

A Coherent Framework for Understanding the Success of an Information System Project

Syopiansyah Jaya Putra¹, A'ang Subiyakto^{*2}, Abd. Rahman Ahlan³, Mira Kartiwi⁴

^{1,2}Syarif Hidayatullah State Islamic University Jakarta,
Jl. Ir. H. Juanda No. 95, 15412, Tangerang, Indonesia Ph./Fax: +6221 7401925/+6221 7493315

^{3,4}International Islamic University Malaysia,
Jl. Gombak, 50728, Kuala Lumpur, Malaysia. Ph./Fax: +60 361964000 /+60 361964053

*Corresponding author, email: syopian@uinjkt.ac.id¹, aang_subiyakto@uinjkt.ac.id²,
arahman@iium.edu.my³, mira@iium.edu.my⁴

Abstract

This paper elucidates the sequential revisions of an information system (IS) project framework across the research model development and its examinations. The authors adopted, adapted, and combined five concepts of the project management discipline and the information processing theory to revise the framework. Besides the use of this multi-dimensional perspective, the authors were also succeeded to present an interrelation between the framework and the examined model within a coherent representation. It was one of the essential points of this model development study, in particular for presenting the research focus. It may be trivial issue for the experts in the research fields, but the coherent illustration is one of the critical issues in the validity measurement of a model, whereas the inexperienced ones may need a guideline to represent the interrelationship. Such points became the main contribution of this study to fill the gap in the literatures, particularly in the lack of comprehensive detail of a research model development.

Keywords: ICT project framework, multi-dimensional perspectives, interrelation concept, model validation

Copyright © 2016 Universitas Ahmad Dahlan. All rights reserved.

1. Introduction

One of reasons why numerous studies [1-3] indicated that the IS project management is the immature discipline; it may be because the performance of the projects still show its high failure rate [4]. As it was initiated by the Standish Group's report in the mid of 1990s, and the similar announcements were presented by numerous survey studies [5-7]. In respect of this issue, Subiyakto and Ahlan [8-9] identified several gaps of this field, among others, there are the ambiguity of the project success definition [10-12], the use of the partial perspective in its success measurement [12-15], and the tendency of the critical success factor (CSF) determination methods [7, 9]. Accordingly, they proposed a coherent-conceptual framework based on their scanning the depth and breadth of the body of knowledge in the research field [8]. They hoped that the framework will be one of references for researchers and practitioners to understand the success of an IS project in term of its multi-dimensions. Sequentially, these scholars developed their IS project success model [16] and then, examined the model qualitatively [17] and quantitatively [18].

The next questions are how to explore the framework following its development and the examinations of the research model and how to understand the interrelationship between this framework and the model. These issues may be a triviality for many scholars who had experiences and expertise in the research works, but these are not for the beginners or inexperienced ones in the works. Besides the clarity of the interrelationship is one of the significant points of a research model assessment, it is also rare to be presented in many literatures. This paper demonstrates the development and its revisions of an IS project framework and its interrelationship with the research model. The objectives are to explore theoretically the revised framework and to understand its interrelationship with the examined model. This framework and its model mapping, which were represented here, they may be a learning point for scholars, particularly in their model validity developments. There are the four main sections of the paper. First, the literature review section elucidates the basis theories and concepts of the

development and revision of the framework. Second, the research method section describes the methodical explanation of the revision. Third, the results and discussion section represents the result of this revision study, including the discussions and its recommendations for the future studies. Lastly, the sections of this paper are closed by the conclusion section.

2. Literature Review

It is unlike its main research discipline, which is the project management; numerous researchers [1-3] indicated that IS project management is still in the immature level. Besides that, a number of the project survey studies in IS environment [4-7] tend to announce the high failure level. The other ones expressed indirectly the uncertainty of the project success definitions [10-12]. Therefore, Subiyakto and Ahlan [8] developed a conceptual framework in the previous study in order to understanding comprehensively the project success by adopting and combining the six concepts, i.e., the project management [19-21], strategic project management [22-25], information communication [15], [26-27] and processing [28], project resources [29-31], project stakeholder focuses [32, 33], and the project environment [3, 34, 35] concepts.

Nowadays, many methodical concepts can be found in project management literatures with its different approaches [36] from the structured method, which emphasizes the processional point of view [e.g., 19-21], to the agile one, which focuses to the project outcome [e.g., 37, 38]. Retrospectively, Jugdev and Müller [19] explained the processional and causal concepts of a project in their meta-analysis study and concluded that the concepts are starting from its limited scope around the project life cycle into the more extensive area, which reflected completely the product life cycle. As it was pointed out by Wateridge [22], the success of a project is the combination of the project management success and its product success. Methodically, it can be meant that the project implementation stages represent a product life cycle. Similarly, by referring DeLone and McLean's [15], [26-27] logical assumptions in their IS success model development, the Davis's [28] information processing theory can be used to develop the IS project success model [16]. This theory explains the three layers, i.e., the input, process, and the output layers [16, 28].

A number of scholars [3], [34-35] indicated that the performance of a project is influenced by its environments. As it was described by Hartman and Ashrafi [44] that the constraints of a project are in regard with its managerial, institutional, humanity, and cultural issues, there are not only linked with the technical ones. Howsawi et al. [34] mapped clearly the environments of a project in four environmental levels, i.e., the project, institution, business and the context environments. In the context of the Davis's [28], these environmental factors can be classified as the input layer of the IS project success model.

Further, the layers of the DeLone and McLean's [15], [26-27] IS success model can be identified as the process and output layers of the IS project success model. The system creation is the process layer of the model. Meanwhile, the system use and its system impact are the output one. Referring the Jugdev and Müller's (2005) project schema, the system creation layer demonstrates the production stages of a project, the system use represents the product deliverable and its use, and the system impact shows the close down stage. In addition, the success model of an IS project can be also seen within the time periods of the business objectives, i.e., the short, middle and the long terms of the objectives. This is consistent with the De Wit's [39] conclusion, that the most suitable criteria for measuring a project's success is the degree to which project met its objectives. A number of the project success literatures [24, 25, 30] expressed indirectly that the directional business issues of an organization seem influencing the success of its projects. Thus, the appropriateness of the project implementations and the objectives of a business-technically, operationally, strategically, may have effects toward success of the project.

Furthermore, the other researchers [29, 40] tried to increase the success level of a project by studying its success criteria by adopting the organizational resource concepts, e.g., Atkinson [29] who popularized the triangle success model and Heek [40] with the Leavitt's diamond model. Several researchers, e.g. Ika [41], criticized these concepts because of their incapability to represent the comprehensive criteria, but the concepts provided a basic understanding of the project success theories. On the other contexts, many scholars used these theories in their studies, e.g., [42] and [43] who applied the concepts in internet-based banking studies. While, Westerveld [13] described that the satisfactory responses of the overall

stakeholders are the important criteria of a project. It may have a reason why the use and the user satisfaction variables are adopted in many IS success studies [15, 26, 27]. Achterkamp and Vos [32] and Davis [33] found that the satisfactions of the project stakeholders have effect towards the success of a project in their meta-analysis studies.

In short, it is an indication that the representation of an IS project success can be seen from a variety of its perspectives. The use of this multi-perspective may helpful to more understand the success of an IS project, rather than the use of the single perspective. As it was suggested by scholars [8, 9], [13-16], [45], emphasized that the use of the multi-dimension may develop the comprehensive view of the success. With regard to the above issue, Subiyakto and Ahlan [16] proposed an IS project success model based on their previous conceptual framework. Khattak [46] explained that a conceptual framework-in this case, can be useful in scoping and mapping the research problem. Consequently, the framework and its interrelation with the proposed model should also be presented in order to develop a comprehensive view of its basis concepts. Moreover, the representation of the meeting point among the used concepts and theories may help to show the focus of the model.

3. Research Method

Procedurally, Figure 1 displays the six stages of the study. The literature review was done through studying the prior publications in order to formulate the program and design of the study in the first stage. Following Xu et al. [47], in this case, the term of IS project is defined interchangeably with information technology (IT) or information and communication technology (ICT) project in the context of their developments to encourage the processes and services of the institution's business functions. The researchers [8] then developed the first framework by combining the management [19-21], direction [22-25], resource [29-31], stakeholder [32-33], and the environment [3], [34-35] dimensions as a term of the project success criteria, i.e., the efficiency and effectiveness [19], [29-30], [41, 47], user satisfaction [41, 45, 47], and the functional fulfilment [48] of the project requirements. As regards the Belaut and Gauvreau's description [49], they developed an IS project success model by combining the DeLone and Mclean's IS success model [15], [26-27] with the McLeod and MacDonell's project classificatory framework [24, 25] in term of the Davis's information processing theory [28] in respect of the developed framework [8]. Based on the first developed model, the scholars revised the first framework by incorporating the system dimension considering the DeLone and Mclean's IS success concept [15], [26-27] on the fourth stage.

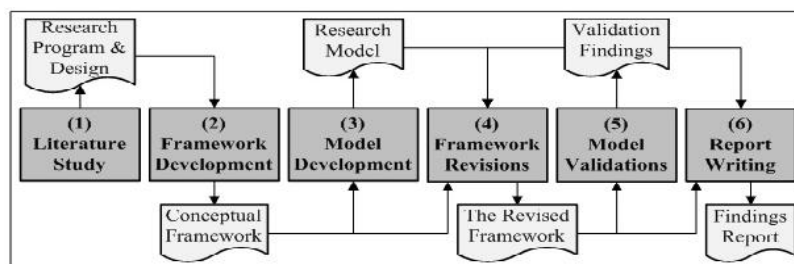


Figure 1. The research stages

Specifically, in the fifth stage, these scholars examined the model using a sequential mixed method. The first method was a focus group study [17] to explore the validity of the model and its feasibility in the research implementation, involving 16 of 20 enrolled participants who are the members of an IS research group. In respect of the recommendations of this qualitative study, the model then was revised as the input of the quantitative validation [18] in the second stage of the examinations. The five Likert scale [50] questionnaires were sent to 130 IS project stakeholders in the sample institution and around 48% (n=62) of these respondents responded the survey. Considering the strong of the statistics software in exploration and prediction of a small sample size [51-52], the researchers used the SmartPLS 2.0 to analyze the measurement and its structural models of the model. Accordingly, the second revision of the model was done

following the results of this survey study. Lastly, as it was driven by the proposed problem of the study, the map of the interrelationship between the revised framework and the examined model was then developed to demonstrate the coherency of both the framework and its model.

In short, this methodical procedure represents that the framework development and its revision were conducted in regard to the research model development and its validations. As it was indicated by several researchers [e.g., 15, 16, 26, 49], who indicated that a model is mostly developed based on the logical relationships of the prior theories, e.g., the comparisons, adoptions, adaptations, or the combinations of the selected theories. Automatically, if the researchers used or rejected a selected theory in the model examinations, they will have revised the framework in order to keep the coherency between the model and its framework.

4. Results and Discussion

The essential result of this framework revision study was the clarity of the interrelation between the revised framework and its research model. Figure 2 shows the clear representation of the interrelationship. It can be seen that the theoretical bases of the model development covers coherently the relationships of the model's variables.

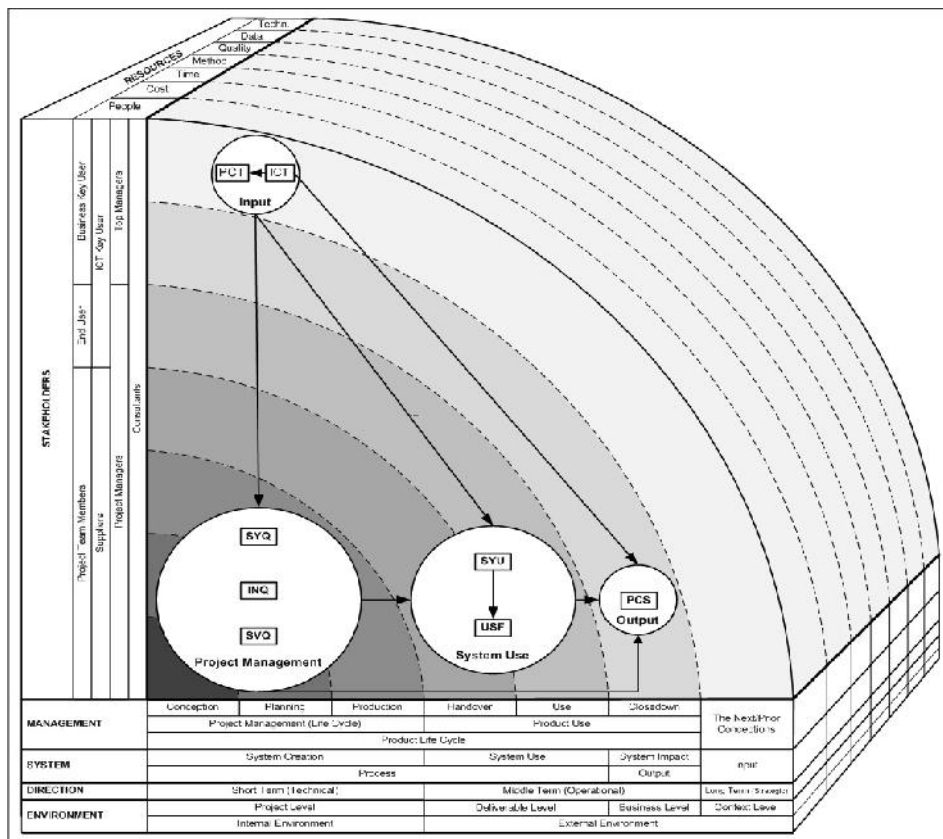


Figure 2. The second revised model

There are three main issues of the discussion part of this study in regard with the comprehensiveness of the model development, the coherence of the theoretical bases of the framework development, and the cohesiveness of the interrelationship between the model and its conceptual framework.

First, the model was included three main layers following the used theoretical assumption of the modelling, i.e., the information processing theory [28]. There are the input (i.e., the Project Context [PCT] and the Institutional Context [ICT] variables), process (i.e., the System Quality [SYQ], Information Quality [INQ], Service Quality [SVQ], System Use [SYU], and

the User Satisfaction [USF] variables), and the output (i.e., the Project Success [PCS] variable) layers. The input layer adopted the two of the five constructs of the McLeod and MacDonells's framework [24-25]. Previously, this layer included three constructs in the preliminary model, but one of them was rejected (i.e., the people and actions [PAC] variable) based on the recommendations of the second model examination [18]. Furthermore, referring the product life cycle concept [19] and the adopted IS success model [15], [26-27], the process layer was divided into two sub-layers, i.e., the project management (i.e., SYQ, INQ, and SVQ variables) and the system use (i.e., SYU and USF variables) layers. Lastly, the output layer was adopted based on the Net Benefit construct of the IS success model [15, 26, 27] considering several project success concepts [e.g., 19, 30, 39, 41, 48]. In brief, as it was described by [13-15], [45], the multi-dimensional modelling approach indicated a comprehensive view of the research phenomenon.

Second, the revised framework incorporated coherently the six dimensions of an IS project, i.e., the resource [29-31], stakeholder [32-33], management [19-21], system [15], [26-28], direction [22-25], and the environment [3], [34-35] dimensions. The resource layer was adoption, adaptation, and combination of the components of the triangle model [29], and the diamond model [40] considering the total quality project management concepts [35]. The stakeholder layer was used to accommodate the significant roles of the people in the project success measurement [32-33]. The management layer was adopted from the project management concept [19]. The system layer was a combination of the DeLone and McLean's IS success model [15], [26-27] and the information processing theory [28]. The direction layer was in regard to the descriptions of the previous researchers [22-25], who mentioned that the strategic management issues should be considered for measuring the success of a project. And the environment layer, which it was adopted in respect of its essential effects in a project success measurement study. In short, the framework demonstrated coherently the theoretical perspectives of an IS project success measurement with respect to the project components, subjects, stages, systematizations, scopes, and its circumstances.

Third, Figure 2 also displays the three-dimensional representations of the cohesive interrelation between the examined model and its revised-conceptual framework. It can be seen clearly that the layers of the model were mapped coherently across the dimensions of the conceptual framework. For example, the input layer of the model can be identified in term of the managerial, systematic, directional, and the environmental theories of a project. Besides that, the particular stakeholders, who focused on the layer can be initiated in the framework. Shortly, the proposed research model was interrelated consistently within its conceptual framework.

In Summary, the three points can be noticed here. First, the representation of the multi-layers schema in the model development represented the completeness of the processional and causal model of the IS project success model. Second, the use of the multi-dimensional perspectives in the framework development tended to show the coherence view of the theoretical bases of the model development. Lastly, the cohesive interrelationship between the conceptual framework and its developed model was clearly demonstrated in the study. It is can be noted that, despite this development and revision of the framework was carried out based on an assumption, that the IS project stages are like information processing phases [28], the reputation of the basic theory is inevitable in the IS discipline. As, it was also conducted by DeLone and McLean [15], [26-27] in their model development. Besides that, the use of the basic theories of the project management field in this study may be a consideration point of the framework assessment. The use of the other assumptions, procedures, and theories may imply the other results. Therefore, the uses of these aspects in this study were to be the limitations of the study. The recommendation of the study is, the other ones can consider these limitations in respect of the complexity of the interrelationship.

5. Conclusion

This article describes methodical revisions of an IS project success framework, across the development until its second revision, which were conducted following the research model development and its examinations. The essential lessons of this revision work were related to the clarity and comprehensiveness of the multi-dimensional perspective on the framework and its model developments and the cohesiveness of their interrelationship. As it suggested by previous studies, the multi-dimension use and its clear representations in a framework

development indicate the validity of the developed model. In this case, despite the fact that this framework revision study was the early stages of the main one, the effort to ensure the validity of the proposed model may have indicated the feasibility of the main research implementation. Accordingly, the two lessons described above were the major contribution of this study. It is recommended, that the attentions of both issues may important to be considered for the other researchers, particularly in the preliminary stages of a research. It is because the attentions might ensure the validity of the proposed model and the feasibility of the research implementation.

Acknowledgements

On behalf of the Syarif Hidayatullah State Islamic University Jakarta, Center of Research and Publication Unit funded this study based on *the* Research-Based International Publication Program, No. Un.01/KPA/252/2015.

References

- [1] Pellegriinelli S, Partington D, Hemingway C, Mohdzain Z, Shah M. The Importance of Context in Programme Management: An Empirical Review of Programme Practices. *International Journal of Project Management (IJPM)*. 2007; 25(1): 41-55.
- [2] Marnewick C, Les Labuschagne. Factors that Influence the Outcome of Information Technology Projects in South Africa: An Empirical Investigation. *Acta Commercii*. 2009; 9(1): 78-89.
- [3] Azimi A, Manesh FS. A New Model to Identify and Evaluate Critical Success Factors in the IT Projects; Case Study: Using RFID Technology in Iranian Fuel Distribution System. *IJISM*. 2010: 99-112.
- [4] Roth A. Conception of A Holistic and Long-Term Performance Management: Five Part Disciplines As Systematizing Framework. *QRBD*. 2014; 1(2): 127-137.
- [5] Independent Evaluation Group (IEG). Capturing Technology for Development: An Evaluation of World Bank Group Activities in ICTs. Washington, DC: Independent Evaluation Group, the World Bank Group. 2011.
- [6] Ika LA, Diallo A, Thuillier D. Critical Success Factors for World Bank Projects: An Empirical Investigation. *IJPM*. 2012; 30(1): 105-116.
- [7] Stankovic D, Nikolic V, Djordjevic M, Cao DB. A Survey Study of Critical Success Factors in Agile Software Projects in Former Yugoslavia It Companies. *Journal of Systems and Software*. 2013; 86(6): 1663-1678.
- [8] Subiyakto A, Ahlan AR. *A Coherent Framework for Understanding Critical Success Factors of ICT Project Environment*. Proceeding of ICRIS. Kuala Lumpur. 2013: 342-347.
- [9] Subiyakto A, Ahlan AR, Sukmana HT. An Alternative Method for Determining Critical Success Factors of Information System Project. *TELKOMNIKA (Telecommunication Computing Electronics and Control [TCEC])*. 2014; 12(3): 665-674.
- [10] Pinto JK, Slevin DP. Project Success: Definitions and Measurement Techniques. *Project Management Journal (PMJ)*. 1988; 19(1): 67-72.
- [11] Baccarini D. The Logical Framework Method for Defining Project Success. *PMJ*. 1999; 30(4): 25-32.
- [12] Prabhakar GP. Projects and Their Management: A Literature Review. *International Journal of Business and Management*. 2008; 3(8): 3-9.
- [13] Westerveld E. The Project Excellence Model®: Linking Success Criteria and Critical Success Factors. *IJPM*. 2003; 21(6): 411-418.
- [14] Pan GSC. Information Systems Project Abandonment: A Stakeholder Analysis. *International Journal of Information Management*. 2005; 25(2): 173-184.
- [15] Petter S, DeLone W, McLean E. Measuring Information Systems Success: Models, Dimensions, Measures, and Interrelationships. *European Journal of Information Systems*. 2008; 17: 236-263.
- [16] Subiyakto A, Ahlan AR. Implementation of Input-Process-Output Model for Measuring Information System Project Success. *TELKOMNIKA Indonesian Journal of Electrical Engineering*. 2014; 12(7): 5603-5612.
- [17] Subiyakto A, Ahlan AR, Kartiwi M, Putra SJ. Validation of Information System Project Success Model: A Focus Group Study. *SAGE Open*. 2015; 5(2): 1-14.
- [18] Subiyakto A, Kartiwi M, Ahlan AR, Putra SJ. Measurement of the Information System Project Success of the Higher Education Institutions in Indonesia: A Pilot Study. *IJBIS*. 2015.
- [19] Jugdev K, Müller R. A retrospective look at our evolving understanding of project success. *PMJ*. 2005; 36: 19-31.
- [20] Joslin R, Müller R. Relationships between A Project Management Methodology and Project Success in Different Project Governance Contexts. *IJPM*. 2015; 33(6): 1377-1392.
- [21] Meredith JR, Mantel Jr, SJ. *Project Management: A Managerial Approach*. John Wiley & Sons. 2011.

- [22] Wateridge J. How can IS/IT Projects be Measured for Success. *IJPM*. 1998; 16(1): 59-63
- [23] Yeo KT. Critical Failure Factors in Information Systems Projects. *IJPM*. 2002; 20(3): 241-246.
- [24] McLeod L, MacDonell SG. Factors that affect software systems development project outcomes: A survey of research. *ACM Computing Surveys CSUR*. 2011; 43(4): 24.
- [25] McLeod L, Doolin B, MacDonell SG. A Perspective-Based Understanding of Project Success. *Project Management Journal*. 2012; 43(5): 68-86.
- [26] DeLone WH, McLean E. The DeLone and McLean model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*. 2003; 19(4): 9-30.
- [27] Urbach N, Müller B. The updated DeLone and McLean model of information systems success. In: Dwivedi K, Wade MR, Schneberger SL. *Editors*. Information Systems Theory. New York: Springer; 2012: 1-18.
- [28] Davis WS. HIPO Hierarchy Plus Input-Process-Output. *The Information System Consultant's Handbook: Systems Analysis and Design*. CRC, Florida. 1998: 503-510.
- [29] Atkinson R. Project Management: Cost, Time And Quality, Two Best Guesses and a Phenomenon, Its Time to Accept Other Success Criteria. *IJPM*. 1999; 17(6): 337-342.
- [30] Ghapanchi H, Aurum A. The Impact of Project Capabilities on Project Performance: Case of Open Source Software Projects. *IJPM*. 2012; 30(4): 407-417.
- [31] Almajed A, Mayhew P. *An Empirical Investigation of IT Project Success in Developing Countries*. In Science and Information Conference (SAI). London. 2014: 984-990.
- [32] Achterkamp CM, Vos JFJ. Investigating the Use of the Stakeholder Notion in Project Management Literature, a Meta-Analysis. *IJPM*. 2008; 26(7): 749-757.
- [33] Davis K. Different Stakeholder Groups and Their Perceptions of Project Success. *IJPM*. 2014; 32(2): 189-201.
- [34] Howsawi EM, Eager D, Bagia R. *Understanding Project Success: The Four-Level Project Success Framework*. IEEE International Conference on IEEM. Singapore. 2011: 620-624.
- [35] Kerzner HR. *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. John Wiley & Sons. 2013.
- [36] Wysocki RK. *Effective Project Management: Traditional, Agile, Extreme*. John Wiley & Sons. 2011.
- [37] Cervone HF. Understanding Agile Project Management Methods Using Scrum. *OCLC Systems & Services: International digital library perspectives*. 2011; 27(1): 18-22.
- [38] Dingsøyr T, Nerur S, Balijepally V, Moe NB. A Decade of Agile Methodologies: Towards Explaining Agile Software Development. *Journal of Systems and Software*. 2012; 85(6): 1213-1221.
- [39] De Wit A. Measurement of Project Success. *IJPM*. 1988; 6: 164-170.
- [40] Heeks R. Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society*. 2002; 18(2): 101-112.
- [41] Ika LA. Project Success as a Topic in Project Management Journal. *PMJ*. 2009; 40(4): 6-19.
- [42] Muladi N, Surendro K. *The Readiness Self-Assessment Model For Green IT Implementation in Organizations*. In International Conference of Advanced Informatics: Concept, Theory and Application (ICAICTA). Bandung. 2014: 146-151.
- [43] Susanto A, Zo H. *Factors influencing users' acceptance in Internet banking success: Proposing a unified model*. In Proceeding of the 2nd International Conference on Networking and Information Technology. Singapore. 2011; 17: 44-51.
- [44] Hartman F, Ashrafi R. Project Management in the Information Systems and Information Technologies. *PMJ*. 2002; 33(3): 5-15.
- [45] Volschenk EJ. A Critical Review of Project Management Success Factors in Large SA ICT Companies. Doctoral Dissertation. Stellenbosch: University of Stellenbosch; 2010.
- [46] Khattak AS. *Conceptual Framework and Literature Review*. In Mutual Sustainability of Tubewell Farming and Aquifers. Springer International Publishing. 2014: 15-36.
- [47] Xu X, Zhang W, Barkhi R. IT Infrastructure Capabilities and IT Project Success: A Development Team Perspective. *Information Technology and Management*. 2010; 11(3): 123-142.
- [48] Joosten D, Basten D, Mellis W. *Measurement of Information System Project Success in Organizations—What Researchers can Learn from Practice*. Proceeding of European Conference on Information Systems (ECIS). 2011.
- [49] Belout A, Gauvreau C. Factors Influencing Project Success: the Impact of Human Resource Management. *IJPM*. 2004; 22(1): 1-11.
- [50] Kaptein MC, Nass C, Markopoulos. *Powerful and Consistent Analysis of Likert-Type Ratingscales*. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM. 2010: 2391-2394.
- [51] Urbach N, Ahlemann F. Structural Equation Modeling in Information Systems Research Using Partial Least Squares. *JITTA*. 2010; 11(2): 5-40.
- [52] Hair JF, Sarstedt M, Ringle CM, Mena JA. An Assessment of the Use of Partial Least Squares Structural Equation Modeling in Marketing Research. *Journal of the Academy of Marketing Science*. 2012; 40(3): 414-433.