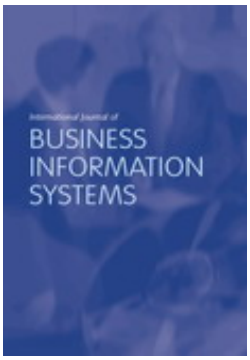

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Individual and technological factors affecting the adoption of enterprise resource planning systems in the Jordanian banking sector

Mohannad Obeid Al Shbail, Zaid Jaradat, Mohammad Bany Baker, Mohammad Almuiet

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Individual and technological factors affecting the adoption of enterprise resource planning systems in the Jordanian banking sector

Mohannad Obeid Al Shbail* and Zaid Jaradat

Department of Accounting,
School of Business,
Al al-Bayt University,
Mafraq 25113, Jordan
Email: mohannadobeid87@aabu.edu.jo
Email: z.jaradat@aabu.edu.jo
*Corresponding author

Mohammad Bany Baker

Faculty of Computer Science and Informatics,
Amman Arab University,
Amman 11953, Jordan
Email: m.banibakr@aabu.edu.jo

Mohammad Almuiet

Data Science and Artificial Intelligence Department,
Irbid National University,
Irbid 2600, Jordan
Email: malmuiet@qnac.edu.jo

Abstract: This paper proposed a framework of the drivers of enterprise resource planning (ERP) system adoption in the banking sector of Jordan, based on the UTAUT model. The study objectives were achieved by involving 150 managers and heads of department to which questionnaire copies were distributed to in 13 banks that employed the ERP system. On the basis of the findings, the factors that drove the ERP system adoption among the examined banks were self-efficacy, attitude, perceived usefulness and perceived ease of use. The findings further indicated that ERP adoption leads to the enhancement of banks performance and that attitude, self-efficacy, perceived usefulness and perceived ease of use can be manipulated to enhance such performance through their influence on the adoption of the system. It is expected that framework is used in banks as a guide to promote and facilitate the major drivers of ERP adoption.

Keywords: enterprise resource planning; ERP; individual factors; technological factors; banking sector.

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Biographical notes: Mohannad Obeid Al Shbail is an Assistant Professor in the Department of Accounting at the Al al-Bayt University, Jordan. He earned his PhD in auditing from UMT, Malaysia. His research is currently focused on auditing, AIS, e-accounting, behavioural accounting and adoption of ERP. He has research papers published in journals indexed under data source Scopus and WoS.

Zaid Jaradat is an Assistant Professor in the Department of Accounting at the Al al-Bayt University. He earned his PhD in Managerial Accounting from Malaysia. His research is currently focused on e-accounting in SMEs and adoption of ERP in industrial and banking sectors. He has research papers published in journals indexed under data source Scopus.

Mohammad Bany Baker is an Assistant Professor in the Department of Computer Information Systems at Amman Arab University. He earned his PhD in Computer Information Systems from National University of Malaysia. His research is currently focused on data science, information retrieval, data mining and management information systems. He has research papers published in journals indexed under data source Scopus.

Mohammad Almuiet is an Assistant Professor in the Department of Data Science and Artificial Intelligence at Irbid National University. He earned his PhD in Artificial intelligence from National University of Malaysia. His research is currently focused on cyber security, knowledge technology, prediction, and text mining. He has research papers published in journals indexed under data source Scopus and international scientific indexing.

1 Introduction

In the current business landscape, technology has undergone several dramatic changes, urging organisations to update their strategies and processes via new technologies adoption in order to survive and thrive (Cetindamar et al., 2016). Obtaining competitive advantage over rivals in the market calls for the adoption of new technology for organisations aiming to contribute to the country's economic growth and prosperity. In other words, in the face of tight competition, organisations have resorted to adopting ERP is hardly a new technology.

Generally speaking, ERP systems refer to a set of standardised software and organisation permeating database, within which all business transactions are entered, stored, processed, managed and reported. In other words, it is a process-based IS that supports the processes of various business departments (e.g., accounting in finance, HR, logistics and production, etc.). The organisations therefore have to adopt the system to meet customer demands and to facilitate the required balance between internal production and external information as mentioned in prior studies by Prajogo et al. (2018), Chondamrongkul (2018) and Ranjan et al. (2018). ERP-investing organisations aim to

reap the opportunities and benefits from its implementation and use – such benefits are multiple and can be categorised into operational benefits, management benefits, benefits to strategy, to technology and to the organisation as a whole (Balasubramanian and Selladurai, 2018; Seethamraju, 2015).

The reality is that the global market transformation has necessitated the response to requirements by adopting unique strategies, such as ERP system as it allows to meet the competitive demand in the market and to improve management and client relationship, while minimising the period needed, improving quality and maximising sales volumes, with minimal workforce and higher market shares (AboAbdo et al., 2019; Althunibat et al., 2019). Organisations that have limited financial strength when it comes to organising and directing are constantly facing demands from their internal and external customers and as such, they need to improve competitiveness continuously and to increase market share, and this one of the top reasons why ERP adoption and use is invaluable to the banking sector (Madanhire and Mbohwa, 2016).

According to Jaradat et al. (2021), Samiei and Habibi (2020), Syafiera et al. (2019), and Zvezdov and Hack (2016), ERP usage can be described as the employment of the ERP features among users to perform and complete their tasks. Using the system is therefore a top driver of the IS implementation success, in this case ERP system implementation. In this regard, behavioural use has to be realised in firms to reap the benefits of the system, with the top premise being that the higher the ERP system use among users, the greater will be its implementation goals and objectives success (Ali and Miller, 2017). Moreover, the use of ERP system in day-to-day operations of the firm and its smooth handling among the users can be beneficial for firms. However, on the other hand, incorrect handling could mean adverse outcomes for the firms and this is why organisations are faced with disappointed investments in ERP systems, as they had looked forward to expedient realisation of goals from using it (Costa et al., 2016; Helo et al., 2008). In the same line of study, Costa et al. (2016) found that majority of organisations using ERP systems did not realise their business goals, and according to Chou et al. (2014), such failure may be attributed to their ineffective handling and use of the system.

Moreover, studies were dedicated to the determination of the critical success factors (CSFs) of the system use like Ranjan et al. (2018), Ranjan et al. (2016), Costa et al. (2016) and Grabski et al. (2011) and the life cycle of use like Grabski et al. (2011). Meanwhile, other works focused on the post-implementation period of ERP system and these included Fernandez et al. (2018) and during usage period like and Grabski et al. (2011). As for the post-ERP implementation, it should be ensured that the system is used regularly on a daily basis to assist operations, so that it would provide benefits. The present study attempts to determine the effects of individual and technology factors on ERP system adoption.

Literature on ERP generally examined the different adoption aspects of the system that varies from its implementation, the benefits received (financial and economic), success measurement and CSFs (Ranjan et al., 2016; Baker and Yusof, 2016). However, literature still lacks studies that made use of UTAUT to examine the ERP adoption among banks, where most of the widely adopted models include TAM, TRA and TPB – models deemed to promote tradition, attitudinal utilitarianism, technological determinist and techno-centric prediction.

2 Literature review

2.1 Need for ERP system adoption in the banking sector

The Jordanian banking sector makes great contributions to the economic development of the country, highlighting its high significance, which permeates to the banking institutions competitiveness in a way that they are constantly in a search for creative strategies and methods to maintain competitiveness and innovation (Di Bella and Al-Fayoumi, 2016). A dynamic market rife with ongoing changes is characterised by short-life cycle of products, mass customisations, narrowed customer niches, and successful integration of technology (Aburub, 2015).

In the new era of the dynamic global market, it is crucial for banks to adopt a proactive strategy when responding to the requirements of clients and in this background, ERP systems furnishes prepared banking instruments, which is appropriate for meeting the competitive demand. The system also improves customer relationship management, mitigates cycle time, improves quality, maximises sales volume, minimises manpower and improves market share (Jaradat et al., 2021; Ahmadzadeh et al., 2021; Valanarasu and Christy, 2020; Baker and Yusof, 2017a, 2017b; Maiga et al., 2015). Regardless of the advantages that ERP can provide banks, based on evidence there are numerous failed implementation cases reported by management, which stresses on the technical, financial and non-technical factors role in the process. Hence, by examining such factors in light of ERP systems, high successful implementation level would be achieved as suggested by (Chofreh et al., 2018a; Ullah et al., 2018; Zouaghi and Laghouag, 2016).

Added to the above, organisations that invest in ERP primarily attempt to reap the advantages from system implementation and to realise benefits that can be categorised into different dimensions (i.e., operational, managerial, strategic, technological and organisational) (Alhatabat, 2020; Zamzeer et al., 2020 Xu et al., 2017; Dezdar, 2017). More specifically, operational benefit refers to the benefits provided in daily activities and these are minimised cycle time, enhanced productivity and customer services, among others, while managerial benefits include centralised databases, accurate and timely information and customised data analysis capabilities, improved decision-making, planning and resource management (Ali and Miller, 2017; Ranjan et al., 2016). Moreover, disseminating information and the understanding of business processes lead to enhanced users' communication and developed shared vision and they in turn, along with interconnectivity and capability of setting up long-term relationships with customers and partners, provide the organisation with competitive and strategic edge (Balasubramanian and Selladurai, 2018; Mu et al., 2015).

Despite the numerous enumerated benefits of the ERP system, operational, managerial, strategic, organisational and IT infrastructure dimensions were largely left out due to several reasons. First, the ERP system has a direct effect on the connections among intermediate processes, aside from operation and management processes (Jain, 2016; Huang and Handfield, 2015) and as such, advantages stemming from the process changes are described as the direct ERP system advantages (Badewi and Shehab, 2016). Second, notwithstanding the fact that IS provides competitive advantage (Shen et al., 2016), such advantage affects many factors such as market environment and business strategy and this makes it challenging to differentiate between strategy benefits and

system benefits. Third, organisational benefits are associated with long-term system advantages and because of this, drawbacks may be comparable to strategic benefits when gauging system success (Ranjan et al., 2016; Nofal and Yusof, 2016; Hsu et al., 2015). Additionally, in the retail sector (a non-IT intensive sector), the IT infrastructure is not the primary aim for using ERP, indicating that IT benefits are not focused on when gauging retail sector success (Li et al., 2017).

Prior literature on the use of IS have primarily measured system success in the following ways; in Harwood's (2017) study, post-implementation behaviours of users were adopted to measure IS use, and in this regard, ERP system use can be measured through ERP system success following its implementation. Similarly, ERP system use was described by Romero and Vernadat (2016) as constituting automation and informating processes, with the first one referring to the use of ERP system for automated business processes and ongoing, consistent and controlled performance, and the second one referring to the use of the system for the production of information concerning the use of the processes through activities. Automated ERP is a fundamental system function and one of the main organisational benefits, but the use of informating has yet to be controlled (Nwankpa, 2015).

Finally, in Eid and Abbas' (2017) study, the authors stressed urging and facilitating ERP system use among users if the investing firm is desirous of leveraging from its implementation. Informating, in this case, allows ERP systems in problem-solving, supporting decisions, coordinating business units among higher echelons of management and down to subordinates, and providing internal and external customer services (Huang and Handfield, 2015).

2.2 Related studies on ERP System

There is a significant proportion of literature dedicated to the use of technology in general, and the use of ERP system in particular. Tidd and Bessant (2018) stated that employees are generally not inclined to use technology in their organisations and this has directed researchers in the IS field to identify the factors that lower employees' motivation towards adopting IT in the face of benefits (Lal and Bharadwaj, 2016). Authors have been directing their work to identify the major drivers of successful ERP implementation. Accordingly, this study proposes a research framework to investigate the predicting factors of ERP adoption on the basis of individual and technological aspects.

It is notable that studies that investigated the adoption of ERP in the banking field are still few and far between although the instructive element to the experience obtained in other sectors adoption. The knowledge and information provided in other sectors may be juxtaposed to the banking sector in terms of methodologies, management and conceptualisation.

In this line of study, management and staff were found to be inclined towards IT adoption if they expect it to make their workloads easier (Gan et al., 2019) and it is significant for them to accept that such adoption will provide advantages in comparison to other alternative methods (Tidd and Bessant, 2018). In the current times, ERP adoption in the banking sector is considered as something that is a must which is the reason behind the countries awareness of investment in it to produce enhanced financial system

(Aburub, 2015). ERP adoption has also been highlighted to lead to higher effectiveness, performance and enhanced realisation of organisational goals. In this regard, past studies underlined barriers preventing ERP adoption, particularly in the developing nations (Nwankpa, 2015). Majority of the studies including Ali and Miller (2017), Saade and Nijher (2016) and Soja and Weistroffer (2016) revealed that adopting ERP in the banking sector is still a novel phase. The authors primarily concentrated on the industrial sector and they found ERP adoption barriers include technological and organisational factors (Ali and Miller, 2017). On the whole, ERP has been examined extensively by empirical works behind which there were various purposes and findings.

In addition, implementation of ERP has been the major focus of this type of studies just as it was in Alsène (2007) and Awa et al. (2016), while others brought up the topic of financial and economic benefits, like Matolcsy et al. (2005) and Shen et al. (2016). Others like Shen et al. (2016) and Wu and Wang (2006) were confined to success measurement, and adoption in terms of CSFs (e.g., Saade and Nijher, 2016) and modules of ERP (e.g., Metaxiotis et al., 2003).

However, regardless of the number of studies dedicated to the topic, there remains a literature gap from the use of UTAUT to examine the ERP adoption in the banking sector context. Often, other models like TAM, TRA and TPB have been used but at the same time criticised for their being traditional, attitudinal and utilitarian (Awa and Ojiabo, 2016; Eze et al., 2013), and further as deterministic and techno-centric models (Awa et al., 2015b). Moreover, such models examine the adoption as determined by technology and not the individuals/users (Awa et al., 2015a).

Studies hail TAM and UTAUT as the top models to investigate technology acceptance, as a result of which, they underpin majority of studies in the IS field at the organisational level. However, in TAM, where the focus is more on technology, the social and psychological parameters are largely ignored (Venkatesh and Bala, 2008), which is one of the drawbacks of the explanatory and predictive use of the model and explains why suggestions have been made to integrate it with other models (Awa et al., 2015a).

With regards to TPB, a model that was proposed to tackle the drawbacks found in TAM, in a framework similar to TOE, it has yet to underpin studies in the IS field, with studies opting for TEO because of its holistic nature, its size and its appropriate nature for the field (Wen and Chen, 2010), its robust empirical support relative to TAM, IDT, TRA, SM and TPB (Yoon and George, 2013). As for IDT, it consists of constructs from the organisational and technological level to explain adoption, whereas UTAUT integrates individual and technological constructs together (Im et al., 2011).

More importantly, TRA, IDT and TPB are grounded theories that are deemed to be more suitable for various disciples despite their drawbacks when it comes to ICT acceptance as compared to TAM and UTAUT (Moore and Benbasat, 1991). Specifically, TM is robust, valid and specific in investigating organisational IS adoption (Gangwar et al., 2014) because of its generic factors that highlight user's opinions of systems, the user adoption and implementation processes, challenges prediction and the effects on the value chain and diffusion following adoption, and lastly, development of technological capabilities within firms (Wang et al., 2010). The next section is dedicated to the individual and technological factors and their influence on ERP adoption.

2.3 Individual and technological factors

According to Chou (2019) and Hasan (2018), individual dimensions of attitude, knowledge and self-efficacy are determinants of ERP systems adoption success. Fishbein and Ajzen's (1977) theory of planned behaviour (TPB) stresses the attitudes of individual in determining their adoption of new technology, in which case, attitude towards behaviour is the positive/negative perception of the individual towards performing a behaviour. Based on this premise, Venkatesh et al. (2003) described attitude as the general response of the individual towards system use and thus, this study views attitude as a major determinant of the likelihood of ERP system adoption success (Abdinnour-Helm et al., 2003; Pries-Heje, 2008).

Another factor is self-efficacy, which is an in-depth insight of the user's intention and behaviour (Kowitlawakul et al., 2015). In ERP it refers to something akin to computer self-efficacy, which is the individual's sense of whether he possesses the skill to use a computer to complete a task (Compeau and Higgins, 1995). This indicates that self-efficacy is the individual's sense of whether he is adept at using the computer system, and it determines if he can complete his tasks using the computer. With the belief that he is capable of doing it comes success, and without the belief comes failure. In effect ERP self-efficacy is the individual's perception of his ability to use ERP in learning activities.

There are four major elements to the technology dimension and they are perceived usefulness and perceived ease of use. Technology use in a field develops the potential to enhance the service quality, efficiency and effectiveness of staff and this should counter the costs incurred by the organisation (Sun et al., 2009). Amoako-Gyampah (2007) supported this notion when they stressed technology adoption in institutions regardless of the barriers to IT implementation in the banking sector (Lee et al., 2010), which indicates a dire need to determine the factors affecting technology adoption success.

In the past several years, IT and ERP dedicated studies have emphasised the significance of technological factors, revealing significant influence (Calisir and Calisir, 2004) of perceived ease of use on intention to use the system (Ramayah and Lo, 2007), and perceived ease of use on intention towards adopting the system (Al-Naimat et al., 2020; Amoako-Gyampah and Salam, 2004).

3 Framework development

This study primarily aims to determine the factors that influence ERP adoption in the Jordanian banking sector. Literature dedicated to the topic was reviewed and the findings showed some opportunities and challenges that banks are facing in their implementation and adoption of the ERP system. The authors conducted content analysis to identify the factors predicting ERP adoption from the related papers, culled from databases, open search and website search, using the keywords ERP adoption, ERP system factors, factors affecting adoption of technology and ERP adoption factors. Literature reviewed was limited to English articles and the analysis and categorisation of the contents was done to select works relevant to the topic. More than 100 related articles were reviewed, and from the factors that were extracted and short-listed, the top comprise the contents of the study framework.

Generally speaking, a conceptual framework is developed in studies via the model's development, whereas a theoretical framework is developed via theories. In the context of social science studies, they begin with a model followed by concepts that represent the research issue related to particular subject, after which data is collected to explain the relationship dynamics among the concepts. The concepts are transformed into theoretical structure as theoretical components that are measured to be operationalised. In contrast to theories, concepts are used to explain and predict, while models are used to describe phenomenon. Theories can also be investigated through the use of propositions and hypotheses via a suitable method.

The technology acceptance model (TAM) is based on TRA and predicts the acceptance and use of technology by its users. The TRA was specifically developed for the information systems field, and it explains information system adoption through perceived usefulness and perceived ease of use. TAM and its variants, namely, TAM 2 and TAM 3, have been applied to a diverse set of technologies and users, thus shedding light on the adoption and utilisation of IT (Venkatesh and Bala, 2008). TAM is not only useful for understanding the factors that drive users' intention to use IT, but it also provides a set of interventions that management can use to increase its utilisation (Venkatesh and Bala, 2008). While IT managers within firms will find the model valuable, cloud vendors are also likely to find it useful, as they may be able to increase adoption by manipulating the various factors that drive acceptance.

The concept of 'intention to use' relates to the theory of technology adoption in TAM of Davis (1989), UTAUT (Venkatesh et al., 2003). In addition, 'intention to use' can replace 'use' in some contexts; 'intention to use' is the attitude – 'use' is the behaviour, attitude and behaviour can be linked (Delone and McLean, 2003). Because of the difficulty in measuring 'use', many studies propose the attitude scale for the behaviour scale. Some works used the term IS to be tantamount to the IS success, while others have used the IS effectiveness to cover the concepts of individual impact and organisational impact or net benefits (Delone and Mclean, 2004). Theories have been brought forward in literature that expound on the effects on technology use and adoption and they covered technology acceptance model (TAM), diffusion of innovation (DOI), theory of reasoned action (TRA), unified theory of acceptance and use of technology (UTAUT), and theory of planned behaviour (TPB), and in the present study, UTAUT is adopted to assess behavioural intention towards adopting ERP among Jordanian banks.

The need to adopt new technologies has been recognised by banks to enhance and extend their reach and performance and it has been evidenced that institutions that successfully adopt technologies focus on the factors that influence adoption. Accordingly, this study focuses on the factors required for adopting ERP among banks in Jordan, specifically examining the interconnections among the individual and technological factors.

Literature has also stressed the factors influencing ERP adoption and has divided it into technology, organisation, environment and individual dimensions. This study is focused on both individual and technological dimensions as determinants for ERP implementation success/failure in Jordanian banking sector.

Empirical findings indicated that several factors do affect ERP adoption and based on the terms of reference, four factors are covered by the relevant dimensions and they are attitude, self-efficacy, perceived usefulness and perceived ease of use. These factors form the background to explaining the forces that play a role in the adoption of ERP among

banks, and the barriers that are faced when shifting to ERP systems from legacy-shared drive systems.

Figure 1 Proposed model

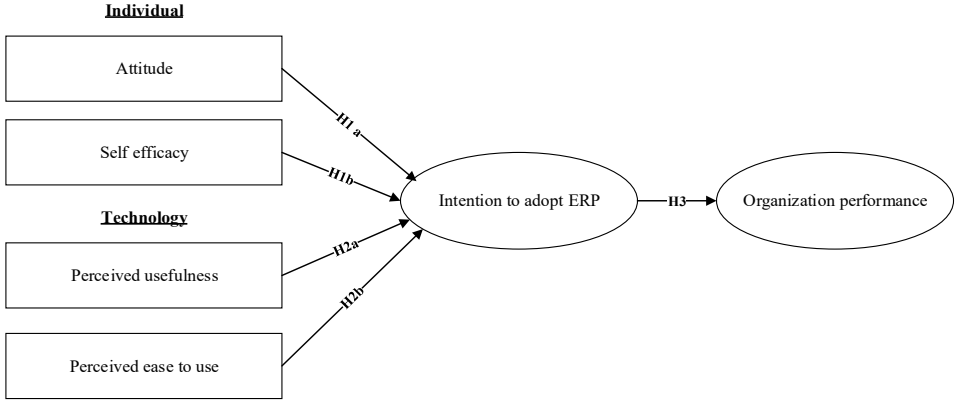


Table 1 The study hypotheses

H1a	Attitude positively affects intention to adopt ERP
H1b	Self-efficacy positively affects intention to adopt ERP
H2a	Perceived usefulness positively affects intention to adopt ERP
H2b	Perceived ease to use positively affects the intention to adopt ERP
H3	ERP adoption positively affects organisation performance

4 Methodology

The main objective of this study is to propose a comprehensive model consisting of the individual and technological factors affecting the adoption of enterprise resource planning systems. To achieve such objective this section is dedicated to presenting the methods and instruments adopted, along with the techniques of data collection, the questionnaire development as well as the reliability and validity of measures.

The research design comprises the investigation structure and the strategy utilised for determining the answers to the research questions and for resolving the study problem. It represents a roadmap for researcher to follow in order to solve specific problems (Bell et al., 2018). It is similar to a master plan, specifying the employed procedures and methods for the collection and analysis of data, which is why every study should have a suitable design (Zikmund et al., 2013). A study design constitutes a set of rational decision-making processes that facilitate the achievement of the study objectives (Sekaran and Bougie, 2016). In the present study, the primary aim is to examine the factors influencing the adoption of ERP and accordingly, the appropriate technique to collect data is the questionnaire survey.

Added to the above, Zikmund et al. (2013) explained that the study objectives, availability of information and the cost of research all have a hand in the selection of research design. Therefore, this study opted for the survey design because data gathered is employed in the examination of the relationships between the dependent and independent variables (Bell et al., 2018). The study respondents comprise managers and heads of departments of banks in Jordan, who are highly-educated and knowledgeable on the research issue as suggested by Cooper et al. (2006). The survey strategy provides benefits in the form of collecting considerable data from respondents in a relatively short time – data which is later analysed and the findings from them generalised to the population at large.

4.1 Questionnaire development

The survey questionnaire is adopted in this study as the main data collection instrument, and it was developed on the basis of the reviewed literature regarding the adoption and acceptance of ERP (refer to Table 2).

Table 2 Sources of survey instrument items

Contract	*No. of items*	*Reference*
Attitude	5	Duyck et al. (2008)
Self-efficacy	5	Chatzoglou et al. (2009)
Perceived usefulness	4	Davis (1989)
Perceived ease of use	5	Davis (1989)
Intention to adopt ERP	5	Mukred et al. (2019)
Organisation performance	5	Law and Ngai (2007)

The survey items totaled 29 and they were adopted from literature, but tweaked to align with the study objectives. The instrument was translated from English into Arabic as the mother language of the respondents is the latter. The questionnaire instructed the respondents to point out the items that are nearest to their perception on a five-point Likert scale ranging from 1 depicting strongly disagree, to 5 depicting strongly agree. The items were specifically selected from IS studies and as such, their validity and reliability have already been established in the original studies. The construct validity of the questionnaire was tested to assess the level to which the items managed to measure the variables they were supposed to. The construct validity of the items was confirmed through the review of literature and the assessment of the original works.

4.2 Data collection

The study is focused on the Jordanian banking sector – with Jordan being a developing nation. It was ensured that the sample adhered to high standards and sound policies. The significance of the study lies in the dire need to adopt ERP systems among the banks to improve their decision-making and management processes. The management team members in the sector introduced new institution-wide policies to minimise the transition gap from traditional method use to the current and best practices. Thus, the banks governance structure is suitable for the e-business technology implementation,

particularly the ERP, with data standards and e-business tools invaluable for supporting the adoption of the system.

The study made use of self-administered questionnaire copies to collect data for achieving the objectives of the study, determining the answers to the research questions, and testing the formulated hypotheses. The author adopted a self-delivery and collection technique as it is the most appropriate method to guarantee high response rate. The questionnaire copies were administered in 13 banks in Jordan to 150 financial managers, IT managers, audit managers, heads of accounting departments, head of internal control departments and head of marketing departments. The banks employed ERP systems in their processes. From 150 copies, 91 copies were retrieved.

4.3 Common method bias

In a quantitative investigation and studies based on self-reported survey, common method bias is a well-known issue, when data is collected from a single source (Avolio et al., 1999). Common method bias can be reduced through procedural design and statistical control as suggested by Reio (2010) but this study followed Podsakoff's (2003) handling of common method bias at the questionnaire design stage and through the employment of statistical techniques following data collection. More specifically, Harman's single factor test was used, where after loading all items, if one factor arises that explains majority of the variance, then the existence of common method variance is deemed to be present.

According to Kock (2015) and Kock and Lynn (2012), applying the full collinearity test is an extensive procedure for assessing vertical and lateral collinearity simultaneously. Additionally, a VIF value exceeding 3.3 was established to indicate pathological collinearity and the contamination of the model by common method bias. Hence, VIF values were obtained in this study and found to be equal to or lower than 3.3 (refer to Table 3), indicating the non-existence of common method bias (Kock, 2015). Statistical outcomes also reveal that common method bias is a non-issue and thus, the data analysis can proceed.

5 Data analysis and results

As mentioned, the study employed PLS-SEM analysis, specifically Smart PLS, Version 3 to examine the proposed hypotheses as suggested by Ringle et al. (2017), being that PLS is the most appropriate analysis because of the small sample size of the study (Hair et al., 2011). To reiterate, the sample size is 93, but it meets the least sample size condition established by Roscoe, which states that samples over 30 and lower than 500 are suitable.

More importantly, the PLS-SEM is preferred over other approaches such as the covariance-based statistics according to several reasons enumerated by Hair et al. (2017). The first reason relates to the nature of the study, which is an exploratory one, meaning to say that the individual and technological factors relationship with ERP system adoption is confirmed in the Jordanian banking sector – there exists the potential of determining new interrelationships. Another reason lies in the non-requirement of normal distribution of data with PLS, in that it is non-parametric method (Hair et al., 2017). Also, the study carried out a two-step approach following the recommendations of Al Shbail et al. (2018a, 2018b) and Anderson and Gerbing (1988), to interpret the results and confirm the

hypotheses outcome. Accordingly, the outer model measurement's reliability and validity were assessed and the inner model was tested and confirmed.

Table 3 Construct reliability and validity

Construct	*Items*	*Loadings*	*Cronbach's alpha*	*rho$_A$*[a]	*CR*[b]	*AVE*[c]	*VIF*[d]
Attitude	A.T-1	0.850	0.906	0.912	0.930	0.728	2.634
	A.T-2	0.821					2.199
	A.T-3	0.846					2.487
	A.T-4	0.897					3.232
	A.T-5	0.852					2.510
Self-efficacy	S.E-1	0.899	0.894	0.913	0.922	0.702	2.938
	S.E-2	0.838					2.373
	S.E-3	0.761					1.754
	S.E-4	0.854					2.431
	S.E-5	0.832					2.222
Perceived usefulness	P.U-1	0.905	0.876	0.895	0.916	0.733	3.260
	P.U-2	0.892					2.995
	P.U-3	0.895					2.682
	P.U-4	0.719					1.528
Perceived ease to use	P.E-1	0.782	0.821	0.823	0.874	0.582	1.678
	P.E-2	0.784					1.697
	P.E-3	0.751					1.589
	P.E-4	0.748					1.675
	P.E-5	0.749					1.573
Intention to adopt ERP	E.R.P-1	0.857	0.873	0.877	0.908	0.663	2.296
	E.R.P-2	0.770					1.754
	E.R.P-3	0.830					2.138
	E.R.P-4	0.786					1.859
	E.R.P-5	0.826					2.054
Organisational performance	O.P-1	0.897	0.901	0.903	0.927	0.716	3.205
	O.P-2	0.864					2.647
	O.P-3	0.803					1.948
	O.P-4	0.846					2.270
	O.P-5	0.819					2.163

Notes: [a]rho_A – Dijkstra-Henseler's rho indictors.
[b]CR – composite reliability.
[c]AVE – average variance extracted.
[d]VIF – variance inflation factor.

5.1 Model measurement (stage 1)

There are four phases to the evaluation of the reflective-construct-based model; first, the individual item's reliability is deemed to be sufficient when the outer loading exceeds 0.70 of an item on its corresponding construct as established by Hair et al. (2017) and in this study, all outer loadings exceeded the threshold level (refer to Table 3). The second phase involves the construct reliability to evaluate if the indicators really measure the constructs they are meant to. The constructs' reliability all exceeded 0.70 (Hair et al., 2017) (refer to Table 3). Still another current method used for the measurement of reliability is through rho_A coefficient (refer to Table 1), where all constructs in this study exceeded the 0.70 threshold level suggested by Dijkstra and Henseler (2015), indicating that all variables are reliable.

Third, the AVE measures the limit of convergence of the variable with its indicators, through item variance evaluation (Hair et al., 2017). The AVE values tabulated in Table 3 are all higher than the 0.50 threshold level (Ahmad and Al-Shbiel, 2019). Fourth, the discriminant validity indicates the level to which a variable is discrete from other model variables empirically and in this study two approaches were used to confirm this type of validity. The first approach is through the use of Fornell-Larcker criterion, which shows that when the diagonal values are higher than the other diagonal values in the columns and rows, discriminant validity exists (Al-Shbiel et al., 2018; Hair et al., 2017). In Table 4, the Fornell-Larcker criterion is met for discriminant validity. The other method is through the use of heterotrait-monotrait ration of correlations (HTMT) suggested by Hair et al. (2017). The approach identifies the correlation among factors, and for the discrimination between two variables, HTMT values have to be <0.85 according to Henseler et al. (2016). All the constructs achieved discriminant validity through this approach (refer to Table 4).

Table 4 Discriminant validity based on Fornell-Larcker and HTMT criteria

Fornell-Larcker criterion						
Construct	*1*	*2*	*3*	*4*	*5*	*6*
Attitude	0.853					
Intention to adopt ERP	0.552	0.814				
Organisational performance	0.378	0.495	0.846			
Perceived ease to use	0.440	0.632	0.328	0.763		
Perceived usefulness	0.385	0.581	0.542	0.402	0.856	
Self-efficacy	0.385	0.546	0.241	0.421	0.450	0.838
HTMT criterion						
Construct	*1*	*2*	*3*	*4*	*5*	*6*
Attitude						
Intention to adopt ERP	0.618					
Organisational performance	0.416	0.555				
Perceived ease to use	0.503	0.741	0.380			
Perceived usefulness	0.423	0.656	0.603	0.470		
Self-efficacy	0.421	0.606	0.260	0.486	0.503	

The final and outer model assessment in light of indicator reliability, internal consistence, reliability and construct validity for convergent and discriminant validity proved to be supported by the values presented above.

5.2 Structural model assessment (stage 2)

Structural equation modelling (SEM) using SmartPLS was used in this study to test the path as well as the proposed hypotheses in the model. The assessment of the structural model confirms the predictive accuracy and the capabilities of the model and the variables relationships. Four measures were used to determine the predictive relevance of the model and they are; VIF, R^2, f^2 and Q^2. To begin with, VIF values were obtained in this study to determine if the model contained collinearity issues and all VIF values were found to meet the criterion threshold 3.3 (Kock, 2015) (refer to Table 3), confirming that collinearity was a non-issue. Moving on to the R^2 values, particularly of the intention towards ERP adoption and organisational performance (0.602 and 0.245 respectively), substantial values were found (refer to Table 5 and Figure 2) as aligned with the recommendation of Hair et al. (2017). Moving on to f^2 effect size proposed by Cohen (1988), intention towards ERP adoption was found to be of medium level of effect on organisational performance and attitude, perceived ease of use and self-efficacy were found to be of small level of effect on intention towards ERP adoption, but perceived usefulness was found to have a medium level of effect on the same. As for the values of Q^2 (cross-validated redundancy index) of the dependent variables, the blindfolding approach was used, in a way that Q^2 values that are more than 0 support the predictive relevance of the structural model (Chin, 2010). Table 5 shows that the values of the study model supported its predictive relevance for all dependent variables. Finally, the SRMR model fit measures and RMS theta, representing the root mean square residual covariance, obtained the values 0.053 and 0.126, respectively, further confirming the fitness of the PLS-SEM model (Hair et al., 2017).

Table 5 Model predictive capabilities

Constructs	R^2	*Adj.*R^2	f^2	Q^2	*SRMR*	*RMS theta*
Attitude	-	-	0.091	-	-	-
Self-efficacy	-	-	0.067	-	-	-
Perceived usefulness	-	-	0.131	-	-	-
Perceived ease to use	-	-	0.209	-	-	-
Intention to adopt ERP	0.602	0.593	0.325	0.365	-	-
Organisational performance	0.245	0.241	-	0.161	0.053	0.126

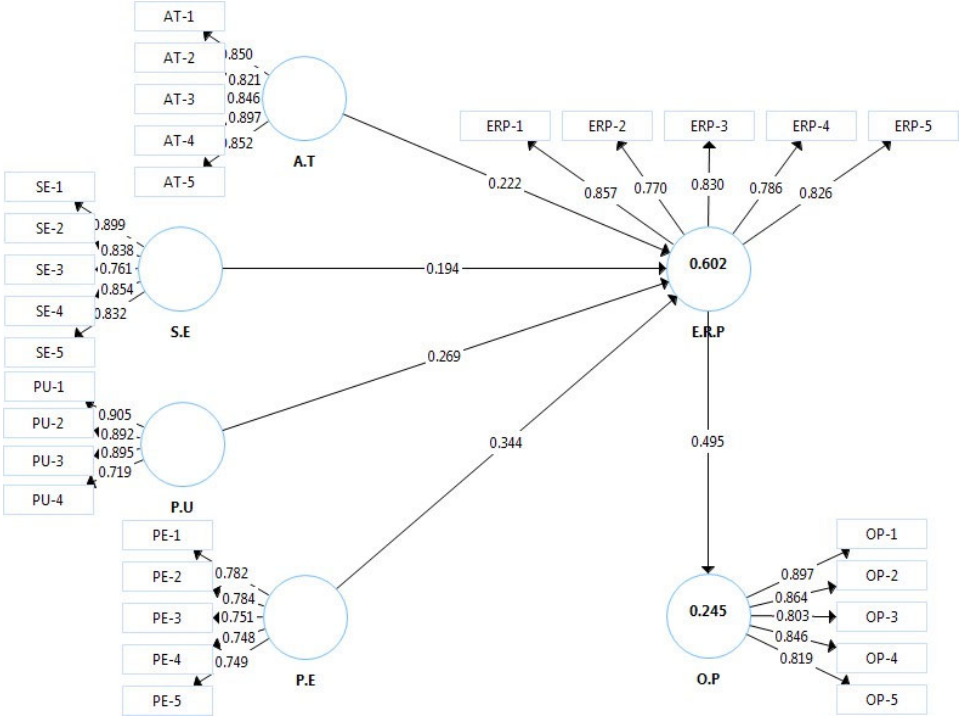
Moving on to the testing of hypotheses, there are five direct relationships proposed, all of which were found to be significant, achieving the expected result. According to Henseler et al. (2016), the percentile bootstrapping is applied to obtain a confidence level of 95%, with structural path coefficient significant different from 0 (Hair et al., 2019). Such path coefficient is confirmed as presented in Figure 2, with the results supporting Hypotheses 1a, 1b, 2a, 2b and 3.

Table 6 Hypothesis testing

Structural path	*Std. beta*	*Std. error*	*t-value*	*Decision*	*95% bias corrected CI*	
					Lower	*Upper*
H1a: AT → ERP	0.222	0.070	3.180*	Supported	(0.092; 0.357) Sig	
H1b: SE → ERP	0.194	0.057	3.401*	Supported	(0.090; 0.311) Sig	
H2a: PU → ERP	0.269	0.073	3.698*	Supported	(0.127; 0.401) Sig	
H2b: PE → ERP	0.344	0.069	5.002*	Supported	(0.194; 0.462) Sig	
H3: ERP → OP	0.495	0.073	6.811*	Supported	(0.356; 0.640) Sig	

Notes: *P < 0.01.
AT – attitude, SE – self-efficacy, PU – perceived usefulness, PE – perceived ease to use, ERP – intention to adopt ERP, OP – organisational performance.

Figure 2 Research model and path coefficients (see online version for colours)



6 Discussion of results

The study's main focus was on examining the influence of individual and technological factors on ERP adoption. The study carried out a confirmation analysis of the structural models comprising of the proposed framework and the developed hypotheses. The content and construct validity were firs obtained, which met the criteria and supported good fit. The measurement framework validity was also confirmed using discriminant validity, convergent validity and composite reliability. For internal consistency,

Cronbach's alpha was employed and the goodness-of-fit estimation of the exogenous factors relationships was achieved using SEM. The findings met all measurement criteria, with standardised coefficients of the correlations proving to be significant, and the items effect size supported the components of the ERP framework. Moreover, the obtained values of indices met the established values, which means the framework had excellent fit, after which the formulated hypotheses were tested.

This study proposed that individual and technological factors of attitude, self-efficacy, perceived usefulness and perceived ease of use have a direct and positive effect on ERP adoption among Jordanian banks (H1a, H1b, H2a and H2b). The obtained results supported the above hypotheses indicating that the variables work towards the enhancement of ERP usage. This finding supports past reported findings (e.g., Chauhan and Jaiswal, 2016; Keong et al., 2012; Alshare and Lane, 2011; Calisir and Calisir, 2004; Scott and Walczak, 2009). More importantly, the finding supports UTAUT model's assumptions concerning the effects of individual and technological factors on ERP system adoption (Dwivedi et al., 2019; Mitra and Mishra, 2016).

Aside from the above proposed hypotheses, this study also proposed a positive relationship between ERP adoption and organisational performance (H3), which was also supported by the findings, indicating that banks have to leverage ERP usage to enhance their performance. This result is consistent with those of prior studies that supported a positive ERP adoption-banking performance relationship (e.g., Fernandez et al., 2017; Hwang and Min, 2015; Kharuddin et al., 2015; Madanhire and Mbohwa, 2016; Shen et al., 2016).

This study has several contributions to the ERP system literature and practical integration. The analysis of data indicates that the holistic adoption of ERP reflect higher variance than its modules. Moreover, the synergistic factors interconnections at various levels and stages along with their effects on performance support the need for further investigation. On the whole, the examination of the factors predicting successful ERP adoption constitutes the first step to implementation success. This study's focus was placed on individual and technological factors only in the banking context for the establishments' performance. The analysis confirmed the fit measure of the sub-models that encapsulate the proposed framework and the developed hypotheses.

7 Conclusions

The permeating and increasing significance of IS among business entities has directed researchers to investigate the drivers of IS adoption, specifically ERP for enhanced effective and efficient management and decision-making process. Studies of this calibre were reviewed and the findings examined in light of ERP adoption and the relevant influencing factors in the context of Jordanian banks. Based on the findings, practitioners' information, knowledge and awareness of ERP in managing business processes are enhanced, stressing the role of individual and technological factors. Banks have to be aware of the strategic drivers and the formulation of guidelines for ERP acceptance in daily processes and activities. It is hoped that the findings can contribute to organisations in other sectors when it comes to successful system adoption and in this regard, it is also hoped that more studies will continue in this line of examination directed towards the ERP role in decision making to support system implementation guidelines.

This study supported the significant relationships of individual and technological factors (attitude, self-efficacy, perceived usefulness and perceived ease of use) with ERP adoption and banks performance in Jordan. Adopting ERP could lead to enhanced banking performance and keeping the factors in the spotlight could benefit institutions, organisations and end-users in terms of operational, tactical and strategic aspects.

7.1 Theoretical contributions

Literature dedicated to the adoption of ERP in public organisations has largely left out the banking sector and thus, this study minimises the gap in literature as it examined ERP adoption in Jordan, a developing country, where financial managers are mostly unaware of how ERP implementation could succeed. Studies concerning ERP adoption and organisational performance have also been limited. Hence, this study's contribution to literature regarding ERP is its emphasis on the functions of ERP that result in optimum banking performance. The study findings pave the way for further studies to provide insight into the relationships between individual and technological factors and ERP adoption.

The present empirical study on the ERP adoption factors influence on Jordanian banks performance contribute to the gap in literature, because despite the importance of the factors to ERP adoption intention, only a few authors have tackled the topic. Thus, the findings of this study can be the basis for future studies in their testing of the ERP adoption framework in the developed nations' banking sector. The factors can be successfully used to assess the adoption intention towards ERP, with few studies dedicated to the issue, highlighting its importance.

In this study, the author developed and brought forward a model that management and subordinates can use when adopting ERP. According to the results of the literature review, the present study is one of the pioneering empirical studies that addressed the factors affecting the adoption of ERP among Jordanian banks and as such, it can be used as a source of empirical and conceptual information in future studies. The author recommends that this study be replicated in future examinations in various contexts for clearer behaviour and attitude knowledge information on the adoption of current technology. Also, the factors contributions highlighted in this study can facilitate successful ERP implementation and adoption among banks, specifically in Jordan.

In this line of contribution, the examination of the predictors of ERP adoption success in Jordan paves the way for technology development in the developing countries and for contributing to literature concerning the adoption. The study significance permeates various fields as it serves information and knowledge to both practitioner and researcher circles, and supports the use of UTAUT underpinning model, in its usefulness for studying the factors in a developing nation, like Jordan.

7.2 Managerial contributions

This study contributes to management by making top management of banking institutions aware of the factors that could facilitate users' intention towards ERP system, and eventually, its successful adoption. Detailed information on the factors can add to the success rate of the system implementation and ultimately enhance the performance of banks. The findings also have implications to IT managers, accounting and financial managers as it promotes awareness of the factors that have a hand in increasing the

intention of users towards ERP system adoption. Organisations inclined towards such adoption should consider that the development of sustainable competitive advantage requires a robust policy for the organisation as well as the system users.

7.3 Limitations and future research

This study has a few limitations, which can be addressed in future research. First, the focus of the study, which is the banking sector. The results are expected to differ in other sectors and thus, it is worth examining the individual and technological factors and their effects on adoption in other sectors. Second, the focus of this study is laid on individual and technological factors and their effect on ERP system adoption, and in this regard, there may be other factors that have the potential to influence the same – future studies may explore factors other than the ones the study examined. Third, this study is also limited to the adopted quantitative approach and data – interview sessions may be alternatively conducted in future studies to provide a deeper meaning into the findings. Future studies may also obtain corresponding views from high-level IT executives concerning ERP adoption.

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