays an essential role in economic development of various nations around the world. Due to the enormous advantages of AIS, many firms are trying to harness the advantages and benefits of AIS and SMEs sector are exception [81]. AIS is about a system that collects, stores, records and processes data to produce information for managers and decision makers [30]. They further stress that, these information is useful for managers to reduce uncertainty in decision making, improved ability of planning and controlling activities.

There are a number of works in the literature that have recognized how SMEs have benefited from AIS. For example, [31] suggests that AIS helps SMEs to grow with respect to sale, revenue and customer. [7] have found that AIS provides information for both external and internal users. It is also seen that AIS has a positive impact on the efficiency of the business management. In a broader context, a number of studies have attempted to recognize the nature of AIS usage influence on firm performance. For instance, [32] reported that AIS usage improved the satisfaction of users, reduced errors and improved availability of information. But, to the authors' knowledge, studies that focus on AIS usage effects on the effectiveness of AIS are relatively rare.

AIS effectiveness is one of the most common dependent latent variables in the AIS literature [33, 34, 35, 36]. Raymond [37] defines “AIS effectiveness as the extent to which AIS actually contributes to achieve an organization’s goals”. Nevertheless, AIS researchers are still wrestling with the problem of which construct has the greatest influence on AIS effectiveness since the definition and conceptualization of AIS effectiveness varies considerably among studies [38].

AIS effectiveness has become an essential issue for practitioners and academic researchers over the world [35]. Previous studies [39, 15, 40] have verified several factors that are believed to influence the effectiveness of AIS. However, based on a review of the literature, the present research has found an important gap. There seems to be relatively little works that have attempted to understand the impact of AIS usage on AIS effectiveness. Thus, it makes sense to study the impact of AIS usage on AIS effectiveness among Jordanian SMEs, as well as the moderating effect of EU on such relationship.

### 3. Theoretical foundation

The present study aims to analyze the usage (post-adoption stages) and impact of AIS from an organizational point of view. Prior IS/IT research has examined the issue from two alternative approaches; one research approach focuses on the variables influencing innovation usage decisions while the second approach examines the antecedents and the impact of innovation usage.

With regard to the first approach, reviewing the earlier literature suggests that the TOE framework provide a useful starting point to look on AIS usage [41, 81]. The TOE framework identifies three categories of factors that influence the process by which firms use technologies. First, technological context describes the perceived innovation attributes which include: observability, relative advantage, complexity, compatibility, and trialability. A meta-analysis study conducted by [41], shows that the most common relevant and positive significant characteristics are the relative advantage and compatibility, which are going to be considered in this study. Secondly, organizational context refers to the amount of slack resources available internally, owner/manager commitment and organizational readiness are the most frequently found to be significant in the usage/adoption of innovations, which also are going to be considered in this research. Thirdly, “environmental context that refers to the arena in which a firm conducts its industry and its business, competitors, and dealings with government” [41]. This framework is consistent with the Diffusion of Innovation Theory (DOI) of Rogers [42] that emphasizes on technological characteristics and organizational characteristics of an organization as drivers for technology diffusion.

Another approach of research has further extended the TOE framework by incorporating the impact of technology usage. The approach grounded on the rational of RBV that firms create value and impact by combining various resources that are economically difficult to imitate or valuable across firms [43]. In addition, resources impact resides more in an organization’s ability to leverage an innovation than the innovation itself [44, 45]. Put it differently, innovation impact depends on the extent to which innovation is used to support key activities of the firm’s value chain. The greater the use, the more likely the firm is to develop unique impact from its innovation [46]. This approach has produced stream of research that focus on the antecedents and consequences of innovation usage [29, 47, 48]. However, in the context of AIS, it seems that little works have paid attention on this issue. In response, the current research concentrates on the usage and impact of AIS and, therefore, fills the literature gap.

In short, TOE is the main framework that inspired most of the previous studies in explaining the antecedents of IS/AIS usage [81]. Meanwhile, the consequences of IS usage in view of prior studies were grounded on the RBV.

## 4. Conceptual framework and hypotheses

The present study's conceptual framework incorporates TOE framework and RBV theory as the most prominent theories in the domain of IS/IT [42]. In addition, authors adapted the theoretical lenses to evaluate the usage and impact of AIS by SMEs. Based on the literature review, this paper investigates factors influencing the use of AIS by SMEs from different contexts as well as the impact of AIS usage on AIS effectiveness. Therefore, taking into account variables studied in previous works, Fig. 1 presents a conceptual framework of the study. The three contexts of factors included in the model are: (1) technological-related factors, (2) organizational-related factors, (3) environmental-related factors. These contexts are discussed in the next section and followed by the postulated relationships.

### 4.1. Technological factors and AIS usage

The technological factors indicate the characteristics of the technology to be used [49]. Rogers [42] suggested that innovation technology has attributes which might affect the usage. To illustrate, relative advantage is the degree to which an innovation is perceived as providing greater benefits than its alternatives. Meanwhile, AIS has several unique attributes that differentiate it from other kinds of IT innovations: collection, storage and processing of accounting and financial data that is used for internal management decision making [50]. Relative advantage is said to be the most important factor in IS/IT usage [51, 52]. It was also stated that relative advantage has a positive impact on IS/IT adoption as a whole [53, 54]. Therefore, the following reflects the anticipated relationship:

H1: Relative advantage has a positive relationship with AIS usage.

Compatibility is the degree to which an innovation technology is perceived as being consistent with existing values and practices [42]. In AIS, compatibility reflects how existing processes are similar to the processes required to implement and use AIS. By definition, using a technology requires a new skills and methods to use and implement it correctly, as incompatibility will hinder the usage of technologies and slow down innovation [55, 56]. Compatibility is also considered the strongest driver motivating the use of technology compared to other factors affecting innovation [57, 58, 81]. Hence, hypothesis two was derived:

H2: Compatibility has a positive relationship with AIS usage.

### 4.2. Organizational factors and AIS usage

Organizational factors refer to the firm's characteristics that influence the usage of technology [59]. It is the factors that exist inside the firm itself and relate directly to the firm's policy of managing its resources and running the work environment in order to fulfill the firm's target and missions [60, 41]. Organizational readiness was identified as a major factor that affect IS/IT usage by SME's [57, 61]. The firms often lack of financial support for the usage, and lack of the knowledge needed for successful use of AIS particularly that involve the use of complex technologies [61]. Similarly, previous findings found that organizational readiness is crucial in using technological innovations [48, 62, 81, 82]. On the same vein, [52] also reported that firms with higher level of readiness are more likely to engage successfully in IS/IT activities. This lead to the third hypothesis as follows:

H3: Organizational readiness has a positive relationship with AIS usage.

Owner/Manager Commitment (OMC) refers to the level of commitment, active engagement, and support the management shows with regard to the implementation and the planning of technological

systems within a firm that assures the usage of technologies by the staff [60]. Decision making is usually in the hands of owner/manager, thus it is important to make sure that they are committed to correctly implement every available resource to use AIS successfully and overcome the hurdles present due to natural resistance of the technology usage [63, 64, 82]. It was also shown in previous studies that the success of IS/IT depends heavily on owner/manager commitment [81], and has a positive effect on the success of IS/IT within SME's, making owner/manager commitment a crucial factor in AIS usage [54, 59]. The fourth hypothesis that follows is postulated to reflect the proposed relationship:

H4: Owner/manager commitment has a positive relationship with AIS usage.

#### 4.3. Environmental factors and AIS Usage

Environmental factors can be defined as those external factors that exist outside the control of the SMEs management [65]. Competitive Pressure, as one of the environmental factors, refers to the degree of pressure that the SMEs feel from competitors within the industry. Porter and Millar [66] who analyzed the strategic rationale underlying competitive pressure as an innovation technology-diffusion driver concluded that, by using a new technology, firms might be able to leverage new ways to outperform rivals, and amend the competition rules, affect the industry structure, thus altering the competitive landscape. This analysis can be extended to AIS. As documented in the existing literature, a firm faces greater pressure when it views more and more firms in the industry are using technology and therefore feels the need to use it as well, in order to remain competitive [67, 68]. Thus, pressure from competitors plays an important role in pushing SMEs toward using AIS. Hence, hypothesis five reflects the relationship postulated:

H5: Competitive pressure has a positive relationship with AIS usage.

Another possible significant factor is Government Support that refers to the government role in encouraging and promoting the technology usage within firms [41]. Government policies and regulations vary from one industry to another and from one country to another [41]. These regulations and guidelines can be a constraining factor within a certain industry which discourages the usage of technological innovations; while in another industry, those regulations and policies can stimulate the firm to use technologies [41]. This factor was considered by numerous works, and the findings consistently indicate its significance role to the use of technology [69, 48, 81]. Therefore, this paper considered support from government as a predictor to the usage of AIS within the Jordanian SMEs context. The proposed hypothesis is therefore specified as follows:

H6: Government support has a positive relationship with AIS usage.

#### 4.4. AIS usage and AIS effectiveness

AIS usage refers to the extent in which AIS is used along the other activities. In fact, the ultimate goal of using AIS for any firm is to improve firm's efficiencies. Ali et al. [19] have demonstrated that firms using AIS effectively are more likely to report positive impacts on the firm performance than those with limited use of AIS. Similarly, TOE suggests that a technology impact depends on the extent to which it is being used to conduct business activities [58]. Thus, a business must first use AIS to be able to acknowledge its impact on AIS effectiveness. In this study, authors leverage on the RBV theory to suggest a positive link between AIS usage and AIS impact. Thus, it is anticipated that the wider and deeper the usage of AIS, the greater the possibility that the business creates impact that are valuable, challenging to imitate by rivals, and sustainable over time. Following this reasoning, authors argue

that there is a theoretical association between AIS usage and impact. Hence, the following hypothesis is proposed:

H7: AIS Usage has a positive relationship with AIS Effectiveness.

**4.5. The moderating effect of environmental uncertainty (EU) on the relationship between AIS usage and AIS effectiveness**

EU refers to the source of events and changing trends that create opportunities and threats for organizations [70]. Meanwhile, [71] point out that EU can be viewed as unexpected changes of customers, competitors, and technology. Consistent with the latter definition, the present study views EU as the perspective of uncertainty on customers, suppliers, competitors, and technology. Under highly uncertain environment, firms demand for additional information as to facilitate the decision making. The need for additional information can be easily fulfilled in case of the information processing capability is getting more efficient in line with increased information needs [72]. Deployment of AIS is one of the possible mechanisms to extend firms' information processing capability. As such, under highly uncertain environment, firms with superior AIS usage are more capable to collect, analyze, and spread information and therefore, are more likely to attain greater AIS effectiveness. In another respect, [25] further point out stronger relationship between firms' resources such as AIS usage and its impact for firms operating under highly uncertain business environment. Responding to these propositions, authors anticipate that the impact of AIS usage on AIS effectiveness will be greater under highly uncertain business environment as illustrated in the following hypothesis:

H8: EU moderates the relationship between AIS Usage and AIS Effectiveness.

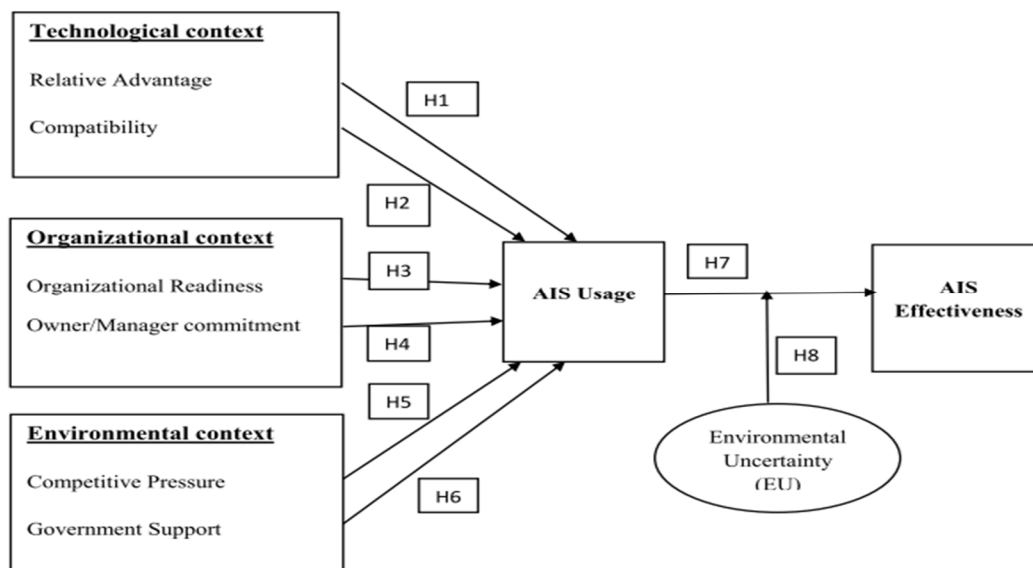


Fig. 1. Proposed Framework

**5. Research method**

Consistent with the research objectives to investigate the effect of TOE factors on AIS usage and its impact on AIS effectiveness, authors have considered manufacturing SMEs as a sampling frame as

obtained from Amman Chamber Industry directory [73]. A small firms refer to a firm that employs between 10 and 49 full-time employees (FTEs) while medium firms employ between 50 and 249 FTEs. As the study concerns on the firm's perception on AIS usage and the effectiveness of AIS, therefore, firm becomes unit of analysis of the study with manager was identified as the targeted respondent. The manager typically the owner of the firm, and most likely involve in AIS-related decisions [74].

The data was obtained using questionnaire survey. The questionnaire comprises of five sections namely; the extent of AIS usage, AIS effectiveness, factors affecting the usage of AIS, respondent's profile and firm's demographic information. Five-point scale was utilized to measure all main latent constructs that were adopted from prior research. Authors have engaged a forward-backward-translations procedure as to ensure the translation of the survey questionnaire from English to Arabic is accurate, free from bias and eliminate any discrepancies [75]. Authors had pre-tested the instrument with academicians in the area of accounting/AIS as well as owner/managers of SMEs in Jordan. Then, for the purpose of pilot testing, the instrument was tested with 31 selected firms.

For data collection purpose, this study opted for survey questionnaire with a combination of via an email and self-administered survey questionnaire. The questionnaires were distributed to all respondents (741 firms) as identified from the directory. As part of the efforts to increase the responses rate, two rounds of reminders were sent out after the initial distribution. The first reminder took place two weeks after the questionnaires were sent out. The second reminder was issued two weeks after the first reminder. After four weeks, 204 responses were obtained with 17 responses were excluded due to incomplete information. Additionally, one of the cases was considered as outliers and therefore being deleted. This reduced the usable number of responses to 186 (25.1% response rate). Nevertheless, as indicated by [76], the total responses received fulfills the minimum samples required to test the model using Partial Least Square-Structural Equation Modeling (PLS-SEM) i.e. a minimum of ten cases per latent variable.

## 6. Data analysis

This study employed PLS-SEM approach for testing the proposed hypotheses. PLS-SEM is a multivariate statistical technique that enables simultaneous evaluation of multiple variables in a single model. It is appropriate for assessing the present research model due to its ability to assess relationships among latent constructs with several indicators even with relatively lower sample sizes [76].

PLS-SEM involves two-step procedures namely; evaluation of the measurement model and evaluation of the structural model. The measurement model evaluates validity and reliability of the items and constructs while the structural model predicts direction of relationship and level of significance of the hypothesized relationships.

Table 1 reports relevant indicators representing the measurement model. The reported data indicate reliability and validity of all constructs as all scores exceeded the thresholds value specified for Cronbach's Alpha (CR), composite reliability (CR) and average variance extracted (AVE) of 0.70, 0.70 and 0.50 respectively [76, 78]. Furthermore, all items have demonstrated convergent validity and discriminant validity as all the factor loadings loaded higher than 0.40 on their respective constructs [76]. The discriminant validity of the variables was further determined by comparing the squared roots of AVE and correlation coefficients between constructs. As presented in Table 2, all the squared roots of AVE on the diagonal line are reportedly higher than the correlation coefficients between constructs, signifying discriminant validity at the construct level. Taken into account all the indicators presented, it is appropriate to conclude that the measurement model have met all the



requirements of reliability, convergent validity, and discriminant validity at both construct and item levels. Therefore, it is safe to proceed with the structural model execution.

**Table 1**  
 Constructs reliability and validity

Constructs	Cronbach's Alpha CA	Composite Reliability (CR)	Average Variance Extracted (AVE)
AIS Effectiveness (AISE)	0.837	0.879	0.553
AIS Usage (AISU)	0.719	0.826	0.545
Relative Advantage (RA)	0.836	0.874	0.541
Compatibility (CO)	0.717	0.835	0.631
Owner/Manager Commitment (OMC)	0.853	0.893	0.628
Organizational Readiness (OR)	0.849	0.893	0.628
Competitive Pressure (CP)	0.767	0.845	0.538
Government Support (GS)	0.811	0.866	0.523
Environmental Uncertainty (EU)	0.910	0.928	0.685

**Table 2**  
 Discriminant assessment and correlation matrix.

	AISE	AISU	CO	CP	EU	GS	OR	O/MC	RA
AIS Effectiveness (AISE)	<b>0.744</b>								
AIS Usage (AISU)	0.383	<b>0.738</b>							
Compatibility (CO)	0.452	0.347	<b>0.794</b>						
Competitive Pressure (CP)	0.288	0.386	0.317	<b>0.733</b>					
Environment Uncertainty(EU)	0.261	0.371	0.211	0.305	<b>0.828</b>				
Government Support (GS)	0.143	0.160	0.196	0.025	0.128	<b>0.723</b>			
Organization Readiness (OR)	0.085	0.277	0.165	0.425	0.603	0.061	<b>0.793</b>		
Owner/Manager Commitment (O/MC)	0.409	0.281	0.360	0.335	0.114	0.157	0.122	<b>0.792</b>	
Relative Advantage (RA)	0.685	0.255	0.526	0.329	0.150	0.171	0.112	0.383	<b>0.736</b>

Authors have assessed the structural model by applying similar PLS algorithm. The significance of path coefficients was calculated via bootstrapping technique generating 5000 resamples. Table 3 presents standardized path coefficients ( $\beta$ -values), the critical ratios (t-values), and the p-values (in case of supported hypotheses) of each proposed hypothesis. Overall, six out of eight hypotheses were supported at 90% and 95% confidence level respectively. Among them, Competitive Pressure effects on AIS usage ( $\beta = 0.232$ ,  $t = 2.927$ ,  $p < 0.01$ ) and AIS usage effects on AIS Effectiveness ( $\beta = 0.332$ ,  $t = 4.628$ ,  $p < 0.01$ ) represent factors with the strongest effect. As such, H5 and H7 are supported.

In terms of technological factors, compatibility reported significant and positively related to AIS usage ( $\beta = 0.193$ ,  $t = 2.588$ ,  $p < 0.05$ ), while relative advantage was found insignificant ( $\beta = 0.009$ ,  $t = 0.123$ ). As such, H2 is supported but H1 is not supported.

With respect to organizational domain, Organizational Readiness demonstrated significant positive effect on AIS usage ( $\beta = 0.128$ ,  $t = 1.896$ ,  $p < 0.05$ ), and hence, H3 is accepted. Owner/Manager Commitment was found to be marginally significant in determining AIS usage ( $\beta = 0.100$ ,  $t = 1.564$ ,  $p < 0.10$ ). Thus, H4 was supported.

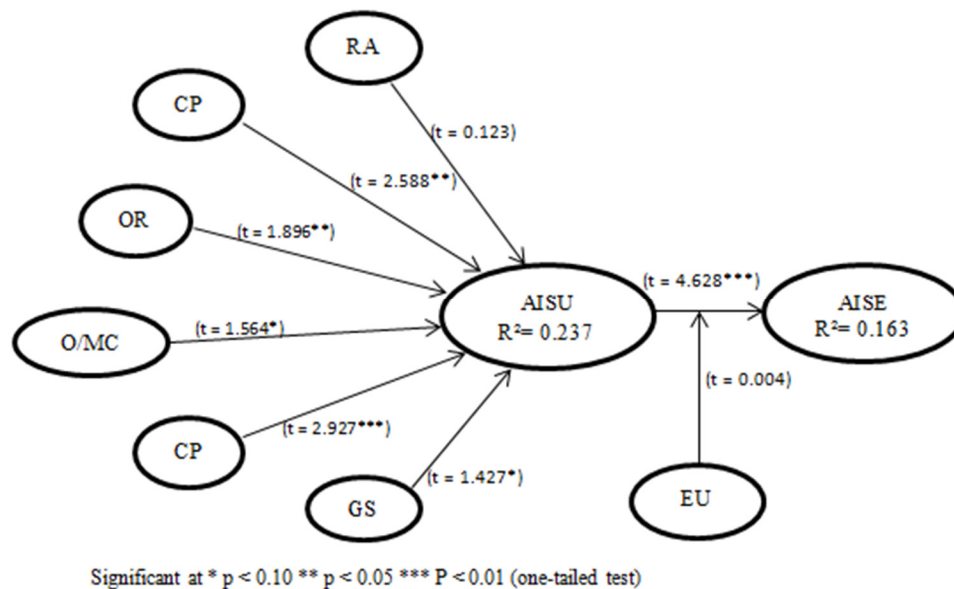
With regard to the environmental factors, the relationship between government support and AIS usage was found to be marginally significant ( $\beta = 0.091$ ,  $t = 1.427$ ,  $p < 0.10$ ), supporting H6. On the other hand, EU being hypothesized in H8 as a moderator on the relationship between AIS usage and AIS effectiveness was not supported by our findings ( $\beta = 0.000$ ,  $t = 0.004$ ).

The explanatory power of this study model is also shown in Fig. 2. The results indicate that AIS usage explains 16.3% of the variances in AIS Effectiveness. Meanwhile, 23.7% of the variance in AIS usage is being explained by the specified independent latent variables.

**Table 3**  
 Results of the tested hypotheses

H	Relationships	Beta	Std. Err	t-value	p-value	Supported
H1	RA → AISU	0.009	0.074	0.123	-----	NO
H2	CO → AISU	0.193	0.075	2.588	0.016	YES (p<0.05)
H3	OR → AISU	0.128	0.067	1.896	0.047	YES (p<0.05)
H4	O/MC → AISU	0.100	0.064	1.564	0.078	YES (p<0.10)
H5	CP → AISU	0.232	0.079	2.927	0.009	YES (p<0.01)
H6	GS → AISU	0.091	0.064	1.427	0.069	YES (p<0.10)
H7	AISU → AISE	0.332	0.072	4.628	0.001	YES (p<0.01)
H8	AISU*EU → AISE	0.000	0.074	0.004	-----	NO

Note: AISU (AIS Usage), AISE (AIS Effectiveness), RA (Relative Advantage), CO (Compatibility), O/MC (Owner/ Manager Commitment), OR (Organizational Readiness), CP (Competitive Pressure), GS (Government Support), EU (Environmental Uncertainty).



**Fig. 2.** Structural model results

## 7. Discussions and conclusion

Given that AIS still lacks of theoretical foundation from an organizational point of view, one of the purposes of this study is to explore AIS impact (perceived effectiveness) and its components from an organizational perspective. Therefore, this study offers an integrated model that draws upon TOE framework to explain AIS usage and RBV theory to explain the relationship between AIS usage and its perceived impacts. Authors have found that among the TOE factors, competitive pressure, compatibility, owner/ manager commitment, government support and organizational readiness as significant antecedents of AIS usage.

As previously indicated, the results shows that competitive pressure appears to be the most important factor influencing the usage of AIS. This result corresponds to prior works that signified the critical importance of competitive pressure in the usage processes of IS/IT related applications amongst SMEs [47, 58, 81]. Thus, it is suggested that firms tend to embrace AIS more extensively

when the firms perceived some benefits and advantages can be derived from its applications in dealing with greater competitive pressure [81].

In response to the view that compatibility plays crucial role for successful use of AIS, this study provides sufficient empirical support for such claim. Compatibility of technology with respect to existing IT infrastructure, business practice and work process are found to be another salient antecedent of AIS usage. Unfortunately, the effect of relative advantage was not adequately supported, which contradicts with DOI theory proposition [42] as well as previous studies [53, 52]. One plausible explanation is that regardless of the differing level of 'affordability' among firms, nowadays, AIS seem to be more affordable as a result of stiff competition in a software industry [19]. Hence, more affordable AIS solution apart from firms' desirability to imitate competitors of the same industry encourage the firms to acquire the system while putting less emphasize on the promised benefits of the system [81]. The results further suggest that organizational attributes, namely, organizational readiness and owner/ manager commitment are marginally important to explain level of AIS usage among firms. The result receives considerable support in prior works which reported significant association between organizational readiness and IS/IT usage [48, 62, 81]. While perceived compatibility inspires businesses to embrace AIS, availability of technical and financial resources ensures effective usage of AIS. Therefore, this study confirms those firms having more resources make greater use of AIS. Similarly, firms with greater level of owner/manager commitment tend to have greater extent of AIS usage. This is consistent with [78] argument that owner/manager understanding of AIS and his/her active involvement in AIS-related tasks likely promote more extensive AIS usage. With regard to the government support, the study only reported marginal importance of the factor on the use of AIS. This partly could be due to the fact that IS/IT technologies are constantly changing. Therefore, its use tends to be driven by individual initiatives instead of government and institutional support.

Interestingly, this study provides support to the proposition that the extent of AIS usage is associated to a greater level of impact on AIS effectiveness. This result is in line with the prediction of RBV theory and several empirical studies in other types of IS/IT applications in which intensive usage of IS/IT lead to a greater level of impact and value [29, 47, 48].

With regard to EU as moderator, authors unable to provide adequate evidence to support the stipulated hypothesis. Ideally, firms operating under high uncertainty environment tend to rely on greater amount of information in order to sustain their competitiveness. In response, there is greater tendency for the firms to increase their information processing capabilities as to match with higher information requirements [79]. Unfortunately, as the results might suggest, there is no substantial relationship between AIS usage and AIS effectiveness for firms operating under different level of EU. This could be associated to the fact that firms operating under highly uncertain business environment have tendency to spend considerable amount of their resources and time on environmental scanning and anticipating than those firms that operating under lower uncertainty environment [80]. In other words, firms in the former category attribute most of their resources on activities such as research and development or marketing as a quick measure to survive rather than to extend their investment on AIS.

This research offers several theoretical and practical implications. This study incorporates TOE and RBV in a single research model to investigate the usage and impact of specific types of IT application (AIS). As such, the research confirms applicability of the TOE frameworks and RBV theory for organizational level studies. The study therefore supports the use of RBV as a theoretical foundation for studies of impact or value of AIS. It also extends previous works on AIS that does not examine beyond usage level (overall impact). With respect to practical implication of the study, the developed and validated model facilitates firms to identify salient factors that promote more

extensive use of AIS and how does the use of AIS substantially affects AIS effectiveness. Specifically, the model helps firms to give a particular attention on potential impacts of AIS usage that they might have overlooked. This can help them to evaluate the impact and value of AIS to the firms as well as to facilitate their decisions on AIS initiatives.

Regardless of its contributions, readers should consider limitations of the study in generalizing the results. First, the sample size or number of observations is somewhat lower. While it meets minimum requirement to execute the PLS, employing larger sample sizes enables application of covariance-based (CB-SEM) for more robust findings. Secondly, while the model was validated in the context of Jordan, further research may be carried out to validate the proposed research model in different countries setting. Future research may employ the research model in other countries where AIS usage may be higher or lower than Jordan. Finally, this study investigates the relationship between TOE variables and AIS usage, then the relationship between AIS usage and AIS effectiveness. Future works should test the direct effects of the TOE variables on IS/IT impact in order to recognize these potential direct relations.

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