FACTORS AFFECTING THE USER ACCEPTANCE OF ERP AND THE IMPACT ON THE INDIVIDUALS: A CONCEPTUAL MODEL

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Abstract: *Enterprise Resource Planning or ERP integrates the data of all business areas within the organization. It is a complex technology involving different type of end users and implementing it in developing countries like India makes it even more difficult owing to the cultural and social differences. Effective usage of ERP leads to its success. However, degree of usage depends on many individual, organizational and technological factors. The post-ERP implementation is found to have impact on the user behavior and hence it is also essential to understand the impacts of the acceptance on the individual. This paper identifies the factors that affect the usage of ERP. A conceptual research framework is proposed to find the combined effect of the individual, organizational and technological factors on the ERP usage using the Technology Acceptance Model (TAM). The model also seeks to find out the impact of usage of ERP on panoptic empowerment, job satisfaction and individual performance.*

Keywords: Enterprise Resource Planning, Individual characteristics, Organizational characteristics, Technological characteristics, TAM, Panoptic Empowerment, Job satisfaction, Individual performance.

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1. Introduction

The role of Information Technology (IT) in industries has increased rapidly during the last century. IT now represents about half of all capital investments on a global basis while much of the developed workforce in the developed world relies on telecommunications and computer based Information systems (Martinsons & Chong, 1999). Information systems have been developed in an ad-hoc manner focusing on their corresponding business units. This creates islands of information in the organization making information sharing difficult (Chang, Cheung, Cheng & Yeung, 2008). Enterprise Resource Planning or ERP are implemented in Organizations to provide an integrated management approach. ERP systems promise to improve organizational performance and competitiveness by streamlining business processes and eliminating duplication of effort and data (Kwahk & Ahn, 2010). But despite the various benefits promised more than two thirds of ERP system projects result in failure (Chang et al., 2008). A closer look at the nature of reported problems clearly suggest that the ERP implementation issues are not just technical, but encompass wider behavioral factors (Skok & Doringer, 2001). The most critical determinant of the success of an information system is the human element (Martinson & Chong, 1999). If users are not willing to use it due to their negative attitude toward change, the ERP system would not bring the expected benefits to the company (Kwahk & Kim, 2008). It is important for the organizations to understand the system adoption from the user's perspective to prepare their employees to face new challenges and learn how to make good use of the technology by translating into tangible benefits (Chang et al., 2008; Sun, Bhattacherjee, & Ma, 2009).

The strategies on ERP adoption must address cultural differences and localized strategies (Liang, Xue, Boulton, & Byrd, 2004) The implementation in developing countries face specific difficulties over and above those found in industrialized countries (Kamhawi, 2007; Soja, 2008; Xue, Liang, Boulton, & Snyder, 2005) because of differences in the sophistication of IT use, and in the cultural and social contexts (Tarafdar & Roy, 2003). This distinction between cultures suggests that information technology and management practices should be modified for different cultural contexts (Ananadarajan, Igbaria, & Anakwe, 2002).

Thus it is essential to understand the influence of the various factors influencing the acceptance of ERP in the Indian context. Based on the review of extant literature, this study is done to identify those factors and the effect of those on the acceptance and usage. With little research existing to study the impact at the individual level, this study also seeks to find the impacts of usage of ERP system on the users.

2. Literature Review

2.1 ERP Implementation

Kumar and Hillegersberg (2000) defined enterprise resource planning (ERP) systems as ‘‘configurable information systems packages that integrate information and information based processes within and across functional areas in an organization’’. It integrates all aspects of a business promising one database, one application and a unified interface across the entire enterprise (Bingi, Sharma, & Godla, 1999). ERPs such as SAP/R3, PeopleSoft, and Oracle are software packages that promise the seamless integration of all information flowing through a company including information on finance and accounting, human resources, supply chains, and customers (Davenport, 1998). When an ERP system is introduced and applied, the organization may receive many benefits, such as reduced cost, improved response time to customers, as well as enhanced organizational performance (Lee & Olson, 2010). It can deliver a great reward but the risks they carry are equally great (Davenport, 1998).

A major difference between ERP systems and traditional information systems comes from the integrated nature of ERP applications. Implementing an ERP system causes dramatic changes that need to be carefully administrated to reap the advantages of an ERP solution (Al-Mudimigh, Zairi, & Al-Mashari 2001). It requires changes not only in systems but also in processes and other social dimensions (Kwahk & Kim, 2008) and in the coordination and corporation among the members of the organizations to make it work (Chang et al., 2008). It is a socio-technical challenge that requires a fundamentally different outlook from technologically-driven innovation (Al-Mudimigh et al., 2001). The causes for failures arise from the interactions among people, tasks, environment and technology (Kwahk & Ahn, 2010) and also since ERP software being developed in technically advanced countries, standards are often too high for under developed or developing countries (Botta-Genoulaz, Millet, & Grabot, 2005).

To find out why these ERP projects fail, many researchers have tried to identify the critical success factors of ERP systems. , these include committed leadership (Dong, 2001; Sarker & Lee, 2003; Wee, 2000), Organizational support, organizational fit of the ERP (Hong & Kim, 2002), computer self efficacy (Compeau & Higgins, 1995), Training (Aladwani, 2001; Somers & Nelson, 2001), project communication (Nah, Lau, & Kuang, 2001), system quality

and information quality (DeLone & Mclean, 1992), user involvement (Amoako-Gyampah & Salam, 1999). Social factor is found significantly influencing the usage of ERP system therefore; experience sharing should be arranged for employees so that the nonuser can see the benefits of using the ERP system as told by the users. This may motivate them to use the ERP system (Roger, 1995). When adopting an ERP system, there is also a need to recognize the unique Asian context concerning cultures as most of the existing business models typically reflect Western practices (Al- Mashari et al., 2003; Hong & Kim, 2002; Motwani et al., 2002).

While research has examined aspects of business process change, little research has focused on the individual employee and has studied the drivers of process adoption by employees, the factors influencing resistance, the impacts of process change on employees of complex technology solutions like the ERP (Venkatesh, 2006).

2.2 Technology Acceptance

With the growth in use of Information Technology by organizations, user acceptance of information system has becomes an important management issue for better management of resources and needs (Kanwal & Manarvi, 2010). There are several theoretical models to explain the user acceptance towards information systems such as Technology acceptance Model (Davis, 1989), Computer Self efficacy (Compeau & Higgins, 1995), Task–Technology Fit (Goodhue, 1995), Motivational Model (Davis, Bagozzi & Warshaw, 1992) and adapted Theory of Planned Behavior (Mathieson, 1991; Taylor & Todd, 1995).

Technology Acceptance Model or TAM is a widely applied IS model to explain end user adoption of IT. It is a powerful model of user acceptance of computer technology (Igbaria et al., 1997). This model explains the potential user behavioral intention to use a technological innovation. TAM is based on the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980).

It theorizes that an individual's behavioral intention to use the system is determined by two beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) (Venkatesh & Davis, 2000).

Perceived Usefulness:

Davis (1989) defined PU as "the degree to which a person believes that using a particular system would enhance his or her job performance." PU has two dimensions: PU for the organization and PU for the individual. PU for the organization means economic benefits

(e.g. product quality and cost savings) resulting from adopting a new technology. On the other hand, PU for the individual is most likely the result of improved job performance and user motivations (Robey & Farrow, 1982). Studies have reported that PU is positively associated with system usage (Igbaria, 1994; Thompson et al., 1991)

Perceived Ease of Use:

PEOU is defined as "the degree to which a person believes that using a using the system will be free of effort". According to TAM, perceived usefulness is also influenced by perceived ease of use because, other things being equal the easier the system is to use and the more useful it can be. People with PEOU are more likely to believe in the ease and usefulness of the system (Robey & Farrow, 1982) and in the ease of access for using the system (Amoako-Gyampah, 2007).

Recently, the Technology Acceptance Model (TAM) has been applied to ERP systems to explain the complex implementation and adoption issues of stakeholders and end users (Amoako-Gympah & Salam, 2003; Gefen, 2004).

2.3 Role of External and Contextual variables on use of ERP

TAM predicts that external variables are expected to influence technology acceptance behavior indirectly by affecting beliefs, attitudes, or intentions (Szajna, 1996). Orlikowski (1993) demonstrated that adopting and using a specific IT is not solely dependent on the characteristics of the IT but is also dependent on other aspects such as organizational or social context and individual characteristics and attitudes.

2.3.1 Individual characteristics

Some individual characteristics of information system users have been empirically shown to be associated with different levels of information or information system usage (Szajna, 1993) which are discussed below.

Computer Self-efficacy

Venkatesh and Davis modeled and empirically tested the determinants of PEOU and found that an individual's computer self-efficacy is a strong determinant of PEOU and behavioral intention (Compeau & Higgins, 1995). Self-efficacy is a measure of a user's confidence in their ability to use a technology (Taylor & Todd, 1995). It is the people's judgments of their

capabilities to organize and execute courses of action required to attain designated types of performances (Bandura, 1986). In the context of using computers and IT, computer self efficacy, therefore, is defined as a judgment of one's capability to use a computer and is an important antecedent of perceived usefulness (Compeau & Higgins, 1995).

Absorptive Capacity

Zahra and George (2002) suggested that absorptive capacity was an important factor for an organization to implement new IS successfully. Cohen and Levinthal (1990) defined it as the ability of an organizational member to value, assimilate and apply new knowledge. At the level of the individual, absorptive capacity refers to memory development, in which accumulated prior knowledge enables the ability to store new knowledge into one's memory and to recall and use it (Cohen & Levinthal, 1990). ERP users are often unwilling to change to the ERP mode of operation and the individual users' absorptive capacities of understanding, assimilating and applying knowledge influences the performance of ERP users (Park, Suh & Yang, 2007).

2.3.2 Organizational characteristics

Some of the organizational characteristics like Top management support (Bingi et al., 1999), training of employees (Aladwani, 2001), project communication (Nah et al., 2001), project management (Al-Mudimigh et al., 2001) are identified as important to the successful implementation of ERP systems.

Organizational Support

In organizations with using a technical system, organizational support affects behavioral intention to use the system (Fishbein & Ajzen, 1975). Organizational support was identified as two broad areas, technology support and management support (Lee, Kim, Rhee, & Trimi, 2006). Ralph (1991) defined technical support as people assisting the users of computer hardware and software products, which can include hotlines, online support service, machine-readable support knowledge bases, faxes, automated telephone voice response systems, remote control software and other facilities. Technical support had a significant effect on perceived ease of use and perceived usefulness (Ngai et al., 2007). Top management support is defined as the willingness of top management to provide the necessary resources and authority or power for project success (Slevin & Pinto, 1987). It has been identified as the most important and crucial success factor in ERP implementation projects (Bingi et al., 1999;

Nah et al., 2001; Somers & Nelson, 2001). Organization support has been found to be crucial for successful adoption of a new system but little work has been done on the effect of internal technical support on technology acceptance (Lee et al., 2006).

Training

Education and training refers to the process of providing management and employees with the logic and overall concepts of ERP system (Yusuf et al., 2004). ERP systems are extremely complex and demand rigorous training and therefore an important factor for successful implementation (Bingi et al., 1999). Lack of training has been one of the important reasons for failure of ERP systems (Gupta, 2000; Somers & Nelson, 2001). Training and education will reduce employees' anxiety and stress about the use of the ERP system and provide better understanding about benefits of the system for their tasks (Lee, Lee, Olson, & Chung, 2010). It influences user beliefs toward the systems and training programs increases the user confidence in their ability to use (Gist, 1987; Igbaria, 1995). It also provides managers with a mechanism to disseminate useful and pertinent information about the ERP system and how it fits in with the existing and proposed system (Amoako-Gyampah & Salam, 2004).

2.3.3 Technological characteristics

Literature shows that technological characteristics also play an important role in influencing the usage (Lederer, Maupin, Sena, & Zhuang, 2000).

Complexity

ERP systems, similar to other management information systems, are often perceived as very complex and difficult to be implemented (Liang, Saraf, Hu, & Xue, 2007). Aiman-smith and Green(2002) defined technology complexity as the extent to which a new technology is more complicated for its user than the previous technology used for the same or similar work and represents an increase in the number of things the user must do at once. Higher complexity results in higher mental workload and stress (Sanders & McCormick, 1993; Sokol, 1994). Complexity is found to have a negative impact on the adoption of information technologies (Igbaria, Guimaraes & Davis, 1995).

Compatibility

If the system is highly capable and more compatible with the organization, end users will have a more positive perception towards the technology (Kerimoglu, Basoglu, & Daim, 2008). Information systems that are incompatible with the culture and convention of the organization may fail (Yusuf, Gunasekaran, & Abthorpe, 2004). ERP packages are only compatible with some companies' databases and operation systems and procedural and data compatibility are crucial to the acceptance of the system by the employees (Zhang, Lee, Huang, Zhang, & Huang, 2005).

2.3.4 Subjective norm

Subjective norm, defined as a "person's perception that most people who are important to him think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975). The rationale for a direct effect of subjective norm on intention is that people may choose to perform a behavior, even if they are not themselves favorable toward the behavior or its consequences, if they believe one or more important referents think they should, and they are sufficiently motivated to comply with the referents (Venkatesh & Davis, 2000). Subjective norm in TAM has had a mixed and inconclusive role (Schepers & Wetzels, 2007). Some studies have found considerable impacts of it on the dependent variables such as (Cheung, Lee, & Chen, 2002; Taylor & Todd, 1995) but some other studies did not find significant effects (Davis et al., 1989; Matheison, 1991; Roberts & Henderson, 2000). Some of the cross cultural studies have reported that people in cultures exhibiting strong collectivism tend to emphasize the importance of subjective norm (Boon & Lee, 2010; Lee & Green, 1991). These individuals will conform to the accepted social norm in using computerized systems because of their belief that they will be perceived as being technologically sophisticated by those whom they consider important to their future well-being (Anandarajan, Igbaria, & Anakwe, 2002).

2.4 Impact of ERP usage

In addition to understanding the factors which influence technology acceptance, it is also important to examine the impact of accepting or rejecting IT from an individual or social system perspective (Rogers, 1995). The impacts and the outcomes on the usage of ERP should be investigated from different perspectives especially with a view to study how the

human factor influences success and how users can improve ERP's performance significantly (Botta-Genoulaz & Millet, 2006). Little research has addressed the link between user acceptance and individual and organizational outcomes and there has been no systematic investigation of the impact of technology on employee job characteristics (Venkatesh, 2003). A major issue in previous studies, is their reliance on organizational level data to evaluate the impacts of IS on performance (Abugabah & Sanzogni, 2009).

The post-ERP implementation environment has revealed the considerable impact of these systems on user behavior, both among managers and among their subordinates (Decoster & Zwicker, 2009). Hanseth et al (2001) claims that ERP systems are the ideal managerial control technology. ERP systems are capable of providing simultaneously both management with ample visibility (and, consequently, greater control) and also contribute to employee empowerment by providing access to information (Elmes, Strong, & Volkoff, 2005).

2.4.1 Panoptic Empowerment

The design of ERP allows "decentralized decision making" by giving operational level employees both access to information, and empowering them to make decisions (Rajapakse & Seddon, 2005). IS was shown to support employees by providing information or promoting the delegation of decisions, while at the same time IS can be used to control (Psoinas, Kern, & Smith, 2000). The contradiction between control and empowerment arises when control is viewed in the bureaucratic sense of a supervisor exercising power over a subordinate, and empowerment is viewed as the transfer of power from managers to workers (Elmes, Strong, & Volkoff, 2005)

The ERP system has not only increased the ability of organizations to gather more information in greater detail and in real time, but also brings about more widespread dispersal of information throughout the organization. This expanded access to information not only gives them added flexibility, but also allows them to make decisions which used to be formally referred upwards or to other departments due to a lack of information (Sia, Tang, Soh, & Boh, 2002). The central concept of empowerment is the delegation of power to staff/employees in order to make and implement their own decisions (Psoinas et al., 2000). Thus empowerment is defined as any increase in worker power that enables workers to achieve institutional objectives with greater efficiency and effectiveness (Elmes et al., 2005).

ERP enables a much greater visibility if one's workplace behavior and the performance is enhanced as management can analyze data in real time, in finer granularity, and in multiple dimensions. Thus the ERP systems create an information panopticon through the visibility of information they provide, giving employees decision-making power while simultaneously making them visible to management, thereby leading to employee empowerment (Sia et al., 2002).

The Panopticon is an early nineteenth century design for prisons, developed by Bentham. The principal effect of the Panopticon is to induce in the prisoners a state of conscious and permanent visibility that assures the automatic functioning of power and they begin to act as if they are being observed because they cannot tell when or whether they are being observed (Foucault, 1979). An ERP similarly employs a gaze because it records all user actions, which can be observed in real-time and also stored for later observation. Thus, with no extra effort ERP surveillance is essentially continuous (Sia et al., 2002).

The greater visibility of information provided by the common shared database not only empowers workers to do their work more efficiently and effectively but also makes them more visible to others throughout the organization who can then easily exercise process and outcome control (Elmes et al., 2005). This is referred to as panoptic empowerment which combines the concept of empowerment and multidirectional visibility. There is simultaneous increase in control and empowerment occurs through the mediating effects of information visibility (Elmes et al., 2005). These results contrast with Sia et al's (2002) study. More research is required to generalize the findings to other organizations.

2.4.2 Job Satisfaction

One of the established theories of job satisfaction was developed by Hackman and Oldham (1980). They defined job satisfaction as a positive emotional state of contentment arising from the presence of certain characteristics in a job (Hackman & Oldham, 1980).

Job satisfaction is an important outcome in its own right and has been linked to other key job outcomes, such as organizational commitment, turnover intentions, and job performance (Kumar, 2002). ERP system implementations have the potential to drastically alter jobs, thereby changing people's reactions to their work situation. The job perception and the implementation of an ERP system will interact to influence employees' job satisfaction (Morris & Venkatesh, 2010). Attitudes towards IT is related to acceptance and therefore to

the employees' job satisfaction (Korunka & Vitouch, 1999) The amount of design of employee training and the management of implementation affects employee's satisfaction. (Eriksson, 1990) Some studies have shown that computer based Information systems have a positive effect on the job satisfaction and motivation of end users (Ryker ,1995) while some other have showed that there was no impact (Ang & Soh, 1997) or a negative impact (Korunka & Vitouch, 1999) which needs to be further examined.

2.4.3 Individual Performance

With the rapid growth in use of computing, academics and practitioners have recognized that IT success can be measured by its impact on an individual's work (Law & Ngai, 2007). Organizations that spend millions of dollars on IT are primarily concerned about how their investment will influence organizational and individual performance. IT impact on work at the individual level is a direct consequence of system use, which in turn is a major factor of determining organizational impact (Torkzadeh & Doll, 1999). Goodhue and Thompson (1995) argued that IT was more likely to be used in organizational settings and would have a positive impact on individual performance if the capabilities of the IT matched the tasks that the user had to perform. The system quality of the ERP system influences user's work performance and their satisfaction (Wu & Wang, 2006). Performance and user satisfaction are both caused by the extent to which requirements are met (Gelderman, 1998). Users would adopt an ERP system if they perceived ERP would assist them to attain desired performance outcomes (Amoako-Gyampah & Salam, 2004)

There had been very few empirical studies involving individual performance in ERP environments (Donalds, 2010). Some of these studies have stated positive relationships between IS and performance (Venkatesh, 2000; Weber, 1988) while other studies have stated otherwise (Milman & Hartwick, 1987).

3. Proposed Model

The review of literature shows that there has been no study to find the combined effects of individual, organizational and technical characteristics to form a comprehensive construct of the usage. Also there has been little research existing to find the impacts on the employees on the acceptance of ERP. Many of the existing research on ERP adoption is primarily undertaken by developed countries and very few on the developing countries. Based on this

research gap, the following research model (Fig 1) is proposed to study the effects of the various factors affecting the usage of ERP and its impacts on the employee attitude and behaviors in the Indian context. The following propositions are developed from the review of literature.

The relationships between the TAM variables are replicated in our model in the context of ERP system.

Proposition 1: There is a positive relationship between the perceived usefulness of ERP system and the intention to use the ERP system.

Proposition 2: There is a positive relationship between the perceived ease of use and intention to use the ERP system

Proposition 3: There is a positive relationship between perceived ease of use of ERP system and perceived usefulness of ERP system.

Proposition 4: There is a positive relationship between the intention to use and usage of ERP.

The use of subjective norm in previous studies has obtained mixed results. We wish to reexamine the effect of subjective norm on ERP acceptance.

Proposition 5: Subjective norm has a positive relationship on perceived usefulness of ERP system.

The acceptance of ERP is influenced by various external variables. Though previous research have considered the external variables in their research, there was no clear pattern with respect to the choice of the external variables considered (Legris et al., 2003). In this study we have categorized the external variables as individual, organizational and technological characteristics and we propose the following:

Proposition 6a: There is a positive relationship between the individual characteristics (computer self efficacy and absorptive capacity) and the perceived usefulness of ERP system

Proposition 6b: There is a positive relationship between the individual characteristics (computer self efficacy and absorptive capacity) and the perceived ease of use of ERP system.

Proposition 7a: There is a positive relationship between the organizational characteristics (organizational support and training) and the perceived usefulness of ERP system.

Proposition 7b: There is a positive relationship between the organizational characteristics (organizational support and training) and the perceived ease of use of ERP system.

Proposition 8a: There is a negative relationship between the technological characteristic (complexity) and the perceived usefulness of ERP system.

Proposition 8b: There is a positive relationship between the technological characteristic (compatibility) and the perceived usefulness of ERP system.

Proposition 8c: There is a negative relationship between the technological characteristics (complexity) and the perceived ease of use of ERP system.

Proposition 8d: There is a positive relationship between the technological characteristics (compatibility) and the perceived ease of use of ERP system.

Literature suggests that the acceptance and usage of ERP system will have an outcome at the individual level however little research has empirically examined this link. Hence panoptic Empowerment, job satisfaction and individual performance have been considered as the outcome variables measured at the individual level. The following are the propositions developed.

Proposition 9: There is a positive relationship between the usage of ERP and the outcomes (panoptic empowerment, job satisfaction and individual performance).

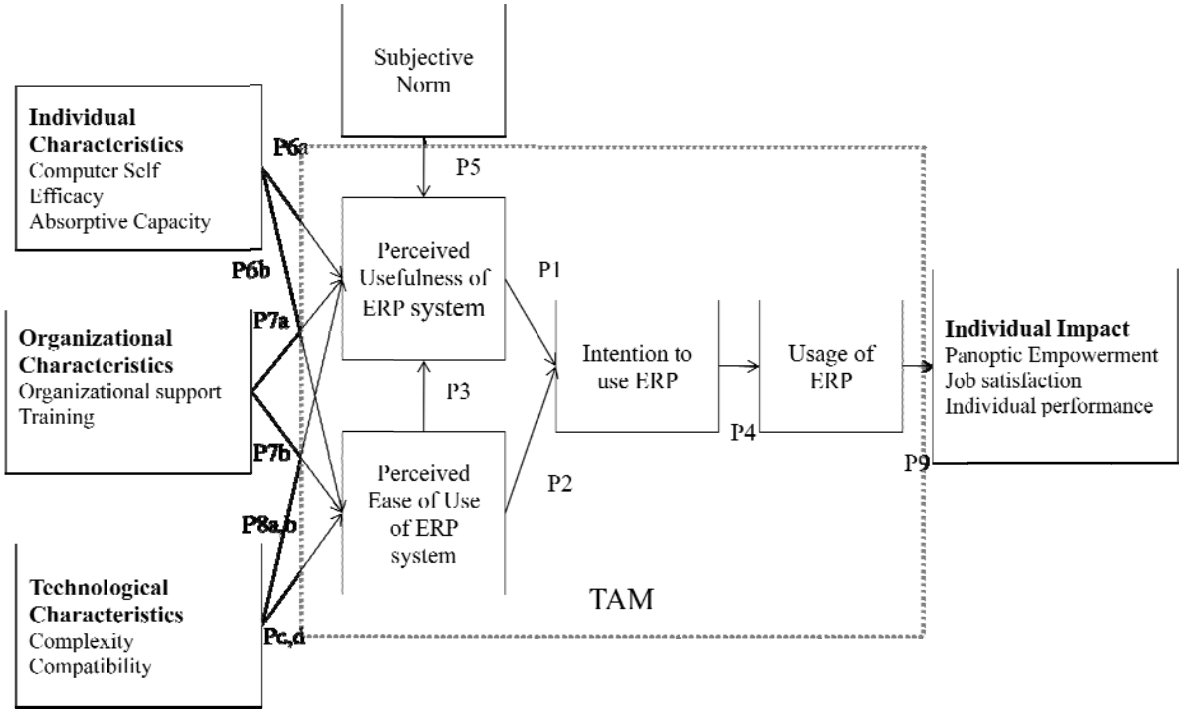

Fig 1 - The proposed research model

4. Implications and Conclusion

The proposed study aims to provide insights for managers to manage efficiently to adopt ERP software across the organization. The management should understand the critical effects of the characteristics of the individual, technological and organizational characteristics on the acceptance of ERP. Managers should have the goal of not just making use of the system but to make employees satisfied with using the system, to improve their performance by using their time and energy and also to empower them to make decisions. This in turn has positive impact on the organization's performance and success of ERP.

The main purpose of this paper was to gain an understanding of the various factors affecting the acceptance of ERP by the employees in the organization and the impacts of the usage on the employees. The review of literature provides the evidence that may support the proposed model structure.

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