

RESEARCH ARTICLE

Critical Success Factors for ERP Systems' Post-Implementations of SMEs in Saudi Arabia: A Top Management and Vendors' Perspective

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ABSTRACT Although numerous case studies have determined the critical success factors (CSFs) for enterprise resource planning (ERP) during the adoption and implementation stages, empirical investigations of CSFs for ERP in post-implementation stages (after going live) are in scarcity. As such, this study examined the influence of top management support and vendor support as CSFs on the post-implementation stage of ERP systems in small and medium enterprises (SMEs) established in the Kingdom of Saudi Arabia (KSA). A total of 177 end-users of ERP systems from two manufacturing organizations in KSA that had implemented on-premises ERP systems were involved in this study. Data gathered from structured questionnaires were analyzed using SmartPLS3 and SPSS software programs. The regression analysis was performed to assess the correlations among the variables. Out of seven CSFs identified from the literature, the impact of top management support was significant on user training, competency of internal Information Technology (IT) department, and effective communication between departments, but insignificant on continuous vendor support. Meanwhile, continuous vendor support had a significant influence on continuous integration of the system, but was insignificant on user interfaces and custom code. The study outcomes may serve as practical guidance for effective post-implementation in ERP systems. Referring to the proposed research model, ERP post-implementation success in KSA was significantly influenced by top management support, whereas continuous vendor support displayed a substantial impact on the continuous integration of ERP systems.

INDEX TERMS Post-implementation, success factors, critical success factors (CSFs), enterprise resource planning (ERP), small and medium enterprises (SMEs), kingdom of Saudi Arabia (KSA).

I. INTRODUCTION

Enterprise resources planning (ERP) systems are customizable enterprise-wide packages that can integrate all functions of an organization into a centralized platform with a shared database. The concept of critical success factors

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(CSFs) has garnered attention in the domain of information system (IS), especially ERP systems [1]. Organizations that implement ERP systems display a greater level of implementation success results as these systems have been heralded as a game-changer in solving Y2K issue and in providing an integrated enterprise solution to enhance both operational efficiencies and overall business management [2]. Although a huge number of well-known CSFs has facilitated in

preventing ERP project failures, such projects have miserably failed and faced challenges in the post-implementation stage [3]. As a result, many researchers have expressed concerns regarding the efficacy of the outlined CSFs and their contributions to optimization success. According to [4], organizations do not show the success of ERP systems after going live, but the ERP failure rate is extremely high. This is because; many factors can positively or negatively affect the success of ERP systems at post-implementation. The criticality of a factor can be determined conceptually only after it has been proved that it impacts organization performance or aid in achieving a desired successful outcome, such as the success of a specific stage or phase of an ERP project. Introducing a factor as a CSF is not beneficial to industries unless it is empirically proven to be crucial to the success of the desired result.

Although many studies [5], [6], [7] have examined the impact of CSFs on ERP systems during adoption and implementation stages, the effect of top management support and vendor support as CSFs during the post-implementation stage is largely neglected. Albar and Hoque [8] reported that ERP post-implementation in the Kingdom of Saudi Arabia (KSA) was not as successful as in other parts of the world. Despite the few ERP projects in KSA, he claimed that they faced similar challenges as worldwide deployments.

Some of the most significant obstacles faced by organizations in KSA were caused by unskilled vendors who were not dedicated to the project's success [9]. Al-Harhi and Saudagar [10] identified the problem of insufficient trained top management to be a key hurdle in the course of ERP post-implementation by Saudi industrial enterprises. Ali [11] found that many manufacturers in KSA failed to connect their business operations with ERP software during the ERP post-implementation phase, thus resulting in massive losses.

The literature on successful ERP implementation records many case studies, but only a handful of empirical studies have examined the success aspects of ERP post-implementation. Besides, most of the empirical studies were conducted in the West, while only a few had looked at post-implementation in Middle Eastern countries and none in KSA. This signifies the pressing need to assess the impact of top management support and vendor support as CSFs on ERP post-implementation in KSA manufacturing enterprises. As such, this study investigated the influence of top management support and vendor support on ERP post-implementation success of small and medium enterprises (SMEs) established in KSA.

The main objective of this study is to establish the influence of top management support and vendor support on successful ERP post-implementation in Saudi Arabian SMEs. This study contributes by shedding light on the functions of top management support and vendor support as CSFs empirically in light of post-implementation. It also highlights the significance of establishing CSFs empirically as 'critical', rather than simply identifying them as potential CSFs. The study outcomes can

enhance the quality of CSF in ERP post-implementation research output and industry knowledge transfer.

This study consists of 9 sections; Section 1 presents a brief introduction about the study. Section 2 offers the theoretical background and research hypotheses, while the research method is discussed in section 3. Section 4 discusses the findings, whereas section 5 presents the results of hypotheses testing and path analysis. Study contributions and future research suggestions are presented in sections 6 and 7, respectively. Section 8 lists the study limitations and section 9 concludes this study.

II. THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

A. THEORETICAL BACKGROUND

1) MEASURING SUCCESS

Evaluating the success of ERP systems is particularly challenging attributable to the complexity of the system. However, researchers and practitioners are still debating on methods to quantify or assess the benefits and value of IS for businesses [12]. The D&M (1992) IS success model adds to the IS research domain in two ways: it offers a framework for categorizing the multiple IS success measures used to assess IS efficacy or success. Second, it indicates that the dimensions/constructs of IS success are inextricably linked. One of the early barriers of ERP studies research, as represented in prior studies was to determine both success and acceptance when evaluating the results of an ERP project [13]. Definitions of ERP system success experience have progressed in connection with the development and growth of ERP research domain, which has expanded far beyond system integration trend to include socio-technical theory, data modeling, and post-implementation investigations of organizational factors and influences [11]. Although ERP is a subset of IS, its adoption differs from other traditional IS in two significant ways [14]. First, ERP software implementation necessitates business process engineering attempts to fundamentally alter the adoption decision. Second, unlike other IS application deployments, ERP implementation is rather intricate.

Undoubtedly, the adoption process finds it impossible to begin on such a venture without the assistance of external knowledge. As a result, the success measurement methodologies used in other common IS success evaluations may be insufficient for ERP systems. However, diverse approaches to identify ERP post-implementation success can be divided into two broad categories [15]; the first category is project success to a broader view focused on the organization or defined as "attempting to bring the project on time and under budget". The following is organization, which underscores business process assessment and improvement. Nonetheless, the meaning of success can shift over the course of an ERP project. According to Markus and Tanis [16], the theory of success reflects a changing and increasingly challenging concept rather than a fixed measure, depicting that the definition of success may differ based on the scope from which it

is assessed. Measuring success in ERP post-implementation level is a difficult concept signified by several viewpoints, including organizational performance and business benefits. According to [17], the pinnacle of post-implementation success is achieved when the organization sees advantages in the deployed system.

Measuring ERP post-implementation success may be determined by the point in stages at which it is measured. The three distinct stages in the life cycle of ERP are pre-implementation, implementation, and post-implementation stages. Pre-implementation success is associated with resources allocated to the project, while success in the implementation stage denotes delivering the project on time, within budget, and incorporating operational processes as defined within the project scope. Lastly, post-implementation success is related to achieving the desired results, enhancing business processes, deploying regular maintenance, and upgrading the ERP system [18].

2) CSFS FOR ERP POST-IMPLEMENTATION

One area that has not received much attention is evaluating ERP success after going live, particularly post-implementation in adopting organizations [19]. Previous studies revealed a broad range of CSFs for ERP post-implementation, with context-related factors consistently appearing. Some top CSFs found in the literature include top management support, ERP system that matches the business process, qualified project team members, consultant efficiency, viable IT infrastructure, effective information transfer, project management efficiency, Business Process Reengineering (BPR) efficacy, testing quality, flexible project timeframe, and clear understanding about the use and nature of ERP systems [6], [19]. As outlined in [20], the CSFs in the ERP post-implementation stage are: employee engagement, end-user satisfaction, organizational productivity, continuing education facilities, software dependability, support, and ongoing maintenance. According to Ha and Ahn [21], support from upper management, competency of ERP internal team, user training, inter-departmental communication, continuous process optimization, and continuous systems integration, as CSFs, can affect ERP post-implementation success. Nicolaou [19], some well-known researchers in this field, also identified the CSF dimensions of ERP success in the post-implementation phase, such as assessment of suitability with a long-term vision, evaluation of project planning efficiency, assessment of infrastructure development, evaluation of system integration accomplishment and disclosure flexibility, analysis of level of attainment of related system benefits, evaluation of driving principles for the project, evaluation of project rationalization practices, and evaluation of effective knowledge transmission based on a review of user learning (among project team members & other users). Zhu *et al.* [17], found that IT governance, organizational consensus, implementation quality, and organizational preparedness are factors to consider as most CSFs influence ERP post-implementation success. Chien *et al.*

[22] found only system quality and service quality as CSFs influenced post-implementation success. Another study [23] discovered the consistency between internal factors (User interaction, TMS, project manager management, & team member competency) and external factors (vendor assistance & consultant expertise) as CSFs in the success of ERP at the post-implementation stage. Zare and Ravasan [23] evaluated the performance success of several firms in post-implementation. Based on their proposed model, they found factors that contributed to the success of ERP systems after going live, such as quality of service, system quality, quality of information, influence, teamwork impact, and organizational influence - all being important considerations.

Shatat Dana [24] asserted that there are many CSFs to consider at both pre- and post-ERP system implementations. The literature depicts that many variables as CSF in ERP pre-implementation are indeed closely related to post-implementation (e.g., project management, project champion, & BPR) and must not be seen in isolation. The concept of success is controversial and susceptible to interpretation. Hence, it could be a good idea to revert to the original concept of CSFs as a few essential 'areas' [25], instead of dealing with individual variables in isolation in terms of the major 'areas' where existing ERP research work offers empirical data. Instead of mentioning studies that present a list of key elements, this present study discusses prior work that has looked into individual aspects in prominent IS journals. Referring to their original definition, however, CSFs are industry-specific, company-specific, and occasionally manager-specific [25], [26]; non-receptive to a "one-size-fits-all" strategy. Nonetheless, this study upholds those studies related to CSF should focus on core regions rather than working with variables.

B. THE RESEARCH HYPOTHESES

The findings from the literature reviews were deployed to develop the study model, as illustrated in Figure 1. The model posits that the success of post-implementation is indicated broadly by two sets of factors: top management support and continuous ERP vendor support. Based on these sets, this study determined their influence with other identified CSFs. The hypotheses of the model are explained in the following:

1) HYPOTHESIS 1

Organizational top management attitudes are more likely to moderate the linkages between all five qualities of innovations and adoption decisions [27]. The responsibility of the top management when adopting innovations is to influence individuals by conveying the innovation to them, teaching users how to utilize it, and exerting normative pressure [28]. Training provided as part of the initial ERP project deployment is one of the major success elements stated in past studies, thus being recognized as one of the variables that never stops once the ERP system implementation is completed. The top management has a significant impact on the training needs upon ERP deployment [29]. In reality, training is encouraged to keep going as organizations make

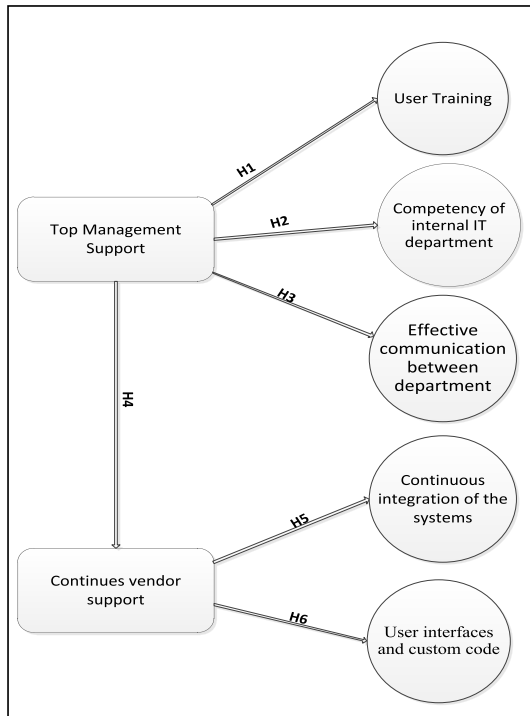


FIGURE 1. Conceptual research model.

additional adjustments to their systems, and it is regarded among the most important critical components in ERP post-implementation success. According to [30], managers' support in training programs is defined as the managers' ability to provide proper emotional support (e.g., encouragement, caring, & open-mindedness) and instrumental support (e.g., offer training opportunities, training provisions, and appealing training locations) prior, during, and/or after training implementation of ERP systems. According to Parthasarathy and Sharma [28], effective ERP post-installation strategy should take into account (a) an appropriate implementation technique, (b) training plan, and (c) data transfer plan. The top management should also implement and monitor training plans to ensure willingness among employees to adapt to change in the post-implementation stage. Hence, the first hypothesis is:

H1: Top management support has a direct impact on user training.

2) HYPOTHESIS 2

According to Hecht [31], IT department capabilities is one of the CSFs in both ERP implementation and post-implementation stages. The most significant group of individuals in the adoption of an enterprise system is the top management. Top executive views and degrees of support have a huge impact on the attitude or involvement of organizational internal IT departments in embracing such systems [32]. The willingness and active support from senior executives in the post-implementation stage play an essential role in the general orientation of internal employees of the

organizational IT department. Leaders of organizations confront a strategic risk when they rely on ERP system providers, particularly on internal IT infrastructure and support [33]. As ERP system suppliers often handle and support IT infrastructure, software, and data backups; the top management may lose its current IT expertise in businesses as organization executives may meet pushback to organizational changes during the post-implementation stage from the IT division [34]. After evaluating the provider's market position, the senior management should begin the implementation process by appointing a qualified IT staff member. Furthermore, senior management should analyze the vendor's financial history, dependability, experience, costs, and user evaluations before selecting a vendor to offset internal IT department opposition [35]. According to Ifinedo *et al.* [36], one of the most important concerns that businesses confront after going live is loss of in-house ERP expertise. As such, the following is hypothesized:

H2: Top management support has a direct impact on the competency of the internal IT department.

3) HYPOTHESIS 3

Securing top management support for ERP deployment by allocating adequate resources is crucial to the performance of ERP post-implementation phase [37]. When senior management is dedicated, they give the resources required to complete a project and utilize them to avoid cost overruns, modifications in scope, and late delivery. Effective communication is a CSF in ERP post-implementation as it lowers resistance to change and yields a high rate of deployment [34], [38]. Employees and other stakeholders should be informed about the project's importance, aims and objectives, as well as progress, by the top management to guarantee successful implementation and accomplishment of the planned goals [39]. The top management should devise a communication plan for ERP installation projects [40]. Developing a communication framework between departments decreases the possibility of user resistance while also keeping the management informed of the project status. According to Darmaningrat [41], among the most significant actions in the post-implementation period are interdepartmental communication and collaboration, as well as other organizational initiatives (e.g., the initial implementation stage), which demand the support of top management. As such, the following hypothesis is proposed:

H3: Top management support has a direct impact on effective communication between departments.

4) HYPOTHESIS 4

Ndubisi asserted that the responsibility of the senior management is to work with ERP providers to maintain and support the ERP program, as well as to give additions or any modifications needed in the source code to maintain the software updated with technical and commercial progress [42]. These enable users to configure to meet business and functional specifications by requiring the providers to make source code

changes. ERP systems are more challenging to adjust or tailor to the exact commercial objectives of an organization. Continued vendor support for the required customization may raise the cost of ERP post-implementation, wherein organizations should weigh the cost versus the requirement for customization [43]. One of the top management responsibilities is to pick an ERP provider that delivers ERP features and functionalities tailored to the firm's business and functional requirements [44]. According to Kinyua, [44] the incorporation of ERP vendors in the project is crucial because successful ERP projects have a "vendor-accelerated deployment approach" that ensures timely system implementation. Thus, both top management and vendors must work together as one team. Because collaboration in ERP implementer-vendor partnering is a critical element that affects both the ERP implementation and the post-implementation successes. The top management should choose ERP system vendors that allow users to configure business requirements during post-implementation without further need for programming [45]. The preceding discussion proposes the following hypothesis:

H4: Top management support has a direct impact on continuous vendor support.

5) HYPOTHESIS 5

Ghobakhloo *et al.* [14] and Ghazaleh [46] identified continuous integration of ERP systems as a CSF in the post-implementation phase. Both ERP systems and vendor support tend to be siloed as their contrasting architectures make integration difficult [13]. Moreover, ERP implementing organizations require extensive vendor assistance as ERP systems are exceedingly complicated projects, and it is impossible for an adopting corporation to take on such an endeavour without the assistance of third parties [47]. The ERP implementation is frequently a long-term investment for enterprises, so as to enhance the compatibility between organizations and systems, in which new ERP system modules should be deployed or upgraded on a regular basis [48]. User education, technical assistance, emergency maintenance, upgrades, service responsiveness, and dependability are all instances of vendor support operations [49]. The ERP providers should supply appropriate user guides, operating guides, manual, and other official documents necessary for the usage of the ERP system. Alkhaffaf *et al.* [50] found that vendor support helps to improve the efficacy of ERP systems at the implementation and post-implementation stages. Although organization leaders can adjust the system during rollout to facilitate customization of application components within a predetermined scope, such as creating extra data fields, developing new templates, revising process workflows, revising business rules, as well as developing reports and dashboards, configuration does not significantly alter source codes [51]. Continued vendor help was positively related to continued system integration [52]. Hence, the hypothesis below is proposed:

H5: Continuous vendor support has a direct impact on continuous integration of the systems.

6) HYPOTHESIS 6

Parhizkar and Comuzzi [53] found that the simplicity of user interface of the ERP system is a CSF in the ERP post-implementation face. He added that most of the ERP vendors impacted both the implemented ERP system and the organization's personnel on upgrade of ERP interface and custom code.

The effect of ERP upgrade on an existing ERP system may be quantified in three ways: vendor-system interaction, relationship between IT support employees and vendors, as well as relationships among systems [54]. The impact of continued vendor support on user interface is reflected in the relationship between end users and support staff when it comes to the relationship between users and vendors as a result of modifications brought in user interfaces due to an upgrade an adaptability adjustment undertaken by firms when executing new technology denotes hiring external specialists [55]. According to Aslam *et al.* [56], the reliance on third-party service providers as a fundamental factor distinguishes the ERP post-implementation from other IS post-implementations. The standard of user interface given by ERP suppliers stretches a long distance toward assuring a favourable result for the company adopting the system. As a result, the following is proposed:

H6: Continuous vendor support has a direct impact on user interfaces and custom code.

7) HYPOTHESES FOR MEDIATION VARIABLE

Gable *et al.* [57] incorporated the relationship between top management support and continuous vendor support as a CSF in ERP post-implementation success. Another study revealed a strong link between continuous vendor support and continuous integration of the systems [60]. One of the primary reasons for this tendency is that cross-enterprise integration will remain a significant organizational aim, particularly for those whose company performance is directly dependent on the success of their supply chain. Moreover, [54] reported linkages among continuous vendor support and user interfaces and custom code mainly because the client-side interface and custom code refer to bug fixes and help-desk requests, whereas vendor-side maintenance is composed of installation of hot-packs (system patches), enhancement packs, and online service system (OSS) that offer updates on patches for the system. Notably, nomenclature differs based on the vendor; for example, SAP refers to enhancement packages and support pack stacks for commencing custom code maintenance tasks. Thus, this study proposes that continuous vendor support has positive mediation effects on the relationship between top management support and user interface and custom code, as well as the relationship between top management support and continuous integration of the system.

III. METHODOLOGY

This study employed a quantitative method. Because quantitative research is more scientific, objective, rapid, focused,

and accepted, it is usually chosen over qualitative [58]. Moreover, a quantitative study generalizes concepts in a wider manner, predicts future outcomes, or investigates causal relationships. Upon comparing the research method deployed in this study with another similar one conducted by SOLTAN [59] to assess the relationship among CSFs in contributing to the success of ERP at the post-implementation phase in the Iranian automotive industry, the factor was analyzed via quantitative empirical study using Exploratory Factor Analysis (EFA) for measurement of scales and constructs. Another similar research method was performed by Perera and Munasinghe [60] to examine factors that affected ERP post-implementation success in the Sri Lankan apparel industry. Interview questionnaires were among the other strategies used to gather data. The sample was selected using the non-probability sampling approach called convenience sampling. The descriptive statistics of Stepwise Regression Analysis and Principal Component Analysis were used to determine the total ERP post-implementation success factors and the relationships among the variables.

As the study objectives are to identify the influence of top management support and vendor support on ERP post-implementation success of SMEs in KSA, the research targets are end users of ERP systems across selected Saudi firms that had adopted the ERP systems within less than two years. Data were examined from two case studies to determine the impact of top management support and vendor support as CSFs on ERP post-implementation success in terms of utilizing the expected capabilities. The SmartPLS3 technique was employed to analyze the results, as it has certain advantages over LISREL or AMOS for a small sample size (<200), enables cross-variable multicollinearity [61] required for regression and component analysis concurrently, as well as simple to utilize for complicated causal connections. The SPSS software was also used in conjunction with the SmartPLS3 software.

A. THE QUESTIONNAIRE

A questionnaire was developed to in this study to design the proposed research model and to formulate the hypotheses. The questionnaire was composed of two sections. The first section gathered the demographic profile of the respondents, such as age, gender, qualification, and familiarity with the ERP system. The model constructs were categorized in accordance with measurement items (see Appendix A) in the second section. In total, 22 items were used to assess the model components. In order to assess the various components of the study model, scales were incorporated into the questionnaire. The respondents were asked to assess the impact of the survey instrument of several success criteria on the ERP post-implementation stage using the five-point Likert scale [62], which ranged from 1 (very low) to 5 (extremely high).

One of the constructs included a two-item measures' which is (Top management support) construct. As prescribed in [63], [64], and [65], single-item measures may suffice. Yong and Sean asserted that a factor with two variables is only

considered reliable when the variables are highly correlated with each another ($r > .70$) but fairly uncorrelated with other variables [66].

Face and content validity were measured to validate the questionnaire. Seven ERP project managers with advanced degrees and more than five years of experience examined the questionnaire to verify face validity. Face validity was tested by distributing the survey to a group of questionnaire creation and IS research professionals. Face validity was determined to ensure if the instrument made sense, to be understood, and appropriate for the specified period. Following that, content validity testing was performed. It is concerned with "the extent to which a questionnaire contains an accurate sample of measurements for the variable being examined" [67]. A panel of seven experts from IS and other related disciplines, including a language expert, evaluated the content validity. As the initial English surveys were translated into Arabic, the questions were modified in terms of language, phrasing, and clarity based on the feedback retrieved from these specialists. All expert recommendations were implemented, and the instrument was pilot tested and deemed ready for the pilot study.

A pilot test identifies and fixes issues/setbacks in instrument and instrument layout concerns. Cooper and Schindler [68] suggested that the sample size for the pilot study should range from 25-100 people. Thus, 80 questionnaires were distributed online to both case studies (40 for each company). Of the 56 questionnaires received, five were discarded because the respondents had no prior experience with ERP systems.

B. CASE BACKGROUND

The study sample comprised of ERP system users in Saudi Arabian businesses who have implemented on-premises ERP systems that's installed locally. The two organizations were chosen owing to the requirement to acquire precise data on each organization's ERP implementation process. The organizations differed significantly in size, industry, and degree of "success" in their ERP system implementation effort. Also, participants existed in the enterprise before the installation. The first case refers to the Granite and Marble factory company (hereafter referred to as Company A), implemented (SAP R/3) in October 2015. It is one of the leading companies in the field of high-quality granite production located in (Al Muzahimiyah) in the central Kingdom of Saudi Arabia. It has a monthly output capacity of 120,000 square meters. The plant is distinguished by the manufacturing of tiles and panels of various sizes and thicknesses for use in floors and walls, as well as interior and exterior cladding and ornamental work. The second case is a medium-sized food sector (hereinafter referred to as Company B) that adopted the (Oracle business suite) in March 2017. Oracle Financial Analytics, Oracle Human Resources Analytics, Oracle Procurement, and Oracle Supply Chain are the modules of the ERP system installed in this industry. Their products include jam, preserved fruits, tomato paste, ketchup, mayonnaise, sauces, natural vinegar,

and dairy products for the manufacturing of biscuits and pastries. Their supplies include commercial complexes, retail stores, and groceries across the KSA.

C. DATA COLLECTION

The following procedure was executed to gather data: First, the two selected companies and the related heads of the department were determined, and their contact details were collected. Second, the heads of the department were invited to participate in the web survey. Third, the questionnaire was distributed via online, and six weeks were given to them to complete the survey. From the 214 distributed questionnaires, 186 were collected and 177 viable questionnaires were used for analysis. In order to acquire such a high number of respondents, the authors arranged appointments with some respondents and individually contacted them to complete the questionnaire. Table 1 lists the demographics of the respondents and the two selected organizations.

The sample size calculation was performed using G*Power software and the power analysis was determined by the following factors: effect size with a value of 0.15, power (1-β) with a value of 0.95, significance level (α) equal to 0.05, and type of statistical analysis was linear multiple regression fixed model R2 deviation from zero [69]. The sample size was also determined by the rule of thumb; and which is a rough method; based on it the minimum required sample size was 10 [70]. The statistical test revealed a significance of 0.05. With the absence of Type II error, the suitable sample size is 107. Hence, 177 respondents are adequate and large enough for this study.

D. DATA ANALYSIS

Descriptive statistics approaches were used to characterize the attributes of the research sample, which included:

- 1) Statistical (Linear Regression Analysis) significance of the study hypotheses was established using simple and multiple tests.
- 2) The determination coefficient (R2) was used to determine the ability of the model (fitness) to explain the connections among the variables.
- 3) The (t-test) was used to assess the intensity of the interactions among the factors.
- 4) Composite reliability test was deployed to assess reliability since Cronbach's alpha may overestimate or underestimate scale dependability. Composite reliability may lead to greater estimations of genuine reliability when compared to Cronbach's alpha.
- 5) Convergent validity, which is a subset of criterion validity, was determined by testing the model's Goodness of Fit (GoF).

IV. RESULTS

A. DEMOGRAPHIC BACKGROUND

Among the 177 respondents, 82% were male and 18% were female. The largest group of respondents (45%) was 30-40

TABLE 1. Demographic statistics.

Demographic characteristics		Percentage
Gender	Male	82%
	Female	18%
Age	Below 30	39%
	30 to 40	45%
	50 to 40	9%
	Above 50	7%
Education	BSS	79%
	MSS	12%
	PhD	9%
Tenure in the company	Less than 2 years	27%
	2 to 5 years	31%
	6 to 10 years	36%
	More than 10 years	6%
Collected data per company		
	Responses	Total
Company A	93	177
Company B	84	

TABLE 2. Analysis of the study scales.

Acceptance score	Relative weight	percentage	Statistical significance
Strongly Agree	5	Greater than 80%	Very high Acceptance rating
Agree	4	79-70%	High degree of Acceptance
Neutral	3	69-50%	Medium Acceptance score
Disagree	2	49-20%	Low Acceptance score
Strongly Disagree	1	Less than 20%	No degree of Acceptance

years old, while the lowest group (7%) was above 50 years old. Most of the respondents (79%) held BSc and the least had MSc and PhD by 12% and 9%, respectively. The majority of the respondents (31-36%) had 5-10 years of work experience, while the minority (27%) stated fewer than two years of work experience. Finally, most of the respondents were from company A (93), whereas (84) respondents were from company B. The demographic details are tabulated in Table 1.

B. STUDY SCALE MEASUREMENT ANALYSIS

The degree of responses for all study axes and each of the independent variables had been tested. The mediating and dependent variables were measured using the Likert scale, which ranged from strongly agree to strongly disagree (see Table 2).

The hypothetical mean for this study is as follows: The overall score for the scale is the sum of the weights multiplied by their number (5 + 4 + 3 + 2 + 1)/5. = (15/5) = 3). It reflects the hypothetical mean of the study, and accordingly, the average of the phrase that exceeds the hypothetical mean (3) [71] signifies the approval of the sample members on the phrase. If the average of the phrase decreases from the hypothetical mean (3), it indicates the disagreement of the sample members with the phrase.

C. CONSTRUCT MEASUREMENT ANALYSIS

The PLS program was used as the analytical tool in this study to test the hypotheses. The data analysis was performed in two stages: The first phase explored the content, convergent, and discriminant validity of the variables, while the second phase tested the hypotheses embedded in the study model [72].

1) EVALUATION OF THE STRUCTURAL MODEL

The method prescribed by Hair [73] was used to evaluate the structural model. It assesses the collinearity, importance, and relevance of the structural model connections; the mediating effects of relevance; and the physical accessibility indicated in the research model based on the degree of R^2 , f^2 (effect size), and predictive relevance Q^2 . The PLS method and the resampling approach were carried out to evaluate the structural model (bootstrapping).

2) COLLINEARITY AND COMMON METHOD BIAS TESTS

Collinearity is assessed by calculating the Variance Inflation Factor (VIF) and tolerance (TOL). The VIF is defined as “the degree of increase in the standard error owing to collinearity.” [73]. $VIF = 1/TOL$ is the reciprocal of the tolerance. According to Hair Jr *et al.*, the TOL value should exceed 0.20 and the VIF value should be less than 5. The assessment of collinearity in this study was carried out by using IBM SPSS. For each dependent construct, the predictor constructs were evaluated independently. Table 8 shows the collinearity evaluation results.

The results of VIF were used to assess common method bias. When employing PLS-SEM, the common method bias may be checked from the results of the entire collinearity test, as indicated by Kock [74]. If all VIF values are equal to or less than 3.3, this implies the model is free of common method bias. Table 4 shows the VIF values, which reveal that all VIF values were less than 3.3. This shows no contamination of common technique bias and common method bias is not an issue in this study.

3) PATH LOADINGS FOR THE PROPOSED MODEL

The above model includes seven factors, (top management support, user training, competency of internal IT department, effective communication between departments, continuous integration of the system, user interface and custom code, and continuous vendor support). Figure 3 presents the outcome of path loadings for all variables associated with the proposed model. Table 3 lists the factor loading result of the research constructs.

Each factor linked with the study model was revised and approved for analysis, except for three items related to user interfaces and custom code (UI3), continuous integration of the systems (COINT1), and continuous vendor support (CVS1), which were not accepted because they are not (≥ 0.55) [75].

Referring to Table 3, the indicators of composite reliability exceed 0.7 for all the seven constructs: indicating excellent

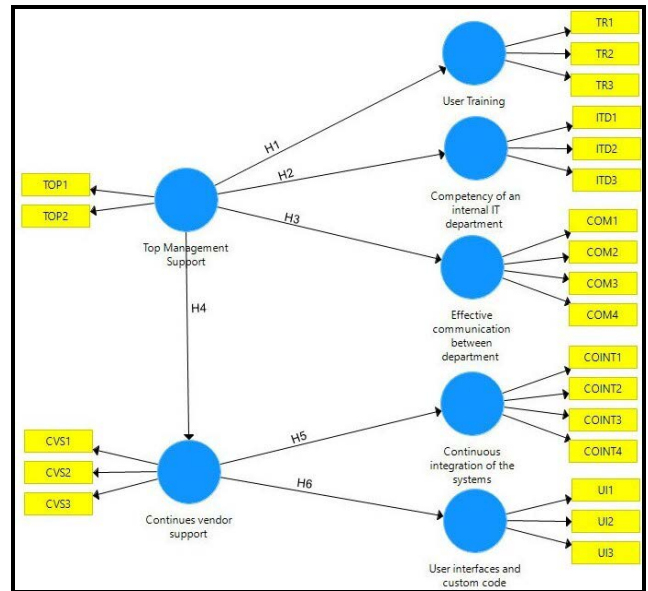


FIGURE 2. Research model and its variable constructs.

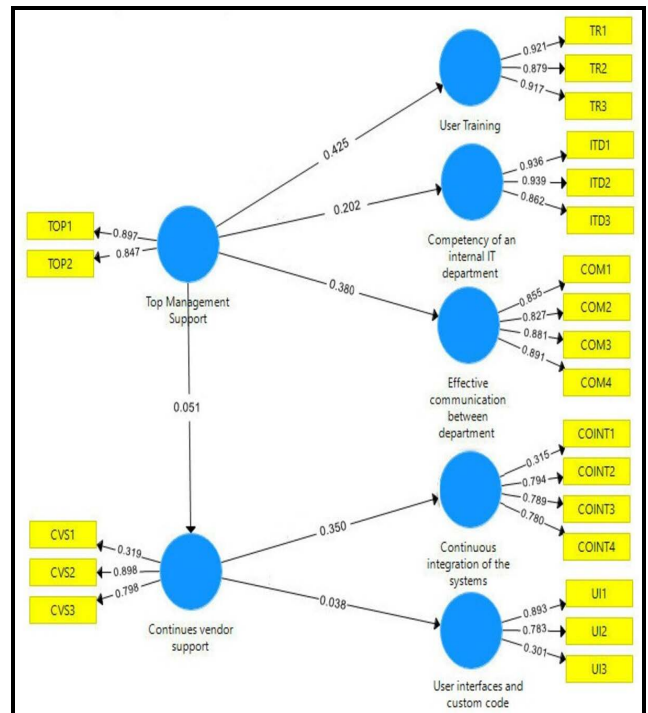


FIGURE 3. SmartPLS3 path loadings result for the tested hypothesized paths.

reliability for all the factor loadings of the items. However, three items, namely (UI3), (COINT1), and (CVS1), were not accepted as they are not ≥ 0.55 ; while the other items were accepted because their standardized path loadings exceeded 0.55, thus displaying significance [76].

4) PATH LOADINGS FOR MODIFIED MODEL

In the beginning, user interfaces and custom code (UI3), Continuous integration of the systems (COINT1), and Continuous

TABLE 3. Analysis result of the factors' constructs.

Construct	Indicator Items	Factor loading	Composite reliability	AVE	Result
Top management support	TOP1	0.897	0.926	0.720	Accept
	TOP2	0.847			Accept
User training	TR1	0.921	0.927	0.891	Accept
	TR2	0.879			Accept
	TR3	0.917			Accept
User interfaces and custom code	UI1	0.893	0.759	0.798	Accept
	UI2	0.783			Accept
	UI3	0.301			Delete
Competency of internal IT department	ITD1	0.936	0.931	0.821	Accept
	ITD2	0.939			Accept
	ITD3	0.862			Accept
Effective communication between departments	COM1	0.855	0.914	0.819	Accept
	COM2	0.827			Accept
	COM3	0.881			Accept
	COM4	0.891			Accept
Continuous integration of the systems	COINT1	0.315	0.842	0.598	Delete
	COINT2	0.794			Accept
	COINT3	0.789			Accept
	COINT4	0.780			Accept
Continuous vendor support	CVS1	0.319	0.721	0.575	Delete
	CVS2	0.898			Accept
	CVS3	0.798			Accept

TABLE 4. Result of Cronbach's Alpha test for items of the study.

Cronbach's Alpha	Number of Items
0.835	19

vendor support (CVS1) items were deleted. All indicators showed standardized path loadings greater than 0.55 and hence all are significant [77] (see Figure 4).

5) RELIABILITY TEST

To ensure reliability, internal consistency should be determined. Internal consistency is tested by using Cronbach's Alpha to describe the extent to which all of the items in a test measure the same concept or construct, thus related to the inter-relatedness of the test. The test-retest method examines if an instrument consistently produces the same results; furthermore, the test-retest technique was carried out to evaluate instrument clarity, question phrasing, simplicity of understanding and accuracy, logical consistency, item sequence, and contextual relevance [78].

The result of Cronbach's Alpha test was ($\alpha = 0.835$), which is a reliable indicator of the internal consistency of a scale. Scores of (0.6-0.7) for Cronbach's Alpha test reflects

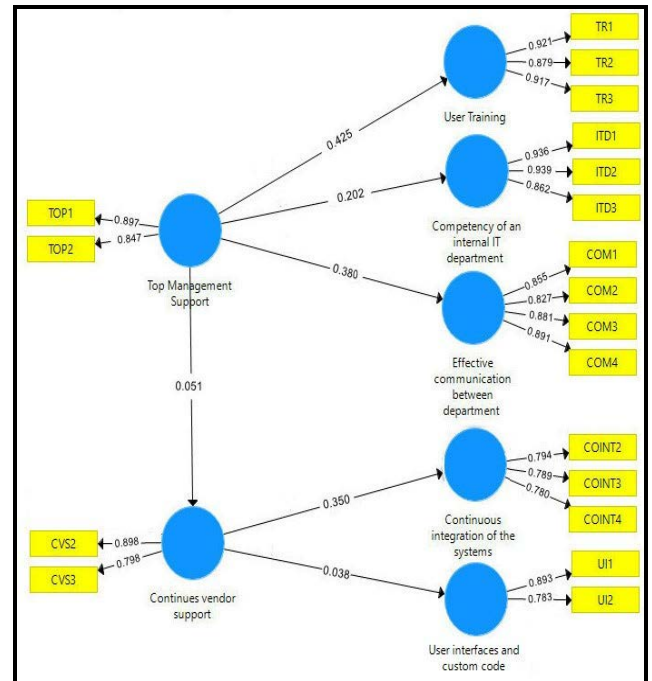


FIGURE 4. Path loading for modified model.

an average degree of dependability, whereas a score of (0.8) or more implies an extremely high level of reliability [79].

6) COMPOSITE RELIABILITY

In order to adequately measure the moderating effect and the consistency in assessing a measure's dependability, composite reliability was determined (see Table 3). It measures scale reliability by taking into account the factor varying loadings of the items by evaluating the within-scale consistency of the responses to the items of the measure [80].

7) CONVERGENT VALIDITY

Concerning discriminant validity, all loaded items were compared with those that were predicted having a greater value with the same construct as other variables (see Table 3). This comparison meets Chin's criterion for discriminant validity [68]. Second, for each construct, the square root of AVE was greater than the inter-scale correlation (see Table 5). All HTMT values were less than 0.85, as suggested by Hair and Henseler [73] to show that all constructions are different (see Table 8). In summary, these findings reveal acceptable reliability and discriminant validity.

The average of variance extracted (AVE) is a convergent validity indicator that measures the amount of variance collected by a construct in relation to the amount of variance due to measurement error. The AVE of 0.5 or higher is demanded [81], otherwise, the variance of the error is more than the variance explained, and this is unacceptable. Accordingly, the constructs of top management support, user training, user interfaces and custom code, competency of internal IT department, and effective communication between departments had

TABLE 5. Results of reliability and convergent validity analyses.

Construct	Indicator Items	Factor loading	t value	AVE
Top management support	TOP1	0.897	54.443	0.720
	TOP2	0.847	53.602	
User training	TR1	0.921	55.852	0.891
	TR2	0.879	34.366	
	TR3	0.917	49.258	
User interfaces and custom code	UI1	0.893	22.780	0.798
	UI2	0.783	22.723	
Competency of internal department	ITD1	0.936	54.443	0.821
	ITD2	0.939	66.790	
	ITD3	0.862	30.898	
Effective communication between departments	COM1	0.855	24.988	0.819
	COM2	0.827	25.363	
	COM3	0.881	24.638	
	COM4	0.891	27.761	
Continuous Integration of the system	COINT1	0.794	50.389	0.598
	COINT2	0.789	46.236	
	COINT3	0.780	42.412	
Continuous vendor support	CVS1	0.898	43.836	0.575
	CVS2	0.798	42.321	

TABLE 6. Results of R² test relationships with mediation variables.

Relation	R (square)
Impact of (top management support) on user training, competency of internal IT department, effective communication between departments, and continuous vendor support	0.87
Impact of (continuous vendor support) on continuous integration of the system, as well as user interfaces and custom code	0.48

2

variance exceeding 0.5, while in contrast, the result of AVE in continuous integration of the systems and continuous vendor support contrast yielded lower scores (≥ 0.50) but still significant.

8) R (SQUARE) TEST

The R² values are displayed within the blue ellipses (see Figure 5) with regard to endogenous latent variables (factors). This is the most often used effect size metric in path models, with meaning comparable to that of multiple regression [82]. The values of path coefficients describe the relationships among all factors based on the used and not used mediation factors. Thus, R (square) test was required to explain these relationships. Table 6 shows the R² values. Figure 5 illustrates the Bootstrapping (T value) for ERP factors on ERP post-implementation success.

The value of R² for the variable (top management support) with factors user training, user interfaces and custom code, competency of internal IT department, effective communication between departments, and continuous vendor support was (0.87), which exceeded (25%) and depicted a

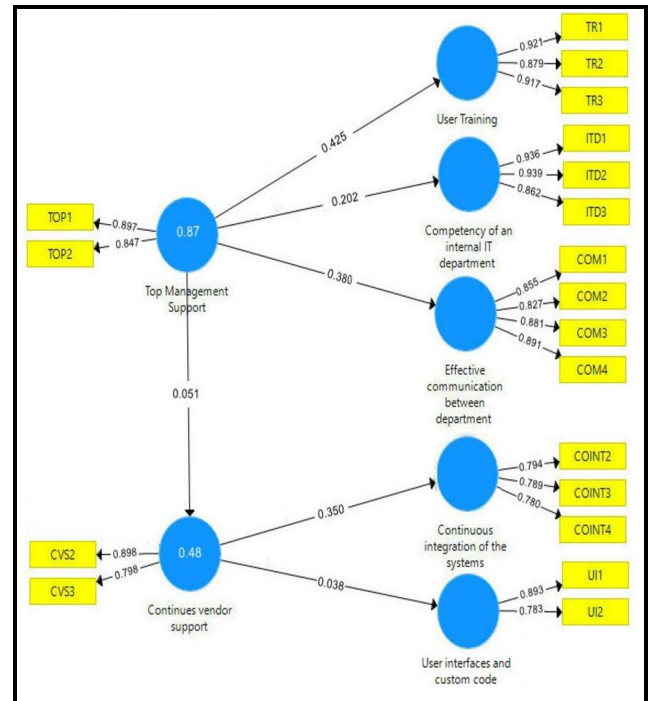


FIGURE 5. Bootstrapping (Coefficients) for success factors on ERP post-implementation.

satisfactory and accepted prediction level as prescribed by Schreiber *et al.* [83]. Next, the value of R² related to (continuous vendor support) variable with continuous integration of the system, as well as user interfaces and custom code as a mediation variable was (0.48%); as the value exceeded (25%), it shows a reasonable and recognized prediction level [77]. The value of R² had modified from 87% to 48%; indicating that the success factor of the ERP post-implementation variable increased the percentage of R² by (25%) when used as a mediation variable in the model.

D. HYPOTHESES TESTING AND RESULTS OF PATH ANALYSIS

After determining the reliability, convergent validity, and discriminant validity of the constructs, the structural model was tested. Bootstrap was used to test the significant impact on the construct via PLS3. In addition, the (P value) test was executed using smartPLS3 to assess all hypotheses concerning success factors in ERP post-implementation. The complete analytical findings are presented in Table 7.

Referring to Table 8, hypotheses 4 and 6 (H4 and H6) are not supported, contrary to our prediction. In precise, no evidence showed that top management support had a significantly positive impact on continuous vendor support (B = 0.287, Coefficient = 0.051, P = 1.011). The hypothesized path (H6) between continuous vendor support and user interfaces and custom code is also not supported (B = -0.107, Coefficient = 0.038, P = 1.031). Meanwhile, the other four hypotheses are supported. The hypothesized

TABLE 7. Results of structural model: path analysis test.

Relationship	Original Sample (B)	Path Coefficient	p-value (Sig)	VIF score	Result
Top management support -> User training	0.418	0.425***	0.001	1.263	Accepted
Top management support -> Competency of internal IT department	0.109	0.202**	0.000	1.353	Accepted
Top management support -> Effective communication between departments	0.398	0.380***	0.001	1.436	Accepted
Top management support -> Continuous vendor support	0.287	0.051	1.011	1.119	Rejected
Continuous vendor support -> Continuous integration of the systems	0.371	0.350	0.003	1.146	Accepted
Continuous vendor support-> User interfaces and custom code	-0.107	0.038	1.031	1.224	Rejected

Note: **p <= 0.01, ***p <= 0.001

TABLE 8. Discriminant validity (HTMT ratio).

Construct	TOP	TR	UI	ITD	COM	COINT	CVS
TOP	-						
TR	0.79	-					
UI	0.65	0.68	-				
ITD	0.08	0.33	0.23	-			
COM	0.18	0.41	0.53	0.39	-		
COINT	0.29	0.38	0.83	0.18	0.53	-	
CVS	0.15	0.30	0.81	0.77	0.23	0.13	-

path (H1) between top management support and user training (B = 0.418, Coefficient = 0.425, P = .001) is verified. The findings also support the hypothesis (H2), which showed a significantly positive link between top management support and competency of internal IT department (B = 0.109, Coefficient = 0.202, P = .000). A positive relationship was noted between top management support and effective communication between departments (B = 0.398, Coefficient = 0.380, P = .001) that supports hypothesis 3 (H3). Next, the positive correlation between continuous vendor support

and continuous integration of the systems (B = 0.371, Coefficient = 0.350, p = .003) supports hypothesis (H5). The next section discusses the findings in detail.

V. DISCUSSION

This study empirically tested the CSFs that affected the ERP success in the post-implementation stage of SMEs in KSA from the perspectives of top management and vendors. The proposed model displays high-level predictability, as four of the hypotheses are strongly supported by the findings.

The retrieved data strongly support the first hypothesis (H1). A significantly positive link was noted between top management support and user training in the context of ERP post-implementation: the path coefficient between these two factors displays one of the highest significances in the model. Lack of user training often stems from the cause of failure during the post-implementation. The primary objective of end-user training is to offer an effective grasp of new business processes, applications, and workflows that result from the implementation of ERP. The efficiency and efficacy of the ERP training program stem from the use of training tactics in the first phase of adoption, which should continue after the post-implementation phase. Mohamad *et al.* [84] asserted that the managers' capability to offer satisfactory emotional aid and instrumental aid in training programs had strongly invoked employees' motivation to learn new knowledge and the latest skills, such as ERP systems. Therefore, it is important for the top management to develop a strategic plan for employee training and education. Based on several training management studies [5], [85], managers' capacity to correctly apply emotional and instrumental support in training programs may have a substantial impact on workers' willingness to learn in firms. Such incentives may lead to greater use of training in enterprises. This finding is in line with earlier studies that have confirmed this particular relationship [20], [86]. This finding implies that such a link may exist over a large range of IS.

The path between top management support and competency of internal IT department was statistically significant to justify the prediction in hypothesis 2 (H2), which resulted in path coefficient value (b = 0.202). Although the path coefficient between these two variables is one of the least significant in the model, it strongly supports the probable consequences from the top management to the organization's IT department that can result from the cumulative advantages that individuals in the organization receive from their ERP software. The IT department is responsible for technical support and aids users of computer hardware and software components through hotlines, OSS, machine-readable support knowledge bases, voice response systems, remote control software, and other capabilities [87]. Employees are more likely to perform well in ERP post-implementation setting if the IT department offers assistance for their tasks. This shows that the senior management should assist individuals in IT department to give the resources and authority required for project success, productivity, decision-making processes, and

overall ability; hence benefiting their own work unit as well as other units in the organization [22]. Consistent correlation between top management support and competency of internal IT department was also found in the study of [31], [88].

Similarly, hypothesis 3 (H3) is supported as top management support and effective communication between departments displayed a significant correlation. This reveals that greater amounts of success are associated with the top management's support in creating an effective communications plan for all phases of the ERP system after going live. This may be orchestrated by placing a small core team made up of people from different departments that communicate and work well with each other. Since ERP systems integrate business processes at the enterprise level, interdepartmental cooperation and communication are crucial. This integration necessitates regular dispute resolution and coordination of shared resources [89]. The introduction of an ERP system demands major modifications in the practices of an organization. Therefore, the top management must acknowledge the importance of communication in ensuring that the employees understand and accept the ERP-enforced changes. As a result, many studies [13], [17], [21], [86] have indicated the positive impact of senior management support on cross-departmental collaboration and communication as a critical aspect of effective ERP post-implementation.

Surprisingly, hypothesis 4 (H4) is not supported in this study, as did prior studies on the link between top management support and continuous vendor support [49]. Although Zhang *et al.* [90] affirmed that continuous vendor support is a significant factor in ERP performance during the post-implementation stage, no evidence was noted in this present study to support such a claim. Another reason for H4 not being supported was related to the ERP systems which are implemented in the two organizations of this case study SAP R/3 and Oracle business suite, as such systems provide the Application Link Enabling (ALE) technology to allow communication among loosely coupled applications which is controlled by a configurable distribution mechanism. These mechanisms supply an exchange of business information and update of master data among technically independent systems [91]. Hence, customers in the GCC region who use SAP R/3 and Oracle business suite enterprises receive additional integration interfaces via a support package as part of the maintenance package that contains corrections to errors with additional integration interfaces, and this may reduce the link between top management and vendor support. This suggests that senior management in KSA did not see vendor support as a critical aspect to ascertain the success of ERP post-implementation. Perhaps, lack of support for the link between top management support and continued vendor support indicates that further research work is required to consolidate understanding in this component of the package.

In the context of ERP post-implementation, this study generates strong support for hypothesis 5 (H5), which involves constructs continuous vendor support and continuous integration of the systems. Many academics have studied the

relevance of vendor support with diverse results. For example, Tsai and Hung [92] reported that the role of the vendor is crucial in any ERP post-implementation, while poor support to integrate the functionality of ERP systems with organizational business process can adversely affect the ERP post-implementation success. According to Ha and Ahn [21], who highlighted the need for a solid vendor partnership during the post-implementation phase for successful adoption of ERP systems, when ERP vendors offer high-quality service with ongoing support (e.g., full functionality support for software upgrades, support on backup, support on software repair, & replacement), then the individuals who employ such methods will reap significant rewards. This supports previous findings of [49] and [93] show that ongoing vendor support is important for both integration and benefits realization in the success of ERP post-implementation.

A weak correlation was observed in Hypothesis 6 (H6) between continuous vendor support and user interfaces and custom code with a coefficient value of 0.038. Thus, continuous vendor support displayed a negative impact on user interfaces and custom code for the case sample. This is because; ERP is customized software created specifically to help organizational processes (despite being re-engineered) [94]. This indicates a significant distinction between the conventional interfaces and custom code in ERP and other IS packaged development software, as well as the implications for vendors' participation. The problem here is that; users (and developers) work to create ERP systems that meet the current demands but ignore the fact that requirements change rapidly today and/or that when a system is being used, users will make adjustments and develop alternative solutions – amplifying the fact that every system will vary from its intended usage pattern [95]. In this regard, the study outcomes are congruent with past studies [96], [97] that discovered a weak relationship between these two constructs.

VI. CONTRIBUTIONS

This study offers theoretical and practical contributions.

Theoretically, this study contributes to the success of information systems in general, and the success of ERP systems after implementation in particular, as only a handful of studies, have used vendor support and their related factors to evaluate the ERP system's success or performance efficacy in the business industry. The literature on successful ERP post-implementation demonstrates that several case studies have focused primarily on examining the CSFs from the stances of top management support and vendor support during ERP adoption and implementation phases [98], [99]. Very few studies have empirically investigated the CSFs of ERP at the post-implementation stage (after going live), while most empirical studies were conducted in the West [13], [17], [100], [101]. Thus, studies on ERP post-implementation in Middle Eastern countries are in scarcity, with none conducted in the KSA. Furthermore, differences in the outcomes of these investigations have been discovered. In response to this gap in the literature, this present study reports critical information

TABLE 9. Measurement items.

Construct	Question Item	Code	Reference
Top management support	Top management offered material assistance to me for the ERP system's deployment.	TOP1	[102, 103]
	I was persuaded to utilize the ERP system by upper management.	TOP2	
User training	I had ERP system training after implementation	TR1	[104]
	Training programs for ERP system were sufficient and beneficial to me.	TR2	
	I was trained by professional and highly skilled individuals.	TR3	
User interfaces and custom code	For me, the user interfaces of the ERP system are straightforward and simple to use.	UI1	[105, 106]
	It's easy to extract and generate reports from the ERP system	UI2	
	Prompts for inputs are clear	UI3	
Competency of internal IT department	When it comes to post-ERP implementation, our organization's IT department and business strategies are aligned which improved information sharing and integration across organizational levels.	ITD1	[107]
	IT staff was fast in troubleshooting system problems and correcting my mistakes about ERP system procedures	ITD2	
	IT Staff was having sufficient knowledge about the ERP product and service	ITD3	
Effective communication between departments	The organization's internal email improves communication and understanding between my colleagues.	COM1	[13, 38]
	During the post-implementation period, communication between the IT department and the business departments was continuing.	COM2	
	Following the implementation of the ERP system, the company took my opinions and suggestions seriously	COM3	
	A group of important personnel from each department were chosen to work together to complete the project tasks and test the procedures based on their unique skills.	COM4	
Continuous integration of the systems	The ERP architecture as a whole was well-configured.	COINT1	[21, 38]
	The data entered into the ERP system was precise and accurate.	COINT2	
	During the post-	COINT3	

TABLE 9. (Continued.) Measurement items.

	implementation phase, the system demonstrated continuous integration across different parts of the company departments		
	It did not take me long to finish and integrate the company's redundant work processes to comply with the ERP system during the ERP system deployment.	COINT4	
Continuous vendor support	Vendor support was technically effective in the post-implementation stage	CVS1	[17]
	The ERP system provider is one of the vendors who have technical expertise and understanding of the company's operations and procedures.	CVS2	
	Upstream suppliers recognized and supported the ERP deployment.	CVS3	

regarding the effects of the identified CSFs on ERP post-implementation.

Practically, this study makes an important addition to practice. First, it benefits all players in the Saudi manufacturing sector because many Saudi industries implement ERP, and this study highlights the importance of vendor support for successful post-implementation of ERP projects by assisting organizations in knowing how to include ongoing vendor support in their implementation process. Second, this study sheds light on the significance of senior management support for collaboration and communication between departments, as well as on user training. This study demonstrates how the top management may work with the IT department to form a strong project management team. Third, this study is important for scholars because it adds to the body of evidence on the key function of top management support and ERP vendor support in KSA.

VII. FUTURE RESEARCH

Future research direction is to survey ERP service providers with dedicated studies to explore, from the stance of components, factors that affect the success of ERP systems post-implementation, besides determining the most influential factor in the performance of the organization. This present research effort may convince other ERP researchers to explore this topic. Furthermore, a larger sample size and a longitudinal approach should be used in future research. The outcomes should be of interest to future scholars as well as firms planning to deploy ERP systems.

The relationship between hypothesis 4 was not supported in the present study and others, such as [49], while supported in the previous study like [20], this may serve as a starting point for new experiments to generate new hypotheses that

can be analyzed in the context of other quantitative studies, so this factor needs more attention as there may be a missing construct that influences its impact.

It is expected that practitioners would pay attention to these elements that might impact the end-user acceptability of an ERP system. Getting end-users to operate an ERP system correctly in the post-implementation stages is significantly more difficult and critical than the initial ERP deployment. Moreover, the success of ERP after going live should be judged by how well end-users use the system.

VIII. LIMITATIONS OF THE STUDY

There are a few limitations to this study. First, the model necessitated the estimate of several variables, which required a large sample size. However, the sample size of this study was small to test other relationships or hypotheses among constructs, and this may limit generalizations of the findings across the SMEs in the entire kingdom of Saudi Arabia.

Second, methodological limitation, this study deployed a cross-sectional survey to gather data. Nevertheless, executing a mixed-method, social cognitive theory, technology Acceptance theory or qualitative approach may effectively unravel additional elements as some impacts of the factors on the success of ERP post-implementation stage may differ at various phases of the post-implementation process.

Third, this study considers CSFs on their importance in literature, not based on a specific theory, as it did not consider all the CSFs found in past studies.

Fourth, the empirical data for this study were gathered from the Saudi Arabian SME manufacturing segment. Hence, the proposed model may not be applicable to other countries. Furthermore, future research might broaden the current study by investigating other hypotheses such as the relationship between top management support and continuous vendor support, and between continuous vendor support and user interfaces and custom code which was not supported in this study and may be affected by other constructs that impact ERP post-implementation success in the Kingdom of Saudi Arabia.

IX. CONCLUSION

Overall, the model explains a considerable portion of the variances of the dependent variables with R^2 exceeding 0.5. The primary constructs described in this study, such as top management support and continuous ERP vendor support, displayed rather high R^2 values ($>50\%$). As a result, the model offers a satisfactory explanation for the whole research challenge. The study hypotheses show that participation and involvement of top management significantly contribute to the success of ERP in the post-implementation phase due to their positive impact on the efficacy of user training, professionalism performance of internal IT department, and effective communication between departments. The participation of vendors emerged as a significant contributor to the continuous integration of ERP systems, which can increase the progressive use of ERP systems in businesses and reverse the

failure of ERP in the post-implementation phase. Top management support and continuous vendor support significantly mediated the ERP post-implementation success. Hence, one may deduce that ERP post-implementation success in KSA is significantly affected by the influence of senior management support on user training, internal IT department, communication between departments, as well as the influence of continuous vendor support on the continuous integration of ERP systems.

APPENDIX

See Table 9.

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