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User Bonding and Information System Development Success

Sazimah Mohamed Salleh*
Faculty of Business and Management, Universiti Teknologi MARA, Malaysia
Email: sazimah@uitm.edu.my

Erne Suzila Kassim
Faculty of Business and Management, Universiti Teknologi MARA, Malaysia

Ramita Abdul Rahim
Faculty of Business and Management, Universiti Teknologi MARA, Malaysia

Norfazlina Ghazali
Faculty of Business and Management, Universiti Teknologi MARA, Malaysia

* *Corresponding Author*

Abstract
Purpose: The purpose of this study is an extensive of previous conceptualization of user bonding on strategic information systems development success that addresses a framework that models the relationship between user bonding and the success of ISD.
Design/methodology/approach: The study was conducted primarily as a quantitative study via the survey research design. This is a cross-sectional study, descriptive and correlation in nature that seeks to identify and describe relationships between multiple variables. The population for this study is the individual experienced with ISD project regardless of system user or developers.
Findings: A total of 400 questionnaires were distributed and 307 successfully collected. Among these, 6 data were unusable due to omissions, which yielded a final response rate of 75% (301). The outcome of this research indicates that structural, cognitive and affective bonding play significant roles in the ISD success.
Research limitations/implications: In order to make the results more reliable, it is recommended that future research distribute and collect data from whole Malaysia.
Practical implications: According to the results of this study, it can be recommended that organization to be success in ISD should strengthen the user involvement in terms of structural, cognitive and affective bond. However, the results did not show the evidence for relational bond as a factor that determines the ISD success and can be omitted for future development of information system.
Originality/value: This is the first interpretation of user bonding and the success of ISD.

Keywords: Information system development (ISD), information system (IS), user involvement, user bonding.

Introduction

Successful information systems development is the core focus and distress for both researchers and practitioners. However, failures in ISD is common as it is known to be a high risk undertaking, are often discussed yet rarely understood despite advances in development tools, methodologies and technologies. All the information system literature reviewed so far suggests many factors could influence information system development success (Wright and Capps III,

2010); Pekkola et al., 2006). These include budget targets, scheduling goals and satisfaction (Fisk et al., 2010), client knowledge and trust in the relationship (Jennex and Adelakun, 2003). Hamdan and Al-Hajri (2021) added that a number of organizations may succeed but in contrast, many faced failures due to the negligence towards the users' reaction during system design phase. Likewise, important to ISD success is the role played by user involvement. However, in spite of the theoretical advantages of user involvement, Markus and Mao, (2004) challenge traditional participation or involvement theory and redefine the conflicting explanations for participation's or involvement effects on ISD success. Defining user participation in terms of activities performed by users does not give a complete and true picture of their involvement., because there are many different ways in which users can partake in system development (Cavaye, 1995). Several dimensions listed are type of participation, degree of participation, content of participation, extent of participation, formality of participation and influence of participation. Users usually have a lot of implicit knowledge about the application domain, the activities they undertake, their work practices, the context in which they use the system, and their own behaviour and preferences. (Bano and Zowghi, 2015).

Existing research on user involvement as ISD success determinant shows its affects are mainly studied from the aspect of general character and pervasiveness. Thus, inadequate users' involvement (user participation) is a major challenge affecting the projects (Kagoya et al., 2019). Addition to the past studies on ISD success determinants is the limited assessment on user bonding, which is an important issue within the cross-boundary collaboration of ISD.

User bonding could be established by relating the concept to user's expectations and to the user-developer relationship. Understanding user's expectations of a system is important in gaining and interpreting their perspectives on ISD success (Wanyama and Zheng, 2011). However, the dynamics of information systems and knowledge has shaped a new user-developer relationship that not only depend on developers' knowledge on IS solely, but with recent IS phenomena, users should go beyond understanding on the ISD processes. Due to the user versus developer knowledge, and motivation of users and developers, personality, societal asymmetries such as social difference and authority, as well as time, space, and resource constraints, different levels of user-developer bonding were established (Hung et al., 2014). It might be measured by relational bond, cognitive bond, or structural bond.

Previous studies showed integration of users' and IS developers' knowledge is a significant success factor in ISD success, since it reduces risks and conflicts. (Chang, 2007; Nandhakumar and Jones, 1997; Tesch et al., 2009). However, inconsistent findings have been concluded between user bonding and ISD success correlations. Therefore, this study is an extensive of previous conceptualization of user bonding on strategic information systems development success that addresses a framework that models the relationship between user bonding and the success of ISD. Sufficient care was engaged in the selection and development of instruments.

Problem Statement

User bonding is the core focus for successful information systems development and widely accepted criteria for both researchers and practitioners. Yet, involvement of users in the design process is a topic that has received little attention. (Carthy et al., 2021) and the changing setting creates a conceptual divide between participants' psychological experiences and system success as measured by system adoption and use by intended users (who may not all have had the opportunity to participate in development) (Markus and Mao, 2004). This gap leaves a major hole as a result of the increased scope of systems development projects. According to research conducted by Standish Group, 83.9% of the projects are partially and completely fail which means the majority of projects, or 52.7%, were over cost, over time, and/or lacking promised functionality and that leaves 31.1% to be classified as failed, meaning they were abandoned or cancelled. (Standish Group, 2019). Furthermore, one of the factors found in the failed projects

include lack of user involvement and one of the top five indicators found in the challenged project is lack of user input. Companies who do not involve users in the design process are more likely to uncover problems or potential design improvements only after the product validation stage, when the cost of redesigning is usually high and the changes may be impossible to implement (dos Santos, et al, 2021; Vredenburg, et al., 2002).
Furthermore, Hung et al. (2014) have the same grounding of argument in one of the three (3) dimensions that have been built on the basis of poor user support, primarily because to the lack of opportunities for users to connect with system developers. A clear route for new conceptual development is to put forward the role of user bonding during system development among users who participate and vice versa; in terms of relationship, opportunity to participate and knowledge integration.

Literature Review

Information Systems Development (ISD) Success

The term information systems development can also be described in abundant ways. ISD projects, with their distinct characteristics, are an ever-expanding field of project management, and project failures in ISD are relatively common (Taipalus et. al, 2020). Examining crucial success criteria for ISD projects is critical because IT projects enable organisational transformation and commercial growth, and despite the contribution of methodologies and frameworks for project management, the percentage of unsuccessful IT projects remains high (Iriarte & Bayona, 2020). ISD is a success when it includes a high-quality system development approach (methodologies used, interactions and conflicts, progress against schedules and budgets) and/or a high-quality outcome of system development, namely a project, a system, or an IT artifact (Markus and Mao, 2004).
The DeLone and McLean information systems (IS) success model aims to provide a thorough knowledge of IS success by identifying and analysing the relationships between its most critical success aspects (Sabeh et. al, 2021). Back in the 20th century, the entire procedure was summarised in one sentence: the initial problem statement, system analysis, system design, building, and implementation (Wright and Capps III, 2010). Nevertheless, DeLone & McLean (1992) define IS success as challenging because success is a multidimensional concept that can be assessed at different levels (e.g., technical, individual, group, organizational) and using several criteria (e.g., economic, financial, behavioral, perceptual). Presently, in the contemporary context, researchers' lead the variable to not only concentrates the cycle of ISD, but to look at the productivity outcome such as the organizational impact, and in terms of project quality and success (He and King, 2008; Hsu and Weng, 2006).
Ultimately, information systems are developed to support both business and organizational process with the support of effective and efficient project management. Unfortunately, due to the organizational intelligence's limits, learning disincentives, organisational designs, and educational impediments (Lyytinen and Robey, 1999) most often many organizations failed to learn, and they come to accept and expect bad performance over time and learned to fail derived from organizational impact.
As mentioned earlier, moving towards 21st century, quality seemed to take its place as the highest priority to consider any ISD moving towards project success. Therefore, this study encompasses ISD success as dependent variable which measures by project, information and system quality. The dimensions used by DeLone and McLean (2003) such as system quality, information quality, use, user behavior, individual impact, and systemic impact; showed that the use and satisfaction of the user have an impact on the system's and information's quality. (Tawaha et al., 2021). Adding to these, Kurt (2019) revealed that system quality has significant impact on both system usage and user satisfaction, however information quality has significant impact only on user satisfaction.

According to He and King (2008) the dimension of project quality measures the features that are desirable of an IS such as system quality (flexibility and integration) and data quality (quality of output reports). Meanwhile, the quality of the system outputs is referred to as the dimension of information quality (i.e., the quality of the information that the system provides) and measures the desirable characteristics of the system outputs (content, reports, dashboards) such as relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, usability (DeLone and McLean, 1992; Markus and Mao, 2004). Lastly, the dimension of system quality is defined as the desirable characteristics of the system as the system itself (DeLone and McLean, 1992) meanwhile, the upgraded version includes intention to use and service quality variables, as well as a net benefits variable that replaces the original model's individual and organizational impact variables. (DeLone and McLean, 2003). According to DeLone and McLean, 1992, intention to use is defined as users' intention to use the system; and service quality measures the quality of the service or support in terms of its fitness for intended use that system users receive from the IS organization and IT support personnel in general or for a specific IS. Examples of service quality measurements are responsiveness, accuracy, usefulness, timeliness, and system and documentation friendliness (Guimaraes et al., 2003).

User Bonding

The factors that influence the performance of information system are user involvement and user abilities, thus the importance of designing useful, usable, and desirable interactive systems i.e., systems that users can easily learn to use, that contain the functions that enable them to complete their responsibilities and are well-liked, resulting in improved information system performance (Rahmani, 2021; Chilufya & Silvervarg, 2021). Lin & Shao (2000) points out that users of an information system (IS) can interact with system designers during the planning, analysis, design, testing, and implementation stages of the system development process, assisting in many elements of the process. In addition, a greater degree of users' participation was sought to prevent design hazards such as bad design specifications, improper design interfaces, and lack of affordability, all of which stemmed from a lack of attention to real user needs (Ongwae & Duncombe, 2021). Contradict to that, Tesch, et al. (2009) debated that when users are not closely bonded with the project team, they do not commit to the project or to IS development.

Empirical research has demonstrated the importance of user attributes and influence in systems development (Barki and Hartwick, 1994; Hunton & Beeler, 1997; Guimaraes et al., 2003; Mattia & Weistroffer, 2010). This study proposed a model to demonstrate perceived users' bonds with project and development team using four (4) dimensions, with new dimension of affective bond factor. The users' structural bond as the interaction pattern between users and developers, the users' relational bond as users' emotional and affective connection with developers, the users' cognitive bond as the extent to which users can understand the ISD process and the users' affective bond as the extent to which users having the right attitude to receive, respond and value command in the ISD process.

Users' relational bond

According to Hung et al. (2014) the dimension of users' relational bond measures the willingness of users to contribute when they are bonded with the project and the team. In order to test the relations between relational bond and ISD success, the following hypothesis is put forward:

H1: Users' relational bond has influence towards the ISD success.

Users' structural bond

According to Hung et al. (2014) the dimension of users' structural bond measures to the extent to which users have adequate opportunity to interact with the developers for example attending formal meeting in a formal participation mechanism create opportunities. Therefore, this study has developed hypothesis as follows:

H2: users' structural bond has influence towards the ISD success.

Users' cognitive bond

The dimension of users' cognitive bond measures the users considerate of the nature of the IS development project's nature (Hung et al., 2014). It is proposed that when they are clear and understand what to contribute, users are more likely and more willingly to contribute knowledge. Users are interested in the system, and they are inclined to want to participate despite the possibility of confrontation with the system designers (Tait and Vessey, 1988). It is thus exciting to discover whether cognitive bond influence ISD success based on the following hypothesis:

H3: users' cognitive bond has influence towards the ISD success.

Users' affective bond

The new dimension of users' affective bond measures the users' attitude and believe the nature of the ISD project. Users are more likely to respond if they have the awareness to contribute towards the ISD success. With affective bond, users are capable of proposes a plan to social improvement and follows through with commitment towards the systems development. Therefore, to confirm whether affective bond effects ISD success, the following hypothesis is developed:

H4: users' affective bond has influence towards the ISD success.

Conceptual Framework

Below is the conceptual framework for this study. According to figure 1, independent variable was user bonding which measure by four variables namely perceived users' structural bond, perceived users' relational bond, perceived users' cognitive bond and perceived users' affective bond, whereas dependent variable was information system development success which measure by project quality, information quality and system quality.

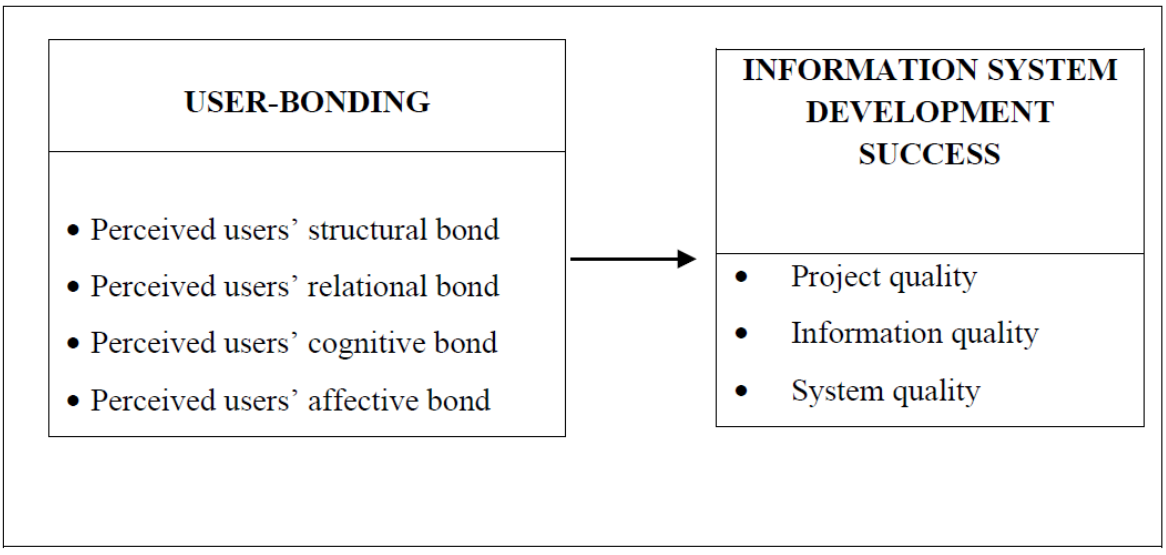

Figure 1: Conceptual Framework of User Bonding and Information System Development Success

Methodology

The study was conducted primarily as a quantitative study via the survey research design. This is a cross-sectional study, descriptive and correlation in nature that seeks to identify and describe relationships between multiple variables. The population for this study is the individual experienced with ISD project regardless of system user or developers. A purposive sampling technique was deployed in this study. Purposive sampling is a non-probability technique that involves the conscious selection of certain people with the most information on the characteristic of interest (Salkind, 2014).

For this study, respondents were selected based on involvement and experienced in information system development. The main tool that was used to gather the required data was a self-administered questionnaire that has been specifically developed by the researchers to address the study objectives. Self-administered refers to a questionnaire that has been designed specifically to be completed by a respondent without intervention of the researchers in data collection process (Babbie, 2008). A total of 400 questionnaires were distributed and 307 successfully collected. Among these, 6 data were unusable due to omissions, which yielded a final response rate of 75% (301). The collected data was analyzed using the AMOS software.

Constructs and Measurement of Variables

The measurement scales of constructs were taken from past studies. In particular, information system development success (project quality, system quality and information quality) is measured using fourteen items adapted from three sources (He and King, 2008; Markus and Mao, 2004; Guimaraes et al., 2003). In assessing the user bonding, this study used twenty two items comprises of four dimensions namely Users' relational bond, Users' structural bond, Users' cognitive bond and Users' affective bond which adapted from Hung et al. (2014). This study used five-point Likert scale ranging 1=strongly disagree to 5=strongly agree. Furthermore, the use of the above source scale is justified as it has been found to be reliable and reached acceptable alpha coefficients more than 0.70. Nunnally (1978) recommends reliabilities of 0.70 or better (but not much beyond than 0.80) for basic research and between 0.90 and 0.95 in cases where important decisions are to be made on the basis of the test scores.

Respondents Profile

The respondents' profiles are depicted in Table 1. Majority of the users worked in the telecommunication and media industry. The highest percentage of employee number is between 101 to 500, and majority of the project duration is more than 2 years.

Table 1: Demographic Profiles

Variable	Frequency	%
Industry Type		
Education	70	23.3
Financial Services	56	18.6
Telco and Media	118	39.2
Transportation	32	2.3
Others	18	6.0
Average Project Duration		
1-2 years	31	10.3
More than 2 years	270	89.7
Number of Employees		
51-100	7	2.3
101-500	197	65.4

Variable	Frequency	%
More than 500	97	32.2
Average IS Team Size		
11-20	11	3.7
21-30	181	60.3
More than 30	108	38.0

Results and Findings

Measurement Model

Prior to the model development, an exploratory factor analysis was performed using the principal components and varimax with kaiser normalization rotation. The results produced a total variance of 64.11%. The KMO of 0.700 indicated factor analysis was appropriate. The MSA>0.5 suggested all variables should be included in the factor analysis, and the Bartlett's test is significant, implying the variables were correlated. As suggested by Beavers et al. (2013) only items with a loading of .40 or greater were considered to be factorized.

The conceptual model was empirically analyzed using AMOS for confirming on the validity and reliability. The indicator loading, CR and AVE for the reflective constructs are shown in the Table 2. Although the AVE values for structural bonding, relational bonding and information quality is less than 0.5 but more than 0.4, the composite reliability is higher than 0.6. Hence, following Fornell and Larcker (1981) the convergent. Validity of the construct is still adequate.

Table 2: Internal Consistency and Convergent Validity

Construct	Loading	AVE	CR
Structural bonding		**.440**	**.702**
Users provide agreement to the work done by the project team	.687		
Users are participating in joint planning for details of project approach, timing, and success criteria	.622		
Users are engaging in discussion with project team	.680		
Relational bonding		**.451**	**.707**
Mutual respect between developers and users	.703		
a good relationship between developers and users	.758		
high mutuality among developers and users	.532		
Cognitive bonding		**.559**	**.792**
familiar with IS development	.796		
aware on the important of their role	.709		
familiar with their role in project	.736		
Affective bonding		**.547**	**.783**
feel the project is theirs	.744		
feel they are part of the project	.696		
have 'emotional' attachment to the project	.777		
Project quality		**.544**	**.780**
Team is able to complete tasks on schedule	.688		
Team is able to complete tasks within budget	.689		
Team is able to effectively perform set tasks	.827		
System Quality		**.553**	**.708**

Construct	Loading	AVE	CR
the system meets intended functional requirements	.636		
overall quality of the developed application is high	.837		
Information quality		**.478**	**.784**
output seems to be exactly what is needed	.632		
Information is easy to understand	.698		
Information appears readable, clear and well formatted	.637		
Information is concise	.788		

The results of the confirmatory factor analysis yield a CFA model that is acceptable [$\chi 2/df$ = 1.353, CFI = 0.962, GFI = .934, TLI = 0.955 and RMSEA = 0.034]. The associations of all variables are shown in Table 3. As shown in Table 3, the square root of the AVE is greater than the correlation with other constructs indicating adequate discriminant validity. Thus the reflective measurement model demonstrated adequate convergent and discriminant validity.

Table 3: Correlations of Variables

	SB	RB	CB	AB	PQ	SQ	IQ
Structural (SB)	**.661**						
Relational (RB)	.237	**.671**					
Cognitive (CB)	.113	.232	**.747**				
Affective (AB)	.014	.034	.039	**.739**			
Project Q (PQ)	.217	.105	.215	.154	**.737**		
System Q (SQ)	.081	.103	.119	.158	.288	**.730**	
Info Q (IQ)	.138	.070	.284	.106	.334	.224	**.691**

Structural Model

PLS algorithm was used to test the hypotheses. Additionally, bootstrapping resampling technique with 1000 sub-samples were employed to ensure the accuracy of the PLS estimates. Based on the results in Table 4, path coefficients were found to be significant at 99% confidence interval for (structural bonding and ISD success ß = .250, $p < 0.05$; cognitive bond, ß = 0.363, $p = 0.000$; and affective bond ß = 0.237, $p < 0.05$). The value of coefficient of determination (R2), of 0.253 suggests that the exogenous constructs explain 25.3% of variances in ISD success.

Table 4: Path Coefficient Assessment and Determination of Coefficient (R2)

Relationship	R^2	Path coefficient	Std error	C.R	Decision
H1: RB and ISD success		.053	.057	.564	Not supported
H2: SB and ISD success	.253	.250	.062	2.418	Supported
H3: CB and ISD success		.363	.061	3.471	Supported
H4: AB and ISD success		.237	.056	2.453	Supported

Discussion and Conclusion

The study examined the role of user bonding in determining the success of information system development. The findings provide the evidences structural, cognitive and affective bonding are playing significant roles in the ISD success. Thus, users' involvement and interactions with

the development team would reduce specification ambiguity and enhance the team understanding of the users' requirements. It can be used as an indicator in the selection of users to be with the development team. In addition, the affective bond, which was tested as a new bonding dimension, was found to be significant. This shows when users feel they are part of the project, and have positive attitude, they will be more likely to have a positive engagement that is important for the project success. According to the results of this study, it can be recommended that organization to be success in ISD should strengthen the user involvement in terms of structural, cognitive and affective bond. However, the results did not show the evidence for relational bond as a factor that determines the ISD success and can be omitted for future development of information system.

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Appendix

Questionnaire on the role of user bonding on strategic information system development success.

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

PERCEIVED USER BOND
PERCEIVED USERS' STRUCTURAL BOND
Users and developers met periodically.
Users are informed about project process and project related problems.
Users provide agreement to the work done by the project team.
Users are participating in joint planning for details of project approach, timing, and success criteria.
Users are engaging in discussion with project team.
PERCEIVED USERS' RELATIONAL BOND
There is mutual respect between developers and users.
There is mutual trust between developers and users.
There is a good relationship between developers and users.
There is high mutuality among developers and users.
PERCEIVED USERS' COGNITIVE BOND
Users are familiar with ISD (IS development) task and life cycle stages.

Users are familiar with data processing.
Users are familiar with IT.
Users have adequate knowledge on ISD.
Users are familiar with IS development.
Users are aware on the important of their roles.
Users are familiar with their role in the project.

AFFECTIVE BOND

Users are happy to work together with the developers.
Users seem to enjoy discussing the project.
Users feel the project is theirs.
Users feel they are part of the project.
Users have 'emotional' attachment to the project.
Users feel a strong sense of belonging to the project.

INFORMATION SYSTEM DEVELOPMENT SUCCESS

PROCESS PERFORMANCE (PROJECT QUALITY)

Team is able to achieve project predefined goal.
Team is able to complete a series of predefined tasks.
Team is able to complete tasks on schedule.
Team is able to complete tasks within budget.
Team is able to effectively perform set tasks.

PRODUCT PERFORMANCE (SYSTEM QUALITY)

The system is easy to maintain.
The users perceive that the system meets intended functional requirements.
The system meets user expectations with respect to response time.
The overall quality of the developed application is high.

INFORMATION QUALITY

The system provide output that seems to be exactly what is needed.
Information needed from the system is always available.
Information from the system is easy to understand.
Information from the system appears readable, clear and well formatted.
Information from the system is precise.