How do Project Managers' Skills Affect Project Success in IT Outsourcing?

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ABSTRACT

What skills do project managers (PMs) need, and how do these skills impact project success in IT outsourcing? In this study, we seek to identify what factors impact IT project outcomes, such as costs and client satisfaction, given the project characteristics and PM's hard and soft skills. We examine data collected from a field study conducted at a major IT service provider in India. Our results suggest that while hard skills such as technical or domain expertise may be essential in a PM, soft skills such as tacit knowledge of organizational culture and clients are the most important contribution that PMs bring to a project. Soft skills not only improve project outcomes directly, but are especially helpful when projects have greater coordination complexity or when there is less familiarity with the task and client. The results are robust to different specifications.

Key words: IT outsourcing, Project Management, Soft Skills, Hard Skills

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1. Introduction

Information Technology (IT) outsourcing is a growing industry. More and more firms are outsourcing their IT assets to external vendors. Typically, the IT outsourcing activities are formalized as different projects, which may involve building a new software application, or maintaining an existing software application. From both the vendors' and the clients' perspectives, the assignment of the right person to lead a project is very important. For the client, having the right person in charge helps ensure better project outcomes in terms of higher software quality, lower risk of project failure, and more peace of mind. For the vendor, better project management reduces the risk of project failure and translates to favorable project outcomes like lower costs and higher client satisfaction.

Selecting the right person to lead a software project is a challenging task. For larger vendors – who have access to a myriad pool of talent and a vast divergence in projects – this is especially important and especially difficult to do well. This selection predicament is compounded in the case of IT outsourcing projects. An inadequate approach to project resource assignment can have severe consequences. For example, a common characteristic of failed projects is the lack of effective project management (for example, see Applegate et al. 1996). Poor project management can not only impact a firm strategically, economically, or culturally; but may also jeopardize client relationships, result in project cost overruns and tarnish the project team's spirit. Over the long term, the goal for an organization is to build capabilities that lead to an improved cost structure, and thus the resource allocation can be viewed as a strategic tool (Venkatraman and Prescott, 1990).

While the need for selecting a suitable project manager is well recognized, there is relatively little knowledge about how to best fit project managers to projects. What skills should a PM bring to the project, and how do these skills affect project success? What kinds of projects require more or less of

these skills? We examine these questions in our study. Our goal is (i) to identify the kinds of skills needed for effective project management, and (ii) to develop a consistent approach to matching project characteristics with project managers' skills. Our study brings together two strands of research: literature related to software project management and IT personnel skills; and contingency theory and person-environment (PE) fit literature with a focus on software project management.

Lee et al. (1995) suggest that IT professionals need to have multi-dimensional skills; i.e., IT professionals should be well versed in not only the technology and application domains but also in interpersonal and management skills. Kirsch (2000) has highlighted that successful project management requires both hard and soft skills. Hard skills comprise technological skills, domain expertise, experience – including overall IT experience as well as project management experience, and project management skills such as planning, monitoring, risk management and scheduling. Soft skills are intangible, and are primarily concerned with managing and working with people and fostering inter- and intra- organizational "relationships." Such skills include but are not limited to organizational knowledge, tacit knowledge in handling people within the organizational structure, leadership and management skills, and customer handling skills (Becker, 1975; Lee et al., 1995; Kirsch, 2000). Thite (1999) has emphasized that both technical and transformational leadership skills are required of IT managers. As prior research has found (e.g., Byrd and Turner, 2001), both hard and soft skills are necessary in IT professionals to achieve higher performance. However, to the best of our knowledge, there has been no study that measures the direct impact of the PM's skills, especially soft skills, on project success.

Prior literature has examined the congruence between IT personnel's professional skills and project success (e.g., Pagell et al., 2000). This approach inherently assumes that there is a congruent relationship between the performance, organization, and context, and thus predicts a unidirectional effect between skills and performance. But does allocating a higher skilled PM always ensure higher project success? While the direct impact of these skills is anticipated, it is important to explore how the fit – between PM skills and the project characteristics – impacts project success. For example, Pagell et al. (2000) find that

the impact of fit between skills and environment on performance is more significant compared to the direct impact of skills on performance.

Person-environment (PE) fit explores an individual's fit with the work environment, specifically, with the job or the organization (Kristof-Brown et al., 2005). Congruence between a person and her job is deemed desirable, but the conceptualization of this congruence is a challenging task. In the software engineering domain, PE fit takes into account various distinguishing characteristics of software, including the project life cycle and uncertainties in various phases (Martin et al., 2004). Extant literature has often used difference scores in specifying this fit, where the scores consist of some deviation between the two constructs that measure the desired versus the actual characteristics (e.g., Vancouver and Schmitt, 1991; Venkatraman and Prescott, 1990). Resource allocation requires a matching of project characteristics with the skill sets of the PM. Such a matching can also be viewed as a strategic choice in response to the (project) environment. Venkatraman and Prescott (1990) suggest that any deviation from an optimal pattern of resource allocation should be significantly and negatively related to performance. Edwards and Parry (1993) advise the use of polynomial functions as an alternative to the difference scores in assessing fit. Similarly, contingency theory (Thompson, 1967), implies fit through interaction effects (e.g., Drazin and van de Ven, 1985; Shenhar, 1999) suggests that while congruence between skills and performance is desirable, a fit, that is, an interaction between skills and organizational characteristics, should be even more beneficial. As Shenhar (1999) elucidates, projects vary in terms of technology, scope, and complexity; teams vary in their level of familiarity with the task. Hence it is naïve to assume that a PM's skills will impact all projects equally. This motivates us to explore the contingency aspect of PM's soft skills with respect to project complexity, and to familiarity with the task and client.

While IT professionals' skills and their contextual fit have been explored with respect to project performance (e.g., Martin et al., 2004), we provide a unique perspective of these in the specific context of IT project management. We especially focus on the skills that a PM brings to the project as the PM is critical to project success. We conceptualize the PM's hard skills as task familiarity and draw upon the

literature on Practical Intelligence (Joseph, et al. 2008; Wagner and Sternberg 1985) to conceptualize the PM's soft skills. We then develop a theoretical model that links a PM's task familiarity and soft skills to project performance. We further explore the contingent impact of soft skills on project performance measures such as project costs and client satisfaction, given project characteristics.

While prior research, especially the literature on PE fit, has primarily used survey data to measure fit and performance, we adopt the approach of Edwards and Parry (1993) and use detailed archival longitudinal data and the critical incident methodology to answer our research questions. A key advantage of our longitudinal data is that we can observe multiple projects for each PM, and can thus isolate the effects of the PM's skills from the project characteristics. Our data were collected from a leading software vendor, and include project and personnel level archival data from 530 projects completed over a four year time period. We use archival data to measure PM hard skills. In addition, following the approach of Joseph, et al. (2008) and Wagner and Sternberg (1985), we employ the critical incidents methodology to assess the soft skills of the 209 PMs who led those projects. Our data and research setting allow us to calibrate not only the resource allocation issue but also to study (i) the differing impact of hard and soft skills on various project outcomes, and (ii) variable effect of soft skills on different project characteristics such as project complexity and familiarity with task, team and client.

We find that after controlling for project characteristics and team attributes, both the PM's hard skills and soft skills have a significant favorable impact on project performance including cost performance and client satisfaction. This is an especially important finding in the case of IT outsourcing projects, where both project costs and client satisfaction can be important determinants of vendor profits and market share. We also find that the PM's hard skills can improve project performance, but the impact is less compared to that of the PM's soft skills. With respect to the interaction effects, we find that the PM's soft skills are especially helpful for projects with higher coordination complexity, i.e., projects that are larger in size, with larger teams, or that have significant time pressure. Interestingly, we find that higher levels of soft skills can substitute for less client or task familiarity, implying that a PM with higher soft skills

may effectively manage a project even when she is not familiar with the client or with the project's technological or domain requirements. Finally, we find that a PM's and team's hard skills are substitutive – a PM with higher levels of hard skills can compensate for a team with less hard skills and vice versa.

Although prior literature has examined measures of skills and how these fit with the job environment (Edwards and Parry, 1993; Kristof-Brown et al., 2005), there has been no research that examines how different kinds of PM skills impact software project performance outcomes. We contribute to the existing software project management literature in the following ways: (i) we measure different kinds of PM skills in our analysis and relate them to project performance, (ii) we provide unique empirical evidence of the importance of soft skills in a PM, and (iii) we extend the contingency theory by showing the contingent effects of PM soft and hard skills for different kinds of IT projects.

This paper is organized as follows. In the next section, we present our theoretical framework. The methodological section describes both our qualitative and quantitative data sets and our empirical strategy. We next present our results and analysis. Finally, we discuss the results and conclude with managerial implications from this study and suggestions for further research.

2. Theoretical Framework

The conceptual model that we develop for this study is shown in Figure 1. We draw upon contingency theory (Thompson, 1967; Nidumolu, 1996; Shenhar, 1999) and the person-environment (PE) fit (Edwards and Parry, 1993; Kristof-Brown et al., 2005) literature to drive our theoretical model. Here, "fit" is defined as the matching of PM characteristics with the project environment. Structural contingency theory suggests that a fit between an organization and its environment is an important predictor of organizational effectiveness (Lawrence and Lorsch, 1967; Shenhar, 2001; Barki et al. 2001). Pagell and colleagues (2000) have demonstrated a strong link amid the fit between job requirements and employee skills on performance. A software project can be viewed as a "temporary organization within an organization," and hence we propose that the fit between a project and its PM would have a significant

impact on project outcomes. The notion of fit is also consistent with practical intelligence (Sternberg and Hedlund, 2002), utilized by individuals to harness their skills to the work environment, and is essentially tacit in nature. For our analysis, we analyze the impact of the PMs' hard as well as soft skills on the projects. Because projects as well as PMs vary in their characteristics in our data set, we are able to identify the impact of these factors on project performance.

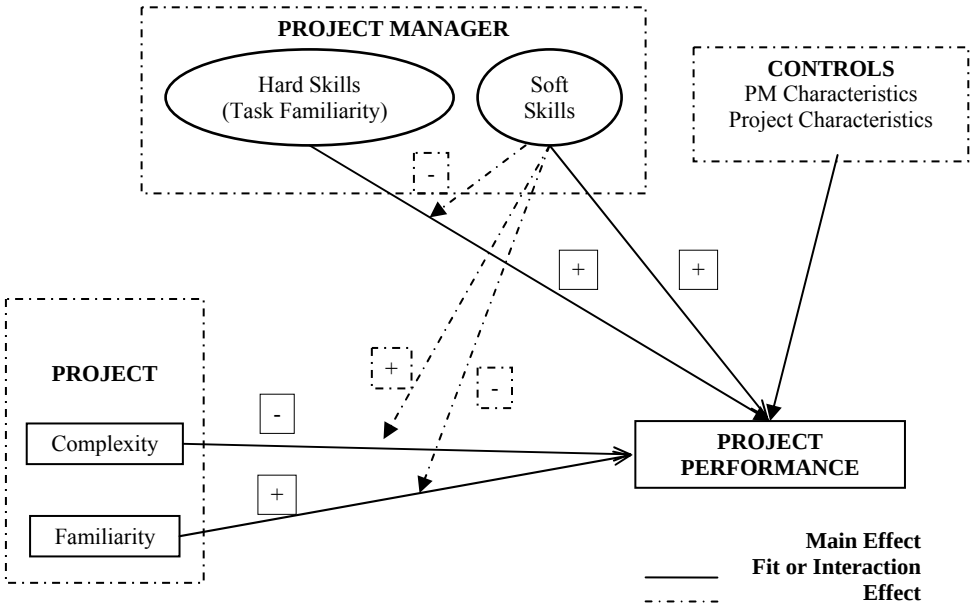

Figure 1: Conceptual Model

IT projects, especially in the outsourcing world, are complex (Kirsch, 1996; Weinberg, 1998) and require multifaceted management skills. A PM has to manifest not only project management related skills (Kirsch, 2000), but also technical and domain expertise as required by the project (Thite, 1999). Project management activities include but are not limited to defining project scope and requirements gathering, managing resources and relevant training issues within a project, advising about technical architecture, identifying specific and general project management practices and escalation procedures, estimating project schedule and budget, ascertaining and managing risks within a project, preparing risk mitigation

plans, ensuring adherence to organizational quality framework, effectively managing change control, and reporting project status to various stake holders (Duncan, 1996; Martin et al., 2004).

Software development or maintenance requires coordination within the project team (Kraut and Streeter, 1995). In case of IT outsourcing, PMs also interface with the client (Hirscheim et al., 2002; Lacity and Willcocks, 2001). More often than not, IT project teams are distributed geographically (onsite and offshore), making coordination issues a greater challenge (e.g., Espinosa et al., 2007). PMs are thus expected to (i) provide technical and domain leadership, (ii) manage geographically and organizationally distributed teams, (iii) interact with the clients, and (iv) coordinate with all the stake holders across inter- and intra-organizational boundaries. Hence, we first posit that a PM needs a judicious mix of hard and soft skills for effective project management and improvement in project performance. Next, we explore the contingent aspect of IT projects. We conjecture that a PM's soft skills will moderate the impact of project complexity and familiarity on project performance.

Direct impact of PM's hard and soft skills

The matching or fit between a PM and project extends not only to the technical or domain skills as enumerated above, but also to other general project-PM profile attributes, such as prior exposure to the methodology experience (Swanson and Beath, 1990). A PM is likely the most senior person within a project. She is often perceived as a sounding board for technical and architectural decisions made for the project. In addition, as more strategic functions are IT enabled and outsourced, the PM is also expected to demonstrate a deep knowledge of the business objectives of the IT system being provided (Bloom, 1996). We conceptualize hard skills as task familiarity, that is, we assess the hard skills needed by the project relative to what the PM brings on board. As an example, a PM who is an expert in object oriented technology may not be able to successfully lead a project in say, mainframe technology. Similarly, domain experience may also be equally necessary in the PM. Prior literature has shown that task familiarity helps in improving performance (e.g., Campbell, 1988; Goodman and Leyden, 1991). Prior exposure to the project characteristics such as technology, domain, or methodology would make the

current task more familiar to the PM, and hence improve performance (for example, see Boehm, 1981; Brooks, 1995; Curtis et al., 1988; Banker and Slaughter 2000). Task familiarity is especially important in the case of software projects (Espinosa, et al. 2007). As Kirsch (2000) and Thite (1999) suggest, a PM should be able to take on the leadership role with respect to not only managing the project but also leading the technological initiatives. She should be able to advise team members as well as the clients on the various technology options available. She should understand the business needs of the application software being built or maintained, and realize its interdependence on other application software. Such familiarity should lead to lower coding and testing errors, improving efficiency and thus having positive impact on performance outcomes such as project costs, budget and schedule. A high task familiarity on part of the PM would make the client also feel more comfortable, knowing that the project is in good hands. Thus, the more relevant hard skills a PM brings to the project, the greater would be the probability of project success. This suggests that:

H1*: A higher level of PM hard skills is associated with higher project performance, given project and team characteristics.*

While hard skills are essential in PMs, soft skills are especially important for PMs because of the nature of their role not only within the project team – requiring intangible management skills – but also in the organizational and client relationship structure. Lee et al. (1995) follow extant literature to argue that interpersonal and management skills are critical for the IT professionals, more so because of the boundary spanning role that these professionals must assume. In the outsourcing world, the PMs have to interact with many stakeholders. They have to not only manage internal project teams, their peers and superiors, but also interact with clients, using skills that are essentially non-technical in nature, and which may not be easily imitable. These include but are not limited to organizational knowledge, tacit knowledge in handling people within the organizational structure, leadership and management skills, and customer handling skills (Becker, 1975; Lee et al., 1995; Kirsch, 2000). Within project teams, as individuals progress from technical roles to more managerial roles, these skills come into play, and help in effective

project management. Wagner and Sternberg (1985) focus on skills that are tacit, and gained through experience rather than being taught in a classroom. They classify these skills as related to managing self, others, and career. They find that differences in these skills between a novice and an expert are consequential for career performance in professional and managerial career pursuits. Further, in the case of the majority of the IT vendors, the PMs are rated on their performance on the project, hence we assume that the there exists an alignment between project outcomes and PMs' project performance. Because these goals are aligned, we argue that soft skills are correlated with PM's performance, and hence also with positive project outcomes. Thus, we hypothesize that,

H2*: A higher level of PM soft skills is associated with higher project performance, given project and team characteristics.*

Do hard and soft skills impact project performance equally? Human capital theory distinguishes between general and specific human capital. General human capital comprises technological skills, domain expertise, experience – including overall IT experience as well as project management experience, and project management skills such as planning, monitoring, risk management and coordination. An individual can use general human capital to increase productivity in many firms. Specific human capital utilizes skills that are intangible, and may be specific to a particular firm or environment (Becker, 1975; Lee et al., 1995; Kirsch, 2000). We can thus broadly conceptualize general human capital as hard skills and specific human capital as soft skills. Slaughter, et al. (2007) show that IT managerial jobs require higher levels of firm-specific human capital compared to other IT jobs such as programming. Thus, as per the human capital theory, PMs with higher levels of firm-specific capital are expected to be more productive and hence more valuable compared to PMs with lower levels of firm-specific capital, given the nature of their job. As stated earlier, this notion is consistent with that of practical intelligence, where individuals need to tailor their skills to the environment (Sternberg and Hedlund, 2002). Hence, we argue that PMs with higher levels of specific human capital, or soft skills, are more productive and should have better project outcomes. The core competency of a PM would not be

general, but highly tailored to the environment, and hence specific. Researchers have also recognized that when it comes to poor performance of IS projects, technology is more often a secondary issue behind management, particularly of human resources (Sauer, 1993; Lowry et al., 1996). We therefore expect the PM's soft skills to have a greater impact on project outcomes compared to hard skills and posit that:

H3*: The PM's soft skills have a greater impact on project performance than the PM's hard skills.*

Contingent impact of PM's skills

IT projects vary in their characteristics, such as complexity. Projects are ***dynamic, temporary and changing***, because of technological, functional or organizational constraints, and hence require active management. As IT projects grow bigger in size, scope, and complexity, coordination issues arise, and may hinder project progress. Because IT projects can theoretically be executed anywhere, they are especially prone to communication and coordination bottlenecks (Boehm, 1981; Curtis et. al., 1988; Brooks, 1995).

Kraut and Streeter (1995) further identify scale and interdependence as the typical features of software development that inevitably lead to coordination problems, and which thus hinder project delivery and result in cost overruns. As IT projects grow in both size and scope, they require larger teams (Brooks, 1995). Likewise, in a typical large project, there are several modules that need to be tightly integrated before the software can function. The scenario is even more complicated when project teams are dispersed across organizations or in different locations, as is the case with most IT outsourcing projects. Although the extant literature has suggested ways and means to overcome coordination issues (for example, Crowston and Kammerer, 1998; Faraj and Sproull, 2000; Mookerjee and Chiang, 2002), coordinating software development remains a challenging task. Hard skills, that is, prior experience with project technology, domain, or methodology would not necessarily help a PM in such coordination tasks. Prior literature has also suggested the use of good software project management practices (e.g., Deck, 2001; MacCormack et al., 2003). Other factors, such as shared knowledge, understanding client needs,

and practice implementation, along with coordination, ensure that project performance improves. However, these factors can only be fostered through better management and enhanced soft skills on the part of the PM. It is the PM who fosters communication channels and common goal orientation within the team (Kraut and Streeter, 1995). Thus, the central role played by the PM in IT project management leads us to believe that PM's soft skills should moderate these project parameters in improving project performance. We elucidate these below.

Project complexity

As IT moves closer to a firm's strategy and business core (e.g., Barua, et al., 1995), IT projects are increasing in both scope and size. In the case of IT outsourcing, as client firms do strategic sourcing, the number of stakeholders also increases (e.g., Aron and Singh, 2002; Craumer, 2002). For example, consider a client sourcing through multiple vendors for different modules that need to be integrated into single application software. Similarly, team sizes also increase with project scope and size (Brooks, 1995). Larger tasks are more difficult to coordinate because there are more people and elements to connect and manage. As software complexity increases, so does its interdependence with other software. Complex software development or maintenance requires an increased coordinative effort as developers and users need to interact more often and with more people (Wood, 1986). Schedule pressure also complicates projects, requiring intense coordination of task and team schedules. Prior literature has shown that an increase in project complexity leads to lower performance (e.g., Banker, et al. 1998). At the same time, a PM's soft skills should be especially helpful in ensuring smoother coordination in complex projects. For example, the PM can leverage soft skills to communicate effectively with a greater number of stakeholders in complex projects leading to improved performance. We thus expect that:

H4: *Higher levels of PM soft skills help more complex projects even more in terms of higher performance; given project, team, and PM characteristics.*

Project familiarity

We have conceptualized and discussed the PM's task familiarity and its impact on project performance earlier. While the PM's hard skills play a role in determining project performance, team members also play a crucial role. In a complex cognitive activity such as software development, familiarity within the team should help in project performance. When team members are more familiar with each other, the coordination effort required is lower, because familiarity can provide information about the task and task stakeholders (Espinosa et al., 2007). For example, when team members interact with each other over the course of a project, they develop a road map of expertise, that is, they know where and how to locate the expertise needed when in the next project (Boh et al., 2007). Because coordination is easier to accomplish in a more familiar team, we expect that the PM's soft skills are more helpful for less familiar teams, in terms of facilitating project performance. Therefore,

H5: *Higher levels of PM soft skills help less familiar project teams even more in terms of higher project performance, given project and PM characteristics.*

Although prior research has not examined client familiarity, we would expect a similar relationship to that with team familiarity and the PM's soft skills in terms of project performance. That is, a PM's soft skills should be even more useful when the client is new, as the PM can leverage soft skills to communicate with and develop a relationship with a less familiar client. Conversely, less soft skills may be needed to interact with a client who is very familiar. This leads us to expect that:

H6: *Higher levels of PM soft skills help with a less familiar client even more in terms of higher project performance, given project and PM characteristics.*

We hypothesized earlier that higher levels of the PM's soft skills should help project performance more than higher levels of the PM's hard skills. However, it is not clear whether projects benefit more when a PM has higher levels of both hard skills and soft skills. In the literature on software projects (e.g., Brooks 1995), there is a notion that software projects are best led by individuals who possess high levels of technical skills as well as soft skills. On the other hand, there is also the recognition that relatively few

individuals possess high levels of both types of skills (Brooks, 1995; Weinberg 1995). Thus, an important question is whether higher levels of one type of skill can compensate for lower levels of the other type of skill and result in higher project performance. We would expect that PMs with lower levels of hard skills (i.e., less task familiarity) could compensate in two ways: 1) the PMs could utilize greater soft skills to communicate with project stakeholders to acquire the technical know-how needed to effectively manage the project or 2) the team could be composed of members who have the relevant technical expertise that the PM lacks. PMs with higher soft skills can communicate with others to discover the important technical elements that need to be coordinated and managed in the project. In a similar way, having a team with higher task familiarity can also compensate for the lower task familiarity of the PM as the team can inform the PM of the relevant technical aspects of the project. Thus, we would expect that:

H7: Higher levels of PM soft skills can compensate for lower levels of the PM's task familiarity and lead to higher project performance, given project and PM characteristics

H8: Higher levels of the Team's task familiarity can compensate for lower levels of PM task familiarity and lead to higher project performance, given project and PM characteristics.

3. Methodology

Research setting

To empirically validate our hypotheses, we collected data from a leading IT outsourcing vendor in India. The vendor has expertise in software development and maintenance of complex IT business systems and provides IT services for multiple domains such as banking and finance, retail, telecommunications, etc. The vendor deploys stringent quality processes and has been assessed at CMM level 5. The organizational policies with respect to project management are thus perceived to be flexible yet measurable.

The data we collected are from 530 IT outsourcing projects executed between 2002 and 2006 and involve 209 project managers. The data include both archival and critical incidents data. We now describe how we collect and measure key variables as well as the controls used in the model.

Archival data

We collected project level financial, allocation, project characteristics, and personnel data. The financial data include project costs, profits and operating margins in USD.[1] The project resource allocation data are detailed, and specify which employee was allocated to which project, in what capacity, and for what duration. The data on project characteristics include project type (development or maintenance), contracting type (fixed price or time and materials), project technology (whether low level or high level, including the Caper Jones language level indicator), client id, project duration, and project domain. The personnel data include PM and team members' performance ratings as well as details on their total work experience. The data also contain client feedback reports for these projects, which are on a scale of 1 (very dissatisfied) to 7 (very satisfied).

The data allow us to directly measure project size in terms of both software functionality (e.g., Boehm, 1983; Gopal, 2003) and team size. We used the baseline measure spreadsheets provided by the vendor to compute project size in terms of function points and computed team size based on the number of individuals who worked on the project. We averaged historical performance ratings data for each PM at the start of the project. We developed a team familiarity measure following Espinosa et al. (2007). For this, we assigned a count variable for each team member. We then examined the allocation data, and increased the count variable by one if a team member had worked with another prior to the current project. We did this for each team member, summed it up at the project level, and normalized it by the number of team dyads.[2] Because we had detailed allocation data, we were able to assess the PM's hard skills in terms of prior exposure to the technology, domain, or methodology as required by the project. The client identification for each project enables us to compute whether it was a new client for the vendor, and also whether the PM was familiar with the client or not.

Critical incidents data

While the importance of practical intelligence and soft skills in IT professionals is well established, such skills are not easily assessed. Following the approach of Wagner and Sternberg (1985) and Joseph, et al. (2008), we use the critical incident methodology to measure these skills along the seven dimensions defined by Wagner and Sternberg: managing tasks, self, career, peers, subordinates, superiors, and clients. For PMs, managing tasks relates to soft skills that they utilize while performing project management related activities, such as costing and project planning. In managing careers, PMs display acumen in managing short and long term career growth goals. In managing self, PMs manifest self-regulation strategies of applying self-motivation and self-organizational aspects of individual performance with the objective of improving one's productivity, for example, prioritizing project activities. Finally, because management is an interactive activity, the most important soft skill dimension for PMs is managing others. PMs have to manage not only their team members, but also collaborate with their peers and their superiors. This skill is further demonstrated when interacting with external entities like clients, especially in the outsourcing scenario. Joseph et al. (2008) include superiors, subordinates (permanent or contract), peers, users, clients and vendors in their definition of "others." We find, however, that for most IT vendors, "others" include superiors, subordinates, peers, and clients.

Critical incident collection: The critical incidents were gathered from an expert panel at the research site along each of dimensions of practical intelligence mentioned above. These experts had executed at least five projects as project managers; they were not included in the PMs in our sample. We had a total of 32 questions in our incident bank. We created eight separate instruments, where we randomized the question for each dimension from our incident bank. We then randomly administered one of the eight instruments to the PMs corresponding to the projects. Each PM in the sample was thus asked to respond to seven critical incidents (corresponding to the dimensions mentioned above). Their responses were captured in a detailed essay type format.

Evaluation: We received complete responses from 209 PMs.[3] At the time of incident collection, we had asked the expert panel for a sample good, average, and bad response. Detailed evaluation instructions were prepared using the expert panel's response guidelines. The detailed survey responses were evaluated by a panel of four experts with requisite credentials. Each evaluator had considerable experience in IT as well as project management, in addition to having worked in or been exposed to outsourcing projects; the evaluators also had graduate degrees. We computed inter rater reliability measures for each of the respondents in each dimension, and found that these were over 0.96 (Table 3), suggesting substantial agreement among evaluators. We conducted a factor analysis of the evaluations, using a varimax rotation (Harman, 1967). One factor emerged from this analysis; we used the factor loadings in our analysis as a measure of soft skills.

Measurement

Measuring Project Outcomes

IT projects have multi-dimensional outcomes. Project performance is often measured in financial terms. In the context of outsourcing, where maintaining client relationships is a key to success in the vendor market (Ethiraj et al., 2004), client feedback on a project also becomes an important dimension of project success. Many IT outsourcing vendors view this as a crucial measure, as it can lead to further assignments with the same client.[4] All of these outcome measures are closely related to efficient project management, and hence appropriate in the context of the current study.

Financial outcomes can be measured in two ways, project margins or profits, and costs (Deephouse et al., 1995). A discussion with industry experts revealed that actual project profits depend on numerous factors beyond the control of the PM. For example, sales people often offer discounts to new clients, and hence project profit may not be a suitable project outcome measure in our context. On the other hand, given a project size, project costs can be controlled to a large extent by the PM (Nidumolu and Knotts, 1998). Project costs directly impact a vendor's bottom line, and can define whether a project is successful

or not. Projects that have cost overruns can be deemed failures despite having achieved other quality and engagement level goals. Hence we use project costs as one of the key variables that measures project performance.[5]

Client satisfaction is also an important dimension of project performance (e.g., Kekre et al., 1995; Aladwani, 2000). In an outsourcing scenario, where good client feedback may mean further projects with the same client or renewal of outsourcing contracts, client satisfaction is extremely crucial. In a typical development project, clients are asked for feedback at the end of project lifecycle or at an end of an important project phase. For maintenance projects, these feedbacks are solicited to gauge the health of the project so that appropriate action can be taken with regard to project renewal.

Measuring PM's skills

We measure a PM's skill set across two dimensions, hard and soft skills (Kirsch, 2000). Soft skills are assessed as stated previously. As stated earlier, we conceptualize hard skills as task familiarity. Although the CMM maturity level of the vendor may moderate the impact of such PM skills (Kemerer, 1997), in our sample, the projects had been assessed at the same CMM level. Furthermore, Kirsch (2000) suggests that the processes designed to aid project management in mature organizations can complement the PM's experience and skill level.

We assess the PM's average prior experience in project technology, domain and methodology in number of years, and use that as a measure of hard skills or PM's task familiarity (Krishnan, 1998). Discussions with industry experts reveal that domain expertise is crucial when interacting between the client and the design team. As Lee et al. (1995) point out, the focus of IT activities centers around the effective application of IT to meet business needs. When the client outsources, a PM with an in-depth business functional knowledge necessary for the project is an important asset to the team. IT systems are often seen as strategic assets (Ethiraj et al., 2004), and hence clients need their IT systems to align to their organizational structure and processes to maximize the value of these systems. Domain or functional

knowledge is essential not only from the vendor's perspective but is also prized by clients. In addition to domain expertise and project management skills, a PM has to manifest technological expertise appropriate to the project requirements. One of the PM's activities is to make the technology accessible to the client, and also to examine what business needs and functional requirements from the IT system can or can not be handled by the technology being employed by the project. For example, if the PM has had experience in only mainframe technology, it is difficult for her to comprehend the capabilities offered by internet or web based technology. Further, literature has suggested that maintenance and development projects may require different framework and management styles (Swanson and Beath, 1990, Gopal et al., 2003); therefore we include methodology experience in our hard skills measure.

Project contingency factors and controls

We measure project contingency factors as follows:

Project complexity is assessed in terms of the factors contributing to higher coordinative complexity: project size, schedule pressure, and team size. Prior literature suggests that project size, measured in function points, is indicative of project complexity (Kemerer, 1987 and 1993; Shenhar, 2001). Schedule pressure is also a measure of scheduling complexity, as greater pressure to finish in a short time period requires more coordination effort. Further, as team size increases, coordination and other issues arise, requiring more complex management skills (e.g., Kraut and Streeter, 1995; Nidumolu, 1995; Koushik and Mookerjee, 1995).

Project familiarity is measured with two constructs: team and client familiarity. The literature suggests that prior familiarity between team members enhances coordination and hence impacts project performance (for example, Crowston and Kammerer 1998; Curtis et al. 1988; Faraj and Sproull 2000; Espinosa et al., 2007). Interviews at the research site confirmed that clients are indeed the most crucial external entities that a PM has to deal with. A PM's prior experience with the same client may thus ameliorate project outcomes, especially client feedback, for the better (Ethiraj, et al., 2004; Duncan,

1996). Hence we include PM's prior client experience to control for client familiarity. We also include a dummy to indicate whether the client was familiar to the vendor before the current project execution, because a familiar client would need less hand holding; the vendor may have a rapport with the client which can also ease communication, understanding, and problems with the client.

Other controls: We control for other PM and project characteristics in our analysis. Joseph et al. (1999) find that soft skills are also correlated with the work experience of the IT professional. Thus we control for the PM's IT and project management experience (at the start of the project).

Project and team characteristics, such as average team experience, also impact project outcomes. Factors such as project contracting types may also impact project outcomes (Gopal et al., 2003). For example fixed price contracts are usually very closely monitored, and hence a tighter control over budget may be exercised, leading to lower project costs. Similarly, time and materials contracts are usually maintenance or repeat contracts with an existing client, with whom the vendor may already have established a rapport, and hence may lead to favorable feedback. We also control for average IT experience within a team and PM's performance ratings. Finally, we controlled for project type (whether maintenance or development) and project technology (whether third or fourth generation language).

The archival data variables are described in detail with the descriptive statistics in Table 1. Table 2 shows the correlation matrix between the explanatory and control variables. Variables such as project cost and function points were transformed using logs. Further, prior to analysis, we standardized each variable in the analysis to facilitate interpretation of coefficients and to avoid collinearity issues in estimation (Aiken and West, 1991).

4. Analysis and Results

We develop the following model to test our hypotheses for project *i* and PM *j*:

$$
\begin{aligned}
Performance_i = {} & \alpha_0 + \alpha_1.\log(FP)_i + \alpha_2.Duration_i + \alpha_3.AvgTeamExp_i + \alpha_4.TeamSize_i + \alpha_5.TeamFamiliarity \\
& + \alpha_6.ContractType_i + \alpha_7.ProjectTechnology_i + \alpha_8.ProjectType_i \\
& + \alpha_9.PMRating_{ij} + \alpha_{10}.ITWorkEx_{ij} + \alpha_{11}.PMWorkEx_{ij} + \alpha_{12}.SoftSkills_j \\
& + \alpha_{13}.ClientExp_{ij} + \alpha_{14}.HardSkills_{ij} \\
& + \alpha_{15}.\log(FP)_i\, XSoftSkills + \alpha_{16}.Duration_i\, XSoftSkills \\
& + \alpha_{17}.TeamSize_i\, XSoftSkills + \alpha_{18}.TeamFamiliarity_i\, XSoftSkills \\
& + \alpha_{19}.ProjectTechnology_i\, XSoftSkills + \alpha_{20}.ProjectType_i\, XSoftSkills \\
& + \alpha_{21}.ClientExp_{ij}\, XSoftSkills_j + \alpha_{22}.HardSkills_{ij}\, XSoftSkills_j + \varepsilon_{1i}
\end{aligned}
$$

$$
\begin{aligned}
Feedback_i = {} & \beta_0 + \beta_1.\log(FP)_i + \beta_2.Duration_i + \beta_3.AvgTeamExp_i + \beta_4.TeamSize_i + \beta_5.TeamFamiliarity \\
& + \beta_6.ContractType_i + \beta_7.ProjectTechnology_i + \beta_8.ProjectType_i \\
& + \beta_9.PMRating_{ij} + \beta_{10}.ITWorkEx_{ij} + \beta_{11}.PMWorkEx_{ij} + \beta_{12}.SoftSkills_j \\
& + \beta_{13}.ClientExp_{ij} + \beta_{14}.HardSkills_{ij} \\
& + \beta_{15}.\log(FP)_i\, XSoftSkills + \beta_{16}.Duration_i\, XSoftSkills \\
& + \beta_{17}.TeamSize_i\, XSoftSkills + \beta_{18}.TeamFamiliarity_i\, XSoftSkills \\
& + \beta_{19}.ProjectTechnology_i\, XSoftSkills + \beta_{20}.ProjectType_i\, XSoftSkills \\
& + \beta_{21}.ClientExp_{ij}\, XSoftSkills_j + \beta_{22}.HardSkills_{ij}\, XSoftSkills_j + \beta_{23}.dVendorClient_i + \varepsilon_{2i}
\end{aligned}
$$

We assume that the error terms in the two equations are correlated, and estimate the model using Seemingly Unrelated Regression (SUR) technique.[6] The results are provided in the appendix (Table 4). We inspected the model for multicollinearity by conducting regression diagnostics; we computed condition indices (Belsley et al., 1970) and variation inflation factors (Marquardt, 1970). These collinearity statistics are reported in Table 4. Further, we tested for heteroskedasticity using White's test, and for autocorrelation using the Durbin-Watson test (Greene, 2002). These tests did not reveal any problems.

Hierarchical regression

As is consistent with models using interaction effects (Aiken and West, 1991), we analyzed the model by entering variables hierarchically. We first tested the baseline model, without adding any of the skills

variables. The baseline model thus included all project complexity and familiarity variables, as well as the control variables. Next, we added the skills variables (soft skills, client experience, and hard skills) into the skills model. This increased the explanatory power of the model significantly, especially for feedback equation (Performance: ΔR^2 =0.0190, $F_{\Delta R^2}$ =6.131, $p < 0.001$; feedback: ΔR^2 =0.1586, $F_{\Delta R^2}$ = 35.107, $p <$ 0.001). This suggests that PM's skills are important predictors of project outcomes like performance and feedback. Finally, we added all the interaction variables to estimate the full model. Again, we find that the predictive power of the model increased (Performance: ΔR^2 =0.0249, $F_{\Delta R^2}$ = 3.565, $p < 0.001$; feedback: ΔR^2 =0.0858, $F_{\Delta R^2}$ = 9.037, $p < 0.001$); leading us to believe that the interaction variables explain significant variation in both performance and feedback over the baseline or skills models.

Results of the baseline model

The baseline model estimates show that the effect of the complexity, familiarity and control variables are largely as expected. Project size significantly decreases cost performance (α_1 = -1.710, p < 0.001); however, we find that project size is associated with an increase in feedback (β_1 = 0.233, p < 0.001). This perhaps is indicative of the fact that although executing more complex projects decreases project performance with respect to budget constraints, the final delivery resulted in higher client satisfaction.[7] Team size is associated with an increase in cost performance but a decrease in feedback (α_4 = 0.681, p < 0.001; β_4 = - 0.102, p < 0.10), although the effect is small. Surprisingly, we also find that project manager's ratings are poor predictors of both project performance and client feedback.[8] Likewise, we find that the PM's total IT or project management experience did not significantly impact project cost performance but the latter did help with client feedback (β_{11} = 0.176, p < 0.001). We find that older technology projects are associated with poorer project outcomes. One explanation could be the difficulty in finding people who are willing to develop expertise in older technologies, leading to poor performance in these project types.[9]

Maintenance projects were significantly associated with better cost performance and client satisfaction ($\alpha_8 = 0.824$, $p < 0.001$; $\beta_8 = 0.218$, $p < 0.001$). This suggests that long term relationship with the client, as is the case with most maintenance projects, is beneficial for both the client and the vendor, in terms of project costs. It reduces uncertainty and also builds up trust. In addition, we find that client familiarity at the firm level is significantly correlated with higher feedback ($\beta_{23} = 0.429$, $p < 0.001$).

Results of the skills model

The addition of the PM's skills to the model did not significantly change the estimates for the main effects and control variables significantly. The skills variables added to this model included measures for PM hard and soft skills as well as a variable for client familiarity, which was computed at the PM level. We find that PM's skills, especially soft skills, significantly improve project outcomes.

Hypothesis 1 predicted that hard skills, or task familiarity, would improved project outcomes, that is, increase cost performance as well as client feedback. We find that these skills do help in improving cost performance, but they do not have any significant impact on client feedback ($\alpha_{14} = 0.239$, $p < 0.05$; $\beta_{14} = 0.060$, $p > 0.10$). Thus, hypothesis 1 is partially supported.

Hypothesis 2 predicted that soft skills would also improve project outcomes. We find support for this hypothesis ($\alpha_{12} = 0.419$, $p < 0.001$; $\beta_{12} = 0.412$, $p < 0.001$). Soft skills significantly and positively impact both cost performance and client feedback.

Hypothesis 3 predicted that a PM's soft skills would impact project outcomes more than her hard skills. We find that a one tailed test supports the hypothesis that soft skills impact project performance more than hard skills ($\chi^2 = 26.09$, $p = 0.03$). Likewise, a one tailed test supports the hypothesis that soft skills impacts feedback more than hard skills ($\chi^2 = 51.56$, $p < 0.0001$). Intuitively, hard skills are both more observable and readily if not perfectly substitutable. Hence, if a PM lacks, say technical or domain expertise, it may be compensated by appropriate team allocation. On the other hand, a PM needs soft

skills in managing the team as well as the client, and these skills are tacit in nature and hence may not be as easily substituted. This suggests that soft skills rather than hard skills may be more valuable for a PM.

In addition, the results suggest that prior experience with the client helps the PM in better managing client satisfaction We also find that experience as a project manager helps a PM manage client expectations better. Again, we find that the PM's ratings are poor predictors of project outcomes.

Results of the interactions model

We now discuss the results of the full model that includes interaction effects. For ease of interpretation, we illustrate these effects in Figures 1 and 2 (complexity and familiarity, respectively). Hypothesis 4 stated that soft skills would help more complex projects in improving project outcomes. We find support for Hypothesis 4, using various measures of project complexity. For example, figure 1A through 1C show that PM soft skills help projects that are high in complexity, such as those with higher function points or larger team sizes, improve outcomes more than they do low complexity projects. This holds for both performance and client feedback.

Similarly, hypothesis 5 through 7 stated that soft skills should help projects with less familiarity, with respect to task, team, and client. We find that familiarity – both task and team – may indeed be substitutive with soft skills, at least sometimes. We find that low team familiarity can be offset by soft skills, as can be low hard or technical/domain skills. However, we find mixed results for client familiarity. While client familiarity and soft skills are substitutive for client satisfaction, the effect is not significant for cost performance. With respect to Hypothesis 8, we find as expected, that higher PM task familiarity can compensate for lower levels of the team's task familiarity.

We also investigated how an increase in firm-specific human capital would impact project costs and client satisfaction. Ceteris paribus, we find that an increase of one unit in soft skills enhances project performance by approximately $64,000 and increases client feedback by 0.60 (on a scale of 1 to 7).

5. Discussion and conclusion

How do PM skills affect IT outsourcing projects, and how should PMs be allocated to these projects? We provide a rigorous empirical answer to these questions in the current study. While prior research has predicted that project manager's skills should impact IT project performance, our study is one of the first to provide unequivocal evidence that a project manager's skills do indeed improve project cost performance and client satisfaction.

However, the most significant contributions of the current study are thus. We first develop a rigorous measure for assessing PM's soft skills. We then relate this measure to project outcomes. Our findings provide support that both PM's hard (technical, general) and soft (non-technical, tacit) skills enhance project outcomes. We find that PM soft skills significantly improve both cost performance and client satisfaction feedback. We further show that their impact is much stronger compared to that of hard skills.

Next, we explore the contingent impact of soft skills. We find that in general, PM soft skills help moderate the negative effects of project complexity. These skills improve coordination not only within a project, but also with external stakeholders like clients. Soft skills also help a PM in developing and implementing better management practices.

We further find that soft skills are to a large extent substitutive with task, team, and client familiarity. When there is low task familiarity, such as PMs with lower hard skills, soft skills can substitute for these. Because hard skills may be surrogated with greater ease than soft skills, a project or technical lead with the requisite hard skills may fulfill the role of technical leader within the project, and vice versa.

Our findings have important implications for senior managers, as they advise and groom potential candidates for PM positions. We find that IT or project management experience may not be indicative of an individual's true potential as a PM, in that the experience may not always be commensurate with increased soft skills. Hence it may be necessary for senior management to provide tailored training to PMs.

Our study does have some limitations. The data were collected from a single vendor, though the vendor and projects we chose were fairly representative of the IT outsourcing projects that are currently being executed. Hence, although a single site gives us better control in terms of model identification, the results may be indicative of practices prevalent at the vendor site and organizational peculiarities. These findings could also hold true only in the case of large IT outsourcing vendors, and may not apply to in-house IT projects or non-IT projects. Further, we have a post-hoc measure of soft skills that, although we control for relevant project management experience, may reflect the perfection of hindsight. We hope that future studies will be able to mitigate these data issues and validate our results.

Appendix:

Table 1: Data Dictionary

Variable name	Variable description	Mean (SD)
Performance	log(Cost) is the log transformation of project cost (in USD). Performance is −1*log(Cost) (See Espinosa et al., 2007).	−12.59(2.12)
Feedback	This is the client feedback for at the project level. The feedback ranges from 1 (poor) to 7 (excellent)	5.68(0.87)
log(FP)	This is the log transformation of function points associated with the project. For maintenance projects, these were summed up for major enhancements, minor enhancements, and bug fixes, during the PM's tenure.	8.11(2.14)
Duration	Project duration in months.	14.67(13.78)
AvgTeamExp	Average team experience. This variable is computed by averaging the team members' experience at the start of the project, at the project level.	863.08(424.10)
TeamSize	Team size. This is the number of people who have been allocated to the project, and the number is derived from project allocation data.	42.01(39.87)
TeamFamiliarity	This is a computed variable measuring normalized team familiarity. To measure this, we first computed raw team familiarity, that is, whether two team members have worked with each other before or not, and if yes, how many times. This count is then summed up at the project level. Thus for a 3 member team (A/B/C), if A& B have worked together twice before and A&C have worked together once before, this variable would be 3 at the project level. We then normalize this sum by the team size dyad, which in turn is obtained from a combination algorithm. Thus for a 3 member team, suppose raw team familiarity is 3, then TeamFamiliarity would be 3/(3C2) = 1.	0.15(0.25)
ContractType	Variable indicating whether the contract is fixed price (FP) or times and materials (TM).	FP: 16% TM: 84%
ProjectTechnology	Variable indicating whether the project technology is low level (L) or high level (H).	L: 57% H: 43%
ProjectType	Variable indicating whether the project is development (D) or maintenance (M).	D: 28% M: 72%
PMRating	Average rating of the PM at the start of the project. This is computed from primary data. The rating ranges from 1 (poor) to 4 (excellent).	1.90(0.40)
ITWorkEx	Total IT work experience in years at the start of the project. Each survey respondent was asked for their total IT work experience in years. We then computed this measure based on the survey input and project start date. For example, if the respondent stated that her IT experience in April 2007 is 10 years, for a project started in 2000, this would be 3 years	7.91(2.80)
PMWorkEx	Total experience as PM in years at the start of the project. Each survey respondent was asked for their total work experience as PM in years. We then computed this measure based on the survey input and project start date. For example, if the respondent stated	3.27(2.89)

Variable name	Variable description	Mean (SD)
	that her PM experience in April 2007 is 3 years, for a project started in 2000, this would be 0 years.	
ClientExp	Experience with the client in years. This is computed based on the allocation data. This experience need not be as a PM.	1.24(1.55)
dVendorClient	Dummy variable indicating whether client is familiar to the vendor (1) or not (0), at the firm level.	0.97 (0.18)
SoftSkills	Factor loadings from mean survey evaluations. For obtaining this, we first calculated the mean from all four evaluations for each project manager. Next, we did a factor analysis using varimax rotation. We found that the means load to a single factor, which we use as our measure of soft skills.	0.16(0.91)
HardSkills	This is a computed variable. We calculated the prior experience in years that the PM has for the current project's technology, domain, or methodology, and then averaged it to obtain our measure for hard skills.	3.27(2.60)
TeamHardSkills	This is a computed variable, and similar to PM hard skills variable. This is the average hard skills calculated at the team level.	1.80(0.86)
PriorProjectsPM	This is a computed variable. This variable sums the number of projects completed by the PM (not necessarily as a PM) prior to the current project.	6.02(4.18)
PriorProjectsOrg	This is a computed variable. This variable sums the number of prior projects completed in the organization prior to the current project.	325.07(189.11)
OnsiteRatio	This is a computed variable that provides the ratio of onsite versus total effort in a project. This is calculated directly from the allocation data for each project.	0.31(0.25)

Table 2: Correlation matrix

	Performance	Feedback	log(FP)	Duration	Avg TeamExp	Team Size	Team Familiarity	Contract (TM)	Project Tech(L)	Project Type(M)	PM Rating	IT WorkEx	PM WorkEx	Soft Skills	Client Exp	Hard Skills	dVendorClient
Performance	1.000																
Feedback	-0.015	1.000															
log(FP)	-0.281	0.075	1.000														
Duration	-0.607	0.021	0.193	1.000													
Avg TeamExp	0.137	0.014	-0.497	-0.018	1.000												
Team Size	-0.022	0.005	0.713	0.008	-0.375	1.000											
Team Familiarity	0.002	-0.021	-0.261	-0.041	0.158	-0.269	1.000										
Contract(TM)	-0.344	-0.028	-0.008	0.264	-0.123	-0.278	-0.047	1.000									
Project Technology(L)	-0.080	-0.070	0.149	-0.009	-0.130	0.201	-0.122	0.005	1.000								
Project Type(M)	-0.054	0.075	-0.023	0.265	0.169	-0.173	-0.119	0.145	-0.061	1.000							
PM Rating	-0.087	-0.006	-0.014	0.190	-0.081	-0.079	-0.060	0.027	-0.159	0.149	1.000						
IT WorkEx	-0.139	-0.026	0.016	0.172	-0.054	-0.038	0.076	0.096	-0.041	-0.023	0.242	1.000					
PM WorkEx	-0.093	0.074	-0.017	0.151	-0.018	-0.062	0.032	0.110	-0.074	-0.024	0.233	0.774	1.000				
Soft Skills	0.173	0.338	-0.204	-0.062	0.222	-0.144	0.123	-0.046	-0.141	0.141	0.051	-0.049	-0.027	1.000			
Client Exp	-0.048	0.078	0.092	0.056	-0.052	0.033	0.236	-0.043	0.006	0.008	-0.072	0.109	0.022	-0.015	1.000		
Hard Skills	0.106	0.071	0.010	-0.082	0.025	-0.013	0.278	-0.146	-0.031	-0.052	-0.057	0.091	-0.005	0.007	0.742	1.000	
dVendorClient	-0.026	0.167	0.129	-0.022	-0.036	0.095	-0.075	0.054	0.036	0.122	0.047	-0.076	-0.035	0.042	0.065	0.066	1.000

Table 3: Sample critical incident methodology survey

Dimension	Survey question
Task	You are the offshore PM for a project. The project faced some delays in the timelines, eventually cutting into the time for testing the product thoroughly. On one hand, you need to make an on-time delivery as promised to the client. On the other hand, you are sure that the deliverable is not of the quality it should be. Describe what actions you would take?
Self	You have been in the client-server and web technology for a few years. Because of some visa issues, you are asked to head the onsite team for a data warehousing project. The responsibilities are challenging - you are expected to quickly learn the new technology, tools, procedures, and hit the ground running - at the client side! You of course have the option to take up a lead role in another project which is in the same technology area that you are comfortable in. What would you do?
Career	You have been excited to join ITV[10] as a PM via a lateral entry. You have been at ITV for sometime, and there has been a delay in the timing of your promotion, recognition and rewards for all the hard work you have put in. What would you do?
Superiors	You are project leader for an incident and a change management team. You have been brought into the team with the prospect of you becoming the PM for the change management team. However, after the successful delivery of the project, you are sidelined and a new PM is brought in. How would you approach your superiors about this situation?
Peers	You are the offshore PM for a team. Your onsite coordinator turns out to be a client pleaser - he interprets the client requirements in his own way, and suggests enhancements that are not even within the scope. The resultant scope creep may get out of hand, resulting in missed deadlines. How would you resolve this situation?
Subordinates	Your hard work has paid off, and you have been promoted to be the project manager of your existing team. You are excited, but there is hitch: your old team members view you as one of them, and forget that you are their PM now. At the same time, the senior most team member feels that he has been sidelined, and that he should have been the PM instead of you. All these undercurrents make the transition turbulent, and you are concerned about their impact on project performance and client relationship. Your managers are looking at you to brave this storm and deliver results as you have always done. What should you do?
Clients	You are the onsite PM for a project which is being transitioned from another vendor. Unfortunately, the knowledge transfer necessary for the transition is not happening, and the other vendor has support from client middle management. What would you do to ensure that you take on the project smoothly?

Table 3: Inter rater reliability for survey response evaluations shows significant agreement amongst evaluators.

	Task	Self	Career	Superiors	Peers	Subordinates	Clients
Avg Variance	0.53	0.84	0.52	0.55	0.60	0.60	0.79
Null Variance	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Avg/Null Variance	0.13	0.21	0.13	0.14	0.15	0.15	0.20
1-avg/null	0.87	0.79	0.87	0.86	0.85	0.85	0.80
J	7.00	7.00	7.00	7.00	7.00	7.00	7.00
J*(1-avg/null)	6.08	5.54	6.09	6.03	5.95	5.94	5.61
Rwg(J)	0.98	0.96	0.98	0.98	0.98	0.98	0.97

Table 4: SUR estimation results show significant direct as well as contingent impact of soft skills on project outcome measures.

	Baseline model		+Skills		+ Interactions		VIF
	Coefficient	SE	Coefficient	SE	Coefficient	SE	
Project outcome measure: Performance							
logFP	-1.7097	0.1712	-1.6533	0.1722	-1.6179	0.1833	3.5200
Duration	0.6558	0.0745	0.6260	0.0746	0.6510	0.0901	1.8300
AvgTeamExp	-0.4076	0.0987	-0.3979	0.1006	-0.4461	0.1049	2.3400
TeamSize	0.6806	0.1099	0.6641	0.1094	0.6674	0.1115	3.2000
TeamFamilarity	0.3085	0.0830	0.3077	0.0834	0.2574	0.0977	1.7300
TeamHardSkills	0.4842	0.1051	0.4528	0.1094	0.4992	0.1121	2.8000
OnsiteRatio	-0.4764	0.0824	-0.4804	0.0820	-0.4835	0.0834	1.5600
PriorProjectOrg	0.1982	0.0758	0.1774	0.0758	0.1651	0.0760	1.2900
Contract=TM	-1.0194	0.2211	-0.9903	0.2195	-0.9960	0.2207	1.5500
ProjectType=M	0.8237	0.1903	0.7458	0.1920	0.6925	0.1918	1.8700
ProjectTech=L	-0.7962	0.1621	-0.7523	0.1623	-0.7232	0.1627	1.4800
PMRating	-0.2080	0.0723	-0.2131	0.0725	-0.2044	0.0725	1.2300
ITWorkEx	-0.0849	0.1060	-0.0758	0.1053	-0.1294	0.1078	2.3000
PMWorkEx	0.1065	0.1058	0.1051	0.1050	0.1208	0.1052	2.0800
PriorProjectPM	0.0353	0.0734	-0.0716	0.1168	-0.0682	0.1185	3.4000
SoftSkills			0.4186	0.0951	0.4077	0.0951	1.1800
ClientExp			-0.1500	0.0987	-0.1417	0.1046	2.4200
HardSkills			0.2391	0.1185	0.2158	0.1053	3.2800
logFPXSoftSkills					0.0715	0.0108	2.5900
PriorityXSoftSkills					0.1024	0.0482	1.6500
TeamSizeXSoftSkills					0.2035	0.0902	2.3300
TeamFamiliarityXSoftSkills					-0.1872	0.0811	1.3000
ClientExpXSoftSkills					-0.0738	0.1605	2.6200
SoftSkillsXHardSkills					-0.1066	0.0140	2.5500
TeamHardSkillsXHardSkills					-0.0961	0.0091	1.2700
Project outcome measure : Feedback							
logFP	0.2332	0.0963	0.2964	0.0891	0.4670	0.0917	2.8700
Duration	-0.0581	0.0433	-0.0886	0.0400	-0.0774	0.0468	2.2100
TeamSize	-0.1023	0.0626	-0.1155	0.0575	-0.1581	0.0555	3.1700
TeamFamilarity	0.1223	0.0471	0.1064	0.0431	0.1139	0.0473	2.0900
TeamHardSkills	0.0856	0.0255	0.0670	0.0251	0.0735	0.0214	2.3600
OnsiteRatio	0.0820	0.0407	0.1045	0.0427	0.1070	0.0414	1.5700
PriorProjectOrg	-0.0327	0.0444	-0.0792	0.0408	-0.0524	0.0392	1.4200
dVendorClient	0.4290	0.0269	0.3381	0.0246	0.3098	0.0235	1.2700
Contract=TM	-0.1902	0.0727	-0.1860	0.0712	-0.1677	0.0691	1.6000
ProjectType=M	0.2176	0.0890	0.1937	0.0926	0.1933	0.0961	1.7500
ProjectTech=L	-0.2174	0.0907	-0.2154	0.0838	0.2098	0.0799	1.4900

	Baseline model		+Skills		+ Interactions		VIF
PMRating	-0.0212	0.0407	-0.0202	0.0372	-0.0018	0.0354	1.2200
ITWorkEx	0.2043	0.0604	0.1972	0.0551	0.1637	0.0536	2.8500
PMWorkEx	0.1755	0.0601	0.1782	0.0549	0.1499	0.0522	2.6100
PriorProjectsPM	0.0321	0.0421	0.0961	0.0608	0.1093	0.0584	3.3400
SoftSkills			0.4121	0.0437	0.4629	0.0429	1.2400
ClientExp			0.1230	0.0579	0.1996	0.0601	3.5400
HardSkills			0.0604	0.0695	0.0445	0.0695	1.8300
logFPXSoftSkills					0.4345	0.0863	2.7500
PriorityXSoftSkills					0.0555	0.0497	1.9800
TeamSizeXSoftSkills					0.1521	0.0515	2.4300
TeamFamiliarityXSoftSkills					-0.8190	0.0542	1.7100
ClientExpXSoftSkills					-0.1701	0.0724	1.8900
SoftSkillsXHardSkills					-0.0369	0.0782	1.9100
TeamHardSkillsXHardSkills					-0.0435	0.0130	1.3400

Model Fit Statistics	Baseline model	+ Skills	+ Interaction vars
N	530	530	530
R^2 (Performance)	0.4542	0.4732	0.4981
R^2 (Feedback)	0.0734	0.2320	0.3178
Change in R^2 (Performance)	0.4542	0.0190	0.0249
Change in R^2 (Feedback)	0.0734	0.1586	0.0858
F Test for change in R^2 (Performance)	41.7431	6.1314	3.5649
F Test for change in R^2 (Feedback)	2.5398	35.1068	9.0374
pVal of F Test (Performance)	0.0000	0.0004	0.0009
pVal of F Test (Feedback)	0.0009	0.0000	0.0000
Condition index (collinearity)	12.1094	12.1505	12.2167

Figure 1 Effect of soft skills on project complexity

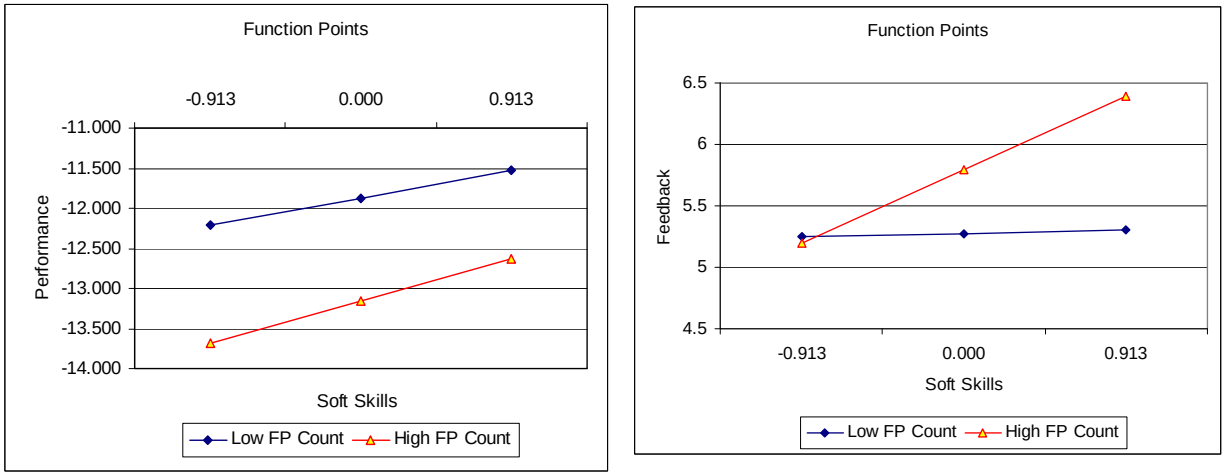

Figure 1A: An increase in soft skills helps projects with higher FP count more and significantly, both in terms of cost performance and feedback.

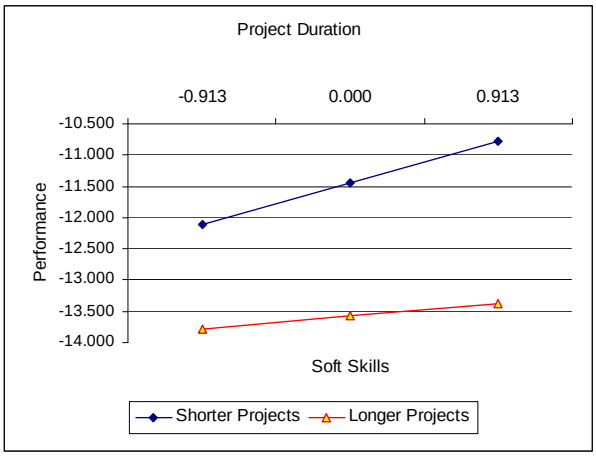

Figure 1B: An increase in soft skills helps improve cost performance for shorter duration projects more.

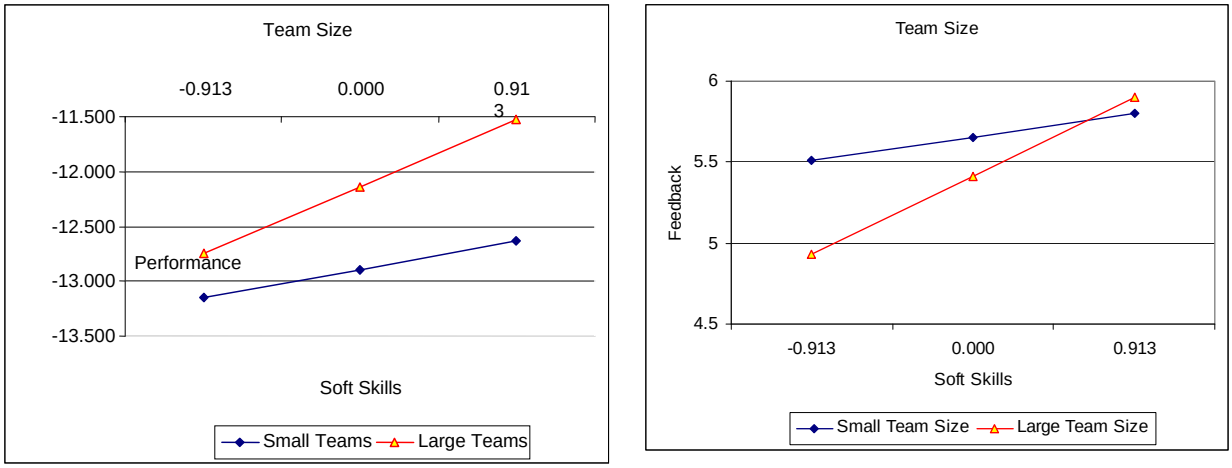

Figure 1C: An increase in soft skills helps projects with larger teams more, both in terms of cost performance and feedback.

Figure 2 Effect of soft skills on project familiarity

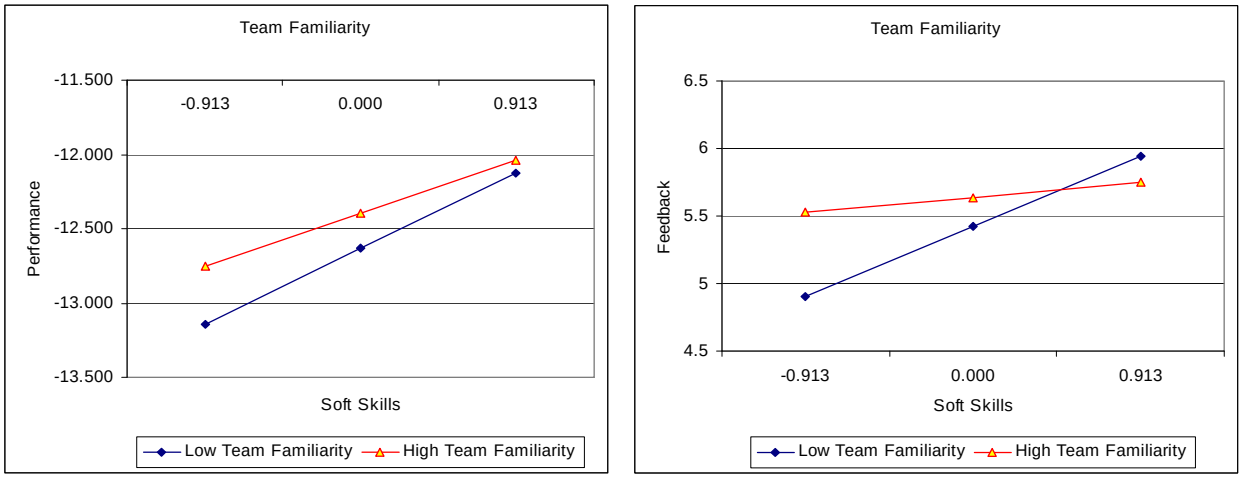

Figure 2A: An increase in soft skills helps projects with low team familiarity more, both in terms of cost performance and feedback.

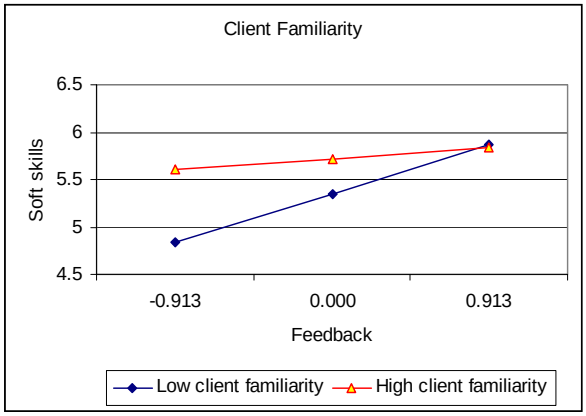

Figure 2B: An increase in soft skills helps PMs with less familiarity achieve higher feedback.

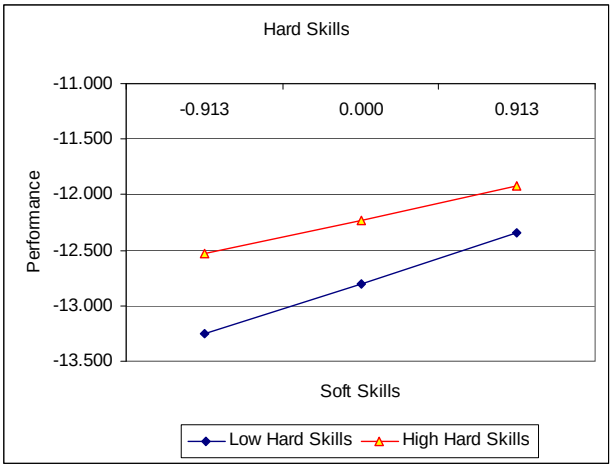

Figure 2C: An increase in soft skills helps PMs with lower levels of hard skills attain better project cost performance.

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[1] 70% of the projects executed in our sample had the base currency as USD. When projects were delivered in countries other than USA, the currency was specified. The other currencies included CAD (Canadian dollar), EURO, GBP (Great Britain pound), or AUD (Australian dollar). We converted these to USD using the historical exchange rates at the time of project transaction. These historical rates are available from US Federal Reserve Board's website (http://www.federalreserve.gov/releases/h10/Hist/, retrieved 07/01/2007).

[2] For example, let a team contain members A, B, and C. Suppose A and B have worked together 3 times in the past, and A& C have worked twice in the past, the familiarity variable for the current project is 5. Normalizing it by the team dyads, we obtain a normalized team familiarity measure as 2.5.

[3] Not all 300 PMs in our original data set responded to the survey. We conducted statistical tests to check for any non-response bias. T-tests of means for experience and performance ratings for the PMs in our sample and the larger population of PMs at the research site indicated no significant differences, suggesting that there was no selection bias in the response to our survey.

[4] As marketing wisdom proclaims, it takes considerable lesser outlay costs to woo an existing client than to engage a new client. The same holds true for IT outsourcing industry.

[5] However, since an increase in costs is akin to a decrease in performance, cost measurements are hard to interpret, especially when we have interaction terms as our explanatory variables. We follow Espinosa et al. (2007), and use -1*log(Cost) as our cost performance variable.

[6] We use a dummy variable to indicate vendor's client experience and use it in the feedback equation. This strategy renders the parameters in the two equations are different; hence the SUR model is identified, and provides more efficient estimates than estimating these models separately.

[7] This result led us to examine whether project costs could be an explanatory factor in client feedback. We estimated a simultaneous equation model to control for the endogeneity in the resultant model. However, we found that although project costs increase client satisfaction, the effect is not significant. Hence we do not report it in the current study. The results are available by request from the authors.

[8] A discussion with the vendor revealed that factors other than PM's performance may influence ratings, and hence they may not be reliable indicators of project performance.

[9] Talks with the developers at site revealed that even when the base system is a mainframe, many of the clients were developing or in the process of developing internet or open system enabled applications; hence there was a high attrition from the projects using older technologies, leading to longer development or knowledge transfer costs.

[10] ITV is "IT Vendor," our research site. For confidentiality purposes, we do not reveal the name of the vendor.