Adoption and Implementation of Enterprise Resource Planning (ERP): An Empirical Study

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Abstract

The study is an attempt to unearth the current state of Enterprise Resource Planning (ERP) adoption and implementation in both manufacturing and service firms. Drawing on the conceptualization of multiple theories based in technology acceptance and innovation diffusion model, this study examines the above objectives with a particular reference to the Unified Theory of Acceptance and Use of Technology (UTAUT). Following the deductive reasoning approach, we applied a self-administered questionnaire survey and used 235 replies from 255 collected responses, leaving the data affected with missing and un-matched responses. The result is applied using the structural equation modeling via SmartPLS 2, a second generation regression model, for testing hypothesized relationships. Findings reveal that all the hypothesized influences are found significantly linked through the explanatory variables with the endogenous variables at different levels of significance, except the impact of effort efficiency and resistance to change. Policy implications are also proposed for the full adoption and utilization of ERP to achieve sustainable development goals. Furthermore, we recommend future researchers to focus on action research or experimental data for preventing the generalizability of the observed results.

Keywords: ERP, ERP adoption, ERP implementation, UTAUT model.

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1. Introduction

Amid today's globalized and competitive market, realizing sustainable competitive advantage is the key to reap organizational success (Porter, 1991). In this newly formed business horizon, it is very challenging and even close to impossible to successfully compete and outrun the key market players without developing an integrated and flexible supply chain management (Lambert & Cooper, 2000). Hence, new organizations are making significant investments in sophisticated Information Systems (IS) such as Enterprise Resource Planning (ERP) systems to cope with the dynamic environment of business. A more in-depth look into the ERP system represents a few core processes such as accounting, procurement, material and inventory management, project management, manufacturing operations, finance to operate and to deliver the final products and information to customers (Reitsma & Hilletofth, 2018). ERP systems tie together plenty of core business processes for enabling the flow of data and information between them (Awa, Uko, & Ukoha, 2017). It reduces the redundancy by centralizing the data from multiple sources, which thereby eliminates the data duplication cost and leaking (Ali & Miller, 2017; ORACLE, 2018). Until recently, ERP vendors were rendering customized package services to firms irrespective of their size, growth, and business lines (Everdingen, Hillegersberg, & Waarts, 2000).

Globally, the use of ERP systems has increased significantly. Interestingly, almost 28.5% of the global ERP market has been occupied by the top 10 vendors with a growth rate of 1.4% to reach $82.2 billion market value of the subscription, maintenance, and license (Pang, 2017). Organizations in developed and developing countries are pursuing ERP to stand out globally for facilitating their growth beyond their previous in-house systems (Huang & Palvia, 2001; Markus & Tanis, 2000). To keep them ahead in the competitive arena, each organization is making a better use of ERP. Thus, it is strategically critical for all firms, not only for their adoption and implementation of ERM usages but also to prepare their users to reap the most tangible and intangible services it provides (Chang, Cheung, Cheng, & Yeung, 2008).

Despite the rampant diffusion of ERP technologies in advanced nations, their relative adoption and implementation in developing countries and least developed countries is relatively scarce (Asamoah & Andoh, 2018; Singh, 2007). Notably, the relative contribution of Asian

nations is found only seven percent as compared to the global ERP implementation (Costa, Ferreira, Bento, & Aparicio, 2016). Moreover, more than half of ERP investment ended in acute failure globally (Ali & Miller, 2017; Darr, 2015; Rajan & Baral, 2015). Nobody can deny the inevitability of investment in the technical aspect. However, there are several behavioral issues or factors stimulating success in the adoption and implementation of ERP (Costa et al., 2016; Rajan & Baral, 2015; United Nations Organization, 2016). Nevertheless, the growth in the adoption of web enabled applications is evident in recent years (Costa et al., 2016; Star, 2018); however, the relative growth during corporate transformation through the use of ERP system is not well-documented.

It is crystal clear from the previous literature that the rate of ERP adoption in developing countries has not been studied adequately (Huang & Palvia, 2001). Only a limited number of studies are witnessed to identify the antecedents influencing ERP software adoption in developing countries (Rajan & Baral, 2015). Besides, to ensure the optimization of ERP adoption through effective and efficient operationalization apart from technical specifications, organizations must sort out the behavioral factors that make the adoption and implementation of ERP complex (Awa et al., 2017; Nandi & Vakkayil, 2018). Essentially, it is critical to explore and examine the behavioral factors impacting the successful adoption and implementation of ERP in the Bangladeshi context. Henceforth, the aim of this research is to explore the rate of ERP adoption and the factors which influence its successful implementation in different industries in Bangladesh. We will investigate the relationship between a number of factors including performance expectancy, effort expectancy, social influence, facilitating conditions, resistance to change, perceived credibility, and actual usage with behavioral intention and how these variables influence the individuals' use and implementation of the system.

1. Literature Review

1.1 Enterprise Resource Planning

ERP is an integrated package software that combines entire business processes into a single information technology architecture for providing a holistic view of the whole business (Klaus, Rosemann, & Gable, 2000, p. 141). ERP has a modular structure and provides integrated information flow across each function of business using an integrated network across functional areas in a database (Davenport, 1998). Since the beginning of

ERP in the mid-1990s, it has been used to outline and organize business processes across all organizational departments (Krotov, Boukhonine, & Ives, 2011; Rouhani & Mehri, 2018). The integrated system ensures the same pace of performance across various levels in an organization (McAfee, 2009). The adoption of ERP requires enormous investments in software to customize it according to the end users requirements (Doom, Milis, Poelmans, & Bloemen, 2010). The uniqueness of ERP technologies is that (i) it integrates all business functions and processes; (ii) restricts the entry of the same data from different sources; (iii) upgrades technology; (iv) enables the systems' portability and adaptability; and (v) applies the best practices (Saatçıoğlu, 2009).

The failure of an organization in implementing ERP will result in losing productivity and competitive advantage at all levels of value creating entities (Addo & Helo, 2011; Rouhani & Mehri, 2018). The contribution of ERP is myriad since it emerges from multiple fields and remains multidisciplinary (Moon, 2007). The study of Esteves and Bohorquez (2007) showed that success in getting an expected result from an ERP project vastly depends on its implementation in addition to its adoption. Therefore, successful implementation requires sweeping changes in entire systems, processes, and other social dimensions through collaborative endeavor and attitude toward the perceived outcome (Kwahk & Kim, 2008). Figure 1 demonstrates the perceived influence of numerous antecedents on the intention to use and the actual use.

1.2 Performance Expectancy

Performance expectancy in the UTAUT model is the most critical determinant which explains behavioral intention very well. An individual believes that using this particular ERP system will result in meaningful performance (Venkatesh, Morris, Davis, & Davis, 2003, p. 447). It shows the measurements of the user of a system manifesting whether the system is advantageous, performance enhancer, user friendly or not.

1.3 Effort Expectancy

Effort expectancy refers to the degree of ease associated with the use of ERP technology (Venkatesh et al., 2003, p. 450). This construct is developed from the ideation of the perceived ease in use and the complexity involved in its usage behavior. Whether an individual inclines to use a new technology is accurately reflected by effort expectancy. According to Aggelidis and Chatzoglou (2009), effort expectancy is an antecedent of users' intention to use ERP.

1.4 Social Influence

Social influence refers to the expectation of the society from an individual keeping in view how important others expect him/her to use the new ERP technology (Venkatesh et al., 2003, p. 451). This construct is derived from subjective norm, image, and social factors. Surrounding environs of a person, which can shape human thoughts and perception, are the determinants of the intention to use new technology (Qi Dong, 2009). Thus, social influence is a significant predictor of how an individual intends to adopt a new technology, especially when people are less involved with it. According to Lu, Yao, and Yu (2005), at the early stage of technological adoption, social influence reserves a revealing impact of users' behavioral intention to use.

1.5 Facilitating conditions

To adopt new technology, it is necessary that organizational and technical infrastructure exists for supporting any new adoption of that novel technology. Venkatesh et al. (2003, p. 453) posited that facilitating conditions, such as perceived compatibility and technical and infrastructural support are a must to support the use of a new system. Yi, Jackson, Park, and Probst (2006) reported the direct influence of facilitating conditions on the use of technology. People always seek assistance if technology is new to them. Therefore, unavailability of supporting circumstances in an organization may create ambiguity or negligence while adopting a novel technology (Qi Dong, 2009; Venkatesh, Thong, Chan, Hu, & Brown, 2011).

1.6 Resistance to Change

One of the most common phenomena in individual, group and organizational behavior is the resistance to change (Audia & Brion, 2007). Resistance to change is driven from the individual's perception of potential threat or powerlessness (Gupta, Misra, Kock, & Roubaud, 2018; Hasan, Ebrahim, Mahmood, & Rahmanm, 2018). Resistance to change is viewed as one of the top reasons why any endeavor for change fails to see hope (Huy, 1999). Therefore, in case of any organizational change, such as acceptance of any new technology or adoption of an ERP system, people exhibit anxiety in accepting it or even try to resist it (Rouhani & Mehri, 2018).

1.7 Perceived Credibility

Perceived credibility deals with the trust and beliefs of end user while adopting a new system. It refers to the degree of belief and trust of the end user in the information being received (Meyer, 1988). The collected data and information must be convincing and credible enough to build a positive attitude in the end user to induce him/her to select the technology. Thus, trust and credibility are critical aspects of regulating an individual's behavior. Employees and the management use credible information while transcending their attitude toward ERP, which in turn influences their behavioral intention (Panigrahi, Zainuddin, & Azizan, 2014).

1.8 Intension to Use

Intention to use is defined as "the degree of evaluative influence that an individual relates with the target system in his or her job" (Venkatesh & Morris, 2000). It refers to the positive evaluation of user position to adopt a new technology. Without the growing behavioral intention to use a particular technology, it must be an utter surprise to experience the actual usage of it. Thus, extant literature documented the direct influence of intention to use a system on actual usage behavior (Carlsson et al, 2006). Henceforth, the practical use of a given technology entirely depends on the employee's intention to use it.

2. Theoretical Framework

End users' acceptance of technology and information systems has received constant attention from academics and professionals since its inauguration (Bhatiasevi, 2016). Since then, numerous studies have been documented about the identification of the factors responsible for the adoption (resistance) and implementation of a new technology. Studies have observed various theoretical underpinnings explaining the acceptance of the new technology. Technology acceptance model among others, such as the theory of reasoned action, the theory planned behavior, social cognitive theory, the extended technology acceptance model, innovation diffusion theory, and the model of perceived credibility theory are popularly used (Khanam, Uddin, & Mahfuz, 2015). However, studies have also attested that certain concerns restrict the broader acceptability of these theories (Bhatiasevi, 2016). Firstly, these different theories demonstrate similar terminologies. Secondly, studies show that behavioral adoption is a complex process which is not covered

in its entirety by any of these theories. Finally, the absence of any comprehensive model triggers the researchers to use the fragmented model or constructs while ignoring other vital constructs of interest.

To guard those concerns, Venkatesh et al. (2003) stressed on reviewing and synthesizing available literature to form a unified model. Venkatesh et al. (2003) advocated the Unified Theory of Acceptance and Use of Technology (UTAUT), integrating the previous fragmented theories (eight) and empirical findings **(**Bhatiasevi, 2016**)**. The UTAUT model has been put forth and applied in this study to find out the adoption and implementation of ERP in the industrial settings of Bangladesh (Venkatesh et al., 2011). The UTAUT model comprises five distinct constructs including effort expectancy, performance expectancy, facilitating conditions, social influence, and behavioral intention, which are the direct antecedents of usage behavior (Venkatesh et al., 2003; Venkatesh, Thong, & Xu, 2012). Building on the essence of the basic UTAUT model, the current study adopted all the five constructs mentioned above. Besides, the adoption of ERP technology in an industrial context has to deal with other contextual difficulties because of the digital divide among people who are intimidated by technological change and the loss of credibility threatened by any given change (Rajan & Baral, 2015). Resistance to change among the end users is due to the shift from the previously held status quo such as no ERP usage, to ERP adoption and implementation (Laumer, Maier, Eckhardt, & Weitzel, 2016) and its perceived credibility from a given technological change warrants remarkable influences on the adoption of ERP analytics. Henceforth, with little extension in the UTAUT model, it is essential to explore the impacts of underlying antecedents on explanatory variables, that is, intention to use and actual use of ERP.

2.1 Hypothesis Development

Performance expectancy is assumed to be a strong predictor of exhibiting user intention. Similarly, effort expectancy has shown the relation of behavioral intention to usage (Davis, 1989). Recent studies on this issue witnessed mixed results. However, the studied effects were observed by global scholars in the management information system arena as one of the critical predictors of the user's behavioral intention (Petter, DeLone, & McLean, 2008). They observed a stronger association between effort expectancy and behavioral intention to use (Youngberg, Olsen, & Hauser, 2009). Extant studies also noticed similar findings of

performance expectancy and effort expectancy to examine the behavioral intention to use ERP (Rajan & Baral, 2015; Sternad & Bobek, 2013). In summary, it suffices to believe on the basis of the empirical and theoretical evidence that performance expectancy and effort expectancy can predict the user's behavioral intention about the actual use of the ERP system.

H1. Performance expectancy of ERP affects users' behavioral intention.

H2. Effort expectancy of ERP influences users' behavioral intention.

Social influence is the strongest predictor when we study users' intention towards the adoption of new technology (Lu et al., 2005). Although there is a limited number of studies available on the influence of user's intention on ERP adoption, the need of a solid theoretical basis for predicting this relation cannot be overlooked (Venkatesh & Davis, 2000). In the parlance of ERP studies, this impact of the essential others on the intention to use ERP is theoretically relevant. Sun, Bhattacherjee, and Ma (2009) suggested that social influence has an impact on behavioral intention to use the ERP system and Calisir, Gumussoy, and Bayram (2009) also identified a significant co-relationship between subjective norms driven by social influence and users' behavioral intention to use ERP in business organizations (Venkatesh et al., 2003; Wagaw, 2017). Based on these arguments, we set forth the following hypothesis,

H3. Social influence has an impact on users' behavioral intention.

Facilitating conditions demonstrate the prevalence of perceived organizational and technical infrastructure to support the use of the system (Venkatesh et al., 2003). Yi et al. (2006) showed that facilitating conditions impact the user's behavioral intention to use a particular technology. Infrastructural support plays a vital role in adopting technology and systems use (Bhattacherjee & Hikmet, 2008). A study by Boontarig, Chutimaskul, Chongsuphajaisiddhi, and Papasratorn (2012) suggested that facilitating conditions positively influence the behavioral intention and usage behavior of any technology. Therefore, we can reveal the following hypothesis in light of the above discussion,

H4. Facilitating conditions have a significant effect on users' behavioral intention.

Perceived credibility and resistance to change have been identified as additional variables which influence the adoption of an ERP system. Resistance to change reduces the user's effort for the adoption of new technology (Guo, Sun, Wang, Peng, & Yan, 2013). It is a general perception that people are afraid of new things and naturally decline to change (Smither & Braun, 1994). Henceforth, we can say that this fear of people leads them to experience anxiety while adopting a new technology (Hasan et al., 2018). Being a new technology in developing countries' context, the adoption of ERP triggers a significant resistance from users. Essentially, it turns out to be a tough task to make the users ready to use ERP. Hence, we propose the following hypothesis,

H5. Resistance to change has adverse effects on users' behavioral intention.

On the other hand, perceived credibility is another critical variable in developing countries' which strongly affects behavioral intention. Trust and credibility are the crucial factors which influence usage behavior. According to Yagci, Biswas, and Dutta (2009), "the positive evaluative beliefs on credibility subsidize significantly to individual's attitude." The establishment of trust in new technology is very significant because confidence in new technology will let them believe that new technology will guarantee them higher efficiency and better living, replacing the old. Therefore, this belief leads to positive attitudes towards behavioral intentions of using ERP. Accordingly, we developed the hypothesis given below,

H6. Perceived credibility has a positive influence on users' behavioral intention.

Finally, several studies have documented the pertinent association between behavioral intention and actual usage, which indicates that behavioral intention is a significant predictor and one of the crucial determinants of actual usage (Sheppard, Hartwick, & Warshaw, 1988; Venkatesh & Morris, 2000). Venkatesh et al. (2003) examined and demonstrated that the user's behavioral intention strongly impacts actual usage. Furthermore, Legris, Ingham, and Collerette (2003) in a meta-analysis, found that the relation between behavioral intention and actual usage was found positive almost in all studies. In other reviews in information systems field, behavioral intention is highlighted as the strongest predictor of actual ERP use (Sternad & Bobek, 2013;

Youngberg et al., 2009). Henceforth, in case of adopting an ERP system one's behavioral intention will surely and positively influence actual usage behavior. So, the following hypothesis is proposed,

H7. Behavioral intention has an impact on actual usage.

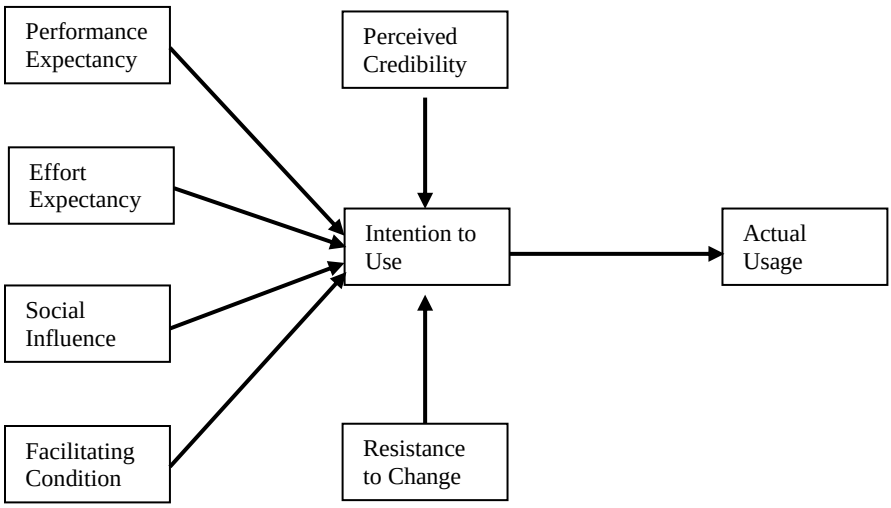

Figure 1. Proposed research model

3. Research Methods

3.1 Data Collection Procedure

A total of 400 self-administered questionnaires were distributed among employees working at different levels in a wide range of industries operating in Bangladesh. Self-administered questionnaire survey technique was chosen because it yields maximum response via email, physical visits, postal services and saves the cost and time consumed in a survey (Zikmund, Babin, Carr, & Griffin, 2010). We delivered the survey instruments to informants through a personal visit and also via email when respondents were unavailable during physical visits. We visited the respondents' facility many times to distribute, remind, and collect data. To prevent response and social desirability bias, we assured them that their identities would be kept private, and this research will only report on the general industrial scenarios. This assurance drove them to respond accurately while keeping their identities secret and saving their faces

(MacKenzie & Podsakoff, 2012; Podsakoff, MacKenzie, & Podsakoff, 2012). A total of 255 usable responses were received with a response rate of 63.75 percent, which is a standard response rate for yielding an accurate result (Uddin, Mahmood, & Fan, 2019). The raw data was then entered into SPSS 20.0 data editor for generating the required statistical analysis. We also employed SmartPLS2, a second generation partial least square analytical tool used for structural equation modeling to estimate the validity and reliability issues of the measures in this study (Howladar, Rahman, & Uddin, 2018). We used structural equation modeling via SmartPLS2 in place of simple regression analysis because of the robustness and authenticity of the findings derived through the integrated model (Hair, Hollingsworth, Randolph, & Chong, 2017).

3.2 Sample Characteristics

Table 1 exhibits the demographic profile of the respondents, including their gender, age, academic qualifications, types of organization, the size of the organization, and tenure experience. It reveals that workplaces are male-dominated, with 63.4 percent men and 36.6 percent women. Additionally, the age distribution of the respondents delineates that most of them (48.6 percent) were in the age range of 26-30 years, followed by 21-25 years (24.3 percent), 31-35 years (12.8 percent), 36-40 years (10.5 percent) and more than 41 years (3.8 percent). The sample included respondents with different educational qualifications, such as bachelors, masters, and others; where the most significant number (73.2 percent) of respondents had a master degree. Regarding organization type, we observed the almost an equal representation of respondents from both the manufacturing and service industries, 49.4 percent from manufacturing and 50.6 percent from service sector, respectively. Finally, maximum responses (81.7 percent) were received from large organizations. The average work experience of the respondents was 3.63 years.

Table 1.
Demographic profile of respondents (n=235)

Aspects	Frequency	Percentage (%)
Gender		
Male	149	63.4
Female	86	36.6
Age		
21-15	57	24.3
26-30	114	48.5
31-35	30	12.8
36-40	25	10.5
41 and above	9	3.8
Education		
Bachelor	58	24.7
Master	172	73.2
Others	5	2.1
Type of Organization		
Manufacturing	116	49.4
Service	119	50.6
Size of Organization		
SME	43	18.3
Large	192	81.7
Working experience		
(Mean)	3.63 years	

3.3 Measurement Tools

The measurement tools used in his research were collected from prior studies. Survey instruments of performance expectancy (Venkatesh et al., 2003), effort expectancy (Venkatesh et al., 2003), social influence (Venkatesh et al., 2003; Venkatesh et al., 2012), facilitating conditions (Venkatesh et al., 2003; Venkatesh et al., 2012), resistance to change (Laumer et al., 2016), perceived credibility (Wang et al., 2003), behavioral intention (Venkatesh et al., 2012), and actual usage (Rajan & Baral, 2015) were used. Some necessary amendments were made in terms of face validity in the items for their better fit in the given context. Measurement items are mentioned in appendix A1.

3 Analysis and Discussion

4.1 Measurement Model Evaluation

The current study adopted structural equation modeling for applying multiple regression analysis. Multiple regression via structural equation modeling improves the authenticity of estimates by comprehensively measuring the regression weights through the integration of the measurement model and structured model analysis (Uddin et al., 2019). SmartPLS is the most applied tool of structural equation modeling in management sciences these days (Hair, Hult, Ringle, & Sarstedt, 2014). At the measurement level, all items underlying a given construct were examined to estimate their suitability. To do so, we investigated their cross-loadings, reliability, convergent validity, and discriminant validity. Table 2 demonstrated the items' cross-loading to their corresponding construct. It exhibited that all the items loaded highly to their original construct than other constructs, which revealed that all the items converged into their constructs.

Table 2.
Cross-loading of the Items

Items	UB	BI	EE	FC	PC	PE	RC	SI
pe1	0.218	0.662	0.512	0.439	0.537	***0.902***	0.200	0.537
pe2	0.351	0.638	0.564	0.480	0.514	***0.907***	0.243	0.550
pe3	0.275	0.556	0.521	0.426	0.497	***0.896***	0.232	0.546
pe4	0.280	0.612	0.532	0.485	0.500	***0.894***	0.288	0.517
ee1	0.332	0.612	***0.917***	0.419	0.434	0.576	0.268	0.480
ee2	0.330	0.565	***0.919***	0.403	0.387	0.484	0.241	0.451
ee3	0.423	0.640	***0.937***	0.418	0.451	0.573	0.274	0.483
ee4	0.396	0.638	***0.918***	0.470	0.481	0.545	0.242	0.506
si1	0.255	0.614	0.461	0.392	0.432	0.518	0.225	***0.927***
si2	0.309	0.623	0.477	0.441	0.445	0.540	0.279	***0.900***
si3	0.298	0.643	0.475	0.410	0.400	0.526	0.257	***0.927***
si4	0.324	0.562	0.504	0.480	0.469	0.511	0.211	***0.926***
fc1	0.313	0.607	0.447	***0.889***	0.316	0.440	0.190	0.429

fc2	0.363	0.570	0.412	***0.901***	0.366	0.457	0.289	0.414
fc3	0.276	0.578	0.410	***0.884***	0.353	0.437	0.157	0.425
fc4	0.320	0.600	0.388	***0.898***	0.395	0.483	0.237	0.407
pc1	0.232	0.595	0.451	0.394	***0.955***	0.533	0.158	0.433
pc2	0.280	0.594	0.459	0.371	***0.955***	0.553	0.212	0.474
rc1	0.240	0.307	0.232	0.272	0.169	0.305	***0.878***	0.278
rc2	0.167	0.267	0.271	0.194	0.144	0.211	***0.893***	0.193
rc3	0.260	0.281	0.269	0.217	0.215	0.239	***0.911***	0.246
rc4	0.231	0.228	0.192	0.149	0.141	0.157	***0.794***	0.190
bi1	0.429	***0.953***	0.555	0.440	0.515	0.627	0.321	0.587
bi2	0.363	***0.931***	0.627	0.611	0.565	0.589	0.244	0.404
bi3	0.398	***0.951***	0.429	0.519	0.583	0.451	0.322	0.455
ub1	**0.928**	0.393	0.366	0.316	0.214	0.281	0.264	0.282
ub2	**0.495**	0.129	0.081	0.239	0.198	0.183	0.195	0.236
ub3	**0.926**	0.412	0.418	0.324	0.261	0.291	0.195	0.292

UB. Use behavior, BI. Behavioral intention, EE. Effort expectancy, FC. Facilitating condition, SI. Social influence, PC. Perceived credibility, PE. Performance expectancy, and RC. Resistance to change.

Table 3 reported that the minimum composite reliability of any construct is 0.842 (actual usage), which is above the minimum threshold limit (≥0.70) (Hair, Black, Babin, & Anderson, 2014). Convergent validity was examined through scrutinizing the average variance extracted. Table 3 delineated that minimum average variance extracted in this study is 0.655, which is also above the minimum cut off value (≥0.50) (Hair, Hult, Ringle, & Sarstedt, 2016). Discriminant validity is shown through the diagonal italic-bold value in the correlation matrix. It reflects a very good fit because the square root of an average variance extracted of any construct is higher than its correlation with other constructs (Mahmood, Uddin, & Luo, 2019). Thus, validity and reliability were accurately ensured.

Table 3.
Convergent and discriminant validities

	AVE	CR	PE	EE	SI	FC	PC	RC	BI	AU
PE	0.810	0.945	***0.900***							
EE	0.851	0.958	0.592	***0.923***						
SI	0.847	0.957	0.597	0.521	***0.920***					
FC	0.798	0.940	0.509	0.464	0.469	***0.893***				
PC	0.912	0.954	0.569	0.477	0.475	0.400	***0.955***			
RC	0.757	0.925	0.268	0.278	0.264	0.244	0.194	***0.870***		
BI	0.893	0.961	0.747	0.667	0.691	0.660	0.623	0.314	***0.945***	
UB	0.655	0.842	0.313	0.403	0.323	0.356	0.268	0.258	0.421	***0.809***

AVE. Average variance extracted, CR. Composite reliability, UB. Use behavior, BI. Behavioral intention, EE. Effort expectancy, FC. Facilitating condition, SI. Social influence, PC. Perceived credibility, PE. Performance expectancy, and RC. Resistance to change.

4.2 Structural Model Evaluation

In structural equation modeling, as depicted in figure 2, we considered several issues to maintain the heightened standard. In this section, we considered the beta-coefficient (β), coefficient of determination (R^2), and goodness of fit index (GoF). β-coefficient exhibited the strength of the effect of an exogenous variable on the endogenous variable and R^2 underlined the overall predictive power of the structured model. The bootstrapping results of sample cases of 5000 showed that only one path has insignificant estimates. We witnessed that the observed variables explain 76.3 percent change in the intention to use, and the intention to use also accounted for 17.7% change (R^2) in actual usage behavior. Following the tenets of Cohen (1988), the minimum R^2 in these two exogenous variables was achieved. In line with the conceptualization of Tenenhaus, Vinzi, Chatelin, and Lauro (2005), we were inclined to calculate GoF, which is the square root of the products of average variance extracted, and R^2. The calculated effect size is significant (Cohen, 1977) because the calculated GoF, in equation (i), showed an excellent effect size (0.619) with a minimum average variance extracted (≥0.50) (Azim, Fan, Uddin, Jilani, & Begum, 2019; Fornell & Larcker, 1981; Yi, Uddin, Das, Mahmood, & Sohel, 2019).

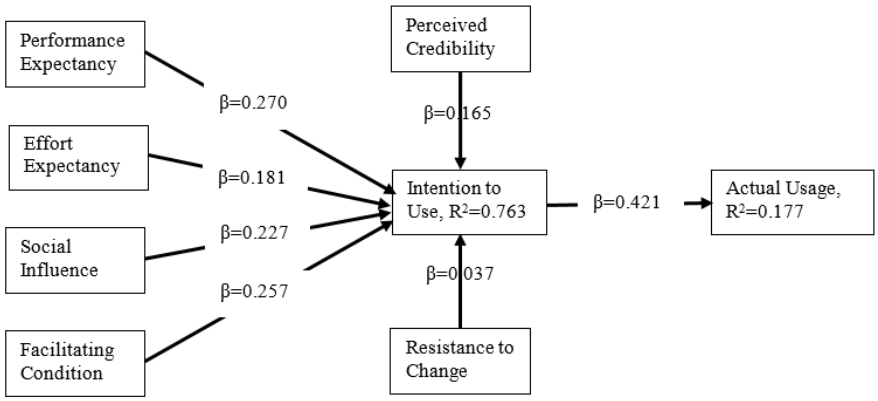

Figure 2. Structural model with path coefficients

$$GoF = \sqrt{(Average\ AVE * Average\ R^2)}$$ ---------Equation (i)

$$GoF = \sqrt{0.815 * 0.470}$$

$$GoF = 0.619$$

4.3 Hypotheses Testing

The following table 4 exhibits the results of the hypotheses along with their relevant estimates. In H1, it was proposed that the perceived effort predicted the behavioral intention. The result demonstrates that the effect (PE→BI) is significant (*β=0.270, t-value=2.458, p.value=0.015*), and the hypothesis is supported. H2 hypothesized that effort expectancy has a significant effect on behavioral intention. Estimates show that the effect (EE→BI) is not significant (*β=0.181, t-value=1.715, p.value=0.088*). Hence, the hypothesis is not supported. We hypothesized in H3 that social influence is a predictor of behavioral intention. The result shows that its influence on behavioral intention (SI→BI) is significant (*β=0.227, t-value=2.003, p.value=0.046*). Hence the hypothesis (H3) is supported. In H4, it was proposed that facilitating conditions predicted behavioral intention. The result shows that the effect (FC→BI) is significant (*β=0.257, t-value=2.829, p.value=0.005*). Thus, this hypothesis is supported. H5 hypothesized that resistance to change has a significant effect on behavioral intention. The result demonstrates that the

effect (RC→BI) is not significant (*β=0.037, t-value 0.724, p.value=0.470*). Henceforth this hypothesis is not supported. We hypothesized in H6 that perceived credibility is a strong predictor of behavioral intention. The result shows that its influence on behavioral intention (PC→BI) is significant (*β=0.165, t-value=2.230, p.value=0.027*). Thus the hypothesis is accepted. Finally, we also hypothesized in H7 that behavioral intention is a predictor of actual usage. The result shows that it has a strong influence on actual usage (BI→UB) which is significant (*β=0.421, t-value=4.981, p.value=0.000*). Eventually, it can also be concluded that H7 is also supported.

Table 4
Estimates on the path coefficient

Hypothesis	Path Relations	*β*	SE	CR	P value	Result
H1	PE -> BI	0.270	0.110	2.458	0.015	Supported
H2	EE -> BI	0.181	0.105	1.715	0.088	Rejected
H3	SI -> BI	0.227	0.113	2.003	0.046	Supported
H4	FC -> BI	0.257	0.091	2.829	0.005	Supported
H5	RC -> BI	0.037	0.051	0.724	0.470	Rejected
H6	PC -> BI	0.165	0.074	2.230	0.027	Supported
H7	BI -> UB	0.421	0.085	4.981	0.000	Supported

UB. Use behavior, BI. Behavioral intention, EE. Effort expectancy, FC. Facilitating condition, SI. Social influence, PC. Perceived credibility, PE. Performance expectancy, and RC. Resistance to change.

5. Discussion

This study tested an extended UTAUT model to determine the users' behavioral intention to adopt and implement ERP. The core objective of this study was to reveal the influencing factors, which determine attitude towards adoption of ERP and its successful implementation in organizations. Five out of seven hypotheses were supported in this study. Consistent with the findings of Venkatesh et al. (2003), Martins, Oliveira, and Popovič (2014), Casey and Wilson (2012) and Escobar and Carvajal (2014), it was found that performance expectancy has a positive influence on behavioral intention. It denotes that performance expectancy of using the ERP system significantly explains the end users' behavioral

intention about it. Moreover, when users believe in the performance of ERP, their positive intention toward ERP enhances.

Also, it was found that facilitating condition positively influence behavioral intention, which reflects that facilitating conditions predict the adoption of ERP. It also states that adequate resource in the custody of any firm promotes the intention to adopt an ERP system. The result is found consistent with the findings of Salloum and Shaalan (2018) and Suki (2017), who assert that the availability of organizational and technical support along with individual capability leads to the intention to use a given technology. In line with the findings of Venkatesh et al. (2003) and Escobar and Carvajal (2014), this study found a positive impact of social influence on behavioral intention. The consistent findings with prior studies strengthen the generalizability of the current results to the fact that end users' adoption of ERP is significantly shaped by the society they belong to.

Surprisingly, the current study revealed that effort expectancy and resistance to change are not significantly associated with the behavioral intention to use ERP. Effort expectancy measures the degree to which a person believes the system is easy to use. Technology phobia in the studied context made the effect of it on the intention to use ERP insignificant (Salloum & Shaalan, 2018). The inconsistent findings of the influence of resistance to change on behavioral intention are not surprising since there are many cultural peculiarities (Hofstede, 2001). Since the people believe in a hierarchical society, users in Bangladesh are greatly influenced by the people who are close and also vital to them. They intend to use ERP for their day to day activity because of the people around them. Likewise, people in collective society tend to avoid risk and resist any change (Hofstede, 2001).

Finally, the impact of behavioral intention on usage behavior was also found to be significant. The result is also found consistent with the findings of Venkatesh et al. (2003), Escobar and Carvajal (2014), Yu (2012), and Ifinedo (2012). This is a clear indication of the continuous usage of ERP in organizations of Bangladesh. Furthermore, perceived credibility was found a significant predictor of behavioral intention to use ERP. This result is found consistent with the findings of Dasgupta, Paul, and Fuloria (2011), and Jeong and Yoon (2013). This means that even though Bangladeshi organization and individual users have become more technically savvy and more technology ignorant, but they still value the contribution of ERP adoption.

5.1 Contributions of Study

We observed that various studies on the adoption of an information system and ERP using the UTAUT model were conducted mostly in the advanced countries. Our literature and survey posited that the rate of adoption and implementation of ERP in a developed country is much higher than the developing countries. Notably, the application of an ERP system is a million dollar investment and the failure to implement makes a firm financially vulnerable. Thus, we do not observe a significant amount of studies in the context of South Asia as well as Bangladesh. This was the primary reason to investigate the adoption and implementation of ERP. Studies showed that ERP transforms today's business and enhances organizations' competitiveness. If Bangladesh or any other developing country wants to turn itself into the business process reengineering, the business organizations have to adopt and implement ERP successfully. So, this study will help the policy makers to understand the significance of using ERP to excel in key industries. Additionally, Venkatesh et al. (2012), Venkatesh et al. (2011), and Rajan and Baral (2015) attested to further study UTAUT adoption and implementation in various contexts to validate the generalizations of this model. Consistent with this, the current findings in Bangladeshi context, which is an emerging country in South Asia, will advance and generalize the understanding of UTAUT applications in a different context.

Till date, the existing studies have observed a few areas that warrant further studies to contribute by filling the vacuum in the latest literature. *Firstly,* studies showed that considerable research has been conducted globally, as most of the reviews were deemed to have a western bias (Huang & Palvia, 2001). However, little is known about developing and the least developed countries which prevents the generalizability of findings (AlBar & Hoque, 2019). Thus further studies in various contexts are needed to draw the inference on the causality of the result. *Secondly,* few researchers focused on challenges impeding ERP adoption and implementation (Fernandez, Zaino, & Ahmad, 2018). Interestingly, they failed to unearth the factors behind ERP adoption and implementation while taking them both together. *Finally,* Awa (2018) and Nandi and Vakkayil (2018) reported that prior studies over-emphasized the technical aspects to adopt and implement ERP. Unfortunately, the behavioral perspective of end users' adoption and implementation of ERP was ignored. Henceforth, the current study on the manufacturing and service

firms in Bangladesh is going to contribute to the existing literature by addressing the issues above based on the tenet of UTAUT.

5.2 Research Implications

This study extended the existing UTAUT model with distinct constructs, such as perceived credibility and resistance to change to identify the factors leading to the adoption and implementation of ERP in Bangladesh and also to identify the degree of influence of each element. It also advanced an extensive review of the literature and a field survey about the adoption and implementation of ERP in the context of a developing country. Although the current study found that the impact of effort expectancy and resistance to change is not significantly evident. Despite the fact that the research shows inconsistent results with prior studies; it will surely predict an almost similar story of other developing countries in South Asia like Bangladesh, regarding information system usage, attitude towards adopting technology and compatibility of socio-economic status concerning the factors (Ram, Corkindale, & Wu, 2014). More importantly, the current research also advances the knowledge and literature since we conducted it in a context which is primarily ignored (Huang & Palvia, 2001). A study in an Asian country will feed and substantiate the generalizability of the previous findings. Furthermore, prior research focused on the technical aspect of ERP adoption (Rajan & Baral, 2015) and complexities in it (Fernandez et al., 2018). On the contrary, a study on the behavioral adoption and implementation of ERP was needed. Therefore, the survey on the adoption and implementation of it will contribute to a large extent by filling that knowledge gap.

The findings of the study contribute to the existing body of research by informing the essence of ERP to maximize its widespread adoption both in small and medium enterprises and large organizations in Bangladesh. This study encloses valuable insights for ERP vendors, the information technology planning agency, practicing managers, and policy makers to identify an opportunity for market expansion, and to develop strategies for successful adoption, implementation and acceleration of ERP technology among end users (Hasan et al., 2018; Reitsma & Hilletofth, 2018). Most importantly, it will undoubtedly help the potential ERP users to build a solid technologically enabled base for accelerating economic growth and achieving the digital Bangladesh goal by making substantial investments in information technology infrastructure. Additionally, the findings are more insightful for ERP

implementation in small and medium enterprises, since prior studies showed that ERP project experiences more failure than larger enterprises (Zach, Munkvold, & Olsen, 2014).

5.3 Policy Implications

In line with the study's findings, policy makers and practicing professionals of ERP will be facilitated and may take an active role while adopting and implementing ERP. Particularly, the results of the study will facilitate the adoption and implementation of ERP among the business owners and new entrepreneurs in Bangladesh. It is also noteworthy that the current findings will assist the ERP vendor in communicating the essential factors of ERP adoption and implementation to the end users in the context of Bangladesh. Henceforth, the results will feed them to customize the future system in order to realize the fullest market potential. Unlike prior research, one of the most important notes for the ERP vendor in Bangladesh is to focus less on effort expectancy and resistance to change from the end users' side. A critical emphasis from ERP vendors on trust, performance, affordability, and social approval will pay back a considerable return to the corporate bottom line. Besides, the current findings will also assist the government and other funding agencies to come forward and use estimates for designing policy guidelines for the broader applications of ERP.

6. Limitations and Direction for Future Research

The current study has some limitations. The sample data was collected from various firms representing both the service and manufacturing industries, which lacks a comprehensive and exhaustive industry wide panorama. Surprisingly, most of the replies were received from large organizations, which limit the extrapolation of the findings irrespective of organizational size. ERP is still limitedly applied to the studied arena, and a considerable portion of the respondents did not have a good idea of the research topic. Additionally, the sample was obtained from just one south Asian country and it represented a nationwide perspective that made the results context based, preventing causal inference (Awa, 2018). Although the results are statistically relevant, further surveys with a broader territorial scope and greater sample size will increase the model's analytical capabilities for the generalizability of the finding (Awa, 2018; Fan, Mahmood, & Uddin, 2019).

Since we have calculated the result by using cross-sectional data, it prevents the generalizability of the findings. Henceforth, we recommend future researchers to either execute action research or use longitudinal data or to adopt the mixed method of study for limiting the chances of being particularized (Qi Dong, 2009; Ram et al., 2014). Drawing on the integrationist perspective, the implementation of any technological innovation must go abreast of multiple influencing factors (Mahmood et al., 2019). Interestingly, this study posited some direct effects of the exogenous variables on their aspired endogenous variables. Thus, taking confounding variables namely moderators and mediators into consideration while generalizing the findings may ensure the robustness of the results and displays an accurate glimpse of the underlying observations (Qi Dong, 2009).

7. Conclusion

In this study, a conceptual model was developed and a survey instrument was constructed to gather data for testing hypothesized model relationships. We examined factors such as performance expectancy, effort expectancy, social influence, facilitating condition, perceived credibility, and resistance to change, which were influencing the adoption and implementation of ERP in the service and manufacturing firms in Bangladesh. All these factors except resistance to change and effort expectancy are significantly associated with adoption and implementation of an ERP system in Bangladesh. The reported results advance the previously held knowledge by providing a more in-depth insight about ERP adoption and implementation through testing an extended UTAUT model in a dissimilar context. This study provides an in-depth understanding of the factors influencing ERP adoption and implementation among academicians, policy makers, and industrial practitioners.

Appendix A1.

Measurement tools	Statements
Performance expectancy	Using ERP improves my productivity I would find ERP useful in my job Using ERP enables me to accomplish tasks more quickly If I use ERP, I will increase my chances of getting a raise
Effort expectancy	Learning to operate ERP is easy for me I would find that ERP is easy for me to use It would be easy for me to become skillful in using ERP My job related activities with ERP are clear and understandable
Social influence	People who are important to me think that I should use ERP People who affect/influence my behavior think that I should use ERP People whose opinions I value prefer that I must use ERP In general, the organization has supported the use of ERP
Facilitating conditions	I have the resources necessary to use ERP I have the knowledge necessary to use ERP ERP is not compatible with other available software/technologies I use I can get help from others if I have difficulties using ERP
Behavioral Intention	I intend to continue using ERP in the future I will always try to use ERP in my daily life I plan to continue to use ERP frequently
Resistance to change	I will not comply with the change to the new way of working with ERP I will not cooperate with the change to the new way of working with ERP I oppose the change to the new way of working with ERP I do not agree with the change to the new way of working with ERP
Actual usage	I have been using ERP for the last few weeks I am using ERP regularly

	I am giving a lot of time to ERP applications
Perceived credibility	Using ERP would not divulge my personal information I would find ERP secure in conducting organizational tasks

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