FACTORS INFLUENCING USER INVOLVEMENT IN BUSINESS PROCESS MODELLING: A FRAMEWORK

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Abstract

The process models are one of the most common approaches employed during the early phases of Information System Development (ISD). Process Modelling is an approach that visually describes how a business operates by defining the business processes, entities, activities, business opportunities and threats. Most ISD projects fail due to factors which include user and stakeholder involvement issues. Although various perspectives and criteria have been employed by researchers to study the factors that influence user involvement during ISD, reported evidence on involvement factors for Business Process Modelling is still limited and requires further study. The current framework is lacking in factors that are related to the process modelling domain. The objective of this paper is to discuss factors affecting user involvement in business process modelling mainly in ISD projects. We proposed a framework for user involvement in business process modelling based on previous models. The framework combines five elements; user, project, process, modeller and interaction.

A case study was conducted to validate the proposed framework. The findings show that the framework is applicable in establishing user involvement before and during initial business process modelling implementation to ensure its success. The identified influencing factors includes user intention towards participation, attitude, interest, commitment, experience, perceived ease of user participation, project importance, benefits, outcome, visibility, complexity and recognition, process efficiency, process learning and innovation, process clarity, modeller satisfaction and expertise, interaction quality and nature. This framework offers guidelines for user involvement prior to the implementation of Business Process Modelling in the future.

Keywords: Business process management, Business process modeling, User involvement/Involvement, Stakeholders

1. Introduction

User involvement is a significant factor in the successful implementation of information systems (IS) (Cresswell, Morrison, Crowe, Robertson, & Sheikh, 2011; de Waal & Batenburg, 2014; Sari Kujala, 2003; Majid, Noor, Adnan, & Mansor, 2010). User involvement increases the level of user satisfaction (Burley, Scheepers, & Owen, 2009) and user acceptance. The involvement of users in the software development process can reduce the cost of research and development work (Pankowska, 2012). Between the developer and the user, the latter is considered more appropriate when describing/identifying system requirements because users determine system use and may be part of the subject matter expert and the process owner. One of the aspects that should be considered during Information System Development (ISD) is the development of a business process model. The involvement of users as input providers are key factors that contribute to the production of quality process model (Antunes, Simões, Carriço, & Pino, 2013; Bandara, Gable, & Rosemann, 2005; Eikebrokk, Iden, Olsen, & Opdahl, 2008; Pinggera et al., 2010; Rittgen, 2010, 2012; Stirna, Persson, & Sandkuhl, 2007). However, experts of business process modeling indicate that most business process modeling failed due to low user involvement (Cresswell, et al., 2011).

It was a difficult to effectively involved users during the development of business process model (Burley, et al., 2009; Cresswell, et al., 2011; Rittgen, 2012). This result in inaccurate process model
that subsequently result in additional cost and time for improvement activities, redevelopment of the system and implementation of change management (Procaccino & Verner, 2009). Understanding the involvement of the user in business process modelling is crucial during attempts to elude obstacles such as system functionality failures caused by insufficient input and poor quality process modelling. However, studies in the involvement of users in the business process modeling are still limited. The focus of most previous studies was on the aspect of Information and Communications Technology (ICT) project development particularly in the system development life cycle (SDLC) (Batenburg & Koopman, 2010; Butt, Ahmad, & Fatimah, 2012; de Waal & Batenburg, 2014; Hsu, Lin, Zheng, & Hung, 2012; Majid, et al., 2010; Nawi, Rahman, & Ibrahim, 2011; Rittgen, 2012). While considerable research has been conducted on the technical aspects of process modelling, it is not the case for the user aspects of process modeling (J. Becker, Rosemann, & Von Uthmann, 2000; J. r. Becker, Breuker, Weiß, & Winkelmann, 2010; Börger, 2011; Koschmider, Hornung, & Oberweis, 2011; Koubarakis & Plexousakis, 1999; Shen, Wall, Zaremba, Chen, & Browne, 2004; Yan, Dijkman, & Grefen, 2012).

The success of a technology is not just seen in terms of function and use, but also takes into account whether the technology is able to fulfill the needs of users. Thus, the importance of investigating the involvement of users cannot be overstated. The objective of this paper is to discuss factors affecting user involvement in business process modeling mainly in ISD projects. We proposed a framework for user involvement in business process modelling based on previous models. This paper is organized as follows. Section 2 discusses an overview of user involvement. Section 3 discusses the user involvement in business process modelling while Section 4 discusses work related to the identification of factors pertaining to user involvement. This then forms the basis of our proposed model for user involvement in business process modeling as presented in section 5. Finally, we bring this study to a close with a conclusion.

1. Overview Of User Involvement

User involvement refers to various design related behaviors and activities that the target users or their representatives perform during the system development process (Barki & Hartwick, 1994). The involvement of users reflects individual interests and is closely related to personal characteristics (Barki & Hartwick, 1989). User involvement is a motivational attitude toward IS and their development (Kappelman, 1995). As such, it plays a decisive role in the successful creation and deployment of IS in organizations. In this paper, 'users' refers to the members of the ISD team who contribute the input during the business process modelling session, including the stakeholder. They are comprised of the subject matter experts including process designer, process user and knowledge worker (Weske, 2012).

The benefits that can be gained through user involvement include sense of ownership by the user; an increase in commitment towards the success of IS; an improvement in the understanding of business processes; the procurement of more complete and accurate information; a realistic expectation; and the reduction of unnecessary system specifications (McKeen & Guimaraes, 1997; Rees, 1993). User involvement in system development activities results in a psychological state whereby the experience enhances the commitment of users to the system and encourages them to be more receptive (Markus & Mao, 2004). Involving users during the early stages of system development can avert additional costs brought about by the need to improve the system (Näkki & Koskela-Huotari, 2012).

Various importance of involving users were reviewed by Kujala (Sari Kujala, 2003) including the improvements of the system quality with the exact requirements production and increasing the level of satisfaction and acceptance of the system (Burley, et al., 2009; Damodaran, 1996). The involvement of users gave a sense of ownership of the system and enhances the users’ understanding of business processes (McKeen & Guimaraes, 1997; Rees, 1993; Venkatesh, 2008). Venkatesh (Venkatesh, 2008) also suggest that the involvement of the users in the development of complex systems is critical as if the system fails; it has the potential to cause disruption to the work of the organization. The involvement of users in the system development is not only to facilitate the process of gathering information but more importantly, to integrate and resolve different vocabulary, interests and values of users and system developers (S Kujala, 2008).
However, there are several factors that hinder the maximum involvement from the users, including implicit knowledge, lack of knowledge and competency, no incentive or encouragement from top management and user concerns in sharing confidential information (Pankowska, 2012; Wood, 1997). Sometimes, users were also reluctant to provide information, especially the proprietary ones (Raduescu, Tan, Sedera, Muehlen, & Lippe, 2006). In addition, the time factor is also a major obstacle since users are bound by the official responsibilities and duties in the organization. All of these barriers cannot be underestimated as the implications resulting in the failure of end users to accept the system (Gallivan & Keil, 2002). The appointment of change agent in the project team as a source of new workforce to overcome this obstacle has been recommended (Markus & Mao, 2004). However, this appointment involves additional cost and time and only suitable when dealing with large projects or tasks that requires complex automation (McKeen & Guimaraes, 1997).

2. User Involvement In Business Process Modelling

The use of business process modelling is not limited to the objective of improving various processes within an organization. The benefits of process modelling, particularly in large IT-enabled Business Process Re-engineering (BPR) projects such as Enterprise Systems implementations, have been widely recognized. Business process modelling related issues, especially in the field of ISD, attracted researchers attention because the process models facilitate communication during the requirements analysis, enable the process owner to confirm ISD needs (de la Vara & Sánchez, 2008), provide a positive impact on IS quality, particularly in robustness, flexibility and uncertainty needs (Mathisen, Ellingsen, & Fallmyr, 2009), act as a key supporter in the communication between process owners during discussions (Gruhn & Laue, 2007), and help to understand complex phenomena related to organizations (Barjis, 2008).

Higher user involvement will lead to deeper process understanding and higher process model quality (Rittgen, 2012). In contrast, failure to involve users will lead to incomplete and outdated information (Santoro, Borges, & Pino, 2010). To overcome the communication problems between developers and model users, various techniques and approaches have been attempted to improve the previous process modelling approach. For example, storytelling technique can be used in which participants have to tell about the activities undertaken instead of describing a process (Santoro, et al., 2010). According to the business process management experts, the main conditions to ensure the effectiveness of users’ involvement are to get their buy in (Bandara, Indulska, Chong, & Sadiq, 2007). Accurate BPM information may be identified by getting the user’s buy in and also combining a good technique of business process modeling.

The business process modelling collaborative approach has been studied by Rittgen (Rittgen, 2010) and Stoitsev (Stoitsev, Scheidl, Flentge, & Mühlhäuser, 2008), where users were actively involved in the development of the process model. Process modelling is a collaborative activity that includes dialogue and negotiation as part of the information elicitation, modelling and verification stages (Mendling, Recker, & Wolf, 2012). These stages place high demands on the aspect of involvement. To facilitate this involvement, the project team needs to encourage users to contribute their knowledge either in the form of statements or sketch models. Collaboration will also result in a higher quality process model that features better team member knowledge about the respective processes.

3. Related Work

We identified and analyzed seven previous researches related to users’ involvement. Comparison of models and frameworks related to the involvement users with the theme, description, users factor and type of action as presented in Table 1. Four research themes were identified, namely the involvement of the users and the success of ISD, benefits of continuous involvement, approach to the users involvement and participation tool.
### Table 1: User Involvement Models and Frameworks

<table>
<thead>
<tr>
<th>Theme</th>
<th>Model</th>
<th>Description</th>
<th>Factors</th>
<th>Type of User Action</th>
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<tbody>
<tr>
<td>Users Involvement And IS Success</td>
<td>User Participation Model (Lin &amp; Shao, 2000)</td>
<td>Examines the relationship between participation and IS success in a broader context</td>
<td>System Impact, System Complexity, Development Methodology, User Attitudes</td>
<td>Instrumental, Strategic</td>
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<td></td>
<td>User Participation Elements Framework (Markus &amp; Mao, 2004)</td>
<td>Revitalize participation as an important area of IS research</td>
<td>Stakeholder Change Agent Participation Activities, System Development, System Implementation, Users Success</td>
<td>Instrumental, Strategic</td>
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<td></td>
<td>User Engagement Model (Cresswell, et al., 2011)</td>
<td>Examine approach and experience of user engagement</td>
<td>Point of Engagement, Period of engagement, Disengagement</td>
<td>Instrumental, Strategic, Discursive</td>
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<tr>
<td>Benefits Of Continuous Involvement</td>
<td>Framework for Effective User Participation in Non-profit Community Contexts (Lee &amp; Carroll, 2010)</td>
<td>Featuring theory that contributes to the on-going benefits of user participation in the context of a non-profit community</td>
<td>Social Interaction, Participation Activities, Functional Empowerment, Democratic Empowerment</td>
<td>Instrumental, Discursive</td>
</tr>
<tr>
<td>Participation Tool</td>
<td>User Participation Element Model (Näkki &amp; Koskela-Huotari, 2012)</td>
<td>Examine the impact of social media on the elements of user involvement</td>
<td>Participant Roles, Participation Activities, Continuous Involvement, User Empowerment, Micro Contributions, Co-creation Experience</td>
<td>Instrumental, Strategic, Discursive</td>
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<tr>
<td>Approach To The Participants Involvement</td>
<td>User Participation Approach (UPA) Framework (Mattia &amp; Weistroffer, 2008)</td>
<td>Includes four systematic approaches of user participation from various IS views</td>
<td>Contingencies User Engagement, Intervening Mechanism, System Outcome</td>
<td>Instrumental, Strategic</td>
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</table>
The involvement of user factors that have been identified are categorized according to the indicators by the conditional factors that affect the level of users’ involvement in the ISD (Maail, Kurnia, & Chang, 2010). We mapped the selected models and linked them to the respective types of action according to the Theory of Communicative Action (TCA), a well-known social science theory used in IS research (Maail, et al., 2010). The purpose of this mapping is to identify the characteristics of the given involvement factors based on the TCA definition. There are four types of action involved: instrumental, strategic, communicative and discursive. The instrumental and strategic actions are success-oriented while the communicative and discursive actions strive to achieve agreement among the participating actors. The instrumental action focuses on control, manipulation and transformation of the physical object where users depend on the technical knowledge of other team members and appropriate tools. The strategic action focuses on the transformation behavior of users while the communicative action is oriented towards maintaining mutual understanding among them. The discursive action restores agreement and conditions for coordinated action. From the mapping, we found that all the involvement factors listed matched with the type of user’s action.

Lin and Shao (Lin & Shao, 2000) suggest that the user involvement factors that lead to system success are system impact, system complexity, development methodology, and user attitude. By updating the traditional IS Participation Theory, Markus and Mao (Markus & Mao, 2004) outlined the key elements of user participation which are stakeholder, change agent, participation activities, system development, system implementation and users’ accomplishment. Additionally, the model by Cresswell (Cresswell, et al., 2011) emphasized on the key points of possible engagement, disengagement and reengagement for the implementation of an effective IS. Due to the close alignment of user needs and expectations, the key points are assimilated into working practices which are in the implementation stage. However, previous models focus on characteristic and importance of the user involvement during systems development instead of process modelling. Other research by (Mattia & Weistroffer, 2008) presents a process organization framework for guiding principles to successful user participation. The process elements include contingencies, user engagement, intervening mechanism and system outcome. This framework is general and does not specify any behaviour or methods for influencing the effectiveness of participation. Lee and Carroll (Lee & Carroll, 2010) focused on the benefits of continuous user participation. The factors that pave the way to success are social interaction, participation activities, functional empowerment and democratic empowerment. The aim of their model is to develop socio-

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<td>User Involvement Enabler Model (Thakurta &amp; Roy, 2012)</td>
<td>Integrate a variety of factors to explain the variation in the diversity of user involvement project background</td>
<td>User Intention Towards Participation Perceived Ease Of User Participation User Interest Process Clarity User Accessibility To Project Perceived Project Importance Perceived Project Benefit Outcome Visibility Project Uncertainty Project Complexity</td>
<td>Instrumental, Strategic, Communicative, Discursive</td>
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technical competencies in order to strengthen organizational and technological capabilities. Social media-based working method creates elements of user involvement such as activities, continuous involvement, user empowerment, micro contributions and co-creation experiences (Näkki & Koskela-Huotari, 2012). Factors that influenced the involvement of users during software development projects were presented (Thakurta & Roy, 2012). These factors are user intention regarding participation, perceived ease of user participation, user interest, process clarity, user accessibility to project, perceived project importance and project benefit, outcome visibility, project uncertainty, and project complexity. Both models explain the enabling conditions and behavioral characteristics that influence user involvement in the software project.

Taking all comparison aspects and user involvement factors into consideration, the model proposed by Thakurta and Roy (Thakurta & Roy, 2012) where they highlighted most aspects and potential factors of user involvement, is probably the most comprehensive. However, this model is lack in business process modelling components as it focused on the overall aspect of the system development project. We argue that factors from the other identified models such as social interaction and participation activities (Lee & Carroll, 2010) are also significant influencing factors in user involvement. To complement the aspects of business process modeling, several factors related to the involvement of users from business process modeling success framework have been identified (Bandara, et al., 2005). This framework is related to the involvement of the users in the context of business process modeling. Factors such as the clarity and efficiency of the process, process learning and innovation, modelers’ competency and satisfaction, model quality are the identified factors can influence the involvement of users in business process modelling. In the next section, we proposed a model for User Involvement in Business Process Modelling by separating the involvement factors into five main components.

4. Proposed Model For User Involvement In Business Process Modelling

Based on the review of user involvement factors, a model was developed as shown in Figure 1. We identified five components that influence user involvement in BPM namely user, process, project, modeller, and interaction. A project encapsulated the overall framework elements, including business process modelling and the development of process model. The user component in the model serves as the main influence pertaining to involvement. Process impact influences the user, while user and modeller interact to provide input, achieve understanding and resolve discrepancy along the business process modelling.

A case study of Immovable Asset Management System (IAMS), was conducted in the Public Works Department of Malaysia. This qualitative research involved three types of data collection including in-depth interview, observation, and document analysis. Purposeful samplings were used in order to gain in-depth information from key informant about the users’ involvement in business process modelling during the system development. The findings show that the framework is applicable in establishing user involvement before and during initial business process modelling implementation to ensure its success. The validation of the framework showed that there are 19 factors that influence the involvement of participants in the modeling of business processes. Factor of participant component is a major factor that led to the involvement of the participants while components of the project, processes and interaction are the external factors that influence the participants. There are also new factors listed from the results of an empirical study which is the participant’s experience and project recognition. This model offers guidelines for user involvement prior to business process modelling implementation in the future.
1.1 User Related Factors

User is a part of project stakeholders with different backgrounds including user, modeler and process owner. The User Involvement Enabler Model (Thakurta & Roy, 2012) explained the user involvement process in software projects by integrating different user related factors. The related factors are user intention towards participation, attitude, interest and commitment, perceived ease of user participation, project importance, and benefits. User attitudes are suggested as one of the related factors (Lin & Shao, 2000).

1.2 Project Related Factors

Apart from the user, project related factors are also important when determining user involvement. They are relevant to system complexity and impact, development methodology (Lin & Shao, 2000), and system development and implementation (Markus & Mao, 2004). The project factors are also described as outcome visibility, project uncertainty and project complexity (Thakurta & Roy, 2012).

1.3 Process Related Factors

Process related factors may also affect user involvement. According to Sedera et. al (Sedera, Rosemann, & Gable, 2002), process modelling is widely accepted, particularly in large IT-enabled Business Process Reengineering (BPR) projects. As the ‘process’ is the main concern in the business process modelling domain, it is included as one of the main model components. Successful modelling positively affects the process and organizational performance as well as the users who participate in the business process modelling session (Sedera, et al., 2002). Process in this model refers to factors that affect performance during process modelling. Here, the ‘process’ refers to the methods or functions that are involved in the modelling procedure. The identified influencing factors include process efficiency, process learning and innovation, and process clarity.

1.4 Modeller Related Factors

The modeller plays a significant role in successful business process modelling (Bandara, et al., 2005; Sedera, et al., 2002). The modeller is responsible for developing the process model based on input contributed by users and a member of the ISD team during the business process modelling session.
He/she intervenes whenever necessary with the intention of clarifying the content so that groups understand the system or process under discussion (Renger, Kolfschoten, & Vreede, 2008). The identified influencing factors includes modeller satisfaction and expertise (Bandara, et al., 2005).

### 1.5 Interaction Related Factors

Factors related to social interaction (Lee & Carroll, 2010) and user roles (Näkki & Koskela-Huotari, 2012) are described as the need for quality interaction between the user and the project members. Rittgen (Rittgen, 2010) applied the collaborative modelling approach which emphasizes on interaction between team members to ensure the quality of the business process model and its successful modelling process. The model by Thakurta and Roy (Thakurta & Roy, 2012) describes the quality and nature of interaction as influencing factors in involvement.

### 5. Conclusions

Many benefits can be gained from understanding the role of involvement including a more accurate identification of user requirements, and increased acceptance of the system. Upon identifying the contributing factors to user involvement in current ISD projects, we proposed a model for business process modelling based on previous models and relevant user involvement factors. The main contribution of this paper is the review of previous business process modelling factors and frameworks. We classified user involvement models based on their particular descriptions and characteristics. We argue that five components contribute to user involvement in business process modelling, namely, the user, project, process, modeller, and interaction. We also established that it is necessary to identify user involvement influences before or during initial business process modelling implementation to ensure a successful outcome.

### References


