Influences of the Input Factors towards Success of An Information System Project

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Abstract
This study tried out the input factors which were reputed theoretically affecting an information system (IS) project success. Three of the four dimensions of the McLeod and MacDonell’s (M&M’s) project framework were adopted in the research model and then surveyed into the internal project stakeholders in a sampled institution. A stratified sampling was carried out based on the project ownership and then sent the online and paper-based questionnaires to the chose 150 respondents. A number of 62 (48%) valid responses, then were analyzed using the partial least squares-structural equation modelling (PLS-SEM) software. The significances of the path coefficients, the acceptances of the hypotheses, the relevances of the predictors relevances, and the moderate coefficient determination of the IS project success variable may present acceptability of the proposed model for the subsequent studies.

Keywords: IS, project success, Input factors, project stakeholders, PLS-SEM

1. Introduction
Systematically, IS project is a micro environment of the business system [1,2]. Similar to this systematic-environmental description, [3] also elucidated their concept within four environmental levels of a project, i.e. process, deliverable, business, and context levels. While, based on their meta-analysis study about the factors which affected the outcomes of the software system projects during 1996-2006, [4] proposed their project framework. Referring to this framework, [5] adopted the framework and combined with the DeLone and McLean’s IS success model [5] in term of the input-processes-output logic [7,8] to represent the processional and causal model of an IS project. These literatures presented that influences of the environment contexts towards the IS project performance have been interesting researchers [e.g. 9-10] for many years ago. While, scholars [e.g. 11-12] indicated that most problems of the IS projects are related to managerial, organizational, and cultural issues which are inherited from the particular context where the projects are carried out [13], not only the technical ones, e.g. the triangle criteria [14]. Although the IS project was performed well and it may consider technically “successful,” it might also reputed to be “futile” because of the contextual indifferences [8].

Therefore, it was reasonable if [15] who cited [10] emphasized that the project success factors are not universal for all projects. Consequently, researchers and practitioners need to explore influences of the IS project environments towards the project success considering in its specific context. Given the importance of the contextual influences as the inputs of an IS project, this study attempted to examine these factors in a sampled institution by incorporating three of the four factors of the M&M’s project framework [4]. In this study, the term of IS, information technology (iT) and information and communication technology (ICT) projects were interchangeably used referred to the deployment of the business processes and services [16]. Sequentially, the following sections elucidate the research model and hypotheses, the research method, the analysis results, the finding discussions, and we conclude the study together with several suggestions for the future studies.
2. Research Model and Hypotheses

In this study, the three dimensions of the M&M’s project framework [4], i.e., project contents (PCT), people and actions (PAC), and institutional contexts (ICT) were adopted (Figure 1) to examine the influences into the IS project success (PCS) within the six hypotheses as it was presented by [2]. 1) Some researchers [18-20] who studied retrospectively the previous project success studies concluded that the studies were defined from the limited scope in the technical into the strategic perspectives of the project [19] by contextualizing comprehensively the previous theories considering to the project stakeholder’s perceptions from technical to strategic aspects. Therefore, we formulated resources savings (PSC1), managerial effectiveness (PSC2), productivity improvement (PSC3), customer satisfaction (PSC4), competitive advantage (PSC5) [5,11,18-22] as the PCS indicators. 2) PCT were the input factors of the PCS measurement related to characteristics of the technology, interrelationship, process, and structure used in the project which materially affect the project outcome [4,8,9,11,19]. Researchers [e.g. 23] indicated that the managerial capability of these aspects has consequences toward the project success. Accordingly, we used project size (PCT1), project complexity (PCT2), resources availability (PCT3), technology development (PCT4), data quality (PCT5) [4,5,11,19] as the PCT indicators and hypothesize that PCT affect significantly PAC (H2) and PCS (H4).

3) PCS were affected by PAC related to characteristics of the project agents and their actions in both individual and organizational levels [4,11,24,25]. Thus, we formulated professionalism (PAC1), integrity (PAC2), norms (PAC3), clarity of the project structure (PAC4), conflict management (PAC5) [4,11,24,25] as the PAC indicators and hypothesize that PAC affect significantly PCS (H5). 4) Researchers [e.g. 12,26-28] indicated that the contextual factors affect PCS. Similar to [12] who cited [10] mentioned that the project success factors are not universal for all projects and very context-dependent [18]. Although, the project management was performed well and the project could be considered “successful”, it was also probable to be the futile project because of indifferences of its contextual factors [9]. The alignment between project and business objectives influences the perceived success depending on the environmental changes [4,15,29,30]. Therefore, we used organizational cultures (ICT1), organizational policies (ICT2), organizational experiences (ICT3), legacies system and infrastructure (ICT4), and external context (ICT5) [4,5,11,19,26-30] as the ICT indicators and hypothesize that ICT affect significantly PCT (H1), PAC (H3), and PCS (H5).

3. Research Method

This empirical study was performed on the eight stages (Figure 2) during Feb. to Nov. 2014. 1) A literature review was conducted through investigation of the prior IS project success studies [e.g. 4,5,19] during Feb. to Apr. 2014 to develop the research program as the basis of the subsequent stages. 2) Research model development was performed considering to the selected prior studies, e.g. the project environment models [1-3], the M&M’s project framework [4,11], and the ICT project environment [19] during May 2014 to develop the research model. 3) Research design was conducted during June 2014 to design the research implementation plans in line with the developed research program at the first stage.
4) Instrument development was performed during June 2014. The questionnaire included the invitation letter, research introduction, and the question profile (six participant profiles, six project profiles, and 20 measurement questions) using the five-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5) [31]. In order to ensure validity and reliability of the instrument, we adopted the selected items from the previous studies [e.g. 4-6, 19], conducted a pre-test examination to receive empirical feedback from the experts in IS researches [32,33], and conducted the unidimensionality procedure [34,35] with five deletions (PT1T, PT2, ICT1, and ICT5). 5) Data collection was performed during July to August 2014. We determined the internal project stakeholders, i.e. top users, business key users, IT key users, project managers, and project team members in the sampled institution as the population based on their key informant roles [32,33,36] and obtained the data from the IT unit in the sampled institution including names, positions, telephones, and emails (N=257). We then focused on the 130 (49%) people who experienced in the projects as the sample and distributed the questionnaire via email and direct visits especially to the participants who are on the managerial level. We then obtained 62 (48%) valid responses, including 40 (31%) online and 23 (17%) paper-based answers.

6) Data Analysis was performed statistically in Sep. to Oct. 2014. We processed sequentially the collected data using MS Excel 2007 and SPSS version 20 to prepare the PLS-SEM analyses. We then used SmartPLS 2.0 for analyzing the data because its vast potential in SEM method as described by researchers [e.g. 37-41] related to the exploration and prediction objectives and the small sample size (n=62). In the inferential analysis, we performed the measurement model assessments to evaluate reliability and validity of the outer model using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity assessments [37-41] and the structural model assessments to represent path and explanatory power of the inner model through path coefficient (β), coefficient of determination (R²), t-test, effect size (f²), predictive relevance (Q²) and relative impact (q²) assessments [37-41]. 7) Interpretation was conducted during Oct. 2014 based on the statistical analysis results within the situational considerations of the project and the study limitations respectively. 8) Report writing was performing during Nov. 2014 based on the guideline of the research sponsor.

4. Analysis Results

4.1. The Demographical Data Analyses

Table 1 presents results of these analyses. Majority of the participants (91.9%) were the bachelor graduates and above with the highest percentage of the education levels was the master graduates (59.5%). Most participants (91.9%) experienced during under 10 years and most of them (40.3%) experienced during 5-10 years in the IS project works. While, the highest percentage of the participants (51.1%) is the project team members. While, in the demographic information of the IS project (Table2), most of participants (41.9%) indicated that the development goals of the IS project were to fulfill operational requirements. The institution had the IS strategic plan as it was stated by majority participants (71%). Most of the participants (43.5%) indicated that the IS projects were performed by internal party. In the project funding points, the highest percentage of the participants (38.7%) answered that the projects were funded by internal funding. Moreover, majority participants (80.7%) answered that percentage of the project success level is more than 50% and 33.9% of the participants stated that this percentage was more than 75%.
4.2. The Measurement Model Assessments

These assessments were carried out through four assessment stages.

1) Indicated reliability was evaluated by assessing every correlation between the items to the variable [35,37-41]. The item reliability was evaluated using three loading assessments, i.e. the items with loadings under 0.4 were deleted [35], 0.4 to 0.7 were considered to be used if it will have increased the composite reliability (CR) and the cross loading value must higher than the others, and above 0.7 was preferred [37-40]. Accordingly, we deleted five items (PCT1, PCT2, PCT3, and ICT5) because their non-standard loadings.

2) Internal consistency, reliability was evaluated using the composite reliability (CR) with values above 0.7 [41]. We preferred to use CR rather than CA because CR takes into account that indicators have different loadings [38,43] whereas CA was found to severely underestimate its assumptions in term of the internal consistency reliability [43].

3) Convergent validity was evaluated using the average variance extracted (AVE) with the acceptable threshold of 0.5 [37-41].

4) Discriminant validity was assessed through analysis of cross-loading [34] using the square root of the AVE in line with its definition that is the extent to which a given variable is different from the others [37-41]. In short, Table 3 and Figure 3 show that the outer model
demonstrated statistically the good psychometric properties. Sequentially, it was recommended to be continued into the structural model assessments [33-36] respectively.

4.3. The Structural Model Assessments

These assessments were carried out through six assessment stages and the results were presented graphically by Figure 3 and Table 4.

1) $\beta$ was evaluated with above value of 0.1 to determine the path impact within the model [37-41]. The results presented statistically that the six paths were significant.

2) $R^2$ was evaluated to describe variance of the target endogenous variable [37-41] with values approximately 0.670 substantial, around 0.333 moderate, and about 0.190 and lower weak. The results presented that $R^2$ of PCT (0.115) was weak which it was meant that ICT weakly explained 11.5% of the PCT variance, PCT and ICT together moderately expressed 38.5% of the PAC variance, and ICT, PCT, and PAC together also moderately described 45.8% of the PSC variance.

3) t-test was evaluated via bootstrapping procedure using two-tailed test with a significance level of 5% whereas the hypotheses will be accepted if the t-test is larger than t-values (1.95) [39-40]. The results indicated that overall hypotheses were accepted.

4) $f^2$ was evaluated to examine the predictor variable effects in the structural model [37-41] with values of about 0.02 low, 0.15 medium, or 0.35 large effects. The results showed that ICT $\rightarrow$ PAC presented the largest effect, PCT $\rightarrow$ PSC presented the lowest effect, and the four rest paths presented the medium effects.

5) $Q^2$ was evaluated via blindfolding procedure to give evidence that the proposed model has predictive relevance with threshold values above zero [37-41]. Figure 3 presents that the model has predictive relevance.

6) $q^2$ was also assessed via blindfolding procedure to measure the predictive relevance's relative impact with threshold values 0.02, 0.15, or 0.35 for small, medium or large effect size [39-40].

![Figure 3. Results of the SmartPLS analysis](image)

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5. Discussions

In this section, we propose two discussion points referring to the demographic information of the analysis, the measurement and structural model assessment results.

1) It was reasonable that majority participants (80.7%) presented the project success percentage was more than 50% and around 33.9% of the participants even mentioned that the success percentage was more than 75%, because the IS project may have carried out based on availability of the IS strategic plan as stated by about 71% of the participants, the gradual project implementation as presented by the development goal attainment focusing on the operational into strategic requirements, and the internal party involvement as presented by almost 70% of the participants. In short, the state and attainment of the IS project success were in line with the previous IS project success studies, e.g., [2] and [18] who elucidated that the IS project success related to both the project management and product utilization successes.

2) Although overall outer model demonstrated statistically the good psychometric properties, but the five indicator rejections were needed to be notice that it is inconsistent with the selected prior literatures [e.g., 4,8,9,18, and 19]. In this study, this might unsupported by the developed instrument, the data collected or it might be trend of the IS project implementation in the sampled institution. In addition, based on the structural model assessments, we also notice two highlight points. (1) However, the estimated values of the ICT→PCT presented significantly, the hypothesis was accepted, and the $R^2$ of the PCT was explained weakly (15.5%) by ICT. The significance, acceptance, and relevance of the path are consistent with the basis literatures used, but the weak explanation is properly to be attention related to the developed instrument and the collected data in the study or this might be tendency of the IS project implementation in the sampled institution. (2) Similar to the significance, acceptance, and relevance of the path, the low $R^2$ of the PCT→PSC is also suitably to be notice. This might unsupported by the developed instrument and the collected data and the analysis or portrait of the project implementation trends whereas PCT did not influence PSC.

6. Limitations

Several limitations were also inherent within this exploratory study. The collected data of this survey were obtained from the sampled institution. Therefore, the findings should not be generalized for the other institutions because data from the other institutions may be different from what were found and discussed in this study.

1) The used questionnaire items were adopted and adapted from the selected literatures, thus the other studies which use different items may produce the different findings.

2) This study involved the selected participants who most of them are the project team members and 65% of the group. Accordingly, the participant involvements in the different proportions and types may present differently the findings.

In brief, the subsequent researches can take this study findings and reconsidering the limitations. Moreover, the significance of the $R^2$, effect sizes ($f^2$), acceptances of the six hypotheses, relevances of the $R^2$ and the $Q^2$ sizes are the consideration points for the next studies. The moderate $R^2$ of the PCS may elucidate the proposed model acceptability [37].

7. Conclusion

Influences of the environment contexts towards the IS project performance have been interesting researchers since many years ago. Clarifying the contextual aspects where the projects were carried out. This presented that the project success factors are not universal for all projects. Accordingly, this exploratory study was conducted to respond this issue in order to explore state of the project success and to examine the contextual influences of the input factors. The proposed method was developed adopting the selected literatures. SmartPLS 2.0 was used regarding its vast potential in SEM method with the relative sample size (n=62) for assessing the measurement and structural model. Besides, this study has several limitations, the significances of the $R^2$, acceptances of the hypotheses, the effect sizes ($f^2$), relevances of the $R^2$ and the $Q^2$ sizes are also the consideration points for the future studies especially the moderate $R^2$ of the PCS which it may presents acceptability of the proposed model for the subsequent studies.
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