# INVESTIGATION OF PREDICTOR FACTORS IN PROJECT MANAGEMENT PERFORMANCE

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## ABSTRACT

The purpose of this study is to investigate which factors as a predictor of project management performance (PMP) using knowledge project management performance assessment (KPMPA) model. Questionnaires were developed to measure each construct and distributed using simple random sampling technique at Information Communication & Technology (ICT) Company in Klang Valley, Malaysia with 409 respondents. The result of SEM analysis shows that project life cycle (PLC), teamwork task competency and project knowledge were significantly predicts PMP. Test of fitness indices indicated that the model is in a good fit and test of moderating effect of project knowledge on research model indicated that all hypotheses were supported.

**Keywords:** project management, project management performance, leadership style, knowledge, teamwork, project life cycle

## INTRODUCTION

Project management should be adequately practiced by project leader because Information Communication & Technology (ICT) project is a dynamic and unstructured project which required knowledge and skills [1]. Thus, project leader or person who heads the project must able to practice recommended project management. To ensure project success, it is not to select which methods or tools that applicable and the best, however, it is important to practice how to manage project resources especially people who involve in the project. One way to do this is practicing project management (PM) skills properly.

PM is a tool that can use to handle complex or novel activities [2]. PM is important because it does provide project guidelines which project team can refer. These guidelines explain how to organize, plan and manage project resources in order to accomplish project goals and objectives. Without proper project guideline, most projects do not meet time and budget goals, or fail to satisfy customer and company expectation [3]. Other factors which also contribute to the failure of project such as weaknesses in project mission and planning, lack of project knowledge, communication breakdown between teamwork, lack of resources, politics issues, control issues, lack of top management support, weaknesses in leadership skill and etc [4]. Therefore, project teams are required to have good knowledge in managing project because it is an important and able to moderate the relationship of project management factors and project management performances [5-6]. Lack of experience and knowledge can lead to the troubled of project development. Thus, it is a responsibility of project leader to ensure project teamwork can fulfill their job efficiently.

Few studies are investigated about the effect of leadership style on project management performances (PMP). Leadership style was claimed as a critical factor to project success [7]. Therefore, this study was carried out with aim to investigate which constructs are predictor of PMP using Knowledge Project Management Assessment (KPMPA) model. The model focuses on following constructs: leadership style: transformational and

transactional; teamwork task competency, project life cycle (PLC), project knowledge and key performance indicators (KPIs). To measure project management performance, key performance indicators (KPIs) was used. Knowledge was selected as moderator to test either the relationship of leadership style, teamwork task competency and PLC on PMP is increase using multi group approach. Because of several issues highlighted on previous paragraph, seven research questions addressed: 1) To what extend transformational leadership style is an influence predictor on ICT PMP? 2) To what extend transactional leadership style is an influence predictor on ICT PMP? 3) To what extend teamwork task competency is an influence predictor on ICT PMP? 4) To what extend project life cycle is an influence predictor on ICT PMP? 6) To what extend project knowledge is an influence predictor on ICT PMP? 7) To what extend project knowledge moderate the relationship of indicator factors and PMP?

# LITERATURE REVIEW

## Leadership Style

Leadership style is style on how project manager manage or control the progress of the project [7]. This element has been revealed to give an impact to project performance in industry [7-9]. Two types of leadership styles posited in current study were transactional leadership and transformational leadership. Transformational leadership is a leader who inspires and motivates their project team in achieving project objectives and this style is suggested suits for dynamic projects [8]. As for Higgs et al. [10], transactional style is a leader who gives reward to their project team based on their achievement according to certain standard and it was suggested for simple project. This study believed that both can be a predictor of project management performance.

*H1: Transactional leadership style is predictor of PMP*

*H2: Transformational leadership style is predictor of PMP*

## Teamwork's Task Competency

Teamwork refers by Hsu et al. [11] as a group of people who take responsible on task given in project development. Meanwhile, task competency is defined in this study as level of their skills and how they carried out their work towards project undertake. Every member in a project team should be able to share and utilize the project information effectively and efficiently. Collaboration and communication among team members are important and they aware of each other's expertise and roles [11]. Project team requires a diversity of knowledge among its members to complete the project. One of the important elements in a project team is their competency because it is believed that it can promote project performance [12-13]. Lack of competency on ICT project is one of the primary reasons for the failure of ICT project [12].

*H3: Teamwork's task competency is predictor of PMP*

## Project Life Cycle

Project Life Cycle (PLC) refers to a logical sequence of activities to accomplish project goals and objectives. It consist of several phases, whereby each phases have deliverables output; PLC emphasis on upstream and downstream activities [14]. PLC can help project leader or manager to control the execution of the project and the resources. With well-structured PLC, it can help to reduce project risk.

*H4: PLC is a predictor of PMP*

## Knowledge

Knowledge is important and should be able to be shared by all people involved in the project. In addition, sharing knowledge is important to motivate the team members to perform their best [15]. Leader plays an important role and has a significance influence upon the knowledge management process applied in project development. Thus, a leader responsibility is to ensure that information gained from the project was preserved and made accessible team members. This study believes that knowledge able to increase the relationship between PM factors and the performance of PM.

*H5: Knowledge is a predictor of PMP*

*H6: Knowledge moderate the relationship of transactional leadership and PMP*

*H7: Knowledge moderate the relationship of transformational leadership and PMP*

*H8: Knowledge moderate the relationship of Teamwork's task competency and PMP*

*H9: Knowledge moderate the relationship of PLC and PMP*

## Project Management Performance

Project Management Performance (PMP) is defined as meeting cost and time objectives and adhering to a product specification. In order to measure PMP, Key Performance Indicators was used.

## Key performance Indicators (KPIs)

KPIs are helpful to compare the actual and estimated performance in terms of effectiveness, efficiency and quality of both workmanship and product [16]. In short, success factors are the efforts made – or strategy adopted – to achieve the success on project. Whereas, according to Toor et al. [17], KPIs are the compilations of data measures (either by quantitative or qualitative data) used to access the performance of the construction operation. Based on previous studies, project performances need to be measured in order to evaluate the success of project managements. "The project performance must achieve its objective and aligned with criteria stated by project stakeholders" [18-19]. "If client

or project stakeholder satisfied with the outcome of the project, it shows the performance of the project itself. To measure project success, benchmarking approach or KPIs can be used." [18, 20]. Benchmarking approach has also proved its usefulness in measuring PMP based on KPIs [20].

## RESEARCH MODEL

Research model have been conceptualized based on Project Management Performance Assessment (PMPA) model. New model in Figure I posits the construct based on literature review discussed. The following constructs are Project Leadership Style (transformational leader and transactional leader), Project Teamwork, Project Management Life Cycle and Project Knowledge. Knowledge has been located in the framework as moderator variable in this study. KPIs are used to measure PMP. Research framework was adapted from Qureshi et al. [14] and namely as knowledge project management performance assessment model or KPMPA.
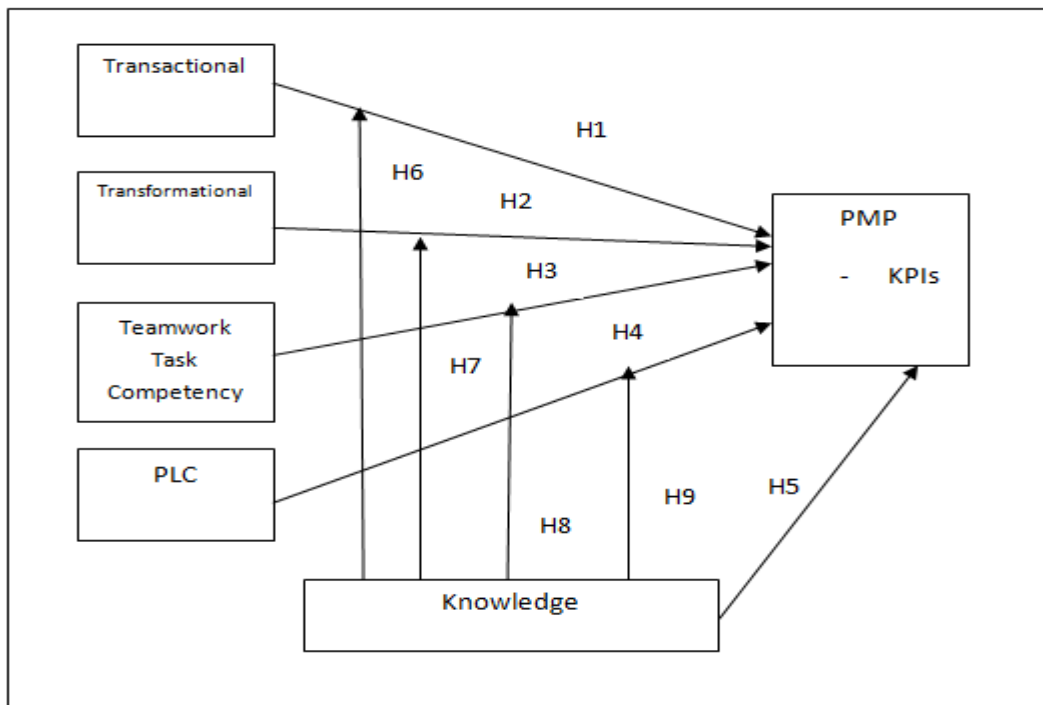


Figure 1: Research Model

# RESEARCH METHODOLOGY

The current study was employed quantitative methods, specifically questionnaires surveys were distributed. The questionnaires included four of demographic questions, three of transactional leadership style questions, three of transformational leadership style questions, three of teamwork task competency questions, three of knowledge questions, four of PLC questions and three of KPIs questions. The survey questionnaires for leadership styles, teamwork task competency, knowledge, PLC and KPIs was measured using a 7-point Likert-Type scale. Pilot study was run to ensure the reliability of questionnaires survey.

Target population of this study was employees who work in ICT Company at Klang Valley, Malaysia and have experiences in ICT project. The final sample size of this study is 409 respondents and was selected using simple random sampling.

# RESEARCH FINDINGS AND DISCUSSION

## Demographic Backgrounds

Total of 409 respondents responded to the questionnaires. These questionnaires were distributed by personal visit. The respondents are an employee of ICT Company in Klang Valley, Malaysia who has experiences in Information System (IS) project. According to the demographic result, most of the respondent was male (340) compare to female (69). Many respondents have experiences in managing project almost 10 years with 62.3% of overall. In term of age, 65.8% respondents are between 25 and 39 years. Thus, the result of the sample shows that respondent is appropriate to answer items for each construct because they fulfill study requirements with enough experience in IS project development.

## Measurement Model

Confirmatory factor analysis (CFA) establishes the construct validity of the proposed measurement model and the validity of the data were tested for each of the constructs. As shown in Table 1, all the items was in standardized loading estimates above 0.5 threshold ranging from 0.697 to 0.922. The composite reliabilities (CR) for each construct range from 0.85 to 0.94. The average variance extract (AVE) for each construct range between 0.65 to 0.83 which is greater than 0.5 and thus the cut of values assures that at least 50% or more of the variances in the observed variables are explained by the set of indicators. The collected data has been verified for its reliability by calculating the Cronbach's Alpha and the value shows that all the constructs have score alpha value more than 0.5 with range of 0.832 to 0.916. Thus, the scale can be considered reliable.

## Measurement Model Fit

The correctness of the research model was tested by using structural equation modeling (SEM) method with SPSS-AMOS 18. This study was chosen Absolute Fit Measure and Incremental Fit Measure to indicate how well the research model can specify reproduces the observed data. Thus, Chi-Square test, Root mean square error of approximation (RMSEA), Good fit index (GFI) and Comparative fit index (CFI) was selected. Chi-Square value is the traditional measure for evaluating overall model fit. The Chi-Square value in this study is 408.311 with 132 degrees of freedom, thus indicating a good fit with the model (a ratio less than 3). Meanwhile, the indices (RMSEA, GFI and CFI) results as shown in Table 2 are at good fit. To conclude, the results showed that the model provides a valid framework for the measurement of project management performance.

Table 1: Measurement Model Analysis

| Construct and Items | Factor Loading | Cronbach's Alpha | AVE | CR |
|---|---|---|---|---|
| **Transactional** | | 0.916 | 0.83 | 0.94 |
| T4 | 0.892 | | | |
| T5 | 0.922 | | | |
| T6 | 0.915 | | | |
| **Transformational** | | 0.84 | 0.68 | 0.86 |
| T12 | 0.697 | | | |
| T15 | 0.926 | | | |
| T16 | 0.832 | | | |
| **Teamwork Task Competency** | | 0.894 | 0.68 | 0.86 |
| Team18 | 0.953 | | | |
| Team19 | 0.831 | | | |
| Team20 | 0.659 | | | |
| **Knowledge** | | 0.832 | 0.67 | 0.85 |
| Knowledge_32 | 0.851 | | | |
| Knowledge_33 | 0.912 | | | |
| Knowledge_35 | 0.663 | | | |
| **PLC** | | 0.887 | 0.65 | 0.88 |
| PLC38 | 0.775 | | | |
| PLC44 | 0.794 | | | |
| PLC45 | 0.825 | | | |
| PLC47 | 0.841 | | | |
| **KPIs** | | 0.861 | 0.67 | 0.86 |
| KPI54 | 0.783 | | | |
| KPI55 | 0.814 | | | |
| KPI57 | 0.852 | | | |

Table 2: Indices of Fit and Comments for Model Analysis

| Indices in SEM | Default Model | Data fitting of the model |
|---|---|---|
| Chi-Square/Degrees of freedom ratio | 408.311/132 = 3.093 | Good fit (should be less than 3) |
| CFI | .953 | Good fit (should be greater than .90) |
| RMSEA | .072 | Good fit (should be less than .08) |
| GFI | .908 | Good fit (should be greater than .90) |

## Hypotheses Analysis

Table 3 and Figure 2 show the results with respect to the six hypotheses constructed. The SEM analysis indicates that project teamwork task competency (TC), project PLC and knowledge of the project are significantly predicting PMP (p-value < 0.05). Thus, H3, H4 and H5 are supported. Meanwhile, other hypotheses (H1-H2) were rejected because they do not significantly predict PMP. Most of the respondents were both practicing leadership styles in managing project ICT. Leadership style is still new to predict PMP. However, many studies have indicated that leadership factor is significantly predicting PMP [7-9, 14].

Table 3: Hypotheses Result

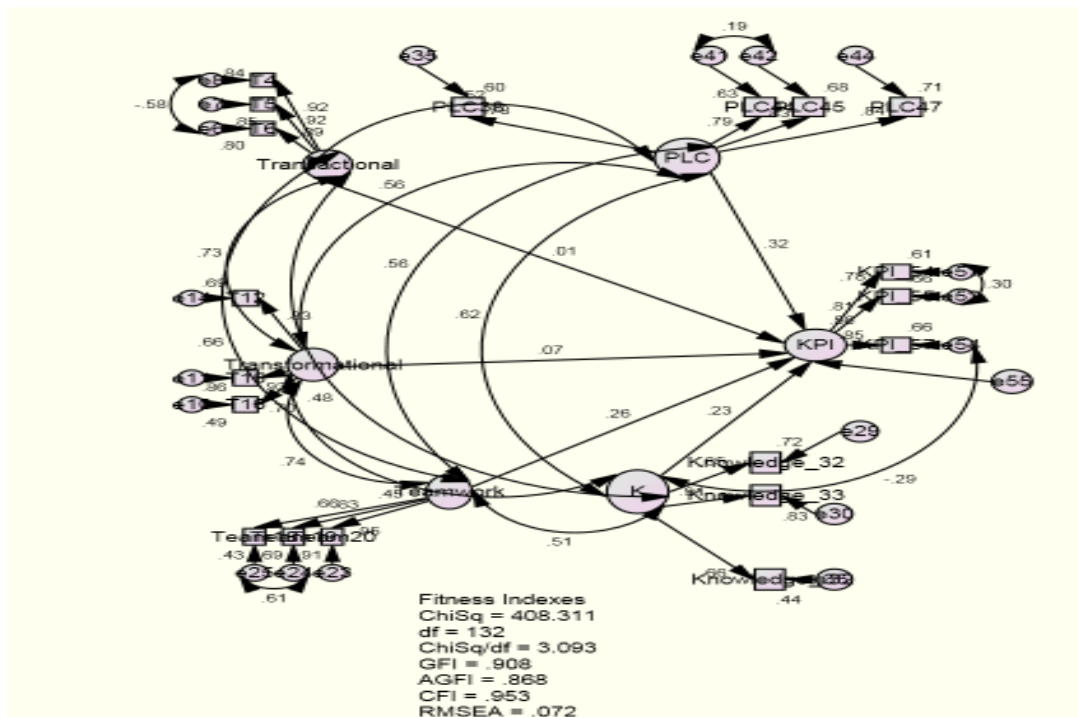| Hypothesis | Causal Relationship | Factor | S.E | Significant | Result |
|---|---|---|---|---|---|
| H1 | Transactional | PMP (KPIs) | .069 | .846 | Not Supported |
| H2 | Transformational | PMP (KPIs) | .077 | .403 | Not Supported |
| H3 | Teamwork TC | PMP (KPIs) | .070 | .001 | Supported |
| H4 | PLC | PMP (KPIs) | .074 | *** | Supported |
| H5 | Knowledge | PMP (KPIs) | .076 | *** | Supported |



Figure 2: The Hypothesized Structural Model

## Moderating Effects of Project Knowledge

The moderating effect of project knowledge on the model was examined using multi group procedure. This study split the sample into 2 groups according to the mean score of the knowledge. A two group AMOS model was used subsequently so that it could be determined whether or not there was any significant difference in structural parameters between the high knowledge group and the low knowledge group.

Subsequent analyses identified the specific paths that are impacted by these variables. The relationship between transactional and PMP is negative in the sample of high and low knowledge and both is nonsignificant ($\Upsilon$[high]= -.005, t = -.072; $\Upsilon$[low]= -.060, t = -.079). The relationship between transformational and PMP is positive in the sample of high and low knowledge and both is nonsignificant ($\Upsilon$[high]= .026, t = .425; $\Upsilon$[low]= .908, t = .399 ). In the actual model also have shown that leadership style was not significantly predicts PMP. This is because majority of respondents were agreed that both of leadership styles were not important in managing ICT project. The relationship between teamwork and PMP is positive and significant in the sample of high knowledge ($\Upsilon$[high]= .211***, t = 3.035), but the relationship is negative and non significant in the sample of low knowledge ($\Upsilon$[low]= -.185, t = -.055). The relationship between PLC and PMP is positive and significant in the

sample of high knowledge ($\Upsilon$[high]= .358***, t = 4.353), but the relationship is negative and non significant in the sample of low knowledge ($\Upsilon$[low]= -1.072, t = -.213).

Table 4 present the result of moderating effect. Overall, all the hypotheses were supported because the Chi-Square differences exceeded the critical value, which are 3.84 for one degree of freedom. Thus, project knowledge was moderates the relationship between indicated variables with PMP. Project team must have a good knowledge in ICT project and thus, it will increase the performance of the project. PLC provides guideline to project team in implementing ICT project development. Without good knowledge in every steps of PLC, it can increase project risk. Moreover, project leader can effectively manage the project if they have sufficient knowledge on project undergo. Test of fitness indices indicated that unconstrained model shows better result compare constrained model, indicating that the group's coefficient differ.

Table 4: Test of Moderating Effect

| Hypothesis | Causal Relationship | Chi-Square | $\chi^2$ difference | Result |
|---|---|---|---|---|
| H6 | Transactional – PMP | 844.2 | 102.718 | Supported |
| H7 | Transformational – PMP | 839.578 | 98.096 | Supported |
| H8 | Teamwork – PMP | 809.023 | 67.541 | Supported |
| H9 | PLC – PMP | 779.129 | 37.647 | Supported |
| *unconstrained Chi-Square result = 741.482 | | | | |
| **Fitness Indices According to The Model** | | | | |
| **Model** | **ChiSq/df** | **GFI** | **CFI** | **RMSEA** |
| Unconstrained Model | 2.788 | .852 | .894 | .066 |
| Constrained Model | | | | |
| Transactional | 3.150 | .834 | .872 | .073 |
| Transformational | 3.133 | .833 | .873 | .072 |
| Teamwork Task Competency | 3.019 | .841 | .879 | .070 |
| PLC | 2.907 | .845 | .886 | .068 |

# CONCLUSION

ICT project is an asset at most of ICT Company and to implement the project required huge amount of money. The characteristics of this project were dynamic and unstructured. If this project was not managed properly, the project might be failed and company might lose their project investment. Therefore, project leader plays an important role to ensure that ICT project runs successfully and meets client's expectation. Previous studies indicated several constructs that have influenced PMP [14-15, 18]. However this study has developed new model namely KPMPA that located several constructs as follows: leadership styles (transactional and transformational), teamwork's task competency, PLC, project knowledge and KPIs. This study was aims to investigate which constructs are predicting PMP using SEM analysis. The respondents were given the questionnaires by personal visits using simple random sampling. Data was collected and analyzed using SPSS 17 and AMOS 18.

Based on SEM analysis shows that PLC, teamwork's task competency and project knowledge were significantly predicts PMP, but leadership styles (transactional and transformational) were not significantly predicted PMP. Most of the respondents agreed that they are practicing both of leadership styles when managing their project, but the results show that this construct was not significant.

Test of moderating effect has shown that project knowledge was moderates the relationship of leadership styles (transactional and transformational), teamwork's task competency, PLC and PMP. This study suggests that project team must have sufficient project knowledge. Without good knowledge, project team may be carried out their task in wrong way and did some mistakes. Other than that, PLC also important as it provides guidelines to project team on how to implement project's task. If some of the phases were not properly implemented, it can increase project risk and the project might fail. Therefore, both of these constructs are important to be considered by project leader when managing ICT project especially when selecting project team. Moreover, project leader

also play an important role and without enough experience and good knowledge on project undergo, project risk might be increased.

In summary, this study provides empirical evidences and recommends that all constructs should be improved and consider as an important predictor on PMP. Project leader should decide which leadership styles they should practice in managing ICT project. Even though the result shows this construct was not significant but it is still important in managing ICT project. It is hoped that the finding of the study can help project leader improving their project management skills. Future work should modify some measurement items and dig out more constructs that are believed can influence PMP such as top management support and project resources. Furthermore, research model developed in this study can also be used to investigate constructs that influence PMP on other types of project such as construction and engineering.

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