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Research-In-Progress: An Exploratory Investigation into the Antecedents of the IT Project Management Capability

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ABSTRACT

In this study, we deploy a rank-order Delphi survey of factors impacting the information technology (IT) project management capability. We first develop a conceptual model based on the theory of dynamic capabilities that positions IT project management as a dynamic capability enabling the IT capabilities of an organization. In our conceptual model, the IT project management maturity level is identified as one antecedent factor that influences the IT project management capability. The objective of this Delphi study is to identify *additional* factors beyond the scope of most project management maturity models that influence the IT project management capability. The results of this Delphi study provide the foundation for future testing and validation of the conceptual model.

Keywords

Project management, project management effectiveness, project management maturity models, dynamic capabilities.

INTRODUCTION

In the information systems (IS) literature, information technology (IT) has been recognized as an organizational capability that can lead to competitive advantage and firm performance (Bharadwaj 2000; Kohli and Devaraj 2003). Although many studies have focused on the consequences of IT (e.g. Brynjolfsson and Hitt 1996; Devaraj and Kohli 2003), there have been fewer studies examining factors that impact the IT capability. In fact, Orlikowski and Iacono (2001, p. 121) find that the "field of information systems …. has not deeply engaged in its core subject matter – the information technology (IT artifact)."

Practitioners are ahead of the academic literature in the recognition of IT project management capabilities as an enabler of IT capabilities. Several examples in the popular press highlight the growing importance of IT project management on IT organizations (e.g. Barnes, 2006; Brandel 2006; Johnson 2006). IT practitioners have embraced the *Project Management Book of Knowledge* (PMBOK®) developed by the Project Management Institute (PMI) as embodying the best practices for managing IT projects, with many IT project manager positions requiring PMI certification as a prerequisite for employment.

One way the effectiveness of the IT PM capability has been assessed is through the use of PM maturity models, with the underlying assumption that higher levels of PM maturity imply higher effectiveness of the PM capability (e.g. Kwak and Ibbs 2002; Sonnekus and Labuschagne, 2004). However, as Jugdev and Thomas (2002, p. 11) report, PM maturity models are not necessarily the "silver bullets" of competitive advantage, with the authors concluding that "MMs [maturity models] are a component of project management, but not a holistic representation of the discipline."

In our study, we view IT project management as an organizational capability that is an enabler of the IT capability. The overarching objective of our conceptual model is to provide insights on 1) how an organization develops capabilities in IT project management and 2) how those project management capabilities impact the organization's IT practices. Specifically, we draw from the theory of dynamic capabilities to develop a conceptual model that links the antecedents of the IT PM capability to the IT capability. Our conceptual model positions the factors identified by PM maturity models as one antecedent. The objective of this research is to identify *additional* factors not encompassed by MMs that impact the IT PM capability.

In order to achieve the objective in identifying the factors that impact IT PM capabilities, we use a data collection method known as a "ranking-type" Delphi survey to produce a rank-order list of factors. The results of this Delphi study represent a first step in providing the foundation for future test and validation of the conceptual model.

This paper is organized as follows. First, we present highlights from the literature relating to dynamic capabilities and PM maturity models. Second, we describe our conceptual model and develop propositions associated with the model. This is

followed by a description of factors identified by the literature as influencing the IT PM capability via PM effectiveness. We next describe the research methodology used to conduct the Delphi study and present the results of phases 1 and 2 of the Delphi study. We conclude with a discussion on the current status of the project and potential implications.

LITERATURE REVIEW

Dynamic Capabilities

Dynamic capabilities have been defined as specific strategic and organizational processes that create value for firms by transforming existing firm resources into new value-creating resources in changing environments (Eisenhardt and Martin 2000). Dynamic capabilities consist of identifiable and specific organizational routines that integrate existing firm resources (e.g. product development and strategic decision-making processes within firms) or routines that are related to the gain and release of organizational resources, such as alliance and acquisition processes or exit strategy routines (Eisenhardt and Martin 2000). These capabilities are dynamic because a firm must continually build, adapt, and reconfigure internal competencies in order to compete in a continual changing business environment, especially in times when the rate of technological change is rapid or when time-to-market is important (Teece et al. 1997).

As identified by the literature, the primary distinction between dynamic capabilities and ordinary operational capabilities is that the focus of dynamic capabilities is on enabling change (Winter 2003). In markets where the competitive landscape is shifting quickly (termed hypercompetitive or high-velocity markets), dynamics capabilities can be "simple, highly experiential, and fragile processes with unpredictable outcomes," whereas in more moderate markets, dynamic capabilities "resemble the traditional conception of routines" (Eisenhardt and Martin 2000, p. 1105).

Consistent with the dynamic capabilities perspective, our study contends that IT project management is a dynamic capability. In a fast-moving, technological environment, firms are using IT project management skills to continually reconfigure and update their internal and external IT resources in order to support and exploit business opportunities. Therefore, IT project management exemplifies the characteristics of dynamic capabilities by enabling the IT capability, which in turn generates customer value.

Project Management Maturity Models

The term "project management maturity" is generally used as an indication or as a measurement of an organization's capability to deliver projects successfully (Pennypacker and Grant 2003; Andersen and Jessen 2003). Over 30 project management maturity models (PM MMs) have emerged (Cooke-Davies et al. 2001), with many of the models integrating the Capability Maturity Model (CMM) developed by the Software Engineering Institute (SEI) at Carnegie Mellon University with PMI's PMBOK® Guide (Skulmoski 2001).

The underlying assumption in the maturity models is that there is a relationship between higher levels of maturity and improved organizational performance. Herbsleb et al. (1997) examined the relationship between a CMM-based model of software process improvement and found broad support for the claim that substantial business benefits can be obtained from moving through the defined levels of the model. Ibbs and Kwak (2000) used a maturity model and project performance data from 38 companies to determine the financial and organizational impacts of project management.

Although the literature has established a link between higher levels of maturity and organizational benefits, the prior studies have not examined the precise mechanisms and intermediate processes in place that enable the causal relationship.

CONCEPTUAL MODEL

Figure 1 presents our overarching conceptual model.

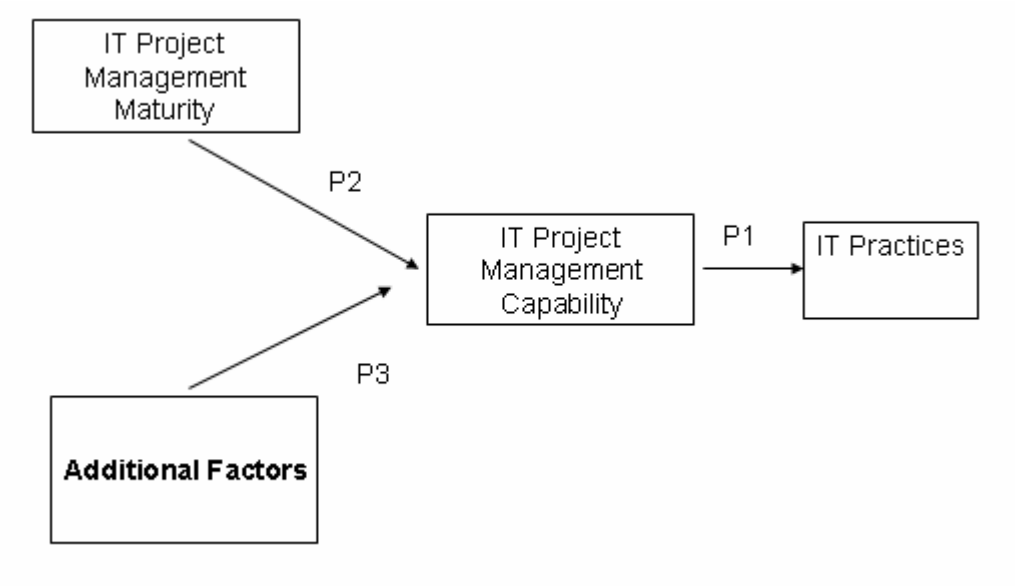

Figure 1. Conceptual Research Model

In the conceptual model, we position IT project management as a dynamic capability that allows the IT resources of a firm to be reconfigured and redeployed in order to provide competitive advantage to a firm (via IT practices) as the environment changes (P1). The best practices and knowledge embodied in IT project management maturity models are an antecedent to the dynamic IT project management capability (P2). One criticism of maturity models is that they are generally process-focused and ignore some of the human resource and organizational aspects of PM effectiveness (Jugdev and Thomas 2002). This implies that there are other tangible and intangible factors that impact the IT Project Management capability (P3), which is the area of focus for the first phase of this research.

FACTORS THAT INFLUENCE IT PM CAPABILITY

In reviewing the literature, there are a broad range of factors beyond the scope of PM Maturity Models that possibly influence the IT PM capability. Several studies from both academics and practitioners have identified factors impacting project management effectiveness and success (Table 1) and are likely to impact the IT PM capability. In the academic literature, for example, Cooke-Davis and Arzymanow (2003) identify organizational culture as exerting a positive influence on the development of superior PM practices. Clarke (1999) recommends the identification of key success factors in improving project management effectiveness. From the practitioner perspective, Johnson et al. (2001) identify the top 10 factors for IT project management success. Given the diverse factors identified by the literature, one goal of our study is to integrate the factors identified by both academics and practitioners in order to develop a nomological network based on those factors as illustrated in the conceptual model (Figure 1).

Study	Context	Factors impacting Project Management Success	
Clarke (1999)	Key project success factors identified through the perspective of an aerospace engineering company	1. communication throughout the project 2. clear objectives and scope	3. breaking the project into "bite sized chunks" 4. Using project plans as working documents
Johnson, Boucher, Connors, and Robinson (2001)	IT Project Management: Results from the Standish Group's CHAOS 10 success factors for 2000	1. Executive support 2. User involvement 3. Experienced project manager 4. Clear business objectives 5. Minimized scope	6. Standard software infrastructure 7. Firm basic requirements 8. Formal methodology 9. Reliable estimates 10. Other criteria (including proper planning,

			competent staff, and ownership)
Schmidt, Lyytinen, Keil, and Cule (2001)	Identification of software project risks via three international panels, including the following top 10 composite ranks:	1. Lack of top management commitment 2. Failure to gain user commitment 3. Misunderstanding of the requirements 4. Lack of adequate user involvement 5. Lack of required knowledge/skills in the project personnel	6. Lack of frozen requirements 7. Changing scope/objectives 8. Introduction of new technology 9. Failure to manage end user expectations 10. Insufficient/inappropriate staffing
Cooke-Davies and Arzymanow (2003)	9 domains identified that are important to PM practices but differed from industry to industry	1. Project culture 2. Organizational leadership 3. Business culture 4. Multi-project management 5. PM structure, methods, and systems	6. Degree of authorization 7. Location of information 8. Matching type of team to project 9. Capability of PM staff 10. Strength of project versus functional management
Sonnekkus and Labuschagne (2004)	Explores the relationship between IT project management maturity and IT project success in South Africa. These factors were based on interviews with IT project managers, but the number of interviewees was not disclosed.	1. Auditing of processes 2. Business objectives 3. Change control processes 4. Communication infrastructure 5. Executive support	6. Formal methodologies 7. Handling of change 8. Project manager competency / experience 9. Project team 10. Requirements definition

Table 1. Project Management Success Factors

RESEARCH METHODOLOGY

A modified rank order Delphi study (Schmidt 1997) was used to identify factors that influence the IT PM capability. In a Delphi study, a panel of experts is used to provide iterative feedback on a topic. Our panel of experts consists of 33 IT project managers working in IT organizations in the public sector. Demographic information on the panel is provided in Table 2 and indicates that the panelists all had extensive experience in IT project management.

Number of Participants		33
Gender (Note: 3 participants did not disclose their gender)		
Male	63.33%	19
Female	36.67%	11
Highest Education Level Attained		
2 year degree	15.20%	5
4 year degree	45.45%	15
Graduate degree	36.36%	12
Other	3.03%	1
# of Years in the IT Industry		
< 5 years	9.09%	3
5 to 10 years	9.09%	3
11 to 15 years	24.24%	8
16 to 20 years	18.18%	6
> 20 years	39.39%	13

# of Years of IT Project Management Experience		
< 5 years	24.24%	8
5 to 10 years	27.27%	9
11 to 15 years	21.21%	7
16 to 20 years	18.18%	6
> 20 years	9.09%	3

Table 2. Panel Demographic Information

Our Delphi process follows the 3 phases of Schmidt (1997): 1) brainstorming; 2) narrowing down; 3) ranking.

In phase 1 of the Delphi study, the goal is to solicit as many PM effectiveness measures as possible from the panel. A one-hour brainstorming session was held in a face-to-face meeting of the panelists. Table 3 lists the 35 factors identified by the panel in phase 1.

Item #	**Description**
1	Top management support (e.g. CIO support) of PM processes
2	Top management driving implementation of PM processes as an organizational objective.
3	Getting the right executive sponsor for the project
4	Availability of training opportunities for individual project managers
5	Project Managers maintaining good working relationship with functional managers / department heads
6	Role of project manager clearly delineated from functional managers / department heads
7	Control by the project manager of organizational resources (e.g. people, funds)
8	Loyalty of project team members to the project
9	Reward system in place to reward successful teams
10	Reward system in place to reward high-performing team members
11	An organizational culture that embraces change
12	An organizational culture that does NOT operate in crisis mode.
13	An organization with a defined strategy
14	An organization with measurable objectives
15	An organization with business processes defined
16	An IT organization with a defined strategy
17	An IT organization with measurable objectives
18	An IT organization with IT processes defined
19	An IT organization with IT architecture standards (e.g. in the areas of network security, database technologies, etc.) clearly defined
20	An IT organization that follows industry standards and/or best practices (e.g. ITIL, ISO standards, CoBIT)
21	The educational level of the project manager
22	The number of years experience of the project manager
23	The certifications (e.g. PMP) that a project manager has attained.
24	Participation of the project manager(s) in communities of practice (such as SCOPE).
25	A project portfolio management process in place to prioritize projects.

26	A project portfolio governance process to manage the progression of projects within the portfolio.
27	A formal Project Management Organization (PMO)
28	A formal PMO with dedicated people in the PM role
29	A clear understanding of each team member's role in a project.
30	A clear understanding of each team member's authority in making decisions
31	An understanding by the project manager of organizational politics and the power structure of the organization
32	The ability of a project manager to obtain team consensus in order to move a project forward.
33	The alignment of project teams with the organization's strategic plan.
34	A clear definition of success for the project team (critical success factors)
35	The ability of the project manager to understand the technical issues related to the IT project.

Table 3. Phase 1 Factor Identification

Phase 2 of the process involves narrowing down the list of factors so that the factors can be meaningfully ranked. This portion of the Delphi process was accomplished via an electronic survey. Each panelist was given the opportunity to evaluate each of the 35 factors in terms of its impact to IT project management effectiveness. A 5-point Likert scale ("Very Unimportant" to "Very Important") was used to evaluate each factor. After each factor was evaluated, each panelist identified his or her top 5 factors without associating a rank to the factors. Table 4 lists the mean response for the 35 factors, as well as the frequency each factor was selected as a top 5 factor.

In order to progress to Phase 3 of the Delphi study, the list of 35 factors must be narrowed down to a manageable number so that ranking is feasible. From Table 4, the factors that were identified as most important by five or more panelists were retained (non-shaded rows). This resulted in a pared down list of 13 factors to be ranked by the panel in Phase 3.

The 3rd phase of the Delphi process is currently incomplete. A final face-to-face meeting with the panel is scheduled for November 2006. During this meeting, the reduced list of 13 factors will be ranked. A mean rank can then be calculated for each item, and a degree of consensus can be assessed.

DISCUSSION/CONCLUSION

Even though the panel has not reached a consensus yet on the final rankings of the factors impacting the IT PM capability, we can draw some preliminary insights based on the phase 2 data. Most significantly, the panel overwhelmingly viewed issues at the organizational or project team level as more important than individual-level project manager characteristics. Only two of the top 13 factors related to individual-level characteristics of project managers (item # 5 and 31). These two individual characteristics focused on maintaining good relationships with functional managers and department heads (item #5) and an understanding of organizational politics and the power structure (item #31) – two "softer" issues typically not addressed by PM best practices and maturity models. Additionally, the panel was consistent with Johnson et al. (2001) in identifying top management support as the overall most important factor impacting the IT PM capability.

When the Delphi study is completed, we plan to classify the top factors into their respective level of impact – individual level, project team level, IT organizational level, and organizational level and integrate these factors into the conceptual model (Figure 1). This Delphi study represents a first step in rigorously identifying the constructs impacting the IT PM capability and sets the stage for testing and validation of the conceptual model.

Item #	Description	Mean	Std Dev	Selected in Top 5
1	Top management support (e.g. CIO support) of PM processes	4.48	1.20	22
34	A clear definition of success for the project team (critical success factors)	4.33	1.34	12
2	Top management driving implementation of PM processes as an organizational objective.	4.27	1.18	12
3	Getting the right executive sponsor for the project	4.30	1.13	11
29	A clear understanding of each team member's role in a project.	4.30	1.31	11

25	A project portfolio management process in place to prioritize projects.	4.06	1.27	11
5	Project Managers maintaining good working relationship with functional managers / department heads	4.27	1.26	10
13	An organization with a defined strategy	4.12	1.19	8
8	Loyalty of project team members to the project	4.06	1.20	6
26	A project portfolio governance process to manage the progression of projects within the portfolio.	3.88	1.14	6
31	An understanding by the project manager of organizational politics and the power structure of the organization	4.27	1.33	5
6	Role of project manager clearly delineated from functional managers / department heads	4.06	1.12	5
33	The alignment of project teams with the organization's strategic plan.	3.88	1.24	5
14	An organization with measurable objectives	4.15	1.12	4
16	An IT organization with a defined strategy	4.12	1.14	4
7	Control by the project manager of organizational resources (e.g. people, funds)	3.67	1.14	4
17	An IT organization with measurable objectives	4.15	1.15	3
11	An organizational culture that embraces change	4.03	1.10	3
32	The ability of a project manager to obtain team consensus in order to move a project forward.	3.97	1.33	3
12	An organizational culture that does NOT operate in crisis mode.	3.88	1.29	3
27	A formal Project Management Organization (PMO)	3.52	1.09	3
4	Availability of training opportunities for individual project managers	4.09	0.98	2
15	An organization with business processes defined	3.97	1.13	2
19	An IT organization with IT architecture standards (e.g. in the areas of network security, database technologies, etc.) clearly defined	3.94	1.12	2
20	An IT organization that follows industry standards and/or best practices (e.g. ITIL, ISO standards, CoBIT)	3.45	1.09	2
18	An IT organization with IT processes defined	4.09	1.10	1
22	The number of years experience of the project manager	3.61	1.12	1
24	Participation of the project manager(s) in communities of practice	3.61	1.09	1
35	The ability of the project manager to understand the technical issues related to the IT project.	3.52	1.06	1
23	The certifications (e.g. PMP) that a project manager has attained.	3.45	0.94	1
21	The educational level of the project manager	3.27	0.88	1
30	A clear understanding of each team member's authority in making decisions	4.24	1.23	0
9	Reward system in place to reward successful teams	3.91	0.80	0
10	Reward system in place to reward high-performing team members	3.91	0.84	0
28	A formal PMO with dedicated people in the PM role	3.64	1.11	0

Table 4. Phase 2 Factor Reduction*

*Note: Top 13 Factors are not shaded.

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