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The Effect of PMO Functions on IT Project Performance*

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Ⅰ. Introduction

Since the 1990s, as organizations began to recognize that their strategies and initiatives were essentially achieved via projects, the project management became a critical competency. While some evidence that IT project management may be improving over time, success remains elusive for a significant proportion of IT projects. Information systems' projects are recognized for being delivered behind schedule, over budget and with low quality (Hurt, 2009).

The Standish Group's CHAOS Summary 2009 shows a marked decrease in project success rates, with 32% of all projects succeeding which are delivered on time, on budget, with required features and functions. 44% were challenged which are late, over budget, and/or with less than the required features and functions and 24% failed which are cancelled prior to completion or

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delivered and never used. This statistics indicate that between 44% and 68% of IT projects are unsuccessful－they either fail to deliver on time, overstep budgeted estimates of resources and time, do not meet customer requirements, or fall short of customer expectations.

We may reveal that many reasons for such failures, however, technology is not the most critical factor, most of project failures are due to lack or improper implementation of project management methodologies (Whittaker, 1999).

The project management office (PMO) seems to be the preferred method or a key for managing projects effectively. As an out-growth of this recognition, organizations have implemented and maintained an organizational entity, the project management office (PMO), to remain competitive or to overcome their challenges to justify (BIA, 2005), to achieve project management oversight, control, support, and alignment and to help lower the typical risks facing projects (Hill, 2004). Thus, over the last decade, the PMO has become prominent feature in many organizations. The application of the PMO concept is a worldwide growing trend in the organizations (Rad and Levin, 2002; Kendall and Rollins, 2003; Kerzner, 2003; Letavec, 2006; Hill, 2007; Hurt, 2009; Singh, 2009; Crawford, 2010; Hobbs and Aubry, 2010).

While PMOs have become a mainstay in organizations, systematic research has not yet been undertaken to study their intricacies. The PMOs have been addressed extensively in the professional literature. Several case studies and interview survey have been conducted by practitioners and consultants promoting the implementation of PMOs, however, there has been very limited theoretical or empirical research evidence of the benefits of deploying PMOs (Kendall and Rollins, 2003; Dai and Wells, 2004; Desouza and Evaristo, 2006; Liu and Yetton, 2007; Hobbs and Aubry, 2008).

Since the mid-2000s, the domestic banking-sectors including leading-commercial banks established and operated PMOs and focused on increasing professionalism of the Next Generation System Projects management. Caused by the Legislation of the Financial Investment Services and Capital Market Act in 2009 in Korea, such trends permeate into the domestic non-banking sectors including securities co., investment bank, insurance co., etc. Today, the PMO is a crucial issue for large organizations or financial institutions in Korea (Baek et al., 2006; Kim & Chang, 2006; Bae et al., 2008; Hong et al., 2010); however, still very little theoretical or empirical research on this topic except several case studies by practitioners. It seems to be pockets of resistance to find PMO’s functions to enhance project performance; therefore, the in-depth research in PMOs in Korea is in needs.

The main purpose of this study is to uncover the PMO’s efficiency and effectiveness that lead to successful project through the use of project management office (PMO). The PMO is seen as the point of entry into the organization to study the efficiency and effectiveness of IT project performance in context. Thus, the primary objective is to examine the relationships between PMO functions and the performance of IT project.

This study also aims to empirically identify the relative importance of the project management Knowledge Areas of the PMBOK® Guide (PMI, 2008) used and their impact on IT project performance. This information may help project managers improve decision making with regard to the way that time and resources are allocated among different Knowledge Areas and associated processes. In the event, conducting project management process mediates the effect on project performance of deploying a PMO.

Ⅱ. Literature Review

2.1 Research on PMO Functions

A PMO is a source of centralized integration and a repository of knowledge that can be used to inform more effective and efficient IT project management (Desouza and Evaristo, 2006) and is a formal and centralized layer of control between senior management and project management (Martin et al., 2005) and is a physical or virtual office that serves as a center for project management excellence (Foti, 2003). PMOs can play an important role in organizational management, thus, the PMO is an organizational innovation (Hobbs et al., 2008) that can not only improve IT project management processes, but also facilitate organizational transformation (Aubry et al., 2008).

Meanwhile, *PMBOK® Guide, 4th ed*., defines a PMO as an organizational body or entity assigned various responsibilities related to the centralized and coordinated management of those projects under its domain. The responsibilities of a PMO can range from providing project management support functions to actually being responsible for the direct management of a project (PMI, 2008, pp.443).

Further, in this study, the researcher would use the PMI’s definition of a PMO, which is an organizational entity and its mandates vary significantly from one to the next. The scope of this study includes only PMOs with mandates that cover many projects or “multi-project PMOs” according to Rad and Levin (2002), Kendall and Rollins (2003), Dai and Wells (2004), Letavec (2006), Hill (2007), Crawford (2010), and Hobbs and Aubry (2010).

The PMO’s function is to help both the project manager and the relevant organization (whether an entire enterprise, a business unit, or a department) to not only understand and apply modern project management processes, but also to adapt and integrate business interests into the organization’s project management efforts (Hill, 2007). Letavec(2006) asserted a PMO may function in any of three roles: a consulting role, a knowledge management role, and a standards setting/compliance role.

Desouza and Evaristo(2006) segmented the functions of PMOs into three levels; strategic, tactical, and operational. Knowledge management remains one of the primary functions of the PMO at all levels. Rad and Levin (2002) categorize the entire spectrum of the functions of the PMO into two separate categories: those that are project-focused, short term, and remedial; and those are enterprise-oriented, long term, and visionary (Rad and Levin, 2002).

Hobbs and Aubry(2007) conducted a descriptive survey of 500 PMOs aimed at providing a realistic portrait of the population of PMOs in organizations. A large number of different functions were identified, but, the final list contained 27 functions of PMOs. By the factorial analysis, five groups of functions are identified: monitoring and controlling project performance, development of project management competencies and methodologies, multi-project management, strategic management, organization learning (Hobbs and Aubry, 2010).

The major objective of Dai and Wells(2004)'s study was to enhance the strength of the empirical research base that examining the particular question of what correlations might exist between the presence of PMO functions and project performance. The 6 functions are as following; developing and maintaining PM standards and methods, developing and maintaining project historical archives, providing project administrative support, providing human resource/staffing assistance, providing PM consulting and mentoring, providing or arranging PM training (Dai and Wells, 2004).

Table 1 shows Project Management Office Functions which would be the name of first- order construct of PMO functions. All five PMO functions are induced from well-established literature reviews such as Rad and Levin(2002), Dai and Wells(2004), Letavec(2006), Hill(2007), PMBOK(2008), Crawford(2010), Hobbs and Aubry(2010). Therefore, the common proposed constructs, PM methodology, administrative support, training and consulting, resource management, knowledge management, are adapted and assumed to the PMO functions.

2.2. Research of Project Management Process

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)-Fourth Edition identifies nine Knowledge Areas that the project manager should focus on during the project life (PMI, 2008). Unfortunately, most project managers may not perform all of those processes that are required by the PMBOK® Guide and may choose to perform only processes that they are most familiar with or that are easier to perform. In the meanwhile, they may give lower priority to Knowledge Areas that have higher impact on project success. As the PMBOK® Guide itself

Table 1 Project Management Office Functions

Function Category	Specific Functions of PMO	References
Providing Methodology	Develop and implement a standard methodology Promote project management within the organization Provide a set of tools without an effort standardize Project Management methodology Project Management tools Standards and metrics Assisting with implementation of organizational best practices for particular project efforts Defining organizational standards for key project processes Creating standard tools for use by project managers for project tracking, estimating, or other common project functions Developing and maintaining PM standards and methods	Rad and Levin (2002) Dai & Wells (2004) Letavec (2006) Hill (2007) PMBOK(2008) Crawford (2010) Hobbs & Aubry (2010)
Providing Administrative Support	Providing project administrative support Report project status to upper management Network and provide environmental scanning Conduct project audits Develop and maintain a project scoreboard Monitor and control the performance of the PMO Facilities and equipment support Vendor/contractor/ customer relationships management Assisting business units with project selection, vendor analysis, and other project processes Leading the implementation of standards and tracking compliance with organizational standards Planning and control support reporting Purchasing and contract administration	Rad and Levin (2002) Dai & Wells (2004) Letavec (2006) Hill (2007) Crawford (2010) Hobbs & Aubry (2010)
Training & Mentoring & Consulting	Develop competency of personnel, including training Provide mentoring for project managers Training and education Career/ Team development Mentoring project managers Providing consulting for troubled projects Creating project management training materials Conducting PM training for project managers Providing PM consulting and mentoring Providing or arranging PM training PM competency and career development Communications and PM community	Rad and Levin (2002) Dai & Wells (2004) Letavec (2006) Hill (2007) PMBOK(2008) Crawford (2010) Hobbs & Aubry (2010)
Resource Management (Multi-project)	Allocate resources between projects Coordinate between projects Manage one or more portfolios/ programs Identify, select, and prioritize new projects Organizational and structure Resource management Project recovery Project portfolio Management Assembling project assets from across the organization Providing human resource / staffing assistance	Rad and Levin (2002) Dai & Wells (2004) Letavec (2006) Hill (2007) PMBOK(2008) Crawford (2010) Hobbs & Aubry (2010)
Knowledge Management	Manage archives of project documentation Conduct post-project reviews Implement and operate a project information system Implement and manage a database of lessons learned Implement and manage a risk database Project knowledge Management Leading lessons-learned sessions Identifying and documenting organizational best practices Creating knowledge repositories and providing access to these repositories to the organization Developing and maintaining project historical archives Lessons learned and continuous improvement	Rad and Levin (2002) Dai & Wells (2004) Letavec (2006) Hill (2007) PMBOK(2008) Crawford (2010) Hobbs & Aubry (2010)

does not identify the relative importance of each Knowledge Area, the objective of this study is to empirically identify the most important of the PMBOK® Guide's Knowledge Areas. This information may help project managers improve decision making with regard to the way that time and resources are allocated among different Knowledge Areas and associated processes.

The PMI's PMBOK® Guide defines a project as "temporary endeavor undertaken to create a unique product, service, or result" (PMI, 2008). Projects are typically authorized with a defined duration and cost and with a defined scope and set of performance criteria in place that set boundaries for the project effort (Letavec, 2006). Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the project management processes comprising the five process groups. These five Process Groups are: initiating, planning, executing, monitoring and controlling, and closing. Managing a project typically includes: identifying requirements, addressing the various needs, concerns, and expectations of the stakeholders as the project is planned and carried out, balancing the competing project constraints including, but not limited to: scope, quality, schedule, budget, resources, and risk (PMI, 2008).

According to the PMBOK® Guide(PMI, 2008), a project manager is expected to perform 42 processes which are categorized into the nine Project Management Knowledge Areas as followings; Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resources Management, Project Communications Management, Project Risk Management, Project Procurement Management .

All above nine knowledge area's process or activities contribute to the project performance of an organization. Integrating these research streams, organizations rely on conducting project management to deliver projects on-time, in-budget and to quality. The BIA's full research report(2010) provided valuable insights that Project Management is most effective when supportive structures are in place, and further, effective Project Management drives organizational success. Thus, lack of consistency in project management processes, tools and templates are negatively affecting project delivery. The standardized PM tools, PM leadership, and PM process may have an impact on higher project success (Milosevic and Patanakul, 2005) and the standardized PM process is identified as the critical factor to project success (Deephouse et al., 1995).

2.3. Research on PMO Capability

PMOs are summarized in typologies comprised of a small number of models. Kendall and Rollins (2003)'s typology is comprised of three types of PMOs: project repository, coach, and enterprise. Each of the typologies proposes two, three, or four multi-project PMOs, organized in an ascending hierarchy. Different authors used different properties to characterize the passage from one level to the next within their hierarchy (Hobbs and Aubry, 2010).

Rad and Levin(2002) describe the five maturity levels. Crawford(2010) verified a strong correlation between organizational performance and the maturity of PMOs. PMO maturity is rated on a scale from Level 1 to 5 (immature, established, grown-up, mature, and best in class). Hill(2007) described five stages of PMO capabilities along a competency continuum. Each PMO stage suggests a particular level of functional capability that the PMO will have achieved if functions are fully implemented. The five PMO stages are also indicative of an organization's maturity in project management, with the PMO's role and responsibilities advancing from project management oversight and control at the lower end of the competency continuum to strategic business alignment at the higher competency stages. It is presumed that a higher-stage PMO has already achieved the competencies prescribed for any lower-stage PMOs. Moreover, it is critical to discern the approximate level of PMO competency that the relevant organization needs (Hill, 2007).

Furthermore, BIA(2010) stated that the effective project management drives organizational success, sponsors and managers play a critical role in project success, and project management is most effective when supportive structures are in place. Patanakul and Milosevic (2009) found that management support is one of the key success factors. This support can be seen in terms of implementing the reasonable amount of projects, allocating resources appropriately, setting clear goals and project priority, and assigning project manager properly.

A supportive organizational culture is identified as a major success factor for project management. The supportive organizational culture is strongly related to both measures of PMO performance: legitimacy and contribution to project/program performance. The supportiveness of the organizational culture is related significantly to the level of project management maturity of the organization. PMOs with little or no support from the organizational culture tend to be situated at a lower level of maturity (Hobbs and Aubry, 2008).

2.4. Research on Project Performance

From the viewpoint of the client, project success can be characterized by project performance in any or all of the elements of the triple constraint. Given that some of the variance in cost and schedule is justified, it is only the unjustified portion of the variance that becomes a source of the judgment as to whether or not the project was a success and by how much. The client may consider the scope/quality of the project a success if the client ultimately receives a product that is a close match with the requirements. It is an important point that scope/quality success tends to overshadow project performance in other areas (Rad, 2001).

Dai and Wells(2004) enhanced the strength of the empirical research base that the particular question of what correlations might exist between the presence of PMO features and project performance. The results show that reported project performance is higher in organizations that have a PMO in comparison with organizations that do not and PM standards and methods are most highly correlated with project performance.

Kerzner(2003) evaluated the deliverables in terms of time, cost, quality, and scope. These constraints often are referred to as Critical Success Factors (CFS) as seen through the eyes of the client. Key Performance Indicators (KPI) are the internally shared learning topics that will allow the company to maximize what is done right and correct what is done wrong and the "internal best practices" that allow us to achieve the critical success factors.

Rad and Levin(2002) outlined project success indicators, as viewed by the client and the team, based on things-related attributes and people-related attributes. Things-issues of the client' view include scope as needed, quality as needed, cost within budget, and schedule on time; whereas people-issues of the client's view include client satisfaction and team morale.

Atkinson(1999) insisted that using the Iron/Golden Triangle of project management, time, cost and quality as the criteria of success is not wrong, but, they are not as good as they could be, that is, something is missing. Thus, he suggested "the square route" of success criteria; organizational benefits, stakeholders benefits, the information system as well as the iron triangle (cost, time and quality) which providing a more realistic and balanced indicator of success.

Deephouse(1995) analyzed the main effect of software processes on performance. They chose to include seven software processes as an independent variables and three project performance (quality, schedules and budgets) as a dependent variables. Thus, in this study, the criteria for project performance followed by preliminary study and literature review are cost, budget, and quality as well as customer satisfaction.

Ⅲ. Research Design

3.1 Research Model

As reviewed earlier, PMO functions-related study mainly focused on inducing PMO main functions that influence the project performance through case study or interview research. Only a few studies show the direct cause-and-effect relationship between PMO functions and project performance.

The purpose of this study is to test the empirical validity of these hypothesized cause-and-effect relationship between PMO functions and project performance. The study established to analyze relationship between the use of project management processes and project performance. In the meanwhile, the effects of PMO functions on project performance are mediated by the use of project management processes. This study also aims to analyze the strength of the relation between PMO functions and project performance via moderator variable: PMO capability which is joined PMO maturity and top-management support. Ideally, this study would like to be able to detect the interaction effect and more importantly estimate the effect size of the interaction.

For this purpose, this study defines four latent variables: PMO functions, project management processes, PMO capability, and project performance. This approach is illustrated empirically second-order latent variable model using formative indicators of PMO functions and reflective indicators of project management processes. The name of each first-order construct of PMO functions are induced from well-established literature reviews in PMO. Based on the Rad and Levin(2002), Dai and Wells(2004), Letavec(2006), Hill(2007), Crawford(2010), and Hobbs and Aubry(2010), the commonly proposed constructs including project management methodology, administrative support, training and consulting, resource management, knowledge management, are adapted and assumed (refer to Table 1). According to Jarvis et al.(2003), this study considers the theoretical direction of causality between the second-order construct (PMO functions) and its measures (five first-order constructs). Since causality is directed from the first-order constructs to the second-order construct, the construct (PMO functions) is formative. With formative construct, changes in the measures do cause changes in the construct, but changes in the construct do not cause changes in the measures.

Formative indicators are measures that form or cause the creation or change in an latent variable (Chin, 1998a). For instance, indicators such as project management methodology, administrative support, training and consulting, resource management, and knowledge management are items that cause or form the latent variable PMO Functions. If a PMO does not provide project management methodology to project managers, the PMO Functions would be negatively affected. But to say that a negative change has occurred in an PMO Functions does not imply that the PMO does not provide project management methodology. Furthermore, a change in an indicator (say project management methodology) does not necessarily imply a similar directional change for the other indicators (say resource management or knowledge management).

Accordingly, this study set all 42 logically grouped project management processes, extracting from the nine knowledge areas of PMI's PMBOK® 4th edition, as manifest variables (observed variables). This study set those nine knowledge areas of PMI's PMBOK 4th edition as the first order constructs to induce the second order construct of project management process. According to Jarvis et al.(2003), reflective construct works in the opposite manner. Since the direction of causality is from the second-order construct to the first-order constructs, the construct (project management processes) is reflective. With reflective construct, changes in the measures do not cause changes in the construct, but rather changes in the construct cause changes in the indicators.

Integrating these research streams, organizations rely on PMO functions and project management processes to deliver projects on-schedule, in-budget, and to quality. Therefore, the project performances are defined and measured using four different areas including the customer satisfaction as well as the iron triangle (time, cost and quality).

This study categorizes observed variables into PMO function, project management processes, and project performance and presents PMO function map as a research model to analyze cause-and-effect relationships or interactions among those constructs. The proposed research model is depicted in Figure 1. This study formulates a mediation hypothesis which recognizes that conducting project management processes intervenes between PMO functions and project performance. The central idea in this

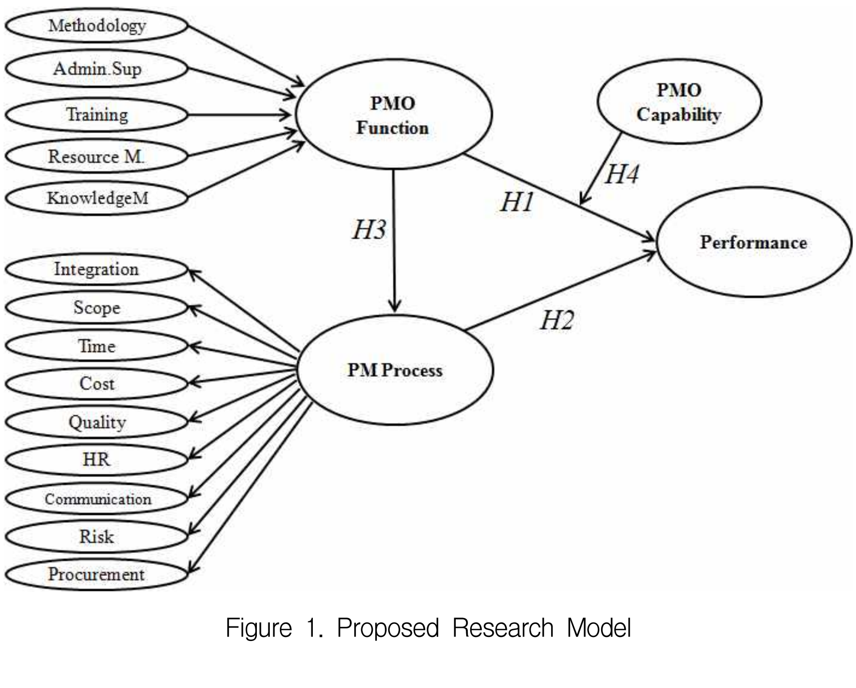

Figure 1. Proposed Research Model

model is that the effects of deploying a PMO functions on project performance are mediated by conducting project management processes.

3.2 Research Hypotheses

The cause-and effect relationship between PMO functions and project performance need to be clearly set up to successfully build-up a model proposed by this study. Hypothesis 1 is related to PMO. Typically, studies on the effect of PMOs on project performance found that PMO functions, including maintaining project management standards and methods, providing administrative support, providing project manager training and consulting, providing resource management, and establishing project knowledge management, have strong links to project performance (Rad and Levin, 2002; Kendall and Rollins, 2003; Dai and Wells, 2004; Letavec, 2006; Hill, 2007; Crawford, 2010; Hobbs and Aubry, 2010).

H1: Deploying PMO functions has a positive effect on project performance.

Several studies identified the project management process as an important success factor in IS projects (Deephouse et al., 1995; Martin et al., 2005; Milosevic and Patanakul, 2005; PMI, 2008). Based on these logic, then, standardizing the project management process for IS projects may also lead to their success. Integrating these research streams, organizations rely on project management process to deliver projects on-schedule, in-budget and to quality. Formally, this can be written as follows:

H2: Conducting project management processes has a positive effect on project performance.

Enhancing PMO functions will lead to project management processes level increase, consequently it will induce the project performance increase. Thus, if this chain of induction is abnormally performed or the chain itself has been set-up in a wrong manner, it will be difficult to conclude that the PMO function lead to increase the project performance. The entire model is important for determining the main target variable, being project performance. In that environment, project management processes mediate the effect of PMO functions on project performance. In other words, the effects of deploying PMO functions on project performance are mediated by conducting project management processes.

H3: Deploying PMO functions has a positive effect on conducting project management processes.

This study investigates the contingent effect on IT project performance of deploying PMO Functions. Depends on the degree of delegation or empowerment of PMO, deploying PMO Functions would have the contingent effect on IT project performance. To examine the degree of delegation or empowerment of PMO, this study would adopt PMO capability. Two variables, the

PMO maturity and 'top-management support' environments, combine to constitute the PMO capability.

Hill(2007) describes five stages of PMO maturity along a competency continuum. The five PMO stages are also indicative of an organization's maturity in project management, with the PMO's role and responsibilities advancing from project management oversight and control at the lower end of the competency continuum to strategic business alignment at the higher competency stages. Thus, the PMO maturity affects the strength of the relation between PMO functions and IT project performance.

The moderator hypothesis is supported if the interaction is significant. There may also be significant main effects for the predictor (PMO functions) and the moderator (PMO capability), but these are not directly relevant conceptually to testing the moderator hypothesis (Baron and Kenny, 1986). The senior management or key personnel supports are the critical drivers of IT project performance. Thus, the top-management support affects the strength of the relation between PMO functions and project performance. Therefore, deploying PMO functions have a positive effect on project performance in high PMO capability.

H4: Deploying PMO Functions have a positive effect on project performance in high PMO capability.

Ⅳ. Research Methods and Results

Initially candidate survey items were compiled from existing literature and presented on a five-point Likert scale. Then the survey items were examined by a professor who is knowledgeable about the research subject as well as the measurement theory and a senior IT manager with practical knowledge in IT PMO infrastructure.

Data were collected through an online survey on the period from mid-March to early-April in 2011. This study employs a 'judgment sampling' and 'snowball sampling' (a form of non-probability sampling). The survey conducted to a project manager or a project leader who has been performed the IT Project in supporting of PMO.

In collaboration with Project Management Institute (PMI) Korea Potential Chapter, we collect and aggregate the individual responses from the members of PMI Korea Potential Chapter and the members of PMP Café. Only the project manager or the project leader which has a project-implementation experience under the PMO supporting can fill out the survey. Since the respondent should fill out all questionnaires to summit via online, there was no missing value, and the researcher did not need to remove the duplicate items or missing value after collecting and aggregating the responses. The resulting refined list of items is collectively exhaustive of all members' responses.

This study attempt is to investigate the cause-and-effect relationship between PMO functions and project performance. For the survey, all of the items were on a five-point Likert scale ranging from strongly disagree (1) through neutral (3) to strongly agree (5). The questionnaire also collected demographic data: general information of respondents and their company including business sector, position, number of employees, budget and period of IT project, age of IT PMO, number of person of IT PMO, and number of projects managed by IT PMO. The survey contains seventy-six questionnaires including eight demographic questionnaires. Via the online survey (Google Docs), 84 valid responses were collected with no missing value.

Throughout this study, Partial Least Squares path modeling (PLS-PM) has been adapted to verify its significance test of proposed research hypotheses. PLS can be used to investigate models at a higher level of abstraction and, further, it is often chosen due to its' ability to estimate complex models (Chin, 1998b). For this study, since relatively large number of indicators and constructs, small sample size, and reflective and formative indicators are used to estimate constructs, PLS path modeling (PLS-PM) is more appropriate model than other alternatives, such as multiple regression or LISREL. In this study, the researcher employed the Smart PLS 2.0 for path modeling analysis.

Figure 2 ~ 9 show characteristics of organizations and IT PMOs of the respondents. Figure 2 summarizes the job title of respondents. More than 34 percent of respondents were project manager, 27 percent of respondents were project leader, and 20 percent of respondents were consultant position. Figure 3 presents the industrial category of organization (business sector). More than 62 percent of organizations were segmented either manufacturing or government (public sector). Others such as financial institution, tele-communications, logistics, IT/IS, and etc are average 8 percent. In Figure 4, the size of organizations shows immense variety; more than 29 percent of corresponding company has more than 500 employees and less than 1,000 employees. IT PMOs of the respondents exist in organizations of all size across industries. Figure 5 presents the project budget. More than 69 percent of IT PMOs spend less than 5 Billion Won for the current project budget. In Figure 6, more than 73 percent of IT PMOs spend less than 1 year for the project periods. Figure 7 shows the project man-power. More than 67 percent of IT PMO commits less than 30 employees to the project. Figure 8 presents the age of IT PMO. More than 64 percent of IT PMOs have been established within 1 year. However, more than 14 percent of IT PMOs have been established more than 5 years. Figure 9 presents the number of projects managed by IT PMO. More than 67 percent of IT PMOs manage less than 4 projects and more than 14 percent of IT PMOs manage more than 10 projects concurrently.

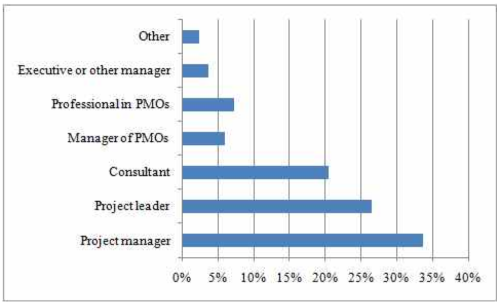

Figure 2. Job Title of Respondents

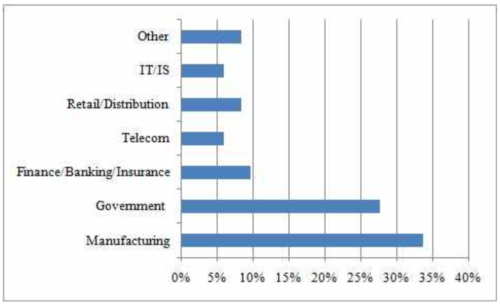

Figure 3. Industrial Category

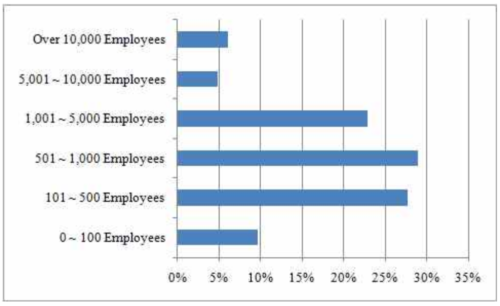

Figure 4. Size of Organization

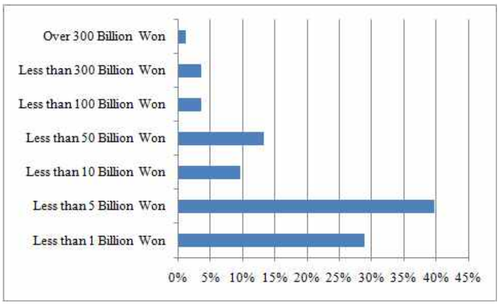

Figure 5. Project Budget

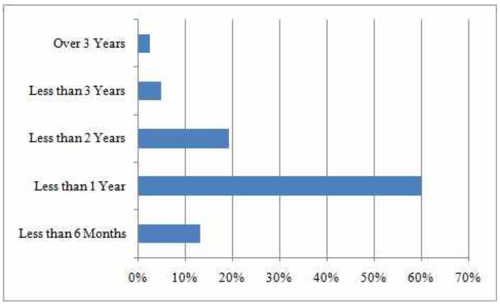

Figure 6. Project Periods

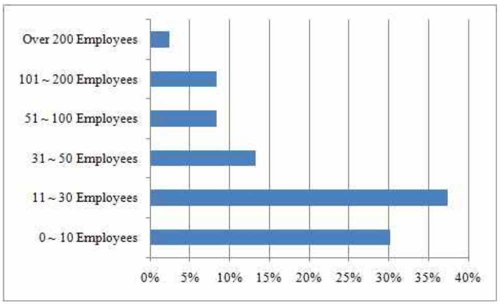

Figure 7. Project Man-power

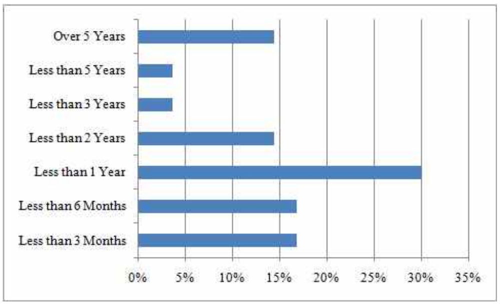

Figure 8. Age of IT PMO

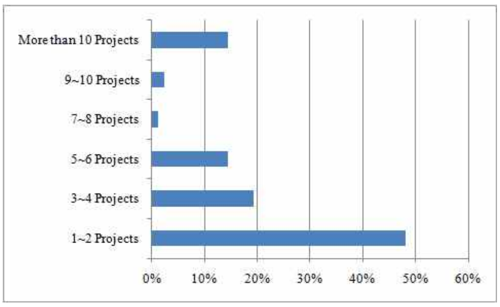

Figure 9. No. of projects managed by IT PMO

4.1. Assessment of Measurement Model

This study adopted the two-stage approach to estimate the second-order constructs model. At the first stage of data analysis, PLS estimates the measurement reliability and validity of reflective constructs and validity of formative constructs. Reflective measurement models should be assessed with regard to their reliability and validity. Usually, the first criterion which is checked is internal consistency reliability by Cronbach's α. In Table 2, the results of Cronbach's alpha from the factor analysis are all presented above the minimum allowance level of 0.7.

The composite reliability (CR) is the index to evaluate reliability of each factor that calculated in considering other constructs. The CR is a measuring indicator of convergent validity of measurement model. If the value is above 0.7, it can be concluded as securing the composite reliability. The composite reliability of all factors used in this study met the above qualification of 0.8, thus, satisfies the requirements for convergent validity.

As the reliability of indicators varies, the reliability of each indicator should be assessed. In PLS, individual item reliability is assessed by examining the loadings (or simple correlations) of the measures with their respective construct. A rule of thumb employed by many researchers is to accept items with loadings of 0.5 or more, which implies that there is more shared variance between the construct and its measure than error variance. The factor loading and cross-loading value for each constructs can be used as an indicator of judgment for convergent validity and discriminant validity of each construct. In Table 2, all factor loading value got above 0.5 providing further evidence of convergent validity and factor loading value of each construct is greater than corresponding cross-loading value providing further evidence of discriminant validity.

The Average Variance Extracted (AVE) is the mean-squared loading for each of the fourteen blocks of indicators. The results of the AVE are all presented above 0.5, thus, satisfies the requirements for convergent validity. Meanwhile, the AVE for exogenous constructs can be used to evaluate discriminant validity (Fornell and Larcker, 1981). To fully satisfy the requirements for discriminant validity, the AVE should be greater than the squared correlation between the two constructs. Therefore, in Table 3, as the square root (√) of the AVE is greater than coefficient of correlation between the construct and other constructs, the measurement model of PLS is regarded as holding the discriminant validity.

The communality index measures the quality of the measurement model for each block and the value should be above minimum 0.5 to be qualified. All communality index of this study shows above 0.5, thus, satisfies the quality of the measurement model for each block.

Subsequently, this study created linear composites from the items used to measure each

Table 2. The results of reliability and convergent validity testing for first-order constructs

Construct	Item	Loading	T Statistics	AVE	CR	α	Communality
Methodology	PMO1	.664	2.825	.588	.846	.900	.588
	PMO2	.698	3.045				
	PMO3	.656	2.821				
	PMO4	.996	3.636				
AdminSupport	PMO5	.550	2.471	.536	.819	.723	.536
	PMO6	.695	3.649				
	PMO7	.857	5.527				
	PMO8	.791	3.986				
Training	PMO9	.886	6.321	.707	.906	.861	.707
	PMO10	.846	5.034				
	PMO11	.870	5.089				
	PMO12	.757	3.322				
Resource M.	PMO13	.798	3.802	.572	.841	.751	.572
	PMO14	.822	3.888				
	PMO15	.623	2.508				
	PMO16	.766	3.740				
Knowledge M.	PMO17	.695	3.041	.710	.907	.872	.710
	PMO18	.877	4.733				
	PMO19	.870	4.562				
	PMO20	.911	4.673				
Integration	PM1	.720	3.188	.660	.906	.873	.660
	PM2	.760	3.509				
	PM3	.717	2.895				
	PM4	.627	2.401				
	PM5	.870	4.900				
	PM6	.792	3.660				
Scope	PM7	.773	5.479	.623	.908	.882	.623
	PM8	.847	5.932				
	PM9	.725	3.930				
	PM10	.855	5.095				
	PM11	.852	4.750				
Time	PM12	.741	4.021	.851	.945	.912	.851
	PM13	.793	4.105				
	PM14	.817	4.887				
	PM15	.872	5.643				
	PM16	.811	4.483				
	PM17	.690	2.644				
Cost	PM18	.931	8.806	.799	.923	.876	.799
	PM19	.945	9.868				
	PM20	.891	6.519				
Quality	PM21	.860	6.909	.702	.904	.860	.702
	PM22	.907	7.898				
	PM23	.913	7.547				
HR	PM24	.831	4.161	.614	.887	.843	.614
	PM25	.883	5.574				
	PM26	.875	5.925				
	PM27	.757	3.666				
Communication	PM28	.883	7.502	.770	.952	.940	.770
	PM29	.801	6.006				
	PM30	.640	4.168				
	PM31	.865	5.333				
	PM32	.703	4.800				
Risk	PM33	.891	11.098	.894	.971	.961	.894
	PM34	.874	10.152				
	PM35	.921	12.621				
	PM36	.856	8.744				
	PM37	.886	8.467				
	PM38	.833	6.200				
Procurement	PM39	.913	18.414	.565	.885	.859	.565
	PM40	.957	16.314				
	PM41	.965	19.405				
	PM42	.946	18.583				

* AVE = Average Variance Extracted; CR = Composite Reliability; α = Cronbach's Alpha

Table 3. The results of correlations and discriminant validity testing for first-order constructs

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Methodology	**.767**														
2. AdminSupport	.491	**.732**													
3. Training	.690	.619	**.841**												
4. Resource M.	.592	.675	.646	**.756**											
5. Knowledge M.	.764	.607	.764	.719	**.843**										
6. Integration	.424	.382	.393	.323	.489	**.812**									
7. Scope	.391	.293	.381	.399	.448	.618	**.789**								
8. Time	.265	.298	.290	.382	.325	.600	.774	**.922**							
9. Cost	.125	.509	.192	.399	.163	.403	.179	.494	**.894**						
10. Quality	.382	.429	.437	.415	.418	.564	.533	.589	.453	**.838**					
11. HR	.336	.247	.415	.328	.271	.540	.565	.658	.448	.568	**.784**				
12. Comm.	.329	.426	.320	.342	.329	.676	.545	.563	.509	.560	.707	**.877**			
13. Risk	.299	.377	.368	.357	.332	.577	.434	.481	.402	.541	.586	.737	**.946**		
14. Procurement	.093	.337	.188	.171	.145	.582	.218	.395	.511	.401	.432	.500	.506	**.752**	
15. Performance	.180	.519	.219	.265	.229	.282	.190	.259	.276	.262	.203	.443	.460	.378	**.804**

* The bolded diagonal values are the square root of the average variance extracted for each construct.

first-order construct and used them as formative or reflective indicators for the second-order constructs. Latent variable scores or multivariate means can be used to compute linear composite scores. However, in this study, the latent variable scores are used as indicates in a separate second-order construct model analysis. Each second-order construct is modeled as a formative or a reflective construct consisting of its first-order constructs as indicators. As the interpretation of the weights is similar to the beta coefficients in a standard regression model, it is usual to have lower absolute weights as compared to loadings.

Results of the analysis for the second-order construct models are presented in Table 4.

Table 4. The results of reliability and convergent validity testing for 2nd-order reflective constructs

2nd-order Construct	Indicator	1st-order Construct	Loading	t-Statistics	AVE	CR	α	Comm-unality
PM process	Reflective	Integration	.799	14.481	.580	.925	.909	.580
		Scope	.683	5.886				
		Time	.796	9.135				
		Cost	.661	5.818				
		Quality	.762	9.804				
		HR	.792	11.970				
		Communication	.869	22.462				
		Risk	.786	13.649				
		Procurement	.678	6.288				

Table 5. The results of convergent validity testing for second-order formative constructs

2nd-order Construct	Indicator	1st-order Construct	Weight	t-Statistics	TOL	VIF	Comm-un ality
PMOfn	Formative	Methodology	.444	1.686	.323	3.087	.494
		AdminSupport	.986	7.694	.483	2.070	
		Training	.653	3.291	.374	2.672	
		Resource M.	.709	4.026	.363	2.749	
		Knowledge M.	.609	3.088	.336	3.231	
Performance	Formative	Budget	.963	4.593	.413	2.419	.645
		CSatisfaction	.677	2.347	.557	1.795	
		Quality	.830	4.236	.432	2.315	
		Schedule	.712	2.653	.489	2.047	

Table 6. Communality and redundancy for second-order constructs

	AVE	Composite Reliability	R Square	Cronbach's Alpha	Communality	Redundancy
PMO Function					0.494	
PM Process	0.580	0.925	0.249	0.909	0.580	0.133
Performance			0.340		0.645	0.013
Average			0.294		0.573	0.073
Goodness-of-fit	0.410					

Table 7. Path Analysis Results

Path	Beta	t	Results
PMO Function => Performance	0.644	2.183*	H1: Accept
PM Process => Performance	0.249	1.551	H2: Reject
PMO Function => PM Process	0.498	3.711**	H3: Accept
PMO Capability	0.552	1.620	H4: Reject

*p<0.05, **p<0.01

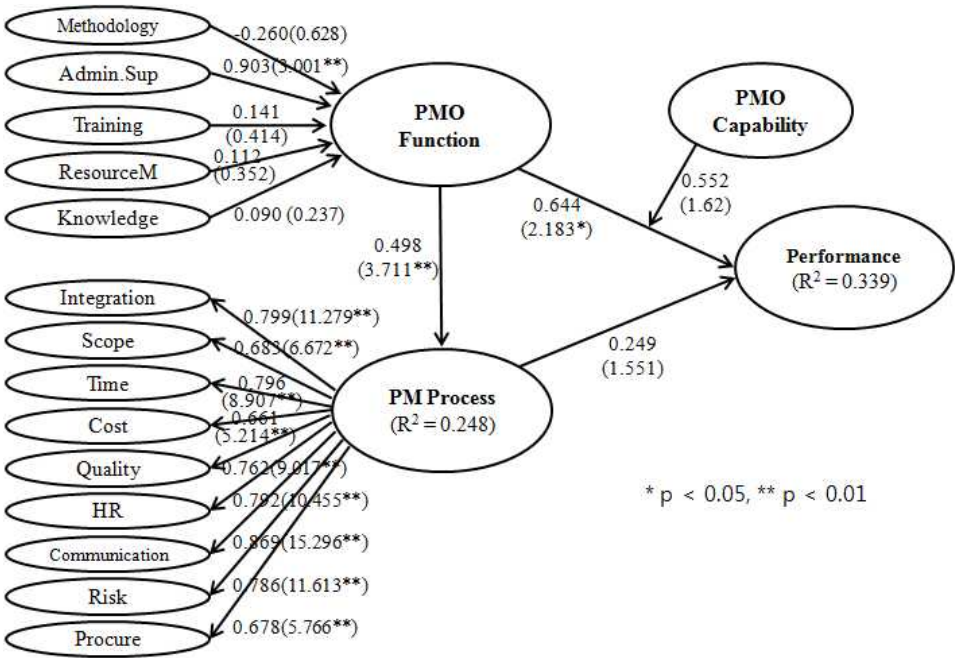

Figure 10. The results of PLS analysis

Since there are two types of indicators (formative or reflective), this study includes the CR and AVE of the reflective measures in the second-order construct models. This shows CR is equal to or greater than 0.80 and AVE is greater than 0.5, which provides evidence of reliable measures. As we demonstrate in the Table 4, the loadings of the first-order construct on the second-order factors (PM process) exceed 0.6, which is in support of the second-order construct model of IT project performance. Those results indicate that all loadings are significant at α = 0.01.

For formative indicators, content validity is considered to be the most important aspect of instrument development (Rossiter, 2002; Jarvis et al., 2003; Diamantopoulos and Winklhofer, 2001). Unlike reflective indicators, where the goal is to randomly select items from the universe of potential items representing the construct, items for formative indicators should be drawn such that the entire scope of the variable as described by the construct is represented (Diamantopoulos and Winklhofer, 2001; Jarvis et al., 2003).

Although a single item may be removed from a set of reflective indicators without materially affecting the quality of the measure, the removal of an item from the measurement of a formative construct may actually serve to alter the meaning of the construct. Thus, traditional validity assessments and classical test theory do not apply to manifest variables that are used in formative measurement models and that the concepts of reliability and construct validity are not meaningful when a formative mode is employed. The less important reliability becomes, the more pivotal it is to secure validity (Diamantopoulos, 2006). A first examination of the validity of formative indicators should use theoretic rationale and expert opinion (Rossiter, 2002). A second assessment of the validity of formative constructs should consist of statistical analyses including significance of weights and multicollinearity. The significance of the estimated indicator weights can be determined by means of bootstrapping (Chin, 1998b; Tenenhaus et al., 2005) and the degree of multicollinearity among the formative indicators (Diamantopoulos and Winklhofer, 2001), for instance, by calculating the variance inflation factor (VIF) or the tolerance values can be assessed. A rule of thumb from econometrics states that VIFs greater than 10 reveal a critical level of multicollinearity. The degrees of multicollinearity among the formative indicators are summarized in Table 5. Substantially, all VIFs are less than 10, indicating no problems with multicollinearity.

The important thing is that formative indicators should never be discarded simply on the basis of statistical outcomes. Such actions may substantially change the content of the formative index (Jarvis et al., 2003). Thus, the researcher should keep both significant and insignificant formative indicators in the measurement model as long as this is conceptually justified.

4.2. Assessment of Structural Model

The proposed hypotheses were tested by PLS. In order to estimate the significance of path coefficients, a bootstrapping technique was used. Bootstrap analysis was done with 500 subsamples and path coefficients were re-estimated using each of these samples. The significance levels of the regression coefficients can be computed using the usual Student's t-statistic or the cross-validation methods like bootstrap can be used (Tenenhaus et al., 2005). In this study, using the bootstrap technique increased the number of initial sample size from 84 with random replacement sampling, then performed verification for statistical significance over 500 composed bootstrap sample. Figure 10 and Table 7 present the result of the structural model analysis with standardized path coefficients, R2, and t-values.

The essential criterion for reliable and valid outer model assessment is the coefficient of determination (R^2) of the endogenous latent variables. Chin(1998b) describes R^2 values of 0.67, 0.33, and 0.19 in PLS path models as substantial, moderate, and weak, respectively. If certain inner path model structures explain an endogenous latent variable by only a few (one or two) exogenous latent variables, ''moderate'' R^2 may be acceptable. For this study, the R^2 value of 0.339 for the endogenous latent variable in the path model shows the existence of the quality of the structural model that means the model explains 33.9 percent of variance in project performance.

A global criterion of goodness-of-fit (GoF) can be proposed as the geometric mean of the average communality and the average R^2 (Tenenhaus et al., 2005). The value of this fitness should above minimum 0.1 and can be categorized into High (above 0.36), Medium (0.25～0.36), and Low (0.1～0.25). Overall goodness-of-fit (GoF) of this study's PLS path model turned out to be 0.410 and shows relatively high goodness-of-fit in Table 6. Based on the above overall goodness-of-fit of PLS path model, the results of analyzing the goodness- of-fit over each path coefficient of the structural model are shown in Figure 10.

The individual path coefficients of the PLS structural model can be interpreted as standardized beta coefficients of ordinary least squares regressions. In order to determine the confidence intervals of the path coefficients and statistical inference, re-sampling techniques such as bootstrapping can be used (Tenenhaus et al., 2005). According to Figure 10 and Table 7, the results of each hypotheses of this study can be summarized as follows. PMO functions (β=0.644, t=2.183, $p<0.05$) have significant direct effects on IT project performance. The input variables in the hypothesized model explain approximately 33.9 percent of the variance in the project performance. PMO functions was found to be significantly related to PM processes (β=0.498, t=3.711, $p<0.01$) and the model explains 24.8 percent of the variance in PM process. The path coefficient of PM processes (β=0.249, t=1.551, $p<0.10$) and PMO capability (β=0.552, t=1.62, $p<0.10$) are not significant at the 0.05 level, but those are significant at the 0.10 level, respectively. Thus, we may conclude those two have slightly weak direct effects on IT project performance.

We also tested for a mediation effect of project management process in the relationship between PMO functions and IT project performance (Baron and Kenny 1986). Our results suggest that the impact of the direct effect declines (β = 0.644, p < 0.05) by the inclusion of the indirect effect through the mediator, project management process. We find that the indirect association between PMO functions and IT project performance ($\beta_{indirect}$ = 0.124) is lesser in magnitude than their direct association (β_{direct} = 0.644). The total effect of 0.768 (= 0.124 + 0.644) provides support for the partially mediating role of project management process between PMO functions and IT project performance.

Finally, the path analysis techniques, which do provide beta path coefficients, had few significant terms, small effect sizes and low power. Low power may have been a main culprit in the large number of non-significant results found in the IS field (Chin et al., 2003). The estimation of the effect size between the independent and dependent variables is needed to find out the indication that the relationship is significant or not. Thus, this study adopted the PLS product indicator approach for measuring interaction effect. The effect size is f^2 = [R^2 (interaction model) - R^2 (main effects)] / R^2 (interaction model)]. The interaction effect, therefore, has an effect size f^2 of 0.139 [= (0.339 – 0.292)/ 0. 339] which is between a small and medium effect.

4.3. Analysis Results

All four hypotheses specify a direct effect of a variable on the IT project performance. The test statistics for these hypotheses is the path coefficient (β) with a one-tailed test and the variance explained (R^2). Figure 10 and Table 7 present the results of the PLS. Hypothesis H1 is supported with respective path coefficients of 0.644. The t-statistic for the hypothesis exceeds significance at the 0.05 level indicating the relationship holds statistical significance. The project performance has R^2 value of 0.339, respectively, which is considered reasonably high. This high R^2 value shows that the deploying PMO functions is important in explaining IT project performance. The results are consistent with a PMO is used to inform more effective and efficient IT project management (Desouza and Evaristo, 2006), a PMO ensures a consistency of approach to projects and therefore a consistency in results (Bates, 1998) and provides a focal point for the discipline of project management (Rad and Levin, 2002).

However, H2 is not supported by the results that the path coefficient of project management processes (β=0.249, t=1.551, $p<0.10$) are not significant at the 0.05 level, but this is significant at the 0.10 level. Thus, we may conclude that project management processes have slightly weak direct effects on IT project performance. Although most project managers may not perform all of nine knowledge area's processes that are required, all above nine processes contribute to the project performance of an organization. Those results may help project managers improve decision making with regard to the way that time and resources are allocated among different Knowledge Areas and associated processes. All these results are consistent with insights that effective project management process drives organizational success (BIA, 2010), standardized PM tools, PM leadership, and PM process may have an impact on higher project success (Milosevic and Patanakul, 2005), and the standardized PM process is identified as the critical factor to project success (Deephouse et al., 1995).

H3 is supported with respective path coefficients of 0.498. The t-statistic for the hypothesis exceeds significance at the 0.01 level indicating the relationship holds statistical significance. The project management processes has R^2 value of 0.248, which is considered reasonably high. This high R^2 value shows that the deploying PMO functions is important in explaining project management processes. The results are consistent with a PMO is a formal and centralized layer of control between senior management and project management (Martin et al., 2005) and serves as a center for project management excellence (Foti, 2003). PMOs can play an important role in organizational management and improve IT project management processes (Aubry et al., 2008).

More, PMO capability (β=0.552, t=1.62, p<0.10) are not significant at the 0.05 level, but this is significant at the 0.10 level, respectively. Thus, we may conclude that PMO capability has slightly weak direct effects on IT project performance. We conclude that the effect size f^2 of 0.139 is between a small and medium effect. Thus, H4 is supported that deploying PMO Functions have slightly weak positive effects on IT project performance in high PMO capability. The results are not consistent with Hill(2007)'s study that each PMO stage suggests a particular level of functional capability and indicates an organization's maturity in project management and, further, the PMO's functions advancing from project management oversight and control at the lower end of the competency continuum to strategic business alignment at the higher competency stages. Thus, we need appropriate variables to attain the nature of project management environment in which it operates.

All these results are consistent with several researchers. The effective project management drives organizational success, sponsors and managers play a critical role in project success, and project management is most effective when supportive structures are in place (BIA, 2010). The management support is one of the key success factors (Patanakul & Milosevic, 2009). The supportive organizational culture is strongly related to both measures of PMO performance: legitimacy and contribution to project/program performance. The supportiveness of the organizational culture is related significantly to the level of project management maturity of the organization. PMOs with little or no support from the organizational culture tend to be situated at a lower level of maturity (Hobbs and Aubry, 2008).

Ⅴ. Conclusion

5.1 Implications for Theory and Practice

This study makes several conceptual contributions to the researchers and practitioners. First, this study supports the multi-dimensional view of IT project performance and provides a theoretical model of the direct cause-and-effect relationship between PMO functions and project performance. Notwithstanding the growing popularity of PMOs is a relatively recent phenomenon that represents a significant step in the evolution of IT project management (Letavec, 2006; Hobbs and Aubry, 2010), there has been little or no empirical research to guide researchers and practitioners and, as reviewed earlier, PMO functions related study mainly focused inducing PMO main functions through case study or interview research. The statistical and conceptual links are too weak to conclude that which functions should be implemented together for better project performance. This study represents a comprehensive list of PMO functions that any project management office may deploy during project periods and identifies them into five categories. This study investigates the effect of PMO's crucial function as an organizational mechanism on the project performance of organizations in the information systems (IS) industry and establishes the causality model of the relationship between PMO function and project performance. This causal relationship analyzed by using partial least square (PLS) path model and the findings provide empirical support for the framework. Specifically, deploying PMOs present as a best practice with significant positive effect on project performance.

Second, this study adopts a reconciling and more logical view of IT project performance, which incorporates both project management process as well as PMO functions. Thus, this study also investigates the effect of project management process as an organizational mechanism on the project performance and tests the empirical validity of these hypothesized cause-and-effect relationship between PM process and project performance. This idea stems from that standardized project management may increase development projects performance. This study will be of great significance in helping project managers determine how to use their available resources most effectively. The study revealed that the project management processes with the greatest impact on project performance were Communication, Integration, Risk, and Human Resources.

Third, this study contributes to the literature by providing evidence that the effects on project performance of deploying PMOs are contingent on PMO capability which is joined PMO maturity and top-management support. Project management processes and PMOs Functions are conceptualized as significant drivers of project performance, and their interrelationship is also explored. Previous studies have typically focused and considered them independently of each other. In general, the overall findings of this study are consistent with the consolidating two separate research area.

Fourth, this study uses PLS path modeling to assess second-order construct model, show an empirical application, and provide guidelines for its use. This approach is illustrated empirically second-order construct model of IT PMO Functions using formative indicators and project management process using reflective indicators. The contributions of second- order construct modeling that they allow for more theoretical parsimony and reduce model complexity. Further, this study observes that PLS path modeling is suitable for studies in which the objective is prediction, the phenomenon under study is new (i.e., the theoretical framework is not yet fully crystallized), the model is relatively complex (i.e., large number of first-order constructs), formative constructs are included in the conceptual framework, and the data used does not satisfy the assumptions of normality or large sample size.

5.2 Limitations and Further Research

The objective of this study is to produce a conceptually rich and empirically grounded model. However, the empirical results of the effect of PMO Functions on IT project performance constitute only a single study with limited generalizability. Therefore, this study should assist researchers with future applications of PMO-related factors on IT project performance using PLS path modeling. It would be useful for future research to compare PLS path modeling versus covariance-based SEM and compare the IT project performance under a number of different conditions (sample size, model complexity, number of manifest variables per latent variables distributional properties of the manifest variables, the direction of the relationship between manifest and latent variables including potential incorrect specification, etc.).

Next, project management processes ($p<0.10$)(H2) and PMO capability ($p<0.10$)(H4) are not significant at the 0.05 level, but these are significant at the 0.10 level. We may conclude that these hypotheses are rejected, however, since PMOs are relatively new creations in the organizational environment, we need further research on appropriate variables to attain the nature of project management environment in which it operates.

Several limitations that should be dealt with in future research. First, the findings supporting all four hypotheses are subject to a potential construct validity threat. Since the research model has been constructed to induce too many first-order constructs such as 5 PMO functions and 9 project management process, therefore, this potential construct validity threat may lead to be low and poor significance. Future research should control for it with decreasing the number of first-order constructs as well as manifest variables.

Second, external validity is concerned with the generalizability of the findings. A limitation relates to the moderate level of consensus on the study’s results with a limited number of sample sizes. Given the small sample size, one must be cautious in generalizing since the sample is not relatively diverse in terms of IT project management and PMO implementation experience. The absence of response bias would support full generalization to the Korea IS industry. Thus, future research should control for it with large samples and use of PLS path modeling.

Third, the strength of the effect of IT project performance might vary for different types of systems or regarding the degree of complexity. Hence, future analysis should take contextual factors of systems such as industries, sizes, types whether package-oriented or development-oriented, into a more detailed consideration.

Future research should focus on the key PMO implementation challenges rather than key success factors. Future research should investigate and identify strategies and tactics for overcoming the organization's challenges. Future research should also investigate both successful and unsuccessful PMO implementations through in-depth studies in order to understand, from a process perspective, how and why these efforts succeed in some instances and fail in others. Further, the researcher could examine PMO implementations in various industries to understand domain specific differences in terms of the challenges, and the various approaches employed by organizations to overcome them.

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김종기(Kim, Jongki)

부산대학교 경영학과에서 경영학 학사학위를 취득하였으며, 미국 Arkansas State University에서 경영학 석사학위, Mississippi State University에서 경영학 박사학위를 취득하였다. 현재 부산대학교 경영학과 교수로 재직 중이며, 주요 연구 관심분야는 정보보안관리, 전자상거래, 기술경영 등이다.

윤옥수(Yoon, Oksoo)

부산대학교에서 경영학(MIS 전공) 박사과정 중에 있다. Price Waterhouse and Coopers (PwC) 에서 컨설턴트로 근무하였고, 숙명여대와 동국대에 출강 하고 있으며, PMI Korea Chapter의 이사이다. 주요연구 관심분야는 프로젝트 관리, PMO (Project Management Office), IT 성과 관리, IT 전략 등이다.

<Abstract>

PMO 기능이 프로젝트 성과에 미치는 영향

김종기 · 윤옥수

본 연구의 목적은 PMO의 기능들이 프로젝트 성과에 미치는 직접 효과와 프로젝트 관리 프로세스의 수행을 통한 간접 효과를 PLS 경로모형을 통해 파악하는데 있다. 또한, PMO 역량 및 최고 경영진의 지원에 따른 프로젝트 성과의 차이의 상호 효과 및 그 효과의 크기를 찾고자 한다. 본 연구에서는 방법론 제공, 행정적 지원, 교육 및 훈련, 자원 관리, 지식 관리를 통하여 형성되는 PMO기능과 통합, 범위, 시간, 비용, 품질, HR, 커뮤니케이션, 위험, 자원조달 등을 통하여 형성되는 프로젝트 관리 과정을 측정하기 위하여 2차 요인 모형(second-order construct model)으로 연구 모형을 검증하였다. 본 연구에서 각 1차 요인(first-order construct)은 반영지표를 이용하여 분석 하였으며, 2차 요인은 조형지표를 이용하여 분석하였기에, 반영지표와 조형지표가 모두 포함되어있는 모형 분석에 용이한 자료처리 도구인 PLS를 이용하였다. 본 연구의 설문대상은 PMO의 지원 하에서 프로젝트를 수행해 본 경험이 있는 프로젝트 관리자나 프로젝트 리더와 같은 전문가 집단으로 한정하여 온라인 설문조사를 실시하였다. 분석 결과, PMO 기능 및 프로젝트 관리과정 모두 프로젝트 성과에 유의한 영향을 미치는 것으로 확인되었다. 또한 PMO기능을 수행할 때, PMO역량에 따라 프로젝트 성과에 유의한 차이가 존재함이 확인되었다. 따라서 경영진들은 프로젝트 수행 시 프로젝트 성과에 긍정적 영향을 미치는 PMO의 설립을 적극적으로 검토해야 한다. 또한 PMO의 역량에 따라 프로젝트 성과에 차이가 발생하므로 프로젝트를 관리하는 PMO에 충분한 권한을 부여하고 경영진의 지원을 신속하게 함으로써 프로젝트를 성공적으로 수행할 수 있을 것이다.

Keywords: PMO(Project Management Office), PMO 기능, 프로젝트 성과, 프로젝트 관리 프로세스, PLS-PM

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