PROJECT MANAGEMENT STANDARDIZATION AND R&D PROJECT PERFORMANCE: A CROSS-NATIONAL COMPARISON

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Abstract: R&D project management is a very complex and difficult work. Many companies attempt to implement standardized project management (SPM) defined as a standardized set of project management (PM) practices. Previous empirical studies of US researchers show that SPM tools, leadership skills, and process may impact project success. Using data collected from R&D project in the China high-velocity industry, we conduct a comparative study to test the impact of PM standardization on R&D project success. The results of the testing indicate that standardized PM process, tools, culture, and leadership are of higher interest, and that standardized metrics, the information management system, and project organization may be of lower interest.

Key words: R&D project, Project management, Standardization.

1. INTRODUCTION

To be successful in today's competitive marketplace, companies must continuously development new products. Unfortunately, many new products fail and never enter the launch phase at all[1]. Of the nearly 16 000 new products introduced in 1991, almost 90% did not reach their business objectives[2]. Many studies have found that the many projects failed are due to PM improperly to some extent[3,4,5,6].To solve the problem, some companies have taken SPM as the strategy for R&D project management, which can be defined as a standardized set of PM practices[7,8]. It suggests that SPM may increase project performance. Meanwhile, some companies perceive research and development as somewhat fuzzy, involving high uncertainty[9]. The literatures we reviewed did not provide adequate evidence that PM

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standardization may increase R&D project performance. SPM refers to a process of managing projects composed of standardized practices. It was reported that 85% of the Fortune 500 use standardized approaches and procedures[10]. The Project Management Institute (2004) issued a new PM standard which suggest that SPM as a major strategy[11].Specifically, Dragan Milosevic and Peerasit Patanakul (2005)[8] have studied the impact of SPM on project performance, and proposed that standardized PM process, tools, and leadership are of higher interest, the standardized PM organization, information management systems, metrics, and culture are of lower interest.

The purpose of this study is, therefore, to test the impact of PM standardization on R&D project performance. We test the results in Dragan Milosevic and Peerasit Patanakul(2005) in the China high-velocity industry. We begin this study by defining the variables and hypotheses from Dragan Milosevic and Peerasit Patanakul (2005) [8]. Next the methodology for collecting and analyzing the China data is discussed, and the results are reported. Finally, the implications of the study are presented.

2. RESEARCH HYPOTHESES

Corresponding to the theoretical hypotheses proposed in Dragan Milosevic and Peerasit Patanakul (2005)[8], we test the following seven hypotheses using the China data.

H1:A higher degree of standardized PM process tends to increase the success of the R&D projects in high-velocity industries.

H2:R&D projects in high-velocity industries organized by more standardized practices of the project organization are more successful.

H3:Using a more standardized OPM-level information management system leads to higher success of projects in high-velocity industries.

H4:R&D projects in high-velocity industries that use more standardized PM tools tend to increase their project success.

H5:R&D projects in high-velocity industries using a more standardized system of metrics to measure and monitor project performance will have higher project success.

H6:R&D projects in high-velocity industries where cultural values are more standardized tend to have increased project success.

H7:R&D projects in high-velocity industries managed by managers with more standardized skill sets tend to have improved project success.

3. RESEARCH METHOD

3.1 Measures

The purpose of this study requires that we follow the same measure evaluation and scale development process in the original US study[8].

The dependent variable is the degree of project success. The degree of project success can be operationalized as the degree to which the projects accomplished their schedule, cost, quality, and customer satisfaction goals. To capture the numerical responses of the respondents as to the degree of project success, we used a 5-point Likert scale (5 being the highest degree, 1 being the lowest degree). The seven independent variables are PM process, organization, information management systems, tools, metrics, culture, and leadership. According to Dragan Milosevic and Peerasit Patanakul (2005) [8], we defined "standardized" as "the degree of uniformity or consistency applied in implementing project management process". Thus, the highest degree of uniformity, i.e., standardization, is when the PM process is implemented by all project managers in the same way. The lowest degree of uniformity, or standardization, is when the PM process is inconsistently used by all project managers. To measure the numerical responses of the respondents as to the degree of PM process standardization, we again used a 5-Likert scale. Using the same way, we measure the degree of standardization of project organization, information management systems, tools, metrics, culture, and leadership.

On account of only one question for each independent variable in original US study[8], the single item construct are less effective than multi-item constructs. Thus, we redesigned anther questionnaire with two or three questions for each variable on the basis of the previous questionnaire again. We found that Cronbach's alphas were higher than the minimum value of 0.70 recommended by Nunnally (1978)[12]. It shows that the scale is reliable and acceptable level of internal consistency for the study.

3.2 Samples and data collection

The data for this study were obtained from the firms in China. To enhance to the validity of the data, we mailed the questionnaires to the project directors only. Meanwhile, to ensure the external validity of the findings, the sample included projects varying in size. The final qualifying sample included 65 R&D projects. Of the samples, 26 were in computer industries; 39 were in electronics industries. Approximately 48 of these firms stated that they had an emphasis on the SPM.

3.3 Data analysis

The purpose of this study requires that we follow the same analysis method in the original US study[8]: two methods of bivariate data analysis along with one multivariate method. The bivariate methods were Pearson product-moment correlation between each independent and dependent variable, and t-test, which assesses the significant difference of the project performance in the terms of project success. The assumption here is that higher project success will have the higher degree of SPM factors. If so, the t-test will show significant differences for each factor. Finally, we use stepwise multiple regression analysis to validate the previous analysis.

4. RESEARCH RESULTS

The summery statistics of the bivariate analysis and stepwise regression results of testing the hypotheses are presented in Table1 and 2.

4.1 SPM tools, leadership, process, and culture analysis are of interest

Table 1. Impact of SPM factors on project performance (bivariate analysis)

Factors	Performance		
	Pearson Correlation	Sig.(2-tailed)	N
Process	.536(**)	.000	65
Organization	.231	.064	65
Information	.185	.141	65
Tools	.562(**)	.000	65
Metrics	.167	.184	65
Culture	.437	.000	65
Leadership	.428(**)	.000	65

** Correlation is significant at the 0.01 level (2-tailed).* Correlation at the 0.05 level.

Table 2. Multiple regression analysis of PM performance Versus standardization (multiple analysis)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	-.240	.371		-.647	.519
	Tools	.891	.095	.762	9.333	.000
2	Constant	-.754	.416		-1.811	.075
	Tools	.815	.097	.696	8.363	.000
	Leadership	.259	.107	.200	2.406	.019

The correlation coefficients of 0.536, 0.562, 0.437, and 0.428 show a significant relationship between the standardized PM process, tools, culture,

and leadership. T-tests confirmed that there are significant differences in the standardization of these variables between these projects. This indicates that higher standardization of PM process, tools, culture, and leadership will lead to higher project success.

From the results of the stepwise multiple regression (Table 2), we found that only two factors (tools, leadership) entered into the equation. The two predicted variable may capture the explained variance of the dependent variable by using its correlated factors. As a result, the correlated factors may not enter the equation. Since some SPM factors were strongly correlated with leadership and tools. For example, the correlation coefficient between leadership and culture is 0.283 and 0.627 between tools and process (at the 0.05 level). Thus, it is quite possible to get a short list of factors in the equation. In summary, Hypotheses 1, 4, 6, and 7 were support.

4.2 The three SPM factors of lower interest

Table 3. Results for US and China

Factors of interest		Factors of lower interest	
US	China	US	China
Process	Process(H1)	Organization	Organization
Tools	Tools(H4)	Information system	Information system
Leadership	Culture(H6)	Metrics	Metrics
	Leadership(H7)	Culture	

The three factors with little or not impact on project success in the statistical analysis were standardized metrics, the information management system, and project organization. The results of the regression also indicate this finding (Table 2). Because they have lower impact on the project success, hypotheses 2, 3, and 5 are not supported.

To facilitate comparison of the US and China findings, we report the results of the testing (Table 3). From table 3, we can find that the results from the China data are some different from the results from US study.

5. DISCUSSION AND MANAGERIAL IMPLICATIONS

The objective of the study is to verify the findings in US study[8]. The findings inconsistent with that in original study [8] show that increasing the level of the standardization of some PM factors will lead to higher project performance.

A standardized PM process may increase project success. PM process can improve project performance. Standardized PM process can result in less rework, fewer mistakes, fewer delays and snags, and better use of time.

When a standardized PM process is in place, the level of repeatability is higher. Thus, those projects using a standardized process will minimize variation in how they are executed, and will be improved in performance.

PM tools are structural factors in determining PM success[13]. Standardized PM tools may impact project success. The companies should create their standardized PM toolbox (e.g., templates, WBS, Gant Chart) in order to help project team to accomplish project goals.

Formal project leadership play a key integrative role in innovation projects both within the project team and between the team and outsides[14]. The project managers with standardized leadership skill sets may be a factor in project success[8]. The standardized leadership will reduce uncertainty for data transmission between the team and top management. The reliance on standardized leadership is likely to be more crucial for performance for projects involving high uncertainty. In this condition, project managers are more likely to deliver on cycle time, customer satisfaction, quality, and cost goals when given a standardized skill set that can address all sorts of project challenges than they are when left to randomly develop such skills[8].

The project team with standardized project culture may help project team to accomplish project goals. The efficiency of project teams are influenced by culture diversity [15], because certain culture values make team members resist teamwork. The cultural standardization might help shape standardizing value and beliefs of employees that reducing variation in their behavior especially in China. The culture standards of different countries' will have different impact on teamwork[16].

6. CONCLUSION

Some companies have tried to introduce SPM for increasing project success, because the R&D PM is very complex. Some researchers have studied the impact of PM standardization on R&D project performance. An important study of US has shown that the SPM would increase project success. Compared to the US, the PM standardization is still immature in developing countries like China. Thinking about the cultural difference between US and China, the PM practices may be also different. Therefore, we test the findings in US using the China data. The results of the testing are not consistent with findings in US study[8]. The testing of the seven hypotheses indicated that standardized PM process, tools, culture, and leadership are of higher interest, and that standardized metrics, the information system, and project organization may be of lower interest.

Since the China survey was designed to replicate the previous US study, we did not redesign another research framework. The research model may be viewed as simple. It does not state the correlation between each of the

different critical standardization factors affecting project success. Another limitation is that this research is based on a final qualifying sample including 65 projects only. To be broadly generalizable, the results need to be replicated in a broader set of sample. Future research should attempt to address these questions.

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