Accounting information system effectiveness from an organizational perspective

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CHRONICLE	ABSTRACT
	This paper aims to explore the influence of Accounting Information System (AIS) success or effectiveness factors namely system quality, information quality, service quality and training quality on the organizational benefits of listed Jordanian firms using a DeLone and McLean Information System (IS) success model. To achieve the purpose of this research, the collected data of 117 Chief Finance Officer (CFO) who are operating in the listed Jordanian firms that had already implemented AIS was analyzed via Partial Least Squares-Structural Equation Modeling (PLS-SEM) to test the research model. The results show that information quality, service quality and training quality had positive and a significant contribution on the organizational benefits. However, system quality did not have any significant impact on the organizational benefits in context of this research. Lastly, the implications of these results for both researchers and practitioners were discussed at the end of this paper.

1. Introduction

Today's accounting system, as one of the widely used organization systems, provides more consistent, suitable and appropriate financial information to different stakeholders to make efficient financial decisions concerning their business entities. Traditionally, an AIS is a system that an organization utilizes to collect, store, manage, process, retrieve and report its financial data and information so that it can be used by accountants, investors, consultants, managers and other stakeholders (Dagiliene & Šutiene, 2019; Lutf, Idris, & Mohamad, 2016). This system is recognized as an efficient tool to deal with the interior and exterior changes through processing data and transactions to generate valuable information for controlling, planning and facilitating the organizational activities, thus enhancing organizational performance (Kwarteng & Aveh, 2018; Huy & Phuc, 2020; Ibrahim, Ali, & Besar, 2020). With contemporary organization wide IS, measuring effectiveness takes on a special significance since the costs and risks of these large technology investments rival their potential payoffs (Sedera, Eden, & McLean, 2013). Naturally, worldwide IT development is becoming ever more powerful, in which investment in IT/IS has increased notably in both private and public sector organizations. However, the majority of the IS projects are not successful, experiencing high rates of failure leading to unfavourable consequences for the business organizations such as financial losses and other risks (Tooranloo & Saghafi, 2020; Kirmizi & Kocaoglu, 2020; Nguyen, Nguyen, & Cao, 2015; Dwivedi et al., 2015; Maier, Laumer, Eckhardt, & Weitzel, 2013). Undoubtedly, organizations today require to measure and evaluate the benefits and costs of IS to justify the expenditure and its contribution to the competitiveness, quality and productivity of the organization (Petter, DeLone, & McLean, 2008, 2012). That is because of the organizations' unprecedented challenges and demands, such as economic conditions and fierce competition, globalization, and a rapidly changing environment that creates pressures to cut costs (DeLone & McLean, 2016). Therefore, evaluating AIS effectiveness is important to understand its efficacy and

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value to organizational efficiency improvement and business accomplishment (Shagari, Abdullah, & Saat, 2017). Even though it is difficult, prior research has confirmed the value of systematically evaluating IS effectiveness. In an effort to provide assistance in addressing this critical issue, the management literature has witnessed a growing and evolving series of works targeted at evaluating and measuring IS implementation success or effectiveness (both concepts are used interchangeably). One of the most widely adopted IS success models is DeLone and McLean IS success model, which presents an integrated approach of measuring IS effectiveness. DeLone and McLean (1992) conducted a literature review that resulted in a suggested model to measure IS effectiveness, which was updated almost a decade later. This model presented several significant contributions to measurement of IS success or effectiveness. First, their model introduces a theoretical model to classify the various dimensions of IS success that have been suggested in the literature (Petter, DeLone & McLean, 2008; Gable, Sedera, & Chan, 2008). Second, it proposes temporary and causal interdependencies between the determined dimensions (Wu & Wang, 2006; Wang, Wang, & Shee, 2007). Third, it provides a suitable foundation for further empirical and conceptual works (Petter et al., 2008; Chien & Tsaur, 2007). Fourth, it is the most widely used IS success model in several domains (Urbach, Smolnik, & Riempp, 2010; Kurt, 2019). And lastly, it can be used at different analysis levels based on the objective of the proposed research (Gorla, Somers, & Wong, 2010; Petter & McLean, 2009; Sedera & Gable, 2004). For these reasons, DeLone and McLean's (D&M) model has general acceptance in the IS literature.

The literature review shows that most of the previous empirical studies that used this model explored IS success at individual level or perspective focusing on the system user and not on the organizational level (Ghobakhloo & Tang, 2015; Walther, Sedera, Sarker, & Eymann, 2013; Urbach & Müller, 2012; Gorla et al., 2010). A summary of the meta-work of Petter et al. (2008) has shown that additional work covering the success model from an organizational viewpoint is required to be able to define the degree of associations between the dimensions. Furthermore, most empirical studies addressed the IS in general, not in specific systems such as AIS that received limited attention (Shagari et al., 2017). Simultaneously, Shagari et al. (2017) argued that a need existed for the researchers to explore in a specific IS context such as AIS. According to the literature available to the researchers to date, there has been no empirical research in AIS success based on the D&M model from an organizational viewpoint. In the present study, therefore, the authors aim to empirically test the D&M model in the AIS context at an organizational level from the listed Jordanian firms' perspective.

The primary contribution of this work is to propose a theoretical model to measure the AIS effectiveness based on the D&M model in the developing countries, namely Jordan. In addition to this context-specific contribution, our research also reduces the knowledge gap regarding organizational IS success work by specifically operationalizing the dimensions on an organizational level among listed Jordanian companies. As a theoretical expansion, this research also extended and modified the D&M model by incorporating training quality as a critical factor of AIS success. The paper is organized as follows. First, the paper introduces the reader to the research background, gap and objectives. Thereafter, the paper presents a theoretical foundation based on prior related studies and D&M IS success model. Section 3 explicates the research model and research hypotheses followed by the research methods in Section 4. The research results and discussion of the results in relation to previous studies are presented in Section 5 and Section 6, respectively. Finally, the paper concludes with a synthesis of the most essential insights of this research and limitations and future work directions in Section 7.

2. Theoretical Background

Numerous prior studies have tried to identify the factors that positively contribute to system AIS successful implementation. Among the popular measures of IS success and effectiveness include user satisfaction (Bailey & Pearson, 1983; Doll, Xia &, Torkzadeh, 1994; Yap, Soh, & Raman, 1992; Montazemi, 1988; Foong, 1999), system quality (Franz & Robey, 1986), system use (Magal & Lewis, 1994; Lai, 1994; Foong, 1999), quality of decision making (Franz & Robey, 1986) and service, project, and economic success (Soh, Yap, & Raman 1992). Past research in AIS has defined system effectiveness as the extent to which AIS actually contributes to accomplishing organizational objectives (Raymond, 1990), whereas others defined it in terms of end-user information satisfaction about the extent to which the information system available to them meets their information requirements (Ives, Olson, & Baroudi, 1983; Seddon & Yip, 1992). Given the lack of objective, systematic measures of AIS success that might propose the potential influence of a system on organizational performance, end-user information satisfaction has been typically accepted as a replacement for utility in decision-making (Nicolaou, 2000). The variety of views in determining the AIS effectiveness has led to numerous approaches and ways of assessing it. However, searching for the factors that could boost AIS effectiveness remains an issue of utmost importance for most business organizations (Guinea, Kelley, & Hunter 2005; Ismail, 2009). That is because the impacts of AIS are often indirect and influenced by organizational, environmental, and human factors as well the complex, inter-related and multi-dimensional nature of IS effectiveness. To address this issue, DeLone and McLean (1992) have comprehensively reviewed and organized past research on IS effectiveness in an organization and developed a model to measure IS effectiveness through a number of different perspectives. This model was actually based on Mason's (1978) modification of the Shannon and Weaver (1949) communications theory which had determined three main phases of information. These phases are the technical phase, which included system accuracy and efficiency that produces it, the semantic phase, which refers to its ability to transfer the intended message, and the effectiveness phase which represents its influence on the receiver (DeLone & McLean, 1992). Mason applied Shannon and Weaver theory for IS and modified the effectiveness level into three categories including information receipt, impact on the recipient, and impact on the system.

DeLone and McLean (1992) identified categories for system success by mapping an aspect of IS success to each of Mason's effectiveness levels. They suggested that the success level of an IS depends on the quality of the system itself, its output (information), its use level, whether users are satisfied with it, and its impact on individual and eventually the organization. In a later publication, DeLone and McLean (2003) re-specified their initial model based on critical suggestions and ideas for model improvement by incorporating Service Quality. Service quality was included because the changing nature of IS requires that service quality be considered when evaluating IS effectiveness (Petter & McLean, 2009). Pitt, Watson and Kavan (1995) stated that evaluation of IS success would be incomplete if services provided by IT support are not duly considered. Another modification was the inclusion of Intention to Use to measure user attitude as an alternative measure of system use for some contexts (Urbach & Müller, 2012). The third modification was the integration of individual and organizational impact as separate dimensions, surrogating them with Net Benefits. These modifications dealt with the idea that IS can impact multiple levels such as customers (Brynjolfsson, 1996), workgroups (Myers, Kappelman & Prybutok, 1998), and societies (Seddon, 1997). The choice of which level of analysis was to be determined by the researcher using the model (Petter & McLean, 2009; Gorla et al., 2010). The last enhancement was addition of Feedback Links to capture IS impact, whether negatively or positively.
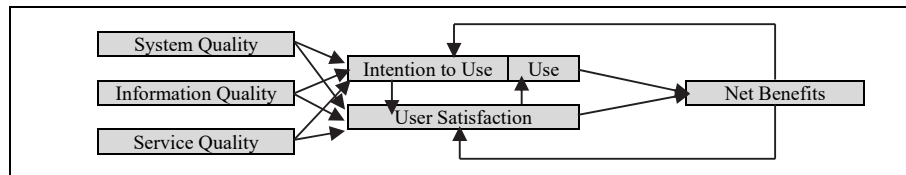

Fig. 1. DeLone and McLean (2003) Model

Like the first model, the updated model consists of six interrelated dimensions, namely information quality, system quality, service quality, (intention to) use, user satisfaction and net benefits. An extensive body of research has tested the updated model in several contexts such as ERP system (Ifinedo, Rapp, Ifinedo, & Sundberg, 2010), internet shopping (Kim, Galliers, Shin, Ryoo, & Kim, 2012), e-taxation system (Floropoulos, Spathis, Halvatzis, & Tsipouridou, 2010), e-learning system (Al-Fraihat, Joy, Masa'deh & Sinclair, 2020; Kurt, 2019), corporate-wide system (Chen, Chen, & Capistrano, 2013), e-government (Wang & Liao, 2008), employee portal success (Urbach et al., 2010), knowledge management (Wu & Wang, 2006), AIS (Shagari et al., 2017) and success of prescription-release (Ku, Sung, & Hsieh, 2014). Although their model is useful for understanding the key IS success factors and their interrelationships, past studies have called for a need to explore and test D&M model at the organizational level (Urbach & Müller, 2012; DeLone & McLean, 2016) especially in AIS context (Shagari et al., 2017). Taken as a whole, no study has considered the D&M model to investigate the AIS effectiveness from an organizational viewpoint context especially in the Arab world, such as Jordan. Therefore, this research model will be based on the D&M model (2003) and adapt to the AIS context at an organizational level among listed Jordanian firms.

3. Research Model and Hypotheses

3.1 The Research Model

Growth in IT coupled with increased competitive pressure driven by increases in innovation have rendered the traditional methods of providing stakeholders with information insufficient in terms of making decisions. In order to achieve strategic and business targets, business organizations today require an effective and successful AIS. The review of the literature on the concepts around AIS effectiveness and success revealed that it is not easy to measure it from a single dimension and that the most widely used dimensions have been afforded by D&M. To evaluate the AIS effectiveness from an organizational perspective, the authors used the D&M model as a theoretical basis in this research. In the AIS field, Livari (2005) conducted research to test the D&M model in the City Council of Oulu, Finland. It was shown that information quality has no influence on system use. Additionally, use and user satisfaction was not proven to mutually influence each other. Livari also claimed that users' satisfaction dimension cannot be used in measuring AIS success. This is because satisfaction is an attitude coming from within and it occurs when the system use is voluntary, not coerced, such as in AIS mandatory among listed Jordanian firms. Similarly, a number of researchers argued that user satisfaction can be assessed through system quality, information and service quality (e.g. Ifinedo et al, 2010; Sedera et al., 2013; Gorla et al., 2010; Wang & Wu, 2007; Rai, Lang, & Welker, 2002; Wang & Liao, 2008). As for the system use construct, several prior works also argued that use of a success dimension is problematic and lacking in-depth conceptualizations. Some argued that use cannot precisely indicate IS success in a mandatory system use case (e.g. Ifinedo et al., 2010; Irawan & Syah, 2017; Gorla et al., 2010; Hsieh & Wang, 2007; Rezaei, Asadi, Rezvanfar, & Hassanshahi, 2009; Holsapple, Wang, & Wu, 2005; Sedera & Gable, 2004). Others showed that some degree of discrepancy may exist between actual and perceptual IS use because several systems are not voluntarily used (e.g. Gable et al., 2008; Seddon, 1997; Iivari, 2005). Therefore, we decided not to include system use and user satisfaction in our research model. Meanwhile, in this research, we incorporate a new quality factor, which is training quality, that is well documented in the IS success literature (e.g. Ram, Corkindale, & Wu, 2013; Dezdar & Ainin, 2011).

The success of AIS primarily dependent on the system users. Systems users must be equipped with a range of scientific knowledge and experience tailored to the requirements of the system, which will enable these users to achieve its objectives (Kocsis, 2019). Thus, end-user training is seen as the medium through which knowledge, both explicit and tacit, becomes grounded in the organizations' routines, practices and functions. However, the contribution of AIS to the long-term profitability and productivity of the organization is dependent on the level of training and skills enhancement of the system users (Ibrahim et al., 2020). In simpler terms, system users must undergo continuous skill development related to the operation, programming and use of the related new technologies. This is supported by Shagari et al. (2017), who stressed that dimensions of the D&M model should not be the focal point; rather, the focus should be on the external factors that have influence on AIS effectiveness in an effort to develop a more specific model in AIS domain.
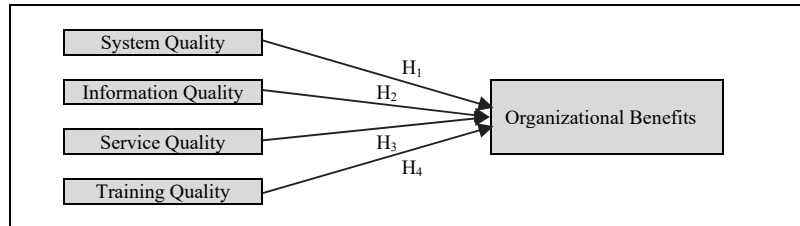

Fig. 2. Research Model

Through our research model, we argue that AIS effectiveness is a multidimensional variable whose measurements have to reflect system quality, information quality, service quality, training quality and organizational benefits. Whereas the prior literature supports the multidimensional aspect of AIS effectiveness, there is no evidence of literature that has combined these five dimensions. The following section discusses our research hypotheses in detail.

3.2 Research Hypotheses

System quality focuses on the system characteristics itself. Characteristics include reliability, response time, system functionality, ease of use and flexibility (DeLone & McLean, 2016). A system that assists users to perform better is expected to be positively correlated with organizational benefits (Gorla et al., 2010; Petter et al., 2008). This is because a well-designed and implemented system improves business processes due to the integration of software, which leads to increased profitability and can help a firm gain competitive advantage (Hendricks, Singhal, & Stratman, 2007; Gorla et al., 2010). In contrast, a poorly designed and constructed system will likely run into occasional system crashes, which are detrimental to business operations, consequently causing increased organizational cost and the loss of the firm's customers (Shagari et al., 2017; Cenfetelli & Schwarz, 2011). Therefore, the essential prerequisites for generating organizational success are a well-designed and developed AIS. Hence, we hypothesized:

H$_1$: System quality is positively related to organizational benefits.

Unlike system quality, information quality is focused on the output attributes that are produced by the AIS. Some of the attributes correlated with information are relevance, accuracy, conciseness, completeness, usability and timeliness (DeLone & McLean, 2016). As accounting information is the main output of AIS, it is easy to realize that these outputs should have the main features of reliability, accuracy, and timeliness that influence performance (Shagari et al., 2017; Al-Okaily & Rahman, 2017). As lack of information quality will negatively affect customers, the decision-making process and strategic goals will be difficult to achieve (Mukred & Yusof, 2017). In addition, the information should have features of usefulness to the users (Calisir & Calisir, 2004) as the system's success depends on the needs of current and future users. On the other hand, high information quality content can lead to high organizational benefits that represent market information support and internal organizational efficiency (Gorla et al., 2010). Thus, we posit:

H$_2$: Information quality is positively related to organizational benefits.

As a measure of IS effectiveness, service quality is defined as "the quality of the support that system users receive from the information systems organization and IT support personnel" (DeLone & McLean, 2016, p.9). It is measured based on whether the service is reliable, technically competent, accurate, responsive and the degree of empathy of the IS personnel staff (Petter et al., 2008, 2013). SERVQUAL instrument is a popular instrument for evaluating IS service that was used from the marketing domain (DeLone & McLean, 2003). Quality services rendered by the appropriate provider are necessary for organizational benefit and success since they are positively related to higher profitability, client loyalty and competitive advantage (Shagari et al., 2017; Gorla et al., 2010). Others found features of empathy that are of significance for IS implementation as such characteristics of the provider constitute the "feel good" prerequisite that establishes trustful associations that lead to customer satisfaction and enhanced productivity (Chang & King, 2005; Landrum, Prybutok, Kappelman, & Zhang, 2008). Moreover, the IS specialists who provide prompt and reliable services to users and who have knowledge of specific requirements of users

can better anticipate and serve customer requirements via the enhancement of proper product/service. This will at some point enable successful business operations and ongoing profitability. Consequently, we hypothesized:

H₃: Service quality is positively related to organizational benefits.

Besides the D&M success factors, end-user training is one of important factors influencing IS effectiveness (e.g. Dezdar & Ainin, 201; Ram, Corkindale, & Wu, 2013). Training can be referred to as the extent to which users have been trained on the use of IS through vendor training, college courses and self-study (Sabherwal, Jeyaraj, & Chowa, 2006). End-user training is one of the pervasive methods of improving users' productivity and achieving organizational objectives (Gupta, Bostrom, & Hober, 2010). The lack of user training and failure to understand how an organization's applications change business processes frequently appears to be responsible for IS problems and implementation failures (Ram et al., 2013). In more concrete terms, a good training program can help users employ the system to its full potential and can help an organization realize the full benefits of implementing AIS (Grabski, Leech, & Schmidt, 2011). Ram et al. (2013) presented the results of 217 Australian organizations that tested the relationship of user training to organizational performance. They concluded that user training is positively associated with organizational performance. In another study, Dezdar and Ainin (2011) found that user training has a positive relationship with user satisfaction, hence leading to improved organizational performance. Through the above, it can be concluded that user training has a worthy impact on user performance and productivity which eventually impacts the overall organizations. Thus, the last hypothesis is:

H₄: Training quality is positively related to organizational benefits.

4. Research Methodology

The empirical data for our hypothesis investigating were obtained through a cross-sectional field survey of 192 listed Jordanian firms in the Amman Stock Exchange (ASE) at the end of 2019. As the unit of analysis of our research was at the organizational level, we arrived at the decision to choose CFOs as the most knowledgeable informants. They were chosen because they are part of an end AIS users' group and also are sufficiently familiar with the business activities of their firms as decision-makers. The survey contains questions related to the evaluation of AIS and the responders' demographics. Therefore, the survey was developed aligned with prior studies to ensure instrument validity and reliability. System quality was assessed using the 5 indictors developed by Wu and Wang (2006) and Gable et al. (2008). Five indictors to measure information quality were also adapted from Gable et al. (2008). Service quality was measured using five indictors which were adapted from Ifinedo et al. (2010). Additionally, training quality was measured using five indictors from Chang and King (2005) and Amoako-Gyampah and Salam (2004). To gauge organizational benefits, we used subjective measures adapted from Ifinedo et al. (2010) and Gorla et al. (2010). The informants were required to answer concerning their overall perception of the AIS they regularly use on a 7 point Likert scale (1 =strongly disagree and 7 = strongly agree). The data collection process started in early April 2019 and finished in early June of the same year. Out of the 192 distributed, 117 valid answers collected were used for analysis. The descriptive analysis results showed that the majority of responders, 95.7 percent, were male. More than half of respondents were aged 41-50 years representing 51.3 percent. About three-quarters, or 73.5 percent, were CFOs holding a bachelor's degree. Of these managers, 57.3 percent have working experience of more than 6 years. The distribution of business sectors included 52.1 percent (financial), 21.4 percent (industrial) and 26.5 percent (services).

5. Research Results

This research utilized the PLS-SEM for data analysis considering it does not place strict conditions on sample size and is commonly used in IS studies (Hair, Hollingsworth, Randolph, & Chong, 2017). The PLS-SEM model assessments through two main stages are the measurement and the structural model. The following sub-sections discuss both the measurement and structural model in detail.

5.1 Measurement Model

The measurement model analyses the association between the indicators and latent constructs. This model analyses the construct validity and reliability based on convergent and discriminant validity. Convergent validity is interested in the correlation between the indicators and their linked constructs (Hair, Sarstedt, Ringle, & Gudergan, 2016). The degree of correlation between them can be investigated using three tests, namely, Factor Loading (FL), which achieves reliability when larger 0.7; Composite Reliability (CR) to achieve internal consistency, whose value should be greater than 0.7; and Average Variance Extracted (AVE) as a criterion to test convergent validity, and whose value should be greater than 0.5 (Fornell & Larcker, 198; Hair et al., 2017). From Table 1, FL values fulfil the required criteria except for TQ2 (0.208), OP1 (0.674) and OP2 (0.518), with CR values ranged between 0.871and 0.965 and AVE values ranged between 0.615 and 0.821. These values emphasize the convergent validity and reliability of all constructs. The discriminant validity, on the other hand, strives to verify that each indicator highly associates with its own construct and not with others (Hair, Sarstedt, Ringle, & Gudergan, 2016). The discriminant validity can be tested through three tests including cross loading, the square root of AVE, which is called Fornell and Larcker criterion, and a new test called Heterotrait-Monotrait ratio of correlations (HTMT<1) (Hair et al.,

2016). As shown in Tables 2, 3 and 4 below, the findings of these three tests indicate that each indicator and construct have more variances with other construct.

Table 1
Results of convergent validity.

Construct	Indictor	FL	CR	AVE
System Quality (SQ)	SQ1	0.881	0.912	0.677
	SQ2	0.849		
	SQ3	0.726		
	SQ4	0.863		
	SQ5	0.783		
Information Quality (IQ)	IQ1	0.759	0.889	0.615
	IQ2	0.745		
	IQ3	0.838		
	IQ4	0.815		
	IQ5	0.760		
Service Quality (SV)	SV1	0.751	0.892	0.625
	SV2	0.783		
	SV3	0.713		
	SV4	0.816		
	SV5	0.879		
Training Quality (TQ)	TQ1	0.776	0.871	0.629
	TQ2	Deleted		
	TQ3	0.798		
	TQ4	0.827		
	TQ5	0.769		
Organizational Benefits (OB)	OB1	Deleted	0.965	0.821
	OB2	Deleted		
	OB3	0.888		
	OB4	0.930		
	OB5	0.889		
	OB6	0.920		
	OB7	0.926		
	OB8	0.883		

5.2 Structural Model

The second stage is structural model assessment and involves five tests: first, Path Coefficients (β) refer to the strengths of the relationships amongst the constructs in the mode (Hair et al., 2016). More precisely, SQ (H1; $\beta = 0.074$, $p < 0.126$), IQ (H2; $\beta = 0.210$, $p < 0.022$), SV (H3; $\beta = 0.529$, $p < 0.00$) and TQ relationship (H4; $\beta = 0.199$, $p < 0.06$), thus IQ, SV and TQ were supported whereas SQ does not by our data context. Second, Coefficient of Determination (R^2) indicates the amount of variance explained through the exogenous constructs. In all, SQ, IQ, SV and TQ explained 70.9 percent of the OB variance, which represents a strong model as indicated by Chin (2010).

Table 2
Results of discriminant validity cross-loading.

Indictors	SQ	IQ	SV	TQ	OB
SQ1	**0.881**	0.608	0.396	0.428	0.504
SQ2	**0.849**	0.479	0.301	0.349	0.364
SQ3	**0.726**	0.455	0.411	0.367	0.415
SQ4	**0.863**	0.471	0.311	0.323	0.381
SQ5	**0.783**	0.740	0.600	0.475	0.648
IQ1	0.742	**0.759**	0.564	0.472	0.598
IQ2	0.491	**0.745**	0.447	0.509	0.537
IQ3	0.610	**0.838**	0.479	0.450	0.565
IQ4	0.425	**0.815**	0.351	0.360	0.439
IQ5	0.397	**0.760**	0.216	0.358	0.394
SV1	0.449	0.431	**0.751**	0.323	0.475
SV2	0.297	0.343	**0.783**	0.281	0.553
SV3	0.510	0.514	**0.713**	0.414	0.687
SV4	0.407	0.416	**0.816**	0.397	0.578
SV5	0.391	0.441	**0.879**	0.378	0.703
TQ1	0.306	0.476	0.306	**0.776**	0.434
TQ3	0.336	0.488	0.336	**0.798**	0.469
TQ4	0.410	0.449	0.410	**0.827**	0.545
TQ5	0.400	0.356	0.400	**0.769**	0.422
OB3	0.493	0.528	0.616	0.412	**0.888**
OB4	0.542	0.601	0.778	0.566	**0.930**
OB5	0.505	0.595	0.638	0.454	**0.889**
OB6	0.595	0.670	0.698	0.623	**0.920**
OB7	0.522	0.570	0.791	0.558	**0.926**
OB8	0.568	0.627	0.658	0.592	**0.883**

Table 3
Results of discriminant validity- Fornell and Larcker method

Construct	IQ	OB	SV	SQ	TQ
IQ	**0.784**				
OB	0.662	**0.906**			
SV	0.548	0.773	**0.791**		
SQ	0.703	0.594	0.522	**0.823**	
TQ	0.559	0.595	0.459	0.490	**0.793**

Table 4
Results of discriminant validity- HTMT method.

Construct	IQ	OB	SV	SQ	TQ
OB	0.717				
SV	0.614	0.837			
SQ	0.747	0.609	0.564		
TQ	0.663	0.667	0.547	0.555	-

Third, Effect Size (F^2) measures the contribution of a particular exogenous construct on a certain endogenous construct by R^2 (Chin, 1998). The total effects on organizational benefits were 0.009 percent for SQ, 0.064 percent for IQ, 61.4 percent for SV and 0.088 percent for TQ, indicating the effect is negligible, small, large and small, respectively. Fourth, Predictive Relevance (Q^2) as the PLS path aims at predicting the value of exogenous constructs in a model. Q^2 is another important aspect of PLS-SEM model (Hair et al., 2014). The Q^2 value of our model is 53.8 percent, which is an index of a large predictive capability as indicated by Chin (1998).

Table 5
Results of hypotheses testing

Hypothesis	β	t- statistic	p-value	Support
SQ⇨OB	0.074	1.144	0.126	No
IQ⇨OB	0.210	2.007	0.022	Yes
SV⇨OB	0.529	7.207	0.000	Yes
TQ⇨OB	0.199	2.517	0.006	Yes

Significant at $p^* < .1$; $p^{**} < .5$; $p^{***} < .01$.

Goodness of Model Fit (GOF), lastly, evaluates the validity of all constructs included in our model through the average AVE values for exogenous constructs and the average R^2 for the endogenous constructs (Tenenhaus, Amato, Esposito, & Vinzi, 2004). Accordingly, we calculated the global GoF of our model. The result indicates that our research model has a GoF value of 67.2 percent, which exceeded the baseline value of 0.36 percent used by Wetzels, Odekerken-Schröder and Oppen (2009).

6. Discussion

Based on our investigation, seventy-five percent of our research hypotheses were supported by our data context as illustrated in Table 5. Inconsistent with our assumptions, we observed that system quality does not determine the AIS success among listed Jordanian firms surveyed. Two possible reasons can be referred to as lack of H1 support: the first reason is theoretical because the SQ is indirectly linked to OB through other factors such as user satisfaction, use and individual impact rather than directly in D&M model. Another possible explanation is that the mediating role of IQ, which represents the AIS outputs in terms of accuracy, timeliness, and relevance, thus influences these features in the decision-making and performance. This finding did not mean that system quality is unimportant. That is because high information quality is an output of high system quality. Therefore, this relationship needs to be investigated in future works. This result agrees with the findings of other related research studies (e.g. Gorla et al., 2010). In contrast, the SEM results give confirmation of the relationship between IQ and OB as other previous studies have done (e.g. Gorla et al., 2010; Shagari et al., 2017). High-quality accounting information content such as timeliness, completeness and accuracy can impact organizational benefits. That is because the quality of information causes a reduction in operational and organizational costs, enables the anticipation of client and market need and improves the decision-making process, which leads to higher organizational benefits. As expected, our findings highlighted that SV significantly influences OB, which is consistent with other comparable studies (e.g. Gorla et al., 2010). This is an expected result, because when AIS users are provided with high level of service from the IT department, organizational benefits should also be high. Thus, when certain aspects related to the SV, including error-free performance, on-time and reliable service, will improve decision-making, which in turn leads to improved internal organizational efficiency, better anticipation of customer demands, and more accurate sales forecast predictions. The results further demonstrated that TQ is another essential determinant of AIS effectiveness among firms surveyed. In particular, it would appear that poor training programs account for little more than a waste of the organization's time and money. Therefore, listed firms must be exposed to useful, effective and frequent training programs in order to realize organizational benefits. While training programs can be costly, significant benefits can be achieved in the long run, such as improved customer service, productivity and decision-making process. In a similar vein, past studies have been reported that user training as an important IS success factor and has influence on organizational goals (e.g. Ram et al., 2013; Dezdar & Ainin, 2011). Overall, our research suggests that information quality, service quality, and training quality are most important successful factors of AIS among listed Jordanian firms.

7. Conclusion and Future Work

The ultimate goal of all business organizations is to be a going concern. At present, the technological revolution has become a challenge that organizations should meet to gain a competitive advantage and excel in its field. Organizations today need a successful AIS that helps them achieve strategic, competitive and business objectives. Therefore, this research proposed an AIS effectiveness model and empirically tested the relationships between model dimensions. In a result summary, this research discovered that information quality, service quality and training quality are important factors for measuring post-implementation AIS effectiveness among listed Jordanian firms. These dimensions play more essential roles than their system quality counterpart in terms of affecting AIS organizational benefits. As a theoretical contribution, our research tested and validated the D&M model from an organizational perspective in a non-US environment, namely Jordan. Another theoretical contribution is extended traditional D&M models to investigate AIS effectiveness. Through first two contributions, this research provides a clear picture of the AIS effectiveness in adopting organizations (i.e. listed Jordanian firms). The last theoretical contribution is refining and expanding the D&M model through the addition of another important and recognized factor in the literature, which is training quality. The findings support the notion that training quality is a critical factor of AIS success and should probably be used in any model examining AIS success or effectiveness due to the rapid development of technology and the dynamic nature of the business environment. Practically speaking, it would be interesting to see whether the model's propositions can actually help practitioners and users to better handle their AIS in practice. This research helps managers and practitioners in the AIS field to understand the factors that can contribute to AIS effectiveness in the listed Jordanian firms. The research findings also can attract the interest of practitioners and policymakers to structure IT strategies to streamline their activities and functions and present guidance for those who can utilize them to develop strategies on AIS implementation and decide how to allocate resources effectively to better benefit their businesses. Managers and policymakers can also work to develop training programs to improve self-efficacy, users' performance to influence organizational benefits. We hope to test our proposed model in different contexts and cultures using a large sample such as foreign firms operating in Jordan to increase generalization in future works. Further work also can be conducted by a longitudinal study in order to enhance the causality understanding between factors suggested over time. This research used subjective measures to assess organizational benefit. Future research should be used as an objective measure and may yield a different finding from ours. The relationship between system quality and organizational benefits, which is at odds with the effectiveness measurement conceptualization in the extant IS literature, clearly requires further testing and investigation. Eventually, future research should investigate interrelationships that were not tested and considered in our research. For example, information quality as a mediating role between our factors.

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