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IT Project Manager Characteristics: A Resource-Based View

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ABSTRACT

In this study, we explore the individual-level factors perceived as important to information technology (IT) project managers. Using a resource-based view, we propose a typology for classifying the IT project manager capability based on outside-in, spanning, and inside-out capabilities. We identify 58 individual-level factors using this typology and develop six hypotheses related to the typology and the factors. Through a field survey of IT project managers, we test our hypotheses and verify the perceived importance of these factors. Our results confirm the resource-based view of the IT project manager capability as a complex mix of tangible and intangible skills and abilities.

Keywords

Project management, project manager success, resource-based view

INTRODUCTION

Organizations have access to similar information technology (IT), but only some are able to parlay the technology into sustainable competitive advantage. Likewise, every IT organization has access to the same IT project management best practices, but again only some are able to consistently leverage those practices into successful IT project deployments. Differences in IT capabilities have been attributed to differences in human resources among the organizations (Keen 1993; Powell and Dent-Metcalf 1997; Wade and Hulland 2004). Keen (1993, p. 17) writes, "Some business leaders are somehow able to fit the pieces together better than others." Likewise, from an IT project management perspective, some IT project managers are somehow able to manage projects better than others. The purpose of this study is to examine individual-level characteristics of IT project managers in an attempt to better understand why some project managers are better at bringing together the disparate pieces of a project puzzle. Using a resource-based approach, we develop a typology of the IT Project Manager resource and identify the individual-level project manager capabilities associated with the resource. We then validate the relative importance of these individual-level capabilities through a cross-sectional survey of IT project managers.

RESOURCE-BASED VIEW OF THE FIRM

According to the resource-based view (RBV), resources enable firms to achieve competitive advantage which can lead to long-term performance (Barney 1991; Grant 1991; Penrose 1959). Resources that can enable long-term performance are those that are valuable, rare, inimitable, and nonsubstitutable (Barney 1986). With RBV's emphasis on internal firm resources as a source of competitive advantage (Hoskisson et al. 1999), a firm's human resources are becoming increasingly recognized as critical to a firm's success (Wright et al. 2001).

A firm's resources are defined as the assets and capabilities available to the firm for use in achieving the firm's objectives (Wade and Hulland 2004). Assets are the tangible or intangible items for creating, producing, and/or offering goods and services to a market (Sanchez et al. 1996), while capabilities reflect a combination of those assets in such a way that enables superior performance (Amit and Schoemaker 1993). Examples of a firm's assets include human capital, which refers to the stock of employee knowledge, skills, and abilities that exist within a firm at a given time (Wright et al. 2001), as well as technology resources such as computer hardware and software.

The IT project management capability has been identified as combination of organizational assets that enable the IT capability of a firm (Lee and Anderson 2006). Through an exploratory Delphi study, Lee and Anderson (2006) identified factors at the organizational-level, team-level, and individual-level that impact the IT PM capability. This study extends that work by focusing on individual-level factors that impact the IT PM capability of a firm. Specifically, the purpose of this study is to explore the individual-level human resource aspect of the IT project management capability and develop a typology for the IT PM capability.

Individual Capabilities

According to Stinchcombe (1990), the skills of an organization's individual members are the foundation of organizational capabilities. IT Project Management is an organizational capability (Lee and Andeson 2006). However, to better understand the capability, we need to understand the individual differences in the skills and abilities of individual project managers.

Agarwal (2000, p. 94) defines individual differences as reflecting the "dissimilarities among people, including differences in perceptions and behaviors, traits and personality characteristics, and variables that connote differences attributable to circumstances such as education and experience." Individual differences have been recognized as playing a critical role in various IS research streams. Most notably, the major theories of technology acceptance (e.g. Davis 1989) recognize the importance of individual differences such as gender, age, beliefs, and attitudes.

One category of individual differences reported by Zmud (1979) are those related to demographic variables (e.g. gender, age, experience, and education abilities) and situational variables (e.g. domain-specific knowledge and skills). As indicated in Figure 1, this study focuses on exploring the set of individual-level differences that impact the organizational-level IT project management capability.

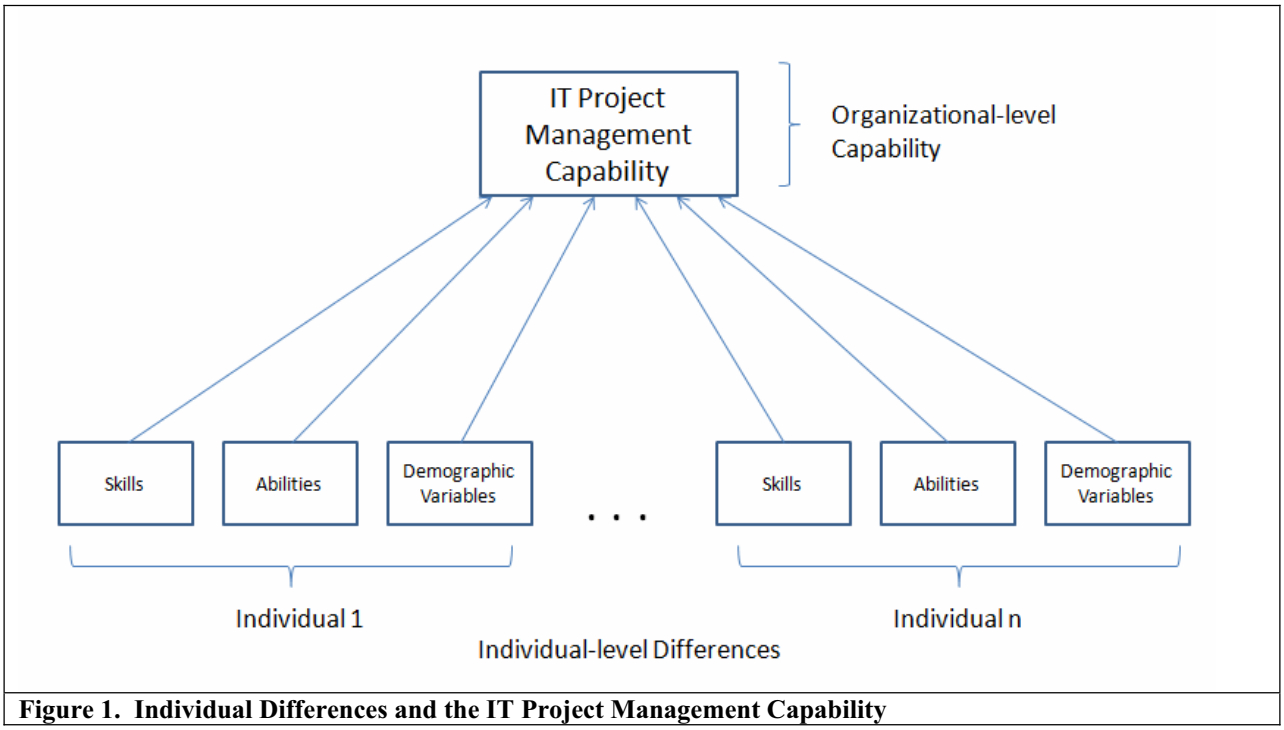

Figure 1. Individual Differences and the IT Project Management Capability

Classifying Capabilities

Day (1994) categorizes organizational capabilities into three categories, depending on the orientation and focus of the defining processes (Figure 2). At one end of the spectrum are those knowledge, skills and abilities that have an external emphasis. These are known as "outside-in" and have a focal point that is outside the organization. At the other end of the spectrum are the processes that have an internal focus which are called "inside-in" processes. In the middle are the boundary-spanning processes that focus on integrating the "outside-in" and "inside-out" processes.

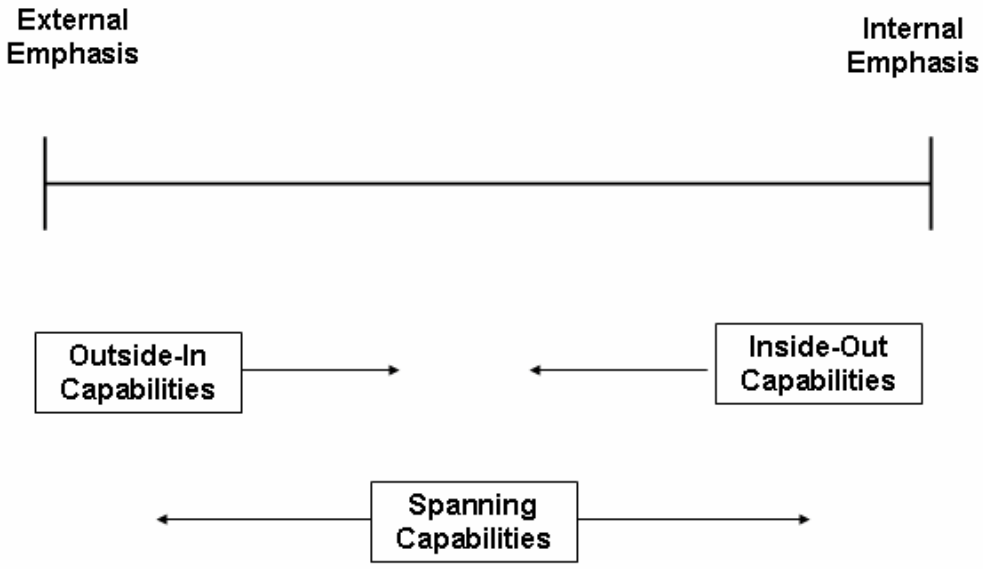

Figure 2. Classifying Capabilities Source: Day (1994)

Day (1994) applied his typology at the firm level and focused on general organizational capabilities. In his typology, inside-out processes are those that have a focal point inside (within) the organization. Examples of "inside-out" processes include manufacturing activities, human resource management, and internal cost management. Outside-in processes are those that connect the organization to the external environment. Examples of "outside-in" process include market sensing, which involves interpreting and anticipating market requirements ahead of competitors, and interorganizational cost management, which refers to partners within a supply chain working together to manage costs (Cooper and Slagmulder 2004).

Wade and Hulland (2004) based their characterization of the IS resource on this framework and organized eight key IS resources into the appropriate category. Our typology (Table 1) of the IT project management capability is also based on the Day (1994) framework. Table 1 suggests how ten broad groupings of individual-level differences can be organized within this typology. Note that project management skills potentially span all three categories.

Outside-In	**Spanning**	**Inside-Out**
External stakeholder management skills	Communication skills	Leadership By Example
	Political Savvy	Participative Decision-Making
Project Management Skills	Project Management Skills	Project Management Skills
		Coaching
		Concertive Control
		Technical Skills
		Concern for Team

Table 1. A Typology of IT Project Manager Capabilities

Outside-In Capabilities

Whereas Day (1994) characterizes "outside-in" capabilities as focusing on processes outside the organization, we characterize "outside-in" project manager capabilities as those focusing *outside* the project team. A fundamental responsibility of a project manager is monitoring the progress of the team. In team-based organizations, traditional functional line managers are not always able to closely monitor the performance of their subordinates who are members of cross-functional teams. One method to minimize the shirking by individuals is for someone to specialize in monitoring the performance of team members (Alchian and Demsetz 1972). The Alchian and Demsetz view of monitoring is much broader than just its disciplinarian connotation: "It connotes measuring output performance, apportioning rewards, observing the input behavior of inputs as means of detecting or estimating their marginal productivity and giving assignments or

instructions in what to do and how to do it" (Alchain and Demsetz 1972, p. 782). In the context of IT projects, the role of monitoring is typically assumed by the project manager. It is an "outside-in" capability in that the primary consumers of the monitoring information are those outside of the project team. And because project managers are monitoring the team primarily as agents of external stakeholders, it is also important that the project manager be able to secure the confidence of these external stakeholders.

Spanning Capabilities

Spanning capabilities are those that integrate the inside-out and outside-in capabilities. Effective team communication emphasizes information sharing both within the team, as well as with external stakeholders, and is therefore classified as a boundary-spanning capability. The communication skills of both project team leaders and team members have been recognized as a critical success factor in the implementation of IT projects (e.g. White and Leifer 1986). From a critical success factor perspective, Karlsen et al. (2006) identify good communication and feedback from involved parties as a top 5 factor reported by project managers as influencing their success.

Another spanning capability is related to political savvy in dealing with both internal team members and external stakeholders. Mintzberg (1983) argued that leaders in organizations require the desire and interest in engaging in politics, as well as the intuitive savvy to be good at it. Political savvy leaders are characterized as devoting considerable attention to the development of relationships with a broad array of subordinates, peers, superiors, and outsiders (Ammeter et al. 2002).

Other spanning capabilities can be found in some of the domain-specific knowledge areas found in the Project Management Body of Knowledge (PMBOK). The PMBOK attempts to capture generally accepted knowledge and practices related to project management. Some of the spanning capabilities identified in the PMBOK are communications management, scope management and risk management.

Inside-Out Capabilities

Inside-out capabilities are those skills and capabilities with a focal-point within the project team. Within this category are the domain-specific skills identified by the PMBOK that focus on within-team management, including skills such as time management, cost management, quality management, and human resource management. Because these PM skills are clearly identified in the PMBOK, these core PM skills are neither rare nor inimitable.

In addition to PM skills, IT technical skills have been identified as important to IT PM success. Thite (2000) demonstrates the importance of technical leadership in IS project success. With monitoring of team members identified as an important outside-in capability, a project manager's individual technical skills can determine whether or not that monitoring is effective.

Another factor that has been recognized as important to project manager success is the leadership capability of the project manager to influence the behavior or actions of the project team (Cleland 1995; Mullins 1999). In an era of empowered teams where team members are granted more self-direction, autonomy, and control (Arnold et al. 2000), the role of a project manager is changing in order to lead these empowered teams.

One construct that may be particularly relevant to IT project managers is the concept of empowered leadership (Arnold et al. 2000). Arnold et al. 2000 identify five factors related to empowered leadership: 1) coaching; 2) informing; 3) leading by example; 4) showing concern / interacting with the team; 5) participative decision-making.

With the advent of empowered teams, a new form of control has emerged in the literature – concertive control. Barker (1993) identifies the self-managing team phenomenon as reflective of an evolutionary trend away from the traditional bureaucratic organization of control to a form of control (concertive control) that is more participatory. Concertive control was first coined by Tompkins and Cheney (1985) where they identified a process of control where team members acted in concert with each other in order to control their own behaviors.

In self-managing teams, the role of a project manager goes beyond simple monitoring of the team. Tompkins and Cheney (1985) argues that traditional control consists of three inter-related processes: 1) directing; 2) monitoring, and 3) rewarding and punishing. However, in self-managing teams, these control methods are many times either not available or no longer effective. Project managers often lament that they have all of the responsibility but no formal power or control. Concertive control techniques, based on shared norms and values of team members, is potentially a form of control that can be utilized by project managers to achieve team objectives.

Capabilities Summary

Table 2 provides a summary of the literature support on our conceptualization of individual-level IT project manager capabilities.

Resource	***Source***
External stakeholder management skills	Karlsen (2002); Cleland (1986).
Political Savvy	Lee and Anderson (2006); Ammeter et al. 2002.
Communication skills	White and Leifer (1986)
Project Management Skills	Jugdev and Thomas (2002)
IT Technical Skills	Thite (2000)
Empowered Leadership skills	Arnold et al. (2000)
Concertive Control Techniques	Tompkins and Cheney (1985); Barker (1993)

Table 2. Source from Previous Literature of the IT Project Manager Capabilities

Demographic Variables

Various demographic variables have been related to the capabilities of IT project managers. These include the education-level of project managers and the IT PM certifications achieved by the individuals. Demographic variables (such as the knowledge and skills represented by education and certification) represent the building blocks of individual capabilities. However, from an RBV perspective, education and certification are neither rare nor inimitable.

Hypotheses

Based on the above review of the individual project manager capabilities and the resource-based perspective, we propose the following hierarchy of IT project manager capabilities from most important to least important:

1. Spanning Capabilities
2. Outside-In Capabilities
3. Inside-Out Capabilities
4. Demographics variables

Demographic variables are at the bottom of the hierarchy, since they represent the building blocks of other capabilities. Moving up the hierarchy, we next have the inside-out capabilities because many of these capabilities can be explicitly identified within the PMBOK and are thus not as rare or inimitable as other capabilities. Outside-in capabilities are recognized as being especially important because a primary role of a project manager is to ensure the success of the project team as a proxy for management. Finally, at the top of our proposed hierarchy are the spanning capabilities which require both an inward and an outward focus and represent the most difficult skills to find or imitate.

The following six hypotheses are based on the hierarchy:

H1: *There will be a significant difference in the mean perceived importance between Spanning Capabilities and Outside-In capabilities, with the mean of Spanning higher than the mean of Outside-In.*

H2: *There will be a significant difference in the mean perceived importance between Spanning Capabilities and Inside-Out capabilities, with the mean of Spanning higher than the mean of Inside-Out.*

H3: *There will be a significant difference in the mean perceived importance between Spanning Capabilities and Demographic variables, with the mean of Spanning higher than the mean of Demographic variables.*

H4: *There will be a significant difference in the mean perceived importance between Outside-In and Inside-Out capabilities, with the mean of Outside-In higher than the mean of Inside-Out.*

H5: *There will be a significant difference in the mean perceived importance between Outside-In capabilities and Demographics, with the mean of Outside-in higher than the mean of Demographics.*

H6: *There will be a significant difference in the mean perceived importance between Inside-Out capabilities and Demographics, with the mean of Inside-Out higher than the mean of Demographics.*

RESEARCH METHODOLOGY

A cross-sectional survey of IT Project Managers was conducted to improve our understanding of the individual-factors related to the IT PM capability. Seventy-nine members of a public sector IT project management community of practice participated in the study. Demographic information is provided in Table 3 and indicates that our respondents are qualified to assess project manager capabilities.

Total Number of Participants	79	
Gender (Note: 6 participants did not disclose their gender)		
Male	36	45.6%
Female	37	46.8%
Highest Education Level Attained (Note: 4 participants did not disclose their education level)		
2 Year Degree	12	15.2%
4 Year Degree	32	40.5%
Graduate Degree	26	32.9%
Other	5	6.3%
Number of Years of Work Experience (Note: 5 participants did not disclose their work experience)		
< 5 years	2	2.5%
5 to 10 years	8	10.1%
11 to 15 years	14	17.7%
16 to 20 years	12	15.2%
> 20 years	38	48.1%
Current Role With Respect to Projects		
Project Manager	50	63.3%
Functional Manager	8	10.1%
Project Team Member or Subject Matter Expert	14	17.7%
Project Sponsor	4	5.1%
Project Stakeholder	1	1.3%
Other	2	2.5%

Table 3. Demographic information

Based on our conceptualization of the relevant individual-level IT PM capabilities from previous literature (Table 2), we developed a survey to assess the importance of each factor to the project manager's success. Each survey item was evaluated on a 7-point Likert-scale ranging from Very Unimportant (1) to Very Important (7). Table 4 provides the items.

Description	ID	Category	Mean	StdDev
Setting high standards for performance by his/her own behavior	LBE1	Spanning	6.4937	0.8897
Ability to secure the confidence of stakeholders	OTHER3	Outside-in	6.4430	0.8733
Ability to communicate salient points in a summary effectively	COM3	Spanning	6.3797	0.9241
Time management skills ensuring the timely completion of the project (e.g. schedule development)	PM3	Inside-out	6.3797	0.9241
Setting a good example by the way he/she behaves	LBE3	Spanning	6.3418	0.9321
Listening to the ideas and suggestions of team members	PDM2	Inside-out	6.3291	0.9019
Scope management skills ensuring that the project includes the work required to complete the project successfully	PM2	Spanning	6.3165	0.9547
Willingness to invest time in one-on-one communications	COM4	Spanning	6.3038	0.9787
Reputation for reporting accurate status	OTHER1	Outside-in	6.2692	1.0022

Willingness to work hard	LBE2	Spanning	6.2658	0.9297
A flexible approach to problem-solving	OTHER5	Spanning	6.2405	0.8946
Oral Presentation Skills	COM1	Spanning	6.2025	1.0905
Helping the team focus on the team's objectives	C6	Inside-out	6.1899	0.9484
Ability to multi-task productively	OTHER4	Spanning	6.1899	0.9347
Integration management skills ensuring that various elements of the project are properly coordinated	PM1	Inside-out	6.1772	1.0223
Quality management skills to ensure the project will satisfy the needs for which it was undertaken	PM5	Inside-out	6.1646	0.9119
Communications management skills to ensure the timely and appropriate generation, collection, dissemination, and storage of project information	PM7	Spanning	6.1646	0.9927
Providing positive feedback to the team when the team performs well	C4	Inside-out	6.1646	0.9927
Providing constructive feedback to the team when the team performs poorly	C5	Inside-out	6.1646	0.9119
Ability to identify win-win options when negotiating for resources, funding, schedules, etc.	PS1	Spanning	6.1538	1.0203
Writing Skills	COM2	Spanning	6.1392	0.9300
An ability to "sanity check" the deliverables of team members (e.g. schedule dates, project documentation)	TS4	Inside-out	6.1266	0.9523
Giving all team members a chance to voice their opinions	PDM4	Inside-out	6.1266	1.0047
Encouraging team members to exchange information with each other	C2	Inside-out	6.1013	0.9281
Ability to chart a manageable, reliable schedule	OTHER2	Spanning	6.0759	1.0225
Ability to compromise	PS2	Spanning	6.0506	1.0115
Ability to manage through organizational change	PS5	Spanning	6.0506	0.9858
Using the suggestions of team members to make decisions that affect the team	PDM3	Inside-out	6.0253	0.9604
Encouraging project team members to express ideas/suggestions	PDM1	Inside-out	6.0127	0.9540
Human resource management skills to make the most effective use of the people involved with the project (e.g. organizational planning, staff acquisition, and team development)	PM6	Inside-out	5.9367	1.0420
Risk management skills in identifying, analyzing, and responding to project risks	PM8	Spanning	5.8987	0.9818
Encouraging team members to solve problems together	C1	Inside-out	5.8734	0.9657
An understanding of the scope and complexity of the technical solution	TS3	Spanning	5.8481	1.0511
Getting along with the project team members	CON4	Inside-out	5.8228	1.1296
Helping develop good relations among team members	C7	Inside-out	5.8101	1.0137
Number of years experience as a project manager	EXP3	Demographic	5.7722	1.1430
Providing help to team members	C3	Inside-out	5.7722	1.0121
Willingness to assist with all project tasks – no matter how routine or tedious	LBE4	Inside-out	5.7595	1.4431
Showing concern for team members' success	CON3	Inside-out	5.7595	1.1003
Championing the values and objectives that are important to the team	CC3	Inside-out	5.7468	1.1032
Making sure every team member "pulls their own weight" on the team	C11	Inside-out	5.7468	1.1376

Ability to determine the appropriate pace to drive the project relative to the organization	PS4	Spanning	5.7342	1.0587
Number of years experience in the IT industry	EXP1	Demographic	5.7089	1.0396
Cost management skills ensuring that the project is completed within the approved budget (e.g. resource planning, cost estimating, cost controls)	PM4	Inside-out	5.6835	1.1607
Encouraging a consensus among team members when making team decisions	PDM5		5.6709	1.1062
Ability to gain recognition for the team	PS3	Inside-out	5.5823	1.1391
Enforcing team rules and policies	CC1	Inside-out	5.5696	1.0338
Educating new team members on the team "way" of doing things	CC2	Inside-out	5.4615	1.0530
Ability to identify gaps in the technical solution	TS2	Inside-out	5.4177	1.2871
Number of years in a leadership position within IT	EXP2	Demographic	5.3718	1.1522
Showing concern for team members' well being	CON2	Inside-out	5.3165	1.0687
The project management certifications (e.g. PMP or SC Associate or Senior SCPM) that a project manager has attained	CERT1	Demographic	5.1519	1.3213
Ability to understand the technical details of the project	TS1	Spanning	5.1266	1.2234
Procurement management skills in acquiring goods and services from outside the organization	PM9	Outside-in	5.0506	1.0365
The educational level of the project manager	ED1	Demographic	5.0380	1.1815
Caring about team members' personal problems	CON1	Inside-out	4.8228	1.1181
A technical degree (e.g. engineering, computer science) earned by the project manager	ED2	Demographic	4.3165	1.1934
A business degree (e.g. MBA) earned by the project manager	ED3	Demographic	4.2911	1.2522

Table 4. Individual-Level Items

Classification of Factors

The 58 items were classified by 4 categories as suggested by the typology in Figure 2. The items were classified by four raters. Two of the raters are the authors, one of which is a full-time director of project managers for an IT organization and PMP-certified. The other two raters are doctoral students, both with experience as project managers (3 years and 20+ years) and one that is PMP-certified. In order to assess the agreement among the raters, we computed the kappa statistic for each of the four categories. Table 5 provides the results.

	Kappa	**Degree of Agreement (Landis and Koch 1977)**	**Standard Error**	**Z**	**Prob>Z**
Demographic Variable	1.000	Almost Perfect	.0536	18.6548	< .0001
Outside-In Capability	.4839	Moderate	.0536	9.0271	< .0001
Spanning Capability	.46776	Moderate	.0536	8.7259	< .0001
Inside-Out Capability	.62305	Substantial	.0536	11.6228	< .0001
Overall	.62572	Substantial	.0369	19.655	< .0001

Table 5. Level of Agreement

In addition to the kappa statistics, we also computed Kendall's coefficient of concordance -- .81935, which indicates a substantial amount of overall agreement between the raters (Kendall 1955).

The final categorization of our factors in Table 4 was based on the following. We had 100% agreement on the demographic variables. For the capabilities, if we had agreement among 3 out of 4 raters, we used the classification made by the majority. In the cases where we had a split result (e.g. 50% spanning and 50% inside-out), we classified the factor as a "spanning"

since by definition spanning includes both. As indicated by the kappa calculations, there was not a clear delineation at times between the categories of capabilities.

Data Analysis

Our hypotheses were tested by aggregating the item-level data into the factor-level constructs as indicated by our classification scheme. At the item-level of analysis, the means are provided in Table 4. The means at the factor-level of analysis are provided in Table 6.

Factor	Mean
Spanning	6.1039
Outside-In	5.9114
Inside-Out	5.8273
Demographics	5.0889

Table 6. Factor-Level Means

In order to test the hypotheses, we performed a two-step procedure of a repeated measures single factor Analysis of Variance (ANOVA) followed by a multiple comparison test. The first step of the ANOVA answers the question if there is at least one mean significantly different from at least one other mean. The one-way ANOVA revealed a significant effect for type of factor, $F(3, 234)$; $p < .0001$. For the second step to determine which factors are significantly different from each other, we performed a multiple comparison test. Tukey's Studentized Range (HSD) test demonstrates that there is a significant difference among the factors ($p < .05$), leading to the support of H1, H2, H3, H5, and H6. There was not a significant difference between the mean for the Inside-Out and the Outside-In groups. Therefore we did not find support for H4.

DISCUSSION / CONCLUSION

Our survey of the individual-level factors perceived as important to IT project manager success emphasizes the diverse set of skills and capabilities required of project managers. From a resource-based view perspective, our study demonstrates that the IT PM capability is a mixture of tangible and intangible skills that have both an inward (within-team) and an outward (outside-team) focus. Spanning capabilities in particular are recognized as being especially important to IT project managers. Our study could not distinguish among the relative importance of outward-facing and inward-facing capabilities, implying that both of these areas are perceived as equally important to IT project managers.

From an examination of the ranks of the items from Table 4, a few issues stand out. Tangible aspects of project management are embodied in the PMBOK. Over half of the PM knowledge areas (time management, cost management, interaction management, and communication management) appeared in the top 20, indicating the importance of these tangible skills to project managers. Other tangible variables are demographic variables. According to a resource-based view, demographic variables (e.g. education and certification) are neither rare nor inimitable and were recognized as such by their position at the bottom of the list.

One contribution of our study is its emphasis on some of the more intangible aspects of project management. At the item-level, items related to leadership stand out by appearing in the top 5 of Table 4. The item with the highest overall mean is from the "leadership by example" construct, with the project manager setting high standards for performance by his/her own behavior (LBE1). A similarly-worded item (LBE3) also appeared in the top 5, providing initial confirmation of the importance to project managers of leading by example. Future studies can focus on the leadership aspects of project management.

A closer examination of the top 10 factors from Table 4 (such as setting high standards, the ability to secure the confidence of stakeholders, the ability to summarize effectively, oral communication skills) reveals a common thread of trust in the project manager as a leader. Stakeholders are willing to trust a project manager who they perceive as honest and hard-working and who is able to provide them with accurate information on the project. This concept of trust in the project manager is another promising area for future research.

A limitation of this study is that we did not test how important these individual-level factors are to project management success. An extension of this study is to develop a model of individual-level project manager success characteristics based on the factors identified in this study.

Our study has several implications for practice. Our typology of the IT PM capability draws attention to the multi-facing focus of project managers. Project managers must recognize that they are the interface point for multiple stakeholders both internal and external to the team and act as a spanning mechanism for connecting these disparate groups. Project managers

must focus on keeping external stakeholders (e.g. management) informed of the progress of the team (an outside-in capability), as well as provide leadership to an empowered team (an inside-in capability) – all of which is in addition to the core project management processes.

The PMBOK serves as a foundation for those skills perceived to be important by project managers. However, as indicated by this study, there are intangible individual-level factors beyond the PMBOK that are critical to project managers. By incorporating these factors into the training and selection process of individual-level project managers, an organization can further develop its organizational-level project management capability for delivering projects to its customers on schedule and with the required features.

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