CRITICAL SUCCESS FACTORS OF CLOUD ENTERPRISE RESOURCE PLANNING SYSTEMS AND FINANCIAL PERFORMANCE: EVIDENCE FROM EMERGING MARKETS

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Abstract

Cloud ERP (C-ERP) systems help firms to reach greater levels of sustainable performance (Gupta, Qian, Bhushan, & Luo, 2019). Ali (2016) demonstrate that the enterprise resource planning (ERP) system implementation influences financial performance indicators. Huang, Rahim, Foster, and Anwar (2021) had investigated and identified the critical success factors (CSFs) which may affect the successful implementation of C-ERP systems. However, no empirical evidence was found on the relationship between C-ERP critical success factors and financial performance. This study examined the effect of key CSFs of the C-ERP systems on financial performance in the post-implementation stage. An online questionnaire was developed to collect data about CSFs in C-ERP firms. The financial ratios were collected from the Amman Stock Exchange (ASE) filings. OLS analysis suggests that financial performance is affected by technological competence, management support, organizational culture, and system characteristics. The study provides empirical evidence on the cause-effect relationship which emphasizes the difference made in long-term financial success by the various managerial techniques. The results provide practical implications to management and service providers that help in installing and maintaining C-ERP systems.

Keywords: Cloud Computing, Cloud Enterprise Resource Planning Systems, Cloud ERP, Financial Performance, Critical Success Factors

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1. INTRODUCTION

Recently, many companies had adopted cloud enterprise resource planning (C-ERP) systems, aiming to improve their operational and financial performance. However, they need to follow proper managerial techniques and practices in order to maximize their benefits. Choudhary and Vithayathil, (2013) expected that the market of cloud services will grow from $26 billion in 2012 to $160 billion in 2020. Panorama, an ERP consulting firm, found that the market share of C-ERP systems had

increased from 11% in 2015 to 27% in 2016 (Panorama, 2016). C-ERP is becoming more popular and replacing legacy ERP systems. It has been argued that SAP AG's 2014 first-quarter report of sales and earnings has missed analysts' estimates as a result of the increasing use of C-ERPs (Ricadela, 2014).

ERP systems were qualified as "the most important development in the corporate use of information technology (IT) in the 1990s" (Davenport, 1998, p. 122). ERP is a technological tool used to manage supply chain processes in firms (Acar, Aydiner, Zaim, & Delen, 2019). ERP systems are strong business packages that facilitate complex functions, integrate departments, and manage resources. Business firms experience higher profitability, superior management, and an organization-wide view of the business in a single platform for business operations (Chaudhari, 2020). This technology has radically changed organizational computing by simplifying integrated planning, production, and customer responses. ERP systems provide the means for managing and controlling data, information, and materials (Migdadi & Abu Zaid, 2016). Despite the high implementation costs for ERP systems, many firms are enhanced to use them via cloud environment (Chaudhari, 2020). They will be committed to paying annual subscription only instead of investing in expensive IT infrastructure. These advantages had encouraged firms to use C-ERP systems in large businesses and more recently, in medium-sized ones. Cloud computing services are constantly replacing in-house computing systems (Gupta, Seetharaman, & Raj, 2013). C-ERP systems combine the advantages of standard ERPs with the enhanced flexibility and lower cost advantages of cloud services.

C-ERP helps firms to reach greater levels of sustainable performance (Gupta, Qian, Bhushan, & Luo, 2019). While some companies have accomplished considerable competencies through ERP, others have faced unsuccessful implementations, budget surpasses, and frustrating performance. ERP systems are designed to improve business processes, and hence, enhance information quality, support decision-making, and increase firm performance (O'Leary, 2000). Accordingly, C-ERP systems are categorized as innovative technology based on its prospective benefits to business organizations. We expect to find a significant positive effect of C-ERP adoption on the firm's performance. C-ERP systems are expected to improve firms' performance and market value. Despite the benefits of ERP systems to the organization, implementing ERP systems might be an expensive and complex process causing traditional technological problems like late delivery or cost overrun. In addition, C-ERP implementations may cause major disruption to the operations of the adopting company and threaten its financial viability.

Many studies have investigated the post-implementation firm performance in order to justify such investment, particularly, many studies focused on the financial performance of these adopters emphasizing improved profits and financial ratios. Hunton, Lippincott, and Reck (2003) argued that ERP adopters showed no changes in their financial performance after implementation. Also, Poston and Grabski (2001) reported very few differences in the number of financial performance measures between ERP adopters and non-adopters. However, Nicolaou (2004) reported that adopters need a lag of 2 years minimum before they would start to achieve additional benefits compared to non-adopters. This result may explain what Poston and Grabski (2001) achieved. The findings of Ali et al. (2016) demonstrate that the ERP systems implementation influences financial performance indicators. In their study, Hult et al. (2008) asserted that combining the several different modules of the ERP system has a stronger effect on performance than simply the direct effect of each module solely.

Another stream of research (Huang, Rahim, Foster, & Anwar, 2021; Tongsuksai, Mathrani, & Taskin, 2019; Alhanatleh & Akkaya, 2020; Alkhaffaf, Aljarrah, Karadsheh, & Alhawari, 2018; Lindström & Robertsson, 2020; Galy & Sauceda, 2014) had investigated and identified the critical success factors (CSFs) which may affect the successful implementation of C-ERP systems such as organizational, environmental, technological and individual characteristics. However, no empirical evidence was found on the relationship between C-ERP critical success factors from all perspectives (technological, organizational, and environmental characteristics together with the people-related individual characteristics) and financial performance. In addition, continuous improvement and assessment of using C-ERP are required over time. Also, researchers and firms that use C-ERP systems must be concerned with success and enhanced firm performance, not only at the adoption stage but also in the post-implementation stage.

Based on the above-mentioned motivations, this study tries to contribute in providing empirical evidence on the cause-effect relationship between the CSFs of C-ERP systems, as concluded from previous literature, and the financial performance of the Jordanian public shareholding companies that have adopted C-ERP systems in the post-implementation stage. The study aims to answer the following question:

RQ1: Do CSFs of C-ERP systems affect the long-term financial performance of firms in the post-implementation stage?

This paper proceeds as follows. Section 2 provides a theoretical background summarizing the CSFs of C-ERPs used as independent variables. It presents the literature review that describes the C-ERP in Jordan, its relationship with financial performance, and the relationship between the critical success factors and financial performance. Section 3 explores the conceptual framework and hypotheses development. Section 4 presents the used research methodology to test our hypotheses. Section 5 presents data analysis and results explanation. A final section provides the conclusion of the paper.

2. LITERATURE REVIEW

2.1. Theoretical background: Critical success factors (CSFs)

C-ERP is a software as a service (SAAS) that allows users to access their ERP system over the Internet. Novais, Maqueira, and Ortiz-Bas (2019) have mentioned many benefits of cloud computing; proper data transactions, resource-sharing, flexibility, pay-per-use, lower cost, and improved performance

of information technologies. However, Bhoir and Principal (2014) have stated many concerns of cloud computing, including data security and privacy, uneven service availability, incompatibility with the firm's applications and systems, and ineffective regulatory frameworks.

Firms adopt cloud computing in order to address operational and logistical issues (Eldalabeeh, Al-Shbail, & Almuiet, Bany Baker, & E'leimat, 2021). Successful adoption and integration requires an understanding of the determinants of cloud services and a clear plan.

DePietro, Wiarda, and Fleischer (1990) proposed the technological-organizational-environmental framework (TOE). It presents three context groups of factors that influence organizations' decision of adopting new technologies: technological factors that describe the available technologies in an organization and its current state of technology. Organizational factors refer to the organization's characteristics, such as size and scope centralization, formalization, managerial structure, and human resources quality. Finally, environmental factors refer to the external environment of the organization including the industry, competitors, and government policies. These factors might be either opportunities or constraints for organizations (DePietro et al., 1990). Oliveira, Thomas, and Espadanal (2014) argued that the TOE framework can be used to examine the adoption, implementation, and usage of emerging technologies like cloud computing. TOE context should be integrated and considered as determinants of the decision of adopting and using new technologies (Oliveira, Martins, Sarker, Thomas, & Popovič, 2019). In addition, the updated D&M model, information systems success model suggests six factors: service quality, system quality, information quality, intention to use, users' satisfaction, and net benefits (DeLone & McNeal, 2003). Moreover, Alkhaffaf et al. (2018) found that organizational environment, system environment, users' environment, and ERP vendors' environment had a significant influence in enhancing the ERP implementation success mediated by the knowledge transfer. Furthermore, Frimpon (2012) has identified three success factors of ERP system: technological infrastructure, departments' participation, and change management. According to Maditinos, Chatzoudes, Tsairidis, and Theriou (2011), factors that affect ERP system success include top management support, workers support, consultants and vendors support, data and information transmission. Muscatello and Chen (2008) stated strategic initiatives, executive commitment, human resources, project management, business process, training, project support and communications, and software selection and support as key factors of a successful ERP system. Williams and Ramaprasad (1996) distinguished CSFs from non-CSFs and their type and level of criticality by developing a taxonomy of CSFs. This taxonomy relies on four levels of criticality: factors linked to success by a known causal mechanism, factors necessary and sufficient for success, factors necessary for success, and factors associated with success.

The influence of CSFs may slightly differ for C-ERPs from on-premises ERPs. For instance, on-premises ERP systems require expert IT staff to maintain the system, while the C-ERP systems are maintained and managed by the cloud service provider (Tongsuksai et al., 2019). According to Njenga, Garg, Bhardwaj, Prakash, and Bawa (2019), determinants of adopting cloud computing services may include technological, environmental, and organizational factors, end-users, cloud services providers, corporate heads, competitors, and regulatory agencies. ERP implementation affects the organization's processes, culture, and people. Those resent some barriers that companies need to come over in order to achieve successful ERP implementation (Ranjan, Jha, & Pal, 2016). Lindström and Robertsson (2020) divided CSFs into vendors' dependability, users' satisfaction, communication, empowered decision-making, mentorship, security, strategic fit, flexibility, integration, interface, and software reliability. Ngai, Law, and Wat (2008), who identified 18 CSFs for the adoption of C-ERPs, introduced different perspective. They found that "training and education" and "top management support" were ranked at the top of these factors.

Huang et al. (2021) conducted a systematic literature review into C-ERP implementation, they identified 35 CSFs for C-ERP implementation. However, the top five frequently cited CSFs were: security, project management, communication, compliance, and network. This literature review revealed also that most CSFs refer to organizational or people-related factors rather than technological and external factors.

A very small number of researches has investigated all the perspectives; the technological, organizational, and environmental characteristics together with the people-related individual characteristics (Tongsuksai et al., 2019). Tongsuksai, et al. (2019) conducted a systematic literature review on C-ERPs implementation. They identified 32 CSFs of C-ERP implementation and ranked them based on their frequency of use in this literature. According to the study, the most critical factors were: systems security, trust of service providers, employee knowledge, system availability, scalability, privacy, ease of integration, and users training.

In the following subsections, the paper briefly explored the literature that is related to the C-ERP systems, their usage in Jordan, their CSFs, and how they affect financial performance.

2.2. Cloud ERP (C-ERP) in Jordan

Nowadays, Jordan occupies a good position in the Middle East since it has recently put huge efforts to develop its infrastructure, technology, and education (Yassin & Al-Khatib, 2019). Jordan has developed its information and communication technologies (ICT) to realize its vision of becoming a center for knowledge and IT (Al-Hujran & Al-Dalahmeh, 2011). This encouraged Jordanian firms to adopt new technologies trying to support their competitiveness in the market locally and internationally (Alshamaileh, Zamzeer, Alsawalqah, & Alqudah, 2017; Yassin, El-Barghouthi, & Al-Khatib, 2012). Using ICT provides great benefits to different-sized firms and improves their competitiveness (Alshamaila, Papagiannidis, & Li, 2013). The evolution of information technology in Jordan has made cloud computing applicable and necessary in SMEs. Previous studies showed that small businesses in

Jordan possess new generations of educated and innovative employees who are early adopters of the internet and new technologies (Al-Jaghoub & Westrup, 2013).

2.3. C-ERP systems and financial performance

ERP systems result in many operational benefits including improved efficiency measures like reduced turn-cycles of the preparation of reports, enhanced data sharing and quality as a result of reduced redundancies, improved supply-chain efficiency (Robey, Ross, & Boudreau, 2002). Other efficiencies include reduced labor costs, reduced inventory. Managers will be able to access comprehensive, and updated reporting mechanisms, this enhances their capabilities of managing resources, controlling performance, and improved decision-making (Staehr, Shanks, & Seddon, 2012). ERP systems encourage business growth due to better information sharing with customers, suppliers, and other alliances, they increase sales using e-commerce capabilities and customer relationship modules (Qu, Kim, & Im, 2011).

C-ERPs can radically decrease cost, time, and efforts compared to on-premises ERP systems (Zhong & Rohde, 2014). Implementing a standardized software package that is quick, easy, and doesn't require an installation of physical technology infrastructure on-premise will increase efficiency (Raihana, 2012). Cloud computing converts the adoption of traditional ERP systems from a capitalized expenditure to an operating expense (Armbrust et al., 2010). In addition, firms can achieve more efficient use of their IT resources via the centralized infrastructure and save the costs of maintaining on-premises hardware or even electricity (Brynjolfsson, Hofmann, & Jordan, 2010).

Ruivo, Oliveira, and Neto (2012) indicated that the incremental contribution of information systems on organizations' performance is an indirect and long-term measure of success. Information system's benefits may be recognized through the enhanced workflow, system usage, and profits (Zhu & Kraemer, 2005). Using C-ERP enables organizations to reduce costs, expand, and avoid superfluous staff (Raihana, 2012).

Based on prior literature, firms' performance could be measured by using different measures. For example, market performance (market share, faster new products and service introduction, and gaining higher success rates, etc.), operational performance (sales revenue, profits, ROA, ROI, etc.), employee stewardship, customer service, shareholder return, and social responsibility (Richard, Devinney, Yip, & Johnson, 2009; Upadhaya, Munir, & Blount, 2014).

2.4. Critical success factors and financial performance

Mithas, Ramasubbu, and Sambamurthy (2011) studied a sample of companies that had adopted different enterprise systems including ERPs, authors investigated the relationship between the firm's information management capability and its financial performance measured by: revenue, profits, earnings per share, market position, and cash-to-cash cycle time. Researchers have found a significant relationship between companies' information management capabilities and their financial performance, this relation was moderated by: process management, performance management, and customer management.

Galy and Sauceda (2014) provided empirical evidence on how the financial performance in the post-implementation stage of ERP was affected by the management practices. A survey to detect these practices was done and, then, linked to the financial figures of those firms. Results indicated that relationships with outside experts and vendors affected earnings, ROI and ROA, increased information sharing among departments, affected net income, ROI and ROA, technological competencies affected net sales, top management support affected net sales and net income, strategic planning, however, negatively affected earnings.

Gupta et al. (2019) investigated the relationship of C-ERPs and big data predictive analytics (BDPA), C-ERPs and firm performance (market and operational performance), BDPA, and firm performance under the moderating effects of organizational culture. The authors used the dynamic capabilities view (DCV) theory to conceptualize C-ERP and BDPA as capabilities that influence firms' performance. Based on Gupta and Misra (2016), C-ERP capability is composed of three intrinsic factors that affect its success. Organizational factor (implementation strategy, strategic goals and objective, project management, business process re-engineering, budget, organizational resistance, and communication), people factor (user involvement and training, vendor selection and trust, top management support and project team), and technological factor (selected package, infrastructure, data integrity, system testing, and system functionality). Results revealed that C-ERPs have a positive relationship with both the BDPA capabilities and firms' performance.

A case study by Alsharari (2021) examined the different influential factors and significant impacts related to C-ERPs in the UAE's public organizations. Results demonstrated that the transformation process to C-ERP could bring many practical benefits to the organization including easiness of accessibility, enhanced controlling system, increased efficiency and productivity, cost reduction, increased profitability, and financial performance in general. However, results revealed that implementing an effective cloud ERP is affected by the provider's professionalism.

Nicolaou (2004) compared 247 ERP systems adopters to non-adopters, before and after adoption, to examine the impact of ERP systems implementation on the adopters' long-term financial performance. The results revealed that firms adopting ERP achieved a significantly higher ROA differential performance for four years after the system installation. However, adopters' ROA was significantly worse in the implementation year and the year after. In addition, ROI was negatively affected by ERP adoption in the year of and the year following the implementation but there was a positive ERP effect on the firm's total ROI performance two years after the implementation.

3. CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

Our study relies on the results of the literature review of Tongsuksai et al. (2019). We grouped the CSFs of C-ERP implementation into six categories and used them as our independent variables. These categories are technological competence, relationships with outside experts and vendors, top management support, increased sharing of information, system characteristics, and organizational culture. The categories are described below.

3.1. Technological competencies

Raut, Gardas, Jha, and Priyadarshinee (2017) measured organizational readiness to IT in two dimensions: 1) Technological competencies, which refer to the infrastructure and human resources required to manage and use the cloud system; 2) Financial competencies, which refer to the financial resources required to implement a cloud computing system and necessary expenses to guarantee its continuous use. Firms with strong infrastructure, experts, and financial resources will gain better benefits from technologies.

Hasibaun and Dantes (2012) indicated that technology infrastructure contributes to the success of the ERP implementation. Firms need to have appropriate hardware, database management systems, operating systems, and telecommunications equipment that are suitable for the ERP system (Markus, Axline, Petrie, & Tanis, 2000). Albar and Hoque (2015) argued that it is easy for SMEs to start receiving C-ERP services by installing a software application onto their computers but they must make sure that they have a strong network to be able to use the cloud ERP system efficiently.

Enterprises should examine the compatibility of new technologies with their existing systems before adoption. They need to adjust their processes and incur major retraining programs (Rohani, 2015). McKenzie (2001) warned that compatibility may negatively affect businesses' use of IT.

Furthermore, firms must possess the relevant knowledge that is necessary to utilize any new IT technology. "Absorptive capacity" (ACAP) has been used as one of the critical success factors in IT (Galy & Sauceda, 2014). Waller and Fawcett (2013) argued that convenient management and technical skills play an essential role in the successful utilization of predictive analytics capabilities. Based on that, our first hypothesis is proposed as follows:

H1: Strong technological competencies in C-ERP firms significantly affect financial performance.

3.2. Relationships with outside experts and vendors

Firms receiving C-ERP services will need to deal with many outside experts, especially, C-ERP vendors, supporting hardware vendors, software, and telecommunications services. Defining a proper vendor is important. C-ERP success is strongly dependent on the cloud technology that may suffer from service outages or data transfer costs (Hofmann & Woods, 2010).

Cloud vendors are responsible for checking up with their clients on their technical support or maintenance needs (Peng & Gala, 2014). Zamzeer et al. (2020) found that vendors must offer 24/7 support agreements and help centers, continuous system testing and maintenance, and guarantee that users will not experience data loss or unavailability issues. If conflicts between the enterprise and the C-ERP provider were not resolved efficiently, it would affect the success of C-ERP (Hofmann & Woods, 2010). In addition, Stank, Keller, and Closs (2002) analyzed the supply-chain management module and found a positive relation between ROA and the suppliers — customers relationships. Based on the previous arguments, the following hypothesis is proposed:

H2: Strong relationships with outside experts and vendors in C-ERP firms significantly affect financial performance.

3.3. Top management support

Managers are more eager to adopt and support C-ERPs when they get financial benefits, save time, and are capable of tracking their firms' transactions and operations efficiently. Management would undervalue the importance of information technologies to organizational growth if it has failed in establishing profitable IT strategies; it will perceive information technologies as a liability and may not support any IT idea. On the other hand, management that perceives information technologies as an asset, will consider them essential to the firm's success and support such projects (Hansen, Kraemmergaard, & Mathiassen, 2011).

Top management has a significant influence on the successful adoption of IT since it is responsible for making strategic, tactical, and operational decisions (Eldalabeeh et al., 2021). Top management's significant perceptions and practices that affect the use of technology include assuring the firm's vision, values enforcement, building up a positive organizational climate, resources commitment and management, enhancing employees' self-efficacy, and helping in overcoming change barriers and resistance (Gangwar, Date, & Ramaswamy, 2015). Prior studies (Sharma & Keswani, 2014; Bingi, Sharma, & Godla, 1999) indicated that ERP systems are complex and require intense training that is supported by the top management. Moreover, management support also may include emotional support to mitigate the anxiety and stress that employees may face when dealing with new technology (Lee, Lee, Olson, & Chung, 2010).

Top management support is an important critical success factor for companies thinking of C-ERP services. Top management should guarantee a high level of employee morale and motivation. However, the empirical evidence for top management support is inconclusive, and its relationship to the success of the ERP implementation is not always apparent (Galy & Sauceda, 2014). For example, Law and Ngai (2007) found a significant relation between the top management support and business process enhancement as a result of adopting ERPs. However, the relation was not significant with the information systems user satisfaction. In addition, Bradford and Florin (2003) concluded in their study that the relation between management support and ERPs success was moderated by users' satisfaction. Our third hypothesis was proposed to investigate this contradiction as follows:

H3: Top management support in C-ERP firms significantly affects financial performance.

3.4. Increased sharing of information

The main advantages of C-ERP services include data integration and information sharing. By providing one central database for the whole organization, users will be granted direct access to all information they need (Grabski, Leech, & Schmidt, 2011).

ERP systems offer a single system and single database where firms can share and transfer data between departments and among the supply chain (Peng & Nunes, 2013). Organizations will be better able to gather, record, and interpret data of their business transactions. This is expected to improve firms' operational performance and enrich their competitiveness in the market.

According to Qian, Li, Cao, Ni, and Wu (2016), C-ERPs facilitate the technical and operational integration of firms' functions and assort data and information streams based on the products' lifecycles. This might lead to enhanced organization's market competitiveness and responsiveness. Hence, C-ERPs provide better availability, reliability, scalability, cost-efficiency, and higher firm performance. Furthermore, Duan, Faker, Fesak, and Stuart (2013) indicated that C-ERP systems enable firms to utilize advanced computing capabilities over the cloud. Beheshti (2006) argued, as well, that C-ERPs are capable of handling and managing the daily big amount of operations and information within the firm. Thus, firms' abilities to manage their business transactions and become more productive are enhanced.

C-ERP systems enhanced with e-commerce and big data predictive analytics provide firms with the capabilities of integrating and sharing resources and capabilities, cooperation with suppliers, and customers, and controlling forthcoming resources and final products. This intensifies the control from inside and outside the firm and provides enhanced reporting capabilities to the management to support strategic decision-making and resolve high uncertainties and strengthen their firm's competitiveness (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012). Based on this, we hypothesize the following:

H4: Increased sharing of information between departments and among the supply chain in C-ERP firms significantly affects financial performance.

3.5. System characteristics (efficiency)

Organizations consider cloud-computing services for cost-saving and late technology platforms acquisition reasons (Ali & Osmanaj, 2020). C-ERP services are cost-effective, efficient, adaptable, and scalable (Sharma & Keswani, 2014). They provide new functions at low costs; this will increase users' satisfaction and desire to keep using it (Chauhan & Jaiswal, 2015). According to Gupta and Misra (2016), C-ERPs provide organizations with huge benefits of quick implementation, scalability, accessibility, flexibility, sales automation, lower operational costs, improved security, and free trials.

With C-ERPs, needed financial and human resources to install and maintain legacy ERP systems are waived and costs will be reduced (Peng & Gala, 2014). Adopting C-ERP will minimize capital expenditures since firms can avoid buying, maintaining, and licensing on-premises systems.

Zamzeer et al. (2020) found that advantages of C-ERPs include independence, mobility and practicality, enhanced efficiency and availability regardless of having a massive infrastructure; additionally, simplicity and user-friendly interface. In C-ERPs, the cloud vendor monitors security. This would be an advantage for firms with low-security standards (Chen, Paxson, & Katz, 2010). However, C-ERPs are sometimes implanted in shared system landscapes, which may make them more vulnerable to attacks (Zissis & Lekkas, 2012). Zhong and Rohde (2014) have determined a combination of main promises and challenges for C-ERPs in their framework. This framework identified four dimensions of C-ERPs: flexibility, efficiency, security, and ubiquity. Overall, C-ERP systems will not bring exceptional advances to the firm's security but there are moderate effects that can be realized (Zhong & Rohde, 2014).

De Lone and Mc Lean (1992) defined a system's quality as the information system technical features and qualities which create the information output. Pai and Huang (2011) and Al-Fraihat, Joy, and Sinclair (2020) demonstrated that systems quality has a significant effect on the perceived ease of use and usefulness of the information system. They explained system quality by design quality, accessibility, and response time. Based on this, the following hypothesis is proposed:

H5: System characteristics and efficiency in C-ERP firms significantly affect financial performance.

3.6. Organizational culture

According to Needle (2010), organizational culture consists of the collective beliefs, values, principles, and behaviors of all enterprise members. It was considered as an intangible resource that enhances a firm's performance since it has accumulated over long periods of time and differs from one firm to another. Organizational members need to put efforts to upgrade their present knowledge from internal and external environments, especially in this competitive and dynamic environment of continuous economic, management, technological, political, and social changes. Khazanchi, Lewis, and Boyer (2007) viewed organizational culture in two orientations: First, control orientation, which ensures values predictability, efficiency, core competencies, value-practice interactions, and congruence. Second, flexible orientation, which ensures innovation, creativity, gullibility, and risk-taking. Previous studies (Al-Fraihat et al., 2020; Pai & Huang, 2011) indicated that service quality positively affects users' perceived IT usefulness and ease of use. According to these studies, service quality includes issues like on-time, professional, and personalized services. Potluri and Angiating (2018) defined service quality as the perceptions and judgements of the system by its information users.

The technology acceptance model (TAM) was found by Davis and Bagozzi (Davis, 1989; Bagozzi, Davis, & Warshaw, 1992) to explain and predict user acceptance of different types of technology. Contextual factors, such as technology factor (compatibility and complexity) and employee factors, may affect perceived usefulness and perceived ease of use, which affect attitude toward usage behavior. Kleintop, Blau, and Currall (1994) concluded that organizations could achieve a better perception of ease of use and usefulness and gain higher levels of acceptance of new IT systems by concentrating on the practice of its end users before

implementation. In addition, Alhanatleh and Akkaya (2020) used the TAM model to examine the factors that affect users' adoption of C-ERP systems pre- and post-implementation. They verified that the technology factor, employee factor, perceived usefulness, and perceived ease of use are important variables affecting users' attitude towards the use of C-ERPs and managerial decision-making. Based on this, the following is hypothesized:

H6: Organizational culture in C-ERP firms significantly affects financial performance.

4. METHODOLOGY

This section consists of sample description, data collection, measurement procedures, and instrument development.

4.1. Sampling

The initial sample of the study contained all public shareholding companies listed on the Amman Stock Exchange (ASE) at the end of 2018. The reason behind this time period selection is to ensure the availability of the financial results two years after the C-ERP implementation, as explained later in the measurement subsection. In addition, the reason behind considering public shareholding companies is the assumption that their financials are more accessible than those for the non-listed ones are (Yassin, 2017). The individual shareholding company was the unit of analysis.

The distribution of the 232 firms is provided in Table 1. Only 63 firms responded to the online survey that was sent to them, representing a response rate of about 27%. Fifty-seven (57) responding firms were implementing ERP systems. They have implemented one of the known ERP systems including SAP, PeopleSoft, Oracle, Baan, J.D. Edwards, etc. A sample of 45 firms had transferred their systems to the cloud (i.e., converted to C-ERP), representing about 79% of the ERP firms. The sample was dominated by the services sector, followed by the industrial sector, with percentages approximating 51% and 29%, respectively.

Table 1. Distribution of the final sample by sectors and subsectors

Sector	Total sample	Responded		Missing data	ERP	OP-ERP*		C-ERP**	
	N	n	%[a]			n	%[a]	n	%[b]
Banks	16	6	37.5		6	2	33.3	**4**	**8.9**
Insurance	21	6	28.6		6	1	16.7	**5**	**11.1**
Services	139	31	22.3	2	29	6	20.7	**23**	**51.1**
Industrial	56	19	33.9	3	16	3	18.8	**13**	**28.9**
Unknown		1		1	0				
Total	232	63	27.2	6	57	12	21.1	**45**	**100.0**

*Notes: * On-premises ERP; ** Cloud ERP; a: Percentage is calculated horizontally; b: Percentage is calculated vertically.*

4.2. Data collection

The website of the Jordan Securities Commission (https://jsc.gov.jo/Default/en) was visited to collect the formal emails of the target firms. An online questionnaire was developed to collect data about the independent variable — the key success factors in firms that implemented C-ERP. The questionnaire was sent to the target emails of information technology managers in September 2020. In November 2020, a call was made with the non-responding firms to ensure the receipt of the email, the correctness of the email address, or follow-up with the respondent. The data collection process took a period of four months, from September 2020 to January 2021. As shown in Table 1, although the data collection process revealed that 57 firms had ERP systems, only 45 firms had C-ERP.

For the 45 C-ERP firms, data about the dependent variables, and following Toumeh, Sofri, Yassin, and Ayoush (2021) and Saleh, Abu Afifa, and Alsufy (2020), the financial ratios were collected from the company guide available on the ASE website for the needed years. For each firm, we collect data ranging from a year prior to the C-ERP implementation to two years following the implementation. C-ERP was initially implemented in 2015, and the last firm in the sample that implemented C-ERP was in 2018. Based on that, the financial ratios used in this study were collected for the periods ranging from 2014 to 2020.

4.3. Measurement

4.3.1. Model

Because of the cause-and-effect nature of this study, an ordinary least square (OLS) regression is the multiple linear modeling technique that was used to predict the dependent variables with a set of independent variables used. Zamzeer et al. (2020) argued that few studies have been conducted in Jordan concerning the effects of cloud ERP adoption. They followed Yin (2013) by employing the case study approach for this type of research. Case studies are an alternative method that would be suitable for conducting this type of research. In addition, Zamzeer et al. (2020) explained that case studies are a helpful tool when exploring areas in which knowledge is limited.

Four models were run in order to test the effect of explanatory variables on four financial performance measures. The general model is described below.

$$FP_i = \beta_0 + \beta_1 TC_i + \beta_2 OE_i + \beta_3 MS_i + \beta_4 SI_i + \beta_5 SC_i + \beta_6 OC_i + \varepsilon_i \quad (1)$$

where:
FP_i: Financial performance for firm i;
TC_i: Technological competence in firm i;
OE_i: Outside experts in firm i;
MS_i: Management support in firm i;
SI_i: Sharing of information in firm i;
SC_i: System characteristics in firm i;
OC_i: Organizational culture in firm i;
ε_i: Error term for firm i.

It is worth noting that no previous literature, employed the same methodology (Galy & Sauceda, 2014), found a statistically significant effect of control variables. This could be referred to as the mixed approach that was used, which employed different measurement methods of independent and dependent variables. Independent and dependent variables are described in detail in the following subsections.

4.3.2. Independent variables

An online questionnaire was prepared to collect data about the independent variables. This questionnaire consists of two parts. The first part aimed at classifying firms into C-ERP firms and non-C-ERP firms. First, the respondents were asked whether their firm is using ERP or not and whether this ERP is on-premises or on the cloud. Then, they were asked about the date of implementing C-ERP. If the firm launched C-ERP, then the respondents were asked to continue to the second part of the questionnaire. It was found that, among the sample firms of this study, C-ERP was initially implemented in 2015.

The second part of the questionnaire aimed at collecting information about the key success factors of implementing C-ERP (i.e., independent variable). This part was divided into six categories. Each category measured a key success factor and consisted of a number of items. The total number of items was 27. These categories and their related items are technological competence for employees (items TC1 to TC3), the relationship with outside experts (items OE1 to OE6), the level of the management's support (items MS1 to MS3), the increased level of information sharing (items SI1 to SI5), the efficiency of the system characteristics (items SC1 to SC7) and the organizational culture (items OC1 to OC3). A five-point Likert scale was used for each item. All the scale points were labelled ranging from 1 (Strongly disagree) to 5 (Strongly agree). The independent variables, their measuring items, and the Cronbach's alpha coefficients of each variable in the scale are shown in Table 2. Cronbach's alpha coefficients indicate acceptable internal consistency reliability.

Table 2. Description of independent variables

Abbr.	*Variable*	*Item No.*	*Item*	*Cronbach's alpha*
TC	Technological competence	TC1	Employees have an advanced level of knowledge of C-ERPs and their advantages.	0.758
		TC2	The company has competencies in terms of technological infrastructure and human resources.	
		TC3	Employees have enough capabilities to establish an innovative face and upgrade technologies to promote information technology at any time.	
OE	Outside experts	OE1	It is easy for C-ERP service providers to integrate with other services depending on the needs of clients.	0.882
		OE2	C-ERP service providers are 24/7 available to meet client requirements.	
		OE3	C-ERP service providers can make modifications without harming the system or the service.	
		OE4	C-ERP service providers are capable of tracing and auditing.	
		OE5	C-ERP service providers are trustworthy.	
		OE6	The company had judiciously chosen a service provider who satisfies the company's needs and its business transactions.	
MS	Management support	MS1	The company has trained its employees before adopting the system.	0.791
		MS2	The top management has created an organizational environment that facilitates the use of new technology and work execution.	
		MS3	The top management has improved the level of openness and entrepreneurship in the organization's culture.	
SI	Sharing of information	SI1	Clients can access the cloud ERP system.	0.810
		SI2	C-ERP systems apply appropriate client restrictions and data sharing.	
		SI3	ERP projects enhance the scalability that decreases or increases resources and services based on the client's needs.	
		SI4	ERPs increase levels of transparency and accuracy in communications.	
		SI5	ERPs improve in-house cooperation and engagement inside organizations.	
SC	System characteristics	SC1	C-ERPs are friendly to users who don't need to be an expert in using computers.	0.777
		SC2	C-ERPs can retrieve data if removed by the client or the cloud services provider the issue that may expose sensitive information to unauthorized people.	
		SC3	C-ERPs are risk-free.	
		SC4	C-ERP service may quickly regain a healthy state of operations after an unintended inconvenience	
		SC5	C-ERPs are free from spyware, viruses, intrusions, or other risk vulnerabilities.	
		SC6	C-ERPs maintenance cost is low.	
		SC7	C-ERPs require a small amount of time for implementation.	
OC	Organizational culture	OC1	Users perceive cloud services as easy to learn, access and utilize.	0.842
		OC2	Users believe that using cloud services improves performance, productivity, and effectiveness.	
		OC3	Users are influenced by others' opinions about adopting new technologies.	
Overall				*0.904*

Source: Adapted from Tongsuksai et al. (2019).

The correlation matrix among independent variables is presented in Table 3. The matrix does not reveal a multicollinearity problem. The correlations were both positive and negative, and small to moderate values. They indicate that the multiple regression results will be reliable because the independent variables will be suitably correlated with the dependent variable.

Table 3. Descriptive statistics and correlation matrix of independent variables

Abbr.	*Variable*	*Mean*	*Std. Dev.*	*OE*	*MS*	*SI*	*SC*	*OC*
TC	Technological competence	3.36	1.32	-0.119	0.760**	-0.154	-0.243	-0.257
OE	Outside experts	3.79	0.66	1	-0.013	-0.195	0.268	0.227
MS	Management support	3.38	1.39		1	-0.074	-0.204	-0.165
SI	Sharing of information	3.90	0.68			1	0.161	0.167
SC	System characteristics	3.99	0.69				1	0.359*
OC	Organizational culture	4.13	0.46					1

*Note: * Significant at $p \leq 0.05$; ** Significant at $p \leq 0.01$.*

In addition, Table 3 presents the descriptive statistics to determine the tendencies and deviations of the collected data. The mean and standard deviation statistics of the independent variables show that all of the responses to the items measured are very close, but they are slightly different.

4.3.3. Dependent variables

Financial performance is the dependent variable of this study. The study used four variables to measure the financial performance, these variables are net revenues (*NR*), earnings before interest and tax (*EBIT*), *ROA*, and *ROI*. Using these variables is justified by using them in prior literature. Hendricks, Singhal, and Stratman (2007), Lee, Hong, and Katerattanaku (2004), Nicolaou (2004), and Tam (1998) emphasized the use of ROA and ROI as common financial performance measures that are affected by IT investment decisions. Galy and Sauceda (2014) argued that NR and EBIT are not commonly used measures but they are important to portray a complete picture for financial performance. Table 4 defines the financial performance measures used in this study in addition to the descriptive statistics of each one of them.

Table 4. Dependent variable — financial performance

Model	*Measure*	*Formula*	*Definition*	*Mean*	*Std. Dev.*
1	Net revenues (NR_i)	$\Delta NR_i = (NRi_{t+2} - NRi_{t-1})/NRi_{t-1}$	Gross sales or revenues fewer sales discounts, returns, and allowances, plus other revenues.	-0.14	10.74
2	Earnings before interest and tax ($EBIT_i$)	$\Delta EBIT_i = (EBITi_{t+2} - EBITi_{t-1})/EBITi_{t-1}$	A firm's net income before income tax expense and interest expenses are deducted.	-0.04	0.43
3	Return on assets (ROA_i)	$\Delta ROA_i = (ROAi_{t+2} - ROAi_{t-1})/ROAi_{t-1}$	Income before extraordinary items available for common stockholders, divided by total assets, multiplied by 100.	0.11	0.23
4	Return on investment (ROI_i)	$\Delta ROI_i = (ROIi_{t+2} - ROIi_{t-1})/ROIi_{t-1}$	Income before extraordinary items — available for common, divided by total investment capital, which is the sum of the following items: total long-term debt; preferred stock; minority interest, and total common equity. This item is then multiplied by 100.	-0.10	0.24

Source: Galy and Sauceda (2014).

Accordingly, the above-mentioned variables were used in the study to measure the increase or decrease in the financial performance of the firm that could be a result of implementing C-ERP. Following Nicolaou (2004), Galy and Sauceda (2014), and Ayoush, Toumeh, and Shabaneh (2021), the study measured the financial performance one year before the C-ERP implementation and two years following the implementation. Although Nicolaou and Bhattacharya (2006) stated that the ERP projects are long-term investment decisions, and their results would appear over the course of several years Kallunki, Laitinen, and Silvola (2011), the reason behind our period selection is that the implementation of C-ERP project is a medium-range investment because it is a conversion from the on-premises ERP to the cloud.

Each one of the financial performance measures is calculated as the percentage change in the measure two years after implementing C-ERP ($t + 2$) compared to one year before the implementation ($t - 1$), then dividing the difference by the same measure at the time ($t - 1$), as shown in Table 4. Moreover, the descriptive statistics in Table 4 showed that the changes in *NR, EBIT,* and *ROI* were negative (mean = -0.14, -0.04, -0.10, respectively), indicating that these variables had decreased, while the change in ROA was positive (mean = 0.11), indicating that this variable had increased after implementing C-ERP. The dispersions of the variables were small, ranging from 0.23 to 0.43, except for the *NR*, which scored 10.74.

As mentioned before, because C-ERP was initially implemented in 2015, the data was collected starting from 2014. Table 5 shows the distribution of our sample based on the date of the C-ERP implementation. It is clear that most of the sample firms implemented the C-ERP in the years 2016 and 2017.

Table 5. Date of C-ERP implementation

Date	*n*	*%*
01/01/2015	9	20.0
01/01/2016	14	31.1
01/01/2017	14	31.1
01/01/2018	8	17.8
Total	45	100.0

5. RESULTS

Table 6 reports the results of the OLS regression analysis used to predict four models of the change in financial performance measures: *NR, EBIT, ROA,* and *ROI*, respectively.

Model 1 shows the results of the percentage change in *NR* estimation for the 45 C-ERP firms, which classifies the model fitness as statistically significant (at $p \leq 0.01$), since the *F*-statistic scores 8.588. The model indicates that the percentage change in *NR* depends on the C-ERP system characteristics and the organizational culture, thus supporting *H5* and *H6*. Both independent variables were statistically significant (at $p \leq 0.01$). None of the other hypotheses was supported as significant. The R-squared result showed that the explanatory power of Model 1 is approximately 51%.

The same findings were assured in Model 2 which estimates the percentage change in *EBIT*, which scored an *F*-statistic of 8.091, indicating that the model is statistically significant (at $p \leq 0.01$). The same independent variables were significant (at $p \leq 0.01$). Again, C-ERP system characteristics and organizational culture predict the percentage change in *EBIT*. They scored *t*-statistics of 4.800 and 3.902, respectively. The results of estimating the percentage change in *EBIT* support *H5* and *H6*. The R-squared result reveals that approximately 49% of the data fit the regression model.

Different results were found in Model 3 that estimates the percentage change in *ROA*. The *F*-statistic scores 8.829, indicating that the model is statistically significant (at $p \leq 0.01$). The R-squared score was approximately 52%, it was the highest among the four models. The model indicates that the percentage change in *ROA* is predicted by technological competence among the employees, management support, and C-ERP system characteristics. The independent variables were significant (at $p \leq 0.01$). These results support *H1, H3,* and *H5*.

Other different results appeared in Model 4 which estimates the percentage change in *ROI*. The model indicates that the percentage change in *ROI* is explained by technological competence among the employees, management support, C-ERP system characteristics, and organizational culture. System characteristics were significant (at $p \leq 0.01$), technological competence and organizational culture were significant (at $p \leq 0.05$), and management support was significant (at $p \leq 0.1$). The results of estimating the percentage change in *ROI* support *H1, H3, H5,* and *H6*. The overall fitness of the model is shown by *F*-statistic which scored 4.879, indicating that the model is statistically significant (at $p \leq 0.01$). The R-squared result showed that the explanatory power of Model 4 is approximately 35%.

Among the four models, it could be noticed that the most explaining model was Model 3, which estimated the percentage change in *ROA*. This model scored the higher R-squared and higher *F*-statistic, while Model 4 had the higher number of significant independent variables. In addition, it could be noticed that all of the significant independent variables positively affect all of the dependent variables in the four models. Furthermore, OLS results among the four different models: neither *H2* nor *H4* was supported.

Table 6. OLS regression analysis

Model	***1***	***2***	***3***	***4***
Variable	ΔNR_i	$\Delta EBIT_i$	ΔROA_i	ΔROI_i
(Constant)	-0.175	0.590	-49.249***	-2.724***
	(-0.571)	(1.210)	(-3.405)	(-4.052)
TC	0.250	0.151	0.789***	0.42**
	(1.475)	(1.311)	(4.686)	(2.144)
OE	0.007	0.041	0.047	0.160
	(0.062)	(0.332)	(0.403)	(1.189)
MS	0.078	0.054	0.590***	0.354*
	(0.471)	(0.351)	(3.599)	(1.858)
SI	0.095	0.040	0.113	0.019
	(0.839)	(0.349)	(1.001)	(0.148)
SC	0.735***	0.806***	0.629***	0.413***
	(6.175)	(4.800)	(5.331)	(3.010)
OC	0.503***	0.488***	0.004	0.293**
	(4.280)	(3.902)	(0.030)	(2.158)
R-square	0.509	0.492	0.516	0.346
F-value	8.588***	8.091***	8.829***	4.879***
Number of observations	45	45	45	45

*Notes: *** Significant at p ≤ 0.01; ** Significant at p ≤ 0.05; * Significant at p ≤ 0.1. T-statistic is in brackets.*

To summarize, the results could be explained as follows:

– *Technological competencies:* The result is consistent with Hasibaun and Dantes (2012) who argued that firms with strong infrastructure, experts, and financial resources will gain better benefits from technologies. The result indicates that the infrastructure and human resources required to manage and use the cloud system affect financial performance.

– *Top management support:* Top management has a significant influence on the successful adoption of IT. Management that perceives information technologies as an asset, will consider them essential to the firm's success and support such projects. This result is consistent with Eldalabeeh et al. (2021), Sharma and Keswani (2014), Hansen et al. (2011).

– *System characteristics and efficiency:* C-ERP services are cost-effective, efficient, adaptable, and scalable (Sharma & Keswani, 2014). This, in turn, will improve the firm performance in general, and specifically, financial performance. This result is consistent with Ali and Osmanaj (2020), Gupta and Misra (2016), Chauhan and Jaiswal (2015).

– *Organizational culture:* Technology factor, employee factor, perceived usefulness, and perceived ease of use are important variables affecting users' attitude towards the use of C-ERPs and managerial decision-making. This will be reflected in improving the financial performance. This result is consistent with Alhanatleh and Akkaya (2020), Al-Fraihat et al. (2020), Needle (2010).

6. CONCLUSION

In the last decade, many companies tend to adopt C-ERP systems, as a way to improve operational and financial performance. It was found that the market share of C-ERP systems had more than doubled, indicating that C-ERP is becoming more popular and replacing legacy ERP system.

This study builds on prior C-ERP literature by trying to provide empirical evidence of the cause-and-effect relationship between the CSFs of C-ERP systems, as managerial practices, and the financial performance. This emphasizes that various managerial techniques could make a difference in long-term financial success.

OLS found that financial performance is explained by technological competence, management support, organizational culture, and system characteristics. They are both internal and external variables. Technological competence is an internal variable that measures the level of technological skills among employees. Management support is a measure of the help and support that is provided by management to the employees, it is also an internal variable. Another internal variable is the organizational culture; it describes the internal environment of firms. System characteristics are the only external variable that affects financial performance. It describes the inherent characteristics of the outsourced C-ERP.

The main limitation of this study is that the perceptions of the respondents are a snapshot view after implementing C-ERP, while the financial data are longitudinal. Implementing the different stages of questionnaires could provide different insights.

Further research could employ different CSFs of C-ERP. These factors could be enlarged to include more factors that were not measured in this study. The focus in this study was on internal significant factors concerning the firm itself, in addition to one external factor. These factors could be enlarged to include factors that are more external. Furthermore, the research could be conducted to determine which factors contribute to the highest success and failure rates. Moreover, financial performance measures that were used in this study include the book financial performance. Further research could include capital market financial performance.

Overall, the results provide practical implications for firms' decision-makers to emphasize the technological competencies in their firms, which refer to the cloud infrastructure and human resources required to use and manage the cloud system. In addition, top management should guarantee a high level of employee morale and motivation and focus on ensuring the long-term vision, enhancing individuals' self-efficacy through supporting training, and helping in overcoming change barriers and resistance, in addition to mitigating anxiety and stress which employees may face when dealing with new technology. These practices are expected to affect the use of technology. Moreover, the results may help cloud service providers in providing high-quality service with maximum benefits, such as flexibility, accessibility, scalability, quick implementation, improved security, and lower operating costs.

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