# Adoption of ERP systems: Does information transparency matter?

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## ABSTRACT

Research on the adoption of Enterprise Resource Planning (ERP) systems has drawn much attention in the information systems (IS) research. This study extends previous research on ERP adoption by examining the direct and indirect effects of perceived information transparency that result from the adoption of ERP systems. Based on the extensive review of literature grounded in the technology acceptance model and theory of reasoned action, a research model is proposed. The proposed model is validated by a survey of 106 ERP users. The results of this survey confirm that perceived information transparency of the ERP system has significant direct effects on perceived usefulness, ease of use, and indirect effects on attitude and adoption. Moreover, the perceived usefulness fully mediates the relationship between information transparency and the attitude toward using the ERP system. This study expands the existing body of knowledge on the adoption of ERP systems, and benefits ERP providers and vendors when formulating their business models.

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## 1. Introduction

Many research studies have attempted to explain the adoption and use of particular technology. None of the existing frameworks, models, and theories fully explains, however, why a particular technology is accepted or rejected. Furthermore, most of the research assumes that the adoption of technology is voluntary and a rejection of the new system is a valid option (Brown et al., 2002). Understanding factors that lead to positive or negative attitudes towards technology is important as it help management implement new technology with less attrition. In particular, resistance towards new information technology (IT) may reduce the overall organizational performance because of the discontented users. Unfortunately, users' acceptance or rejection of IT is not fully understood.

Adoption of IT greatly affects business organizations. Frequently, IT system leads to changes in business procedures, rearrangement of organizational structures, and shifts in managerial power. In addition, implementing IT may lead to a higher level of transparency, as it supports the sharing of data and information. IT applications such as Enterprise Resource Planning (ERP), Enterprise Information Portals (EIP), Customer Relationship Management (CRM) and Supply Chain Management (SCM) enable information sharing across business processes and value chains. These and other applications gather, compile, and distribute information and establish links among business partners.

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Today, a vast amount of information is being exchanged between buyers, sellers, and competitors. This makes information more transparent in the net-enabled organizations. Perceived information transparency was not addressed in previous research studies as a determinant factor of IT adoption. This gap provides the motivation for this study. Hence, the objective of this study is to extend previous research, particularly technology acceptance model, and construct a research model that includes information transparency as a salient factor affecting the users' attitude towards IT adoption and use in business organizations. The research question that this study tries to answer is: Does perceived information transparency impact the perceived usefulness, ease of use, and attitudes toward using IT systems, such as ERP, and as a consequence, do users form favorable attitude toward using the system, and eventually adopt the system?

The rest of the paper is organized as follows. Next is a brief theoretical foundation and proposed research model. Then, the research methodology is described and followed by presenting the results. In the last three sections, the results of the study are discussed, conclusions and limitations of the research study are presented, and future research directions are suggested.

## 2. Theoretical foundation

The next section reviews the important literature that is related to the adoption of IT and relevant to the research question.

### 2.1. Information technology adoption frameworks, models, and theories

The technology acceptance model (TAM), proposed by Davis (1989) is still one of the most frequently cited frameworks to explain why a particular IT is embraced (or rejected) by users (Mao and Palvia, 2008). According to TAM, a specific IT is likely to be accepted by potential users when this technology is perceived to be potentially useful and relatively easy to use. In other words, this model assumes that a prospective user of technology weighs the potential benefits of using a given technology against the challenges in using it, and then adopts or rejects it.

In reality, however, there are many cases when the prospective user is not able to reject a particular IT because it is mandated. One example of this mandatory adoption of IT is the implementation of ERP systems (Al-Jabri and Al-Hadab, 2008). Often, investments in IT are mandated by top management with hopes of staying competitive (Joshi and Pant, 2008) or are conducted under pressure from customers and suppliers (Irani et al., 2003). Thus, these decisions are done by top management that is often under external pressures (Chae and Poole, 2005). In all of these situations, the employees who represent major users have less or no say.

Even though many IT investments, such as Enterprise Systems, are sometimes conducted without involvement of major users, the acceptance of this IT may vary substantially among the users. TAM model (Davis, 1989), or extended TAM (Venkatesh and Davis, 2000), fails to explain this variation of technology acceptance in a mandatory setting (Nah et al., 2004). Several extensions of the TAM have attempted to address the involuntary setting issue. For example, Abdinnour-Helm et al. (2003) proposed to add "expected capability" and "expected value" to the original TAM. However, results from a survey of ERP users in a company in Saudi Arabia suggest that even this extended model is not able to fully explain users resistance toward IT systems (Al-Jabri and Al-Hadab, 2008).

At the same time, as the adoption and use of large intra-organizational (Al-Mashari, 2003) and inter-organizational systems (Irani et al., 2003; Madlberger and Roztocki, 2008, 2009) continue, more and more investments are conducted in a mandatory environment. As a result, there is a need for developing a framework that explains technology acceptance or rejection in settings where users have little influence on adoption and use. Such a study may help to explain sources of the true cost of deploying IT (Love et al., 2006) and make implementations more successful. Moreover, the framework may better explain the complex topic of technology diffusion (Bagchi et al., 2008).

Many research studies have been published in various information technology journals to investigate the main factors of information technology adoption. In essence, there are two lines of research in IT adoption. The first line is based on social psychology models such as theory of reasoned action (TRA) (Fishbein and Ajzen, 1975), the theory of planned behavior (TPB) (Ajzen, 1991), the TAM (Davis, 1989) and its extensions, TAM2 (Venkatesh and Davis, 2000) and TAM3 (Venkatesh and Bala, 2008). The second line is based on the diffusion of innovation theory (DIT) (Rogers, 2003) and other related models. As it could be seen from this literature review, none of the discussed frameworks, models, and theories considered perceived information transparency of the IT system.

### 2.2. Information transparency

McManus in an interview (Lazarus and McManus, 2006) described transparency as the openness and access to information, the free flow of information, and the right to own some information. In a corporate or organization environment, information transparency prevails when internal employees receive, at their desktops, the information necessary to make business decisions (Simon, 2006). Street and Meister (2004) argued that there are two different types of information transparency: internal and external. They defined internal transparency as "an outcome of communication behaviors within an organization that reflects the degree to which employees have access to the information requisite for their responsibilities" (Street and Meister, 2004, p. 477). For example, a supervisor sharing information with subordinates is an example of internal

transparency. Opposite to internal transparency, external transparency which may be defined as an outcome of communication behaviors directed outside the organization (Bushman et al., 2004). The exchange of information between supply chain partners is an example of external transparency.

Several research studies indicated the importance of IT in increasing transparency (Alavi and Leidner, 2001; Day and Wensley, 1988; Min et al., 2002) through information sharing between individuals (Alavi and Leidner, 1999) and organizations (Braunstein, 1999). For example, the Internet has greatly facilitated the distribution and access of government information. The e-government provided access to information and promoted goals related to transparency, accountability, and anti-corruption goals (Anderson, 2009; Cullier and Piotrowski, 2009; Shim and Eom, 2008). In addition, transparency is becoming globally regarded as vital to democratic participation, trust in government, hindrance to corruption, informed decision-making, and provision of information to the public, companies, and other functions in society (Cullier and Piotrowski, 2009; Mulgan, 2007; Quinn, 2003; Reylea, 2009; Shuler et al., 2010).

Nowadays, information transparency becomes relevant to successful implementation of integrated systems such as Enterprise Resource Planning, Customer Relationship Management, and Supply Chain Management applications, where effective utilization is often dependent upon data sharing between internal and external stakeholders. The adoption of large systems such as ERP substantially affects business procedures and organizational structures and induces a shift in managerial power. Moreover, an implementation of ERP supports the sharing of data and knowledge (Erat et al., 2006). This sharing of data and information leads to a higher level of information transparency. Therefore, information transparency, resulting from data sharing, may be an important factor in explaining the acceptance or rejection of IT systems among various stakeholders.

## 3. The proposed research model and development of hypotheses

The review of frameworks, models, and theories confirms that issues of technology adoption are complex. Moreover, a number of factors, such as perceived ease of use, perceived usefulness, social influence, perceived compatibility, perceived fit and perceived information transparency, are highly relevant. In addition, these factors are influenced by external environment (e.g. regulatory, cultural, business, and economic settings). Overall, these factors could be categorized as technology-related, organization-related and user-related factors and were extensively examined in various studies. In this research, we extend the TAM by incorporating perceived information transparency as an antecedent to the perceived usefulness, perceived ease of use, and attitude towards ERP system use.

### 3.1. Perceived information transparency

The perceived information transparency as a direct result of technology implementation was not considered as an important factor in the original TAM (Davis, 1989). According to the stakeholder theory, employees provide the company with their time and skills and in return they expect adequate pay and reasonable working conditions (Hill and Jones, 1992). Stakeholder theory is based on the idea that there are different groups of people that provide crucial resources to companies (Donaldson and Preston, 1995; Hill and Jones, 1992). Accordingly, owners and shareholders provide the company with the necessary financial means while they expect financial compensation for the invested capital (Hill and Jones, 1992). Other important stakeholders include creditors, managers, employees, customers, suppliers, local communities, and general public. In context of this study, we use the stakeholder theory to explain the effect of information transparency on ERP system adoption.

As stated earlier, the increase in the level of information transparency may lead to better decisions and consequently higher satisfaction with the job. Thus, it could be argued that a higher level of transparency, due to sharing of data and information resulting from the implementation of information system like ERP, may lead to positive perception of the usefulness and ease of use; and forms favorable attitude and consequent adoption of information technology. It is also argued that the system will be useful when users perceive it as promoting user and organization transparency. That is, users who directly benefit from the increased level of organizational transparency are more likely to be adopt the information technology. In contrast, users who perceive the increased level organizational transparency as jeopardizing their current position are likely to resist the technology adoption. Therefore, it is hypothesized that perceived transparency will directly influence perceived usefulness and ease of use; and individual users will form a favorable attitude toward the ERP adoption and use of information technology.

H1: *Perceived information transparency will have a positive effect on perceived usefulness.*
H2: *Perceived information transparency will have a positive effect on perceived ease of use.*
H3: *Perceived information transparency will have a positive effect on attitude toward system use.*

### 3.2. Perceived ease of use

The rich body of research confirms that if information technologies are perceived to be user-friendly (Davis, 1989), they are more likely to be useful and lead users to form positive attitude toward the system use. Therefore, it is hypothesized that perceived ease of use will have direct positive effect on perceived usefulness and on the attitude toward ERP adoption and use.

H4: *Perceived ease of use will have a positive effect on perceived usefulness.*
H5: *Perceived ease of use will have a positive effect on attitude toward system use.*

### 3.3. Perceived usefulness

Most of the literature confirms that perceived usefulness is directly related to users' attitudes (Davis, 1989). Moreover, in line with the stakeholder theory (Hill and Jones, 1992), the perceived usefulness may also improve working conditions of employees and thus create a positive attitude towards the system adoption and use.

H6: *Perceived usefulness will have a positive effect on attitude toward system use.*

### 3.4. Attitude towards system use and adoption

Our research framework assumes that a major IT implementation in a company triggers a reaction among its stakeholders. This reaction, based on attitudes towards IT system, leads to adoption of the system. As Nah et al. (2004) argued, the symbolic adoption is used as a surrogate measure for actual adoption and use because the link between intention and actual adoption is not appropriate for examining the acceptance of systems where the use is mandatory, like in the case of the ERP system. Thus it could be reasonably expected, that positive attitude of employees, who are important stakeholder in a company (Donaldson and Preston, 1995), will affect the symbolic adoption of the ERP system.

H7: *Attitude toward system use will have a positive effect on symbolic adoption.*

The proposed conceptual framework is depicted in Fig. 1.

## 4. Methodology

### 4.1. The questionnaire

A questionnaire was developed for this research study. The draft version of the questionnaire items is extracted from various previous research studies and adapted for this research (Bertot et al., 2010; Davis, 1989; Nah et al., 2004; Venkatesh, 2000). The final questionnaire is composed of two parts. The first part included the measures of the theoretical constructs of the research model: perceived information transparency, perceived ease of use, perceived usefulness, attitude towards system use, and symbolic adoption. The second part consisted of questions to collect demographic and organizational information of the respondents, like gender, marital status, nationality, and occupation; and other organizational information, like, number of employees, number of IT staff, and ERP modules implemented.

Most of the items used to measure perceived information transparency were adapted from Bertot et al. (2010) and others developed by the authors. The perceived usefulness and perceived ease of use were measured using scales adapted from the work by Davis (1989) and Venkatesh (2000). The items of attitudes were adapted from Choi et al. (2007) and Nah et al. (2004). The items of symbolic adoption were adapted from Nah et al. (2004). The constructs in this study were measured using a seven-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (7). The adaptation process involved rewording the measurement items to fit the context of ERP system use. The draft questionnaire was reviewed by ERP system experts to identify possible problems in terms of clarity and accuracy. The wording of some items were modified according to the ERP experts' feedback. The final questionnaire items were included in Table 1.

### 4.2. Sample and data collection

The target population was the individuals who have experience with the use of enterprise information systems such as Oracle Suite, SAP, MS Dynamics, or any home-grown ERP system. Those individuals may be users, developers, consultants, managers, or others. Data was collected in Saudi Arabia using online survey during the months of June and July of 2012. The
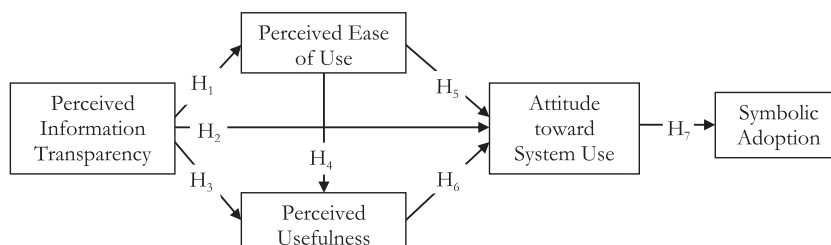


**Fig. 1.** The proposed research model.

**Table 1**
Constructs with items of the survey instrument.

| | |
|---|---|
| *Perceived information transparency (PIT)* | |
| PIT1 | The ERP allows me to track my activities (authors) |
| PIT2 | The ERP provides information on the organization rules and regulations (Bertot et al., 2010) |
| PIT3 | The ERP provides information about the organization decisions and actions (Bertot et al., 2010) |
| PIT4 | The ERP promotes monitoring of the organization financial expenditures (Bertot et al., 2010) |
| PIT5 | The ERP disseminates information on the organization performance (Bertot et al., 2010) |
| PIT6 | The ERP promotes openness of the organization processes, like hiring & promotion (Bertot et al., 2010) |
| PIT7 | Overall, the ERP system has enhanced transparency in my organization (authors) |
| *Perceived usefulness (PU)* | |
| PU1 | Using the ERP in my job enables me to accomplish tasks more quickly (Davis, 1989) |
| PU2 | Using the ERP improves my performance in my job (Davis, 1989) |
| PU3 | Using the ERP in my job increases my productivity (Davis, 1989) |
| PU4 | Using the ERP enhances my effectiveness in my job (Davis, 1989) |
| PU5 | ERP makes it easier to do my job (Davis, 1989) |
| PU6 | Overall, ERP system is useful at my work (Davis, 1989) |
| *Perceived ease of use (PEU)* | |
| PEU1 | Learning to use the ERP is easy to me (Davis, 1989) |
| PEU2 | I find the ERP easy to get what I want it to do (Davis, 1989) |
| PEU3 | My interaction with the ERP systems is clear and understandable (Davis, 1989) |
| PEU4 | I find the ERP flexible to interact with (Davis, 1989) |
| PEU5 | Interacting with the ERP does not require a lot of my mental effort (Venkatesh, 2000) |
| PEU6 | Overall, the ERP system is easy to use (Davis, 1989) |
| *Attitude towards system use (ASU)* | |
| ASU1 | Using the ERP system is a good idea (Nah et al., 2004) |
| ASU2 | Using the ERP system is a wise idea (Choi et al., 2007) |
| ASU3 | Using the ERP system is pleasant (Choi et al., 2007) |
| ASU4 | I like the idea of using the ERP system (Choi et al., 2007) |
| ASU5 | Overall, I have favorable attitude towards the ERP system (authors) |
| *Symbolic adoption (SA)* | |
| SA1 | I am enthusiastic about using the ERP system (Nah et al., 2004) |
| SA2 | I am excited about using the ERP system in my workplace (Nah et al., 2004) |
| SA3 | It is my desire to see the full utilization and deployment of the ERP system (Nah et al., 2004) |

convenience sampling procedure, using the respondent-driven sampling method (Heckathorn, 1997), was conducted via sending e-mail messages to potential participants who were also asked to send it to their friends and co-workers. The e-mail message consisted of a brief description of the study objectives and a link to the survey. The participants were highly encouraged to take the online survey. Participants were also asked to send the online survey link to their friends and co-workers in their organizations. The online survey was also posted in LinkedIn and Facebook sites. A total of 109 participants completed the online survey. Three responses were excluded because the participants indicated that they have not used any ERP system before, resulting in 106 useable responses. Table 2 shows the characteristics of organizations where the users participating in this study work, while Table 3 shows the profile of the respondents. It is interesting to know that most of the participating organizations are using SAP, Oracle, or Dynamics enterprise systems. The most widely used ERP modules are Human Resources, Financials, Supply Chain Management, Customer Relationship Management, and Manufacturing. The organizations are varying in size from small to large, as the number of employees are ranging from less than 100 to more than 5000 employees.

The participants of this study are males and only five females. They are highly educated: 90% hold college degree or higher, 72.6% are employed by the private sector, and 45.3% work in IT/IS departments.

## 5. Results

The research model was tested using the Partial Least Square (PLS) method and used the software application SmartPLS 2.0. (Ringle et al., 2005). PLS was chosen primarily because it is able to model latent constructs under nonnormality and small to medium sample sizes (Chin et al., 2003; Gefen et al., 2000; Hair et al., 2011). The evaluation of the research model according to PLS follows a two-stage process (Chin, 2010). The first stage is the evaluation of the measurement model by investigating the reliability and the convergent and discriminant validity of the constructs. The second stage is evaluating the structural model by testing the significance of the relationships between the model constructs.

### 5.1. The measurement model

Table 4 presents the mean, standard deviation (SD), Cronbach's Alpha (CA), composite reliability (CR), and average variance extracted (AVE) for all model constructs. All CA and CR scores exceeded the recommended value of 0.70 (Nunnally and Bernstein, 1994), indicating that all constructs possessed good reliability.

**Table 2**
Characteristics of the organizations.

| Variable | Values | Frequency | Percent (%) |
|---|---|---|---|
| Number of employees | Less than 100 | 18 | 17.0 |
| | 101–300 | 12 | 11.3 |
| | 301–600 | 16 | 15.1 |
| | 601–1000 | 10 | 9.4 |
| | 1001–5000 | 25 | 23.6 |
| | More than 5000 | 25 | 23.6 |
| Number of IT staff | Less than 5 | 15 | 14.2 |
| | 6–10 | 15 | 14.2 |
| | 11–20 | 9 | 8.5 |
| | 21–30 | 10 | 9.4 |
| | 31–50 | 12 | 11.3 |
| | 51–100 | 16 | 15.1 |
| | 101–500 | 13 | 12.3 |
| | More than 500 | 16 | 15.1 |
| ERP/Information system | SAP | 30 | 28.3 |
| | Oracle/PeopleSoft | 29 | 27.4 |
| | Microsoft dynamics | 19 | 17.9 |
| | In-house ERP/information system | 13 | 12.3 |
| | Other ERP systems | 15 | 14.1 |
| Implemented modules | Human Resources | 82 | 77.4 |
| | Financial | 79 | 74.5 |
| | Supply Chain Management | 65 | 61.3 |
| | Customer Relationship Management | 43 | 40.6 |
| | Manufacturing | 35 | 33.0 |
| | Others | 5 | 4.7 |

To assess discriminant validity, Fornell and Larcker (1981) suggested the use of AVE, the average variance shared between a construct and its measures. The AVE should be greater than the variance shared between the construct and other constructs in the model (i.e., the squared correlation between two constructs). For adequate discriminant validity, the square root of AVEs should be greater than the intercorrelations in the corresponding rows and columns. In Table 4, the square root of all AVEs were greater than the corresponding inter-construct correlations.

Convergent validity involves the degree to which individual items reflecting a construct converge in comparison to items measuring different constructs. A commonly applied criterion of convergent validity is the AVE, as proposed by Fornell and Larcker (1981). An AVE value of 0.500 or more indicates that a construct explains more than half of the variance of its indicators and, thus, demonstrates sufficient convergent validity. All AVEs, presented in Table 4, ranged from 0.638 to 0.817, much higher than the cut-off value of 0.500. In addition, all the factor loadings and their corresponding *t*-values, presented in Table 5, exceeded 0.7 and 1.96 ($P < 0.05$), respectively, thereby demonstrating adequate convergent validity.

### 5.2. The structural model

Goodness of Fit (GoF) was used to evaluate the overall model. GoF is SQRT (average Communality Constructs multiplied by average R-Square for endogenous constructs). According to Wetzels and Odekerken-Schorder (2009), the GoF for a model with large effect sizes should be greater than or equal 0.36. The GoF score for our research model was 0.568, indicating that the model had a good fit.

The proposed research model explained 54.7% of the variance in the attitude toward ERP system use and 59.5% of the variance in ERP adoption, providing good explanatory power. The model also explained 46.4% of the variance in perceived usefulness and only 13.8% of the variance in perceived ease of use of the ERP systems. There were significant direct effects of perceived information transparency on perceived usefulness and perceived ease of use, supporting H1 and H3. However, perceived information transparency had no direct significant effect on attitude toward using ERP, not supporting H2. Perceived usefulness had direct significant effect on attitude, supporting H6. Attitude towards system use had strong and significant impact on the ERP adoption, supporting H7. In summary, based on the survey data, H1, H3, H4, H5, H6 and H7 were supported while H2 was not supported. The path coefficients were shown in Fig. 2. Table 6 summarizes the hypotheses testing results.

### 5.3. The mediation effect

This section shows the mediation effect of PU and PEU on attitude towards ERP system use (ASU). The test for mediation follows the technique suggested by Baron and Kenny (1986). They suggested the following steps in testing mediation. We first test the mediation of PU:

Step 1: Show that the independent variable (i.e. PIT) is correlated with the dependent variable (i.e. ASU).

$$ASU = a + b \ (PIT) \tag{Model1}$$

**Table 3**
Characteristics of the sample.

| Variable | Values | Frequency | Percent (%) |
|---|---|---|---|
| Gender | Male | 101 | 95.3 |
| | Female | 5 | 4.7 |
| Age | 19–25 years | 4 | 3.8 |
| | 26–30 years | 34 | 32.1 |
| | 31–35 years | 35 | 33.0 |
| | 36–40 years | 13 | 12.3 |
| | 41–50 years | 14 | 13.2 |
| | More than 50 years | 6 | 5.7 |
| Marital status | Married | 84 | 79.2 |
| | Single | 22 | 20.8 |
| Nationality | Saudi | 51 | 48.1 |
| | Non-Saudi | 55 | 51.9 |
| Monthly income | Less than SR 10,000 | 22 | 20.8 |
| | SR 10,000–19,999 | 49 | 46.2 |
| | SR 20,000–29,999 | 23 | 21.7 |
| | SR 30,000 or more | 12 | 11.3 |
| Highest education | High School/Diploma | 4 | 3.8 |
| | College/Bachelor | 60 | 56.6 |
| | Master/Doctorate | 42 | 39.6 |
| Occupation | Government sector employee | 20 | 18.9 |
| | Private sector employee | 77 | 72.6 |
| | Self-employed (own business) | 7 | 6.6 |
| | Student (not employed) | 2 | 1.9 |
| Position | Administration staff | 7 | 6.6 |
| | Business/Engineering staff | 22 | 20.8 |
| | IT staff | 28 | 26.4 |
| | Supervisor | 13 | 12.3 |
| | Manager or above | 34 | 32.1 |
| | Faculty/Instructor | 2 | 1.9 |
| Department | IT/IS | 48 | 45.3 |
| | Operation/Engineering | 20 | 18.9 |
| | Human Resources | 12 | 11.3 |
| | Sales and Marketing | 8 | 7.5 |
| | Accounting/Finance | 6 | 5.7 |
| | Other | 12 | 11.3 |
| Years working in the current company | Less than 1 year | 9 | 8.5 |
| | 1–2 years | 21 | 19.8 |
| | 2–5 years | 43 | 40.6 |
| | 6–10 years | 17 | 16.0 |
| | More than 10 years | 16 | 15.1 |
| ERP user level | Consultant | 26 | 24.5 |
| | Key user | 19 | 17.9 |
| | End user | 46 | 43.4 |
| | System administrator | 15 | 14.2 |
| Experience in using ERP system | Less than a year | 16 | 15.1 |
| | 1–5 years | 58 | 54.7 |
| | More than 5 years | 32 | 30.2 |
| Intensity of ERP system use per week | Less than one hour | 23 | 21.7 |
| | 1–5 h | 29 | 27.4 |
| | 6–10 h | 16 | 15.1 |
| | 11–20 h | 10 | 9.4 |
| | More than 20 h | 28 | 26.4 |
| Company sector | IT & Telecomm | 23 | 21.7 |
| | Oil, Gas & Petrochemicals | 12 | 11.3 |
| | Public Sector/Government | 12 | 11.3 |
| | Manufacturing | 10 | 9.4 |
| | Construction/Contracting | 8 | 7.5 |
| | Banking & Finance | 6 | 5.7 |
| | Education | 6 | 5.7 |
| | Transportation/Distribution | 6 | 5.7 |
| | Consultancy Services | 4 | 3.8 |
| | Whole/Retail | 4 | 3.8 |
| | Healthcare | 3 | 2.8 |
| | Other | 12 | 11.3 |

Step 2: Show that the independent variable (i.e. PIT) is correlated with the mediating variable (i.e. PU).
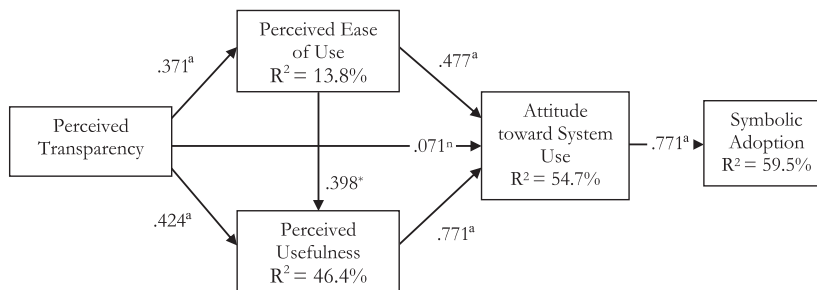
$$PU = a + b \ (PIT) \tag{Model2}$$

**Table 4**
Mean, standard deviation, intercorrelations and reliability scores.

| Construct | Mean | SD | CA | CR | AVE | PIT | PU | PEU | ASU | SA |
|---|---|---|---|---|---|---|---|---|---|---|
| PIT | 5.173 | 1.269 | 0.907 | 0.926 | 0.643 | 0.802[*] | | | | |
| PU | 5.701 | 1.179 | 0.937 | 0.951 | 0.764 | 0.572 | 0.844[*] | | | |
| PEU | 4.983 | 1.305 | 0.933 | 0.947 | 0.750 | 0.371 | 0.556 | 0.86[*] | | |
| ASU | 5.834 | 1.108 | 0.906 | 0.930 | 0.729 | 0.459 | 0.690 | 0.601 | 0.854[*] | |
| SA | 5.764 | 1.180 | 0.888 | 0.931 | 0.817 | 0.426 | 0.528 | 0.461 | 0.771 | 0.904[*] |

[*] Square root of AVE.

**Table 5**
Factor loadings.

| Construct | Item | Load | $t$-Value |
|---|---|---|---|
| Perceived information transparency (PIT) | PIT1 | 0.737 | 10.744 |
| | PIT2 | 0.797 | 23.292 |
| | PIT3 | 0.794 | 20.727 |
| | PIT4 | 0.817 | 21.100 |
| | PIT5 | 0.788 | 10.101 |
| | PIT6 | 0.811 | 22.978 |
| | PIT7 | 0.864 | 27.618 |
| Perceived usefulness (PU) | PU1 | 0.746 | 7.772 |
| | PU2 | 0.913 | 39.492 |
| | PU3 | 0.935 | 61.263 |
| | PU4 | 0.921 | 41.598 |
| | PU5 | 0.804 | 18.360 |
| | PU6 | 0.909 | 46.378 |
| Perceived ease of use (PEU) | PEU1 | 0.831 | 18.615 |
| | PEU2 | 0.910 | 52.913 |
| | PEU3 | 0.910 | 49.035 |
| | PEU4 | 0.870 | 19.076 |
| | PEU5 | 0.765 | 13.717 |
| | PEU6 | 0.902 | 47.049 |
| Attitude towards system use (ASU) | ASU1 | 0.904 | 34.849 |
| | ASU2 | 0.838 | 18.589 |
| | ASU3 | 0.781 | 15.775 |
| | ASU4 | 0.905 | 26.158 |
| | ASU5 | 0.833 | 13.067 |
| Symbolic adoption (SA) | SA1 | 0.920 | 40.026 |
| | SA2 | 0.908 | 38.563 |
| | SA3 | 0.883 | 29.097 |



**Fig. 2.** Path coefficients and $R^2$ of the endogenous variables [a]$P < 0.05$, $n$ = not significant.

Step 3: Show that the mediating variable (i.e. PU) affects the dependent variable (i.e. ASU), controlling for the independent variable (i.e. PIT).

$$ASU = a + b \ (PU) + c \ (PIT) \quad \text{(Model3)}$$

We repeat the above three steps to test the mediation effect of PEU:
Step 1: Same as in Step 1 above.

**Table 6**
Results of Hypotheses Testing.

| Hypothesis | Path | Coefficient | \|T-Value\| | P-Value | Support |
|---|---|---|---|---|---|
| H1 | PIT → PEU | 0.371 | 4.162 | 0.000 | Yes |
| H2 | PIT → ASU | 0.071 | 0.920 | 0.359 | No |
| H3 | PIT → PU | 0.424 | 4.695 | 0.000 | Yes |
| H4 | PEU → PU | 0.398 | 4.571 | 0.000 | Yes |
| H5 | PEU → ASU | 0.310 | 2.543 | 0.012 | Yes |
| H6 | PU → ASU | 0.477 | 3.741 | 0.000 | Yes |
| H7 | ASU → SA | 0.771 | 14.016 | 0.000 | Yes |

Step 2: Show that the independent variable (i.e. PIT) is correlated with the mediating variable (i.e. PEU).

$$PEU = a + b(PIT) \tag{Model4}$$

Step 3: Show that the mediating variable (i.e. PEU) affects the dependent variable (i.e. ASU), controlling for the independent variable (i.e. PIT).

$$ASU = a + b(PEU) + c(PIT) \tag{Model5}$$

Table 7 presents the results of the regression analysis of the above five models. Models 1 and 2 show that independent variable PIT significantly affects both the dependent variable ASU and the mediating variable PU, respectively. Model 3 shows that, after including the mediating variable PU, the PIT is no longer affecting ASU. This ascertains that PU fully mediates the relationship between PIT and ASU. Model 4 shows that PIT significantly affects the other mediating variable PEU. Model 5 shows that both PIT and PEU significantly affect ASU, indicating that the PEU partially mediates the relationship between PIT and ASU.

## 6. Discussion

The research study presented in this paper has investigated the impact of perceived information transparency on the adoption of information technology. The new research model was tested in the context of ERP systems adoption. Perhaps, this is the first study that examined perceived information transparency as an explanatory factor in the ERP adoption.

The interesting findings were the direct significant effect of perceived information transparency on perceived usefulness and ease of use of ERP systems use, and the indirect relationship with the attitude toward using ERP systems. Furthermore, perceived usefulness and ease of use have strong significant relationships with attitude towards using the ERP system, indicating that they form favorable attitudes towards system use and consequently affect the adoption of ERP system. This finding suggests that ERP users value and benefit from sharing the information that the ERP system provided, whether the information are related to the organization, like organization performance and processes, or related to the user, like tracking their activities and knowing information necessary in performing their tasks. When ERP users view the system as useful, they tend to form positive attitudes that will lead to system adoption. This finding is in conformance with other research studies' results. For example, Amoako-Gyampah and Salam (2004) found that effective communication was one of the success factors that influence the acceptance of technology in an ERP implementation environment. This implies that an open and honest information policy communicated to the users can satisfy their need for information and enhance their awareness about organization decisions, actions, rules, and regulations.

Additional benefits that the users and the organization will gain from information transparency or disclosure are trust (Rawlins, 2008), better governance (Chi, 2009), higher performance (Berggren and Bernshteyn, 2007), increased production efficiency (Zhu, 2002), and enhancement of organizational learning (Kumaraswamy and Chitale, 2012). The results of this

**Table 7**
Testing the mediation effects of PU and PEU.

| Model | DV[a] | IV[b] | B | SE | T | P-value | Adj. $R^2$ | F |
|---|---|---|---|---|---|---|---|---|
| 1 | ASU | PIT | 0.392 | 0.077 | 5.119 | 0.000 | 0.194 | 26.205 |
| 2 | PU | PIT | 0.523 | 0.075 | 6.937 | 0.000 | 0.310 | 48.117 |
| 3 | ASU | PIT | 0.082 | 0.075 | 1.080[c] | 0.283 | 0.464 | 46.423 |
| | | PU | 0.594 | 0.081 | 7.310 | 0.000 | | |
| 4 | PEU | PIT | 0.374 | 0.094 | 3.981 | 0.000 | 0.124 | 15.852 |
| 5 | ASU | PIT | 0.232 | 0.070 | 3.298[d] | 0.001 | 0.411 | 37.580 |
| | | PEU | 0.428 | 0.068 | 6.269 | 0.000 | | |

[a] Dependent variable.
[b] Independent variable.
[c] Full mediation.
[d] Partial mediation.

study support the assertion that perceived information transparency of the ERP system in an organization play an important and critical strategic role in shaping the attitudes towards ERP use. The PU played a mediating role between perceived information transparency and attitude. PU was found to fully mediate the impact of PIT on ASU. That is, users who do not perceive ERP a useful system they tend to form indifferent attitude. This explains the insignificant relationship between perceived information transparency and attitude towards system use. The implication for this finding is that any information sharing or disclosure that does not create value for the employees or the firm as whole will not be a success factor for adoption. Information transparency could be counterproductive and the firm becomes in a vulnerable position if important or confidential information is leaked outside the boundary of the organization, because the relationship between perceived information transparency and perceived usefulness is reciprocal. Information that are perceived to be useful for the individual to know and to perform the job successfully will be shared and information that does not add value or sacrifice the competitiveness of the organization will not be shared. Of course, database administrator with coordination with the firm management will decide what information to be shared inside and outside the organization.

## 7. Conclusions

The proposed research model was derived from literature review and backed with empirical validation. The current research represented an important contribution to theory by addressing an important belief: perceived information transparency. This belief construct had strong significant direct relationship with perceived usefulness and perceived ease of use, and indirect relationship with attitude and consequently with ERP system adoption.

In summary, the presented research also makes a substantial contribution to the field of IT in emerging economies, such as Saudi Arabia, which is known for uniqueness in IT adoption (Roztocki and Weistroffer, 2008a,b). More specifically, the research investigated several factors on the technology adoption in a specific IT system context (i.e. ERP system).

## 8. Limitation and future research

The limitations of this study may serve as ideas for future projects. For example, many of our findings may be limited to the setting of our research, the relatively small sample size, and focus on one technology (ERP) and one country. The results may not be generalizable to other information systems use where usage is voluntary.

Thus, the future work could examine the opportunity of enhancing the research model by integrating it with the existing theories about users' satisfaction. To this extent, in addition to the stakeholder theory, the Yield Shift Theory of Satisfaction (YST) proposed by Briggs et al. (2008) appears to be highly promising. The YST offers ten various satisfaction effects that are triggered by changes in individual perception about the particular technology. It appears that these effects could be adapted also to the adoption of ERP mandatory use setting.

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