

# UNDERSTANDING CLOUD BASED ENTERPRISE RESOURCE PLANNING ADOPTION AMONG SMES IN JORDAN

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## ABSTRACT

The purpose of this research is to empirically examine the factors influencing the intention to adopt cloud based Enterprise Resource Planning (CB-ERP) as well as the moderating role of trust on the interrelationship. A quantitative approach through a survey questionnaire was conducted to measure the collected data. The data of 117 participants were gathered using online-based survey questionnaires. Besides, this study adopted the Smart Partial Least Square Structural Equation Modeling (Smart PLS-SEM), where the data analysis took place to test the hypotheses. Furthermore, to support the finding, this study proposes a theoretical model based on Technology acceptance model (TAM). The finding PLS-SEM analysis pointed out that all proposed factors have a significant effect on intention to adopt cloud based Enterprise Resource Planning. Additionally, this research found that trust has a significant impact on the relationship between determinants and intention to adopt CB-ERP at SMEs in Jordan. Finally, some practical and theoretical contributions to cloud computing literature, research limitations and future research directions are provided.

**Keywords:** *CB-ERP, Technology acceptance model (TAM), Self-efficacy, Social influence, Trust, SMEs, and Jordan*

## 1. INTRODUCTION

Recently, cloud-computing services have experienced exceptional growth. It is a model for on-demand, ubiquitous, and convenient access to computing resources (e.g., applications, services, networks, servers, and storage) that can be released with the service provider interaction and least management effort [1], [2]. Cloud computing provides crucial opportunities for all businesses and enterprises, including SMEs, to have more easy-running and flexible business model. Although cloud computing is still a new delivery model, it has already had a significant impact on daily life and in businesses. The cloud computing adoption/implementation has great benefits and advantages for enterprises include affordability of specialist services, providing better customer service, faster innovation, better quality and improved productivity, organization empowerment, improved resources management, meet the adopters' expectations and needs and better planning and decision making [3], [4], [2].

Over the past few decades, CB-ERP system has grown exponentially all over the world. CB-ERP is an evolving paradigm for ERPs that can

offer cost savings and reduction, competitiveness and sustainability to the businesses [5]. In comparison to the on premise ERP software's (traditional ERP systems), CB-ERP offers numerous benefits, for example rapid execution, improved agility, and low implementation and support costs, which allows firms to deal with uncertain market situations [6]. It is estimated that the application time was reduced from 50% to 70% and that cost of implementing CB-ERP was 15% lower than the traditional ERP [5]. In this regards, several firms in global have either employed CB-ERP or are in the employing process. Panorama, a consulting firm specializing in ERPs, found that the market share of CB-ERP was raised up to almost 50% just during the period of 2020 year [7]. The report conclude that more than half of organizations are implementing CB-ERP instead of on premise system. The business organization can route and implement CB-ERP in an extremely short period of time [3]. Moreover, Oracle publicized that nearly 70% of CFOs revealed their interest in implementing CB-ERP for their businesses [5].

However, it is difficult and challenging to implement/adopt CB-ERP in developing Middle Eastern countries such as Jordan [5], [3], [8]. In

Jordanian context as a developing country, it was discovered by several researchers that the CB-ERP is adoption still in its initial stages and a comparatively new research area [9] as there is scarce research work being done on the CB-ERP field particularly on the specific context related to SMEs. In addition, researchers and service providers do not have clear and obvious perception about cloud computing adopters' requirements, needs and expectations. Indeed, adopters' acceptance is a vital step to guarantee the successful adoption of cloud computing. Therefore, it is imperative to identify and understand the essential factors that influence on adopters' decision to adopt CB-ERP. However, scarce efforts have actually been done in investigating the intention to adopt CB-ERP. Thus far, these works have not examined all-important factors that could play a significant role for adopters' decision to adopt CB-ERP. Accordingly, the current research attempts to fill the aforementioned gap by examining the factors that influencing the intention to adopt CB-ERP in Jordanian SMEs by applying Technology acceptance model (TAM). As a starting point to address the lack of academic literature regarding this topic, the present study is specifically being conducted to address the following research question: "the factors that influencing the intention to adopt CB-ERP in Jordanian SMEs by applying TAM?"

## 2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Davis [10] firstly initiated TAM and it was applied for investigating users' adoption/acceptance of innovations/technologies. Consequently, TAM presents a clarification of the common determinants of innovation/technology adoption/acceptance behavior of the adopters and an individual attitude was influenced by exterior variables such as perceived ease of usage (PEOU) and Perceived usefulness (PU) while they adopt/use new systems [10]. Additionally, Venkatesh and Davis [11] confirmed that PU and PEOU were found significant and positive direct influence on adopters' intention to use/implement innovative technologies or systems. Numerous works have confirmed the similar results [12], [13], [14].

Over the years, the adoption of new technology/systems has gained an outstanding field for exploration among the scholars. The emergence of innovation system adoption, several social and psychological constructs are added with original TAM as an extension for better understanding of

the adopters intention or/and continuance behavior. In the current study, author has picked up two new constructs namely social influence (SI) and Self-efficacy (SE). Various research have shown that construct Self-Efficacy were included with TAM [15], [16] have confirmed the significant direct association with intention to adopt/use. Furthermore, Theory of Planned Behavior (TPB) [17] and Theory of Reasoned Action (TRA) [18], [19] have shown that subjective norm (which is equivalent to SI) has direct effect on behavioral intention.

In contrast, TAM2 [11] has added two constructs (image and internationalization) where internationalization refers informational SI of an individual to consider referent's belief into his/her belief while accepting technology/systems. Accordingly, several works have stated that SI has a direct significant influence on adopters' intention [12], [20]. Thus, SI and responsive have gaining a lot of attention in the area of technology adoption/acceptance research's. Author has applied TAM as a theoretical framework along with two new constructs SI and Self-efficacy as well as the moderating effect of trust. Author has considered numerous models from the earlier works associated with intention to adopt cloud computing to propose this study research model [21], [5], [8]. Figure 1 depicts the constructs used in the present research to address the behavioral intention to adopt CB-ERP in Jordanian SMEs.

### 2.1. Perceived Usefulness (PU) and Intention to Adopt CB-ERP

PU is defined by Davis [10] as "the degree to which an individual beliefs adoption of an innovation or new system would flourish his or her performance in job or enhances productivity". In general, SMEs managers do adopt CB-ERP if it ensures the usable, relevance, and purposefulness for them and particularly offers efficiency to them. Ramayah et al. [22] stated that PU has direct significant effect on the users' behavioral intention to adopt internet banking. On the other hand, PU has no significant effect on users' behavioral intention [23], [24]. A several research have proven that PU and cloud computing adoption intention are

positively correlated with each other and PU has significant influence on the behavioral intention of adopters [13], [25], [26]. Therefore, it can hypothesize that:

**H1.** PU has a positive and significant influence on IACB-ERP.

## 2.2. Perceived Ease of Use (PEOU) and Intention to Adopt CB-ERP

PEOU may be defined as “the degree to which anyone believes new innovation or technology would be adopted if it does not require any effort or easier to handle” [10]. If the adopter/user do have trouble to use the technology/system it must not be considered [27], [28]. CB-ERP as a new system, it must be adopted, if it became easier to handle, easy to learn and understand, and friendly to manage. Several works have found negative relationship between PEOU and adopters’ behavioral intention of cloud computing adoption [29], [23], [30]. On the other hand, a lot of research have confirmed that PEOU has a significant and positive influence on adopters’ behavioral intention of cloud computing adoption [13], [31]. Therefore, the following hypothesis can be made:

**H2.** PEOU has a positive and significant influence on IACB-ERP.

## 2.3. Self-Efficacy and Intention to Adopt CB-ERP

Numerous works have devoted attention to persons' variances that play a significant impact in technologies adoption. The current study considers SE as an essential driver that stimulate adopters/users' intention to adopt CB-ERP. SE is defined as the degree to which adopters/users believe that they have the required skills and experiences needed to execute and implement technologies activities [32]. SE has an essential role on intention behavior. Researchers found a strong association between SE and intention to adopt systems/technologies [33]. Intention to adopt an innovation/technology is significantly influenced by the SE as the stronger an individual's SE belief, more likely he/she would accomplish AND succeed

the preferred outcomes, and facilitates more intention to adopt system/technology. In this study, SE is expected to have a positive impact on intention to adopt CB-ERP.

**H3.** Self-efficacy has a positive and significant influence IACB-ERP.

## 2.4 Social Influence (SI) and Intention to Adopt CB-ERP

According to Venkatesh et al. [34] SI can be defined as “the degree to which an individual perceives that important others believe he or she should use the new system”. Generally, SI refers the influence of the surrounded and close people (relative's family, members, and friends) on the mind of adopter or user while to consider any new system or innovation. Dash et al. [35] confirmed that SI has a significant and positive influence on adopters’ behavioral intention to the adoption of internet banking (IB) in Indian environment. On the other hand, Chaouali et al. [36] and Lutfi, Idris, & Mohamad, [37] argued insignificant association between SI and behavioral intention of IS adoption. Many studies have also supported that social influence has positive connection with intention to adopt CB-ERP [13], [38]-[40]. Therefore, it can propose the following hypothesis:

**H4.** SI has a positive and significant influence on IACB-ERP.

## 2.5 Moderating Effect of Cloud Computing Trust

Cloud computing trust is essential for any online business. Trust refers to the expectations on products or services that has an implication on users/adopters decisions or choice [41], [42]. Trust is a key variable in the context of cloud computing. It has a significant effect on adoption/usage behavior [43]. Cloud computing trust in providers and vendors has a significant effect on the intention to adopt [44]. Previous works examined the moderating role of trust in the adoption/usage context. For instance, in the study of Alsaad, Mohamad, and Ismail, [43], the results indicated that trust moderated the associations between desirability, management support, and

organizational readiness with intention to use business-to-business (B2B). In electronic finance (e-finance), trust moderated the effect of customer satisfaction on continuous intention to use e-finance [45]. Cloud computing trust also moderated the effect of online purchase intention on online shopping [46]. Based on the above discussion, trust is anticipated to have a contingent effect between the antecedent of intention to adopt CB-ERP and the intention to adopt CB-ERP. High level of cloud computing trust will increase the intention to adopt CB-ERP and vice versa. Accordingly, it is hypothesized:

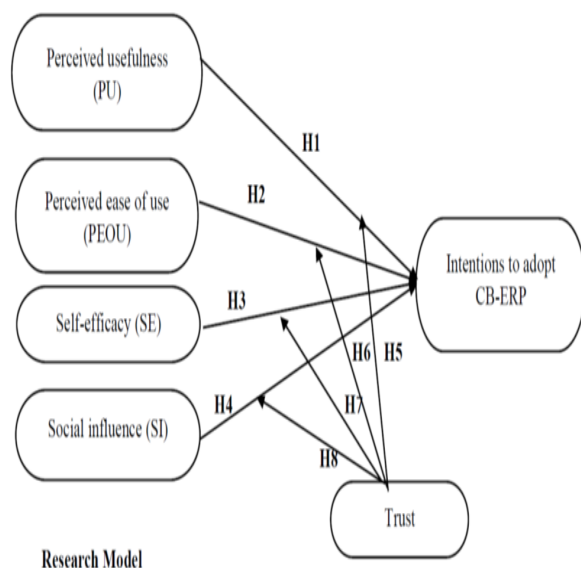
**H5.** Cloud computing trust will moderate the effect of PU on intention to adopt CB-ERP

**H6.** Cloud computing trust will moderate the effect of PEOU on intention to adopt CB-ERP

**H7.** Cloud computing trust will moderate the effect of SE on intention to adopt CB-ERP

**H8.** Cloud computing trust will moderate the effect of SI on intention to adopt CB-ERP

The hypothesized research model is presented in the following Figure 1.



Research Model

Figure 1

### 3. RESEARCH METHODOLOGY

#### 3.1 Research Design and Sampling Technique

The present research is quantitative in nature and is based on Cross-sectional study design. As noted by Alshira'h and Abdul-Jabbar [47] and Alsyouf and Ishak [48] a cross-sectional research approach is based on obtaining direct responses from the set of population. These researches are snaps of outcomes, providing generalizable findings. Therefore, in this study convenient sampling procedure was used to distribute questionnaires as this sampling procedure includes picking the target respondents where they are conveniently accessible [49]. The population of this research consists of staffs that are familiar in different SMEs located in Jordan. Thus, the researcher selected n= 210 respondents by using online-based survey. Nunnally [50] suggests a sample size equal of 10 cases per research model variables in Partial Least Squares-Structural Equation Modeling (PLS-SEM). In addition, Hinkin [51] recommend an item-to-response ratio range of 1:4. However, in the current research, there are a total of 6 variables and 21 items for exogenous and endogenous latent variables for analyses. Hence, the sample size should be anywhere from 60 to 84 respondents. The e-mails messages included a brief clarification of the research purpose, and a link to the questionnaire was attached to the respondents of 350 sample SMEs. To motivate participations, all the respondents were promised that their responses would remain confidential. The author also assured to offer a copy of the results to all respondents. Telephone calls were made in the next two weeks, and two follow-up e-mails were forwarded to raise the response rate. After numerous follow-up e-mails and phone calls, 117 respondents returned the questionnaire (usable responses), yielding a response rate of 56%.

#### 3.2 Measures and Instrument Development

A questionnaire was designed and conducted to validate the current study model. The measured items with regard related variables were selected from different prior sources. For this particular study, author used questionnaires consisted of 21-items in total: regarding the exogenous latent variables, PEOU consists of 4-items and PU consist of 4-items that is adapted from [10], SI consist of 3-items scale adopted from Shankar and Datta [32], self-efficacy consist of 3-items scale adopted from Shankar and Datta [32].

The endogenous latent variable intention to adopt CB-ERP was measured by using a 3-items scale that was developed by [52]. As moderation, variable trust consist of 4-items scale adapted from Constantinides, Lorenzo-Romero and Gómez [53]. All the items used five-point Likert scale (1: strongly disagree to 5: strongly agree). It considers the ideal instruments for gathering information for the reason that it allows collecting quantitative material conveniently and efficiently. Additionally, three professional information systems researchers revised the questionnaire to confirm the face validity; reliability; and appropriateness of the survey. The instruments were pilot pre-tested with 30 respondents to ensure questionnaire validity.

#### 4. DATA ANALYSIS AND RESULTS

The partial least squares (PLS) technique was utilized for data analyses. PLS-SEM is often comparable to covariance-based structural equation modeling (CB-SEM) techniques including AMOS and LISREL in simultaneously calculating all the values of both exogenous and endogenous latent variables in the research framework [54], [55]. Even though the fit of model statistics are not offered in the PLS-SEM outputs, PLS-SEM has advantages understanding complicated causal associations; containing contingent variables with relatively, lower sample sizes [56], [12], [57], [55]. PLS-SEM was employed in this study because the proposed research model includes moderating variables (trust), which increase research model complexity. Furthermore, the sample size in the current work was 117, which is less than the threshold value level that are required to apply other approaches. Following the two-step method recommended by Hair et al.'s [55], the measurement model was first evaluated, and then the structural model was verified.

Based on Hair et al.'s [55] recommendation, the evaluation of measurement model is a key step in the PLS-SEM approach, as this evaluation assists in determining if observed indicator constructs are reliable or unreliable. If they prove to be unreliable, this, in turn, restricts moving to evaluating the structural model. Measurement model estimates both reliability and validity of the constructs and items. The Cronbach's alpha (CR), Composite Reliability (CR), and Average Variance Extracted (AVE) for each of the latent constructs were estimated. As exposed in Table 1 below, the outcomes show that the CAs and the CR of all latent constructs exceed

the value of 0.70, which demonstrate eligible latent construct reliability. Regarding to the convergent validity, the scores reported in Table 1 confirms that AVE's of all latent constructs were greater the thresholds of 0.50. Meanwhile, the square roots of the AVE for all variables were considered to estimate the discriminant validity as shown in Table 2. The outcomes demonstrate that the square roots of the AVEs were all above the inter-construct correlations, signifying good discriminant validity. To conclude, the analyses aforementioned provide evidences of the soundness of the measurement model of the present study.

Table 1: Relevant Indicators of the Measurement Model

Latent Construct	CA	CR	AVE
	> 0.7	> 0.7	> 0.5
Intention to Adopt CB-ERP (IACB-ERP)	0.860	0.862	0.781
Perceived Usefulness (PU)	0.892	0.892	0.758
Perceived Ease of Use (PEOU)	0.844	0.855	0.681
Social Influence (SI)	0.835	0.774	0.580
Cloud computing Trust (CC-T)	0.846	0.805	0.560
Self-efficacy (SE)	0.964	0.983	0.873

Table 2: AVEs Square Root

	IACB-ERP	PU	PEOU	SI	CC-T	SE
IACB-ERP	<b>0.884</b>					
PU	0.771	<b>0.871</b>				
PEOU	0.784	0.799	<b>0.825</b>			
SI	0.473	0.532	0.485	<b>0.762</b>		
CC-T	0.569	0.571	0.586	0.560	<b>0.748</b>	
SE	0.515	0.601	0.594	0.561	0.541	<b>0.934</b>

Note: The values in bold represent the square root of the AVEs.

To assess the inner model (structural model), the direct association model (main relationship model) in which the moderation (trust) was excluded was performed. Then, the contingent relationships were examined in a different model well-known as an interaction (moderation) model [55]. In the direct association model, the bootstrapping technique with 5000 resamples was

applied. The results are exhibited in Table 3. As shown in Table 3, the four hypotheses were sustained at either the 95% or 99% confidence levels. PU, PEOU, SI and SE were positive and significant and influenced a SMEs intention to adopt CB-ERP ( $\beta = 0.11, t = 2.14, p < 0.01$ ); ( $\beta = 0.20, t = 2.83, p < 0.01$ ); ( $\beta = 0.23, t = 4.64, p < 0.01$ ); ( $\beta = 0.37, t = 6.40, p < 0.01$ ); therefore, H1, H2, H3 and H4 were supported.

To evaluate the moderation effect of trust, a contingent model was developed by generating four interaction variables demonstrating the interaction between trust and antecedents related variables (TAM factors) on criterion variable (IACB-ERP). Afterward, the contingent model was examined applying a bootstrapping technique with 5000 resamples. The outcomes are presented in Table 4. The path coefficients for all interaction terms were high (greater than 0.10) and significant ( $p > 0.01$ ). The positive and significant interaction path coefficient of the moderation between trust and PU, PEOU, SI and SE provided clear insights that trust significantly moderate the association between PU, PEOU, SI and SE with IACB-ERP. This would confirm the proposed hypotheses that high level of trust has positive influence on IACB-ERP antecedents.

Table 3: Result of Hypotheses Testing of the Direct Relationship Model

Relationship	Path coeff	T-Value	P-Value	Decision
PU → IACB-ERP	0.11	2.14	0.007***	Supported
PEOU → IACB-ERP	0.20	2.83	0.000***	Supported
SI → IACB-ERP	0.23	4.64	0.000***	Supported
SE → IACB-ERP	0.37	6.40	0.000***	Supported

Note: Significant at \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$  (one-tailed test). IACB-ERP Intention to Adopt Enterprise Recourse Planning; PU = Perceive Usefulness; PEOU = Perceive Ease of Use; SI = Social Influence; SE = Self-efficacy.

Table 4: Results of moderation relationship model.

Relationships	Path Coeff	T-Value	p-Value	Decision
PU * CC-T → IACB-ERP	0.18	2.81	0.005***	Supported
PEOU * CC-T → IACB-ERP	0.17	3.32	0.006***	Supported
SI * CC-T → IACB-ERP	0.25	4.73	0.000***	Supported

SE * CC-T → IACB-ERP	0.22	3.54	0.000***	Supported
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Notes: Significant at \*\*  $p < 0.05$ , and \*\*\*  $p < 0.01$ .

## 5. DISCUSSION AND CONCLUSIONS

The present research contributes to the existent literature by applying TAM as a theoretical framework along with two new constructs SI and Self-efficacy as well as proposing the moderating effect of trust, a framework that receives little attention in earlier IACB-ERP works. Overall, the findings revealed that all covariates were positive and significantly supported; the findings are in agreement with the estimation of the TAM model and prior research. With regard to the influence of PU, the results confirmed the significant relationship with IACB-ERP. This is in agreement with Lutfi et al. [13] who found the association between the technology usefulness and benefits and the likelihood of adoption/implementation were of the most widely stated results in the new technology adoption literature. Indeed, adopter/user logically act and actively consider a valuation of the technology attributes to build cognition about the usefulness and benefits (appropriateness) of CB-ERP embracing. Therefore, CB-ERP will be adopted/implemented when its features are meet the potential requirements, fulfil their specific needs and deliver essential attributes for a potential adopter/user [58], [59]. Likewise, the findings indicates that PEOU significantly and s positively influences a SMEs IACB-ERP. This is an obvious sign that to elevate the adoption rate, ease of use is important. The ease of using and process of CB-ERP is critical for the SMEs. To some extent, ease of use factor allows the adopters to think that they are in control of the process, when they find that the technology is user-friendly and easy to learn and understand content and process as well as only least effort is required. Shankar and Datta [32] emphasized that potential adopters are intend to adopt e-payment only when they feel it easy to use and learn in comparison with other traditional methods. Several earlier works also confirmed the same findings [31]. In aspect of SI construct, in the current work author has established that there is a significant association between SI and IACB-ERP. Previously many researchers had revealed the similar findings as equivalent to this study [15], [60], [61], [62]. Providers should focus on SI and make necessary policies to attract their adopters. SI factor can play an essential role for adopting CB-ERP in Jordanian SMEs. Additionally, self-efficacy also plays positive and significant effect on IACB-

ERP. Many works have proven the same results as confirmed in the present research [16], [32]. Time of services and responding to users is critical.

Regarding the interaction model, the hypotheses from H5 to H8 that specify the moderating influence of trust on the association between PU, PEOU, SI and SE and intent to adopt CB-ERP respectively were tested. The results of the interaction model positively and significantly supported the anticipated hypotheses. This suggests that trust promises advantages in inter-organizational settings and it can produce desired action in an existing association. Trust is a critical factor while implementing technologies-enabled services, as trust decreases perceived risk, which eventually leads to the adoption. Trust can be believed as a significant anticipation of the adopter towards the provider services. If adopters do not trust CB-ERP system, tools and provider's services, their intention to adopt will be negatively influenced.

## 6. CONTRIBUTIONS

In the current study, author developed a new theory of extended TAM by adding two new constructs namely SI and Self-efficacy with original TAM as well as the moderating effect of trust. The study findings reported that SI and Self-efficacy is highly compatible with TAM in context of intention to adopt CB-ERP. Hence, the proposed model provides indispensable contributions in the body of knowledge regarding the emerging cloud computing literature and intention to adopt CB-ERP. Present research provides an overview of factors affecting on IACB-ERP in Jordan. In aspect of practical applications of this study, the findings revealed that PU and PEOU have a significant effect on adopters' behavioral intention to adopt CB-ERP. SMEs who adopt CB-ERP have found it provides them with efficiency or productivity (convenient, saving their money; effort and time). Therefore, the findings are expected to enable policymakers, managers, and practitioners to discover the most important factors to foster CB-ERP adoption. On the other hand, SI and Self-efficacy have found significant relationship with adopters' behavioral intention to adopt CB-ERP. People was influenced by their close buddies (family, friends, colleagues, members, relatives, celebrities, religion leaders, opinion leaders and financial advisers) in Jordan. Therefore, government and providers should be focus on it to attract the various adopters, especially opinion

leaders and financial advisers can use positive words of mouth and advices to promote CB-ERP for the SMEs. Finally, this paper also addresses the moderating effect of trust in the intention to adopt CB-ERP. The findings showed that trust is important for the adopters and providers must establish trusting relationships with the clients.

## 7. LIMITATIONS AND FUTURE STUDIES

Alike other research, the current work have some limitations. Firstly, a major one being the restriction of data used to Jordan. Hence, this study and results reflect what the situations are in Jordan. Secondly, another restriction is the likelihood of adding factors that are not considered in this research model. For instance, author developed an extended TAM grounded on five constructs that might be beneficial for numerous under developed and developing countries of the world with regard of developing the intention to adopt process of CB-ERP. Further studies could be held on other constructs derived from TAM3, TAM or TAM2 or even the planned behavior theory (TPB) or incorporation of TAM with TPB to investigate intention to adopt CB-ERP and cloud computing services. Thirdly, this work nature is cross-sectional and investigates the adopter's behavioral intention at one point in time. Hence, further work could be done on longitudinal basis that will be more significant as compare to the current study. Fourthly, this research is predicting adopter's intention to adopt CB-ERP therefore future work could follow to address actual usage behavior regarding CB-ERP. Fifth, the current study supposed that intention to adopt CB-ERP among adopters could be greater in a high level of trust. Hence, Future works might consider the moderating influence of other indicators of such as security, and risk. Lastly, the extension of the proposed framework to other context in Jordan and other countries would be interesting.

**Funding:** This research was funded by the Deanship of Scientific Research at King Faisal University, grant no. 206024.

**Acknowledgments:** The author acknowledges the Deanship of Scientific Research at King Faisal University for their financial support under Nasher Track (grant no. 206024).

**Conflicts of Interest:** The author declares no conflict of interest.

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