Knowledge Transfer and Quality Practices in the Implementation of an Outsourcing Capability Model

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Abstract

This study adopts the lens of knowledge transfer to examine the implementation of a process improvement framework for outsourcing service providers. Our research model uses Szulansky’s (1996) framework to identify the factors that affect knowledge transfer between the initial implementation team and the organization as well as the factors that affect assimilation of the knowledge into organizational practices. We evaluate our model using detailed archival data collected on the implementation of the eSourcing Capability Model (eSCM) for Service Providers in an offshore delivery center of a large organization. Specifically, we examine knowledge explicitness and complexity, source credibility, the existence of prior quality programs, and the sharing of resources across implementation teams. The current phase of the study examines how knowledge-related factors affect the time to initially implement each practice in the model and the time at which each practice becomes sufficiently assimilated within organizational processes. In addition, we examine the relationship between the time to implement each practice in the model and the probability of successful assimilation of that practice. Future phases of the research will study the implementation of the model in other delivery centers and the performance outcomes associated with the implementation of the model.

1. Introduction

Outsourcing of business services is defined as the procurement of service functions from an external provider. While the practice of services outsourcing has always been a facet of modern business, its importance has increased with the maturation of information technology (IT). Networking technology has enabled the delivery of services over a virtually unlimited geographical range, and software applications have increased the scope of services that can be outsourced. Services offshoring has continued to increase steadily in India, the Philippines and many South American countries over the past decade. However, in spite of the interest in outsourcing and its many success stories more than half of outsourcing relationships fail within 5 years, and many clients state that outsourcing providers do not adequately understand what is
required of them (Ozanne, 2000). Some commonly cited issues include a lack of understanding of success criteria, ineffective practices for service definition and delivery, and poor relationship management.

One way to mitigate the risks inherent in outsourcing relationships is for outsourcing service providers to adopt a common set of effective processes, methods and technologies for service delivery in their delivery centers. However, implementing such practices can be very challenging. Process improvement of any kind is not simply a matter of individuals embracing incremental changes. Instead, individuals in various roles and units must fundamentally rethink their work patterns and relationships, develop new cognitive frameworks and schemas (Spencer, 1994; Mitki et al., 1997) and embed these new structures into their work practices (Ravichandran and Rai, 2003). Improvement emanates from a deep and broad understanding of current work processes, their patterns and implications. Developing this kind of understanding requires knowledge transfer about processes and practices between individuals occupying various organizational roles and located in different work units.

Knowledge transfer is a dyadic exchange in which a recipient learns and applies knowledge transmitted from a source (Argote and Ingram, 2000; Ko et al., 2005). Knowledge can be transferred via mechanisms such as training, technology, and personnel movement (Darr et al., 1995; Argote, 1999; Alavi, 2005). Recent research in information systems (IS) has focused on knowledge transfer as an important factor that differentiates firms that simply adopt innovations from firms that fully assimilate innovations into everyday use (Cooper and Zmud, 1990; Fichman and Kemerer, 1997; Ko et al., 2005). In this study, we use the knowledge transfer lens to examine the implementation process of an improvement framework for outsourcing service providers – the eSourcing Capability Model for Service Providers (eSCM-SP; Hyder et
al, 2004a; Hyder et al, 2004b). Specifically, we focus on factors that affect knowledge transfer between the quality team and the organization as well as factors that affect infusion of the knowledge into organizational practices. Following the general framework for knowledge transfer of best practices as prescribed by Szulanski (1996), we study the characteristics of the knowledge, characteristics of the source and recipient, and characteristics of the organizational context. We also examine how previously implemented quality practices affect the transfer of new practices.

The proposed research is innovative in a number of ways. First, this research will integrate previous research in knowledge management and transfer, quality management practices, and information systems implementation. In contrast to prior work which utilized survey methods to capture a broad cross-section of users, this research design involves investigation of implementation practices within one large service provider. While this potentially limits our ability to generalize results, it enables us to control for cross-sectional differences across firms and isolate how differences in the characteristics of knowledge, source, and recipient interact with knowledge transfer mechanisms to impact implementation success. Second, the research setting is novel. Services science is an area that has captured increasing interest in business and academia (Lohr 2006), and major IT firms such as IBM have identified services sciences as a priority area for research and hiring (Wladawsky-Berger 2006). The eSCM-SP (v2) is a relatively new improvement framework but it has already received much attention from outsourcing practitioners. Carnegie Mellon has had resounding success in developing previous capability models such as the CMM (Paulk et al, 1995), and the eSCM-SP v2 seems well positioned to become a widely adopted standard. Understanding the issues that affect the implementation of models such as the eSCM-SP and the ultimate performance impacts
that organizations experience from implementing these models is important from the perspective of both research and practice. Finally, the proposed research will leverage several primary data sources: detailed implementation project schedules and documentation collected from one of the first service providers to implement and receive certification in the eSCM-SP v2.

2. Background

2.1 eSsourcing Capability Model for Service Providers (eSCM-SP)

The eSCM-SP v2 was developed by the IT Services Qualification Center (ITSqc) at Carnegie Mellon University to enable service providers to determine and improve their capabilities in service design and delivery, to provide clients with an objective means of evaluating and comparing service providers, and to offer service providers a standard to use when differentiating themselves from their competitors. The model consists of 84 “best” practices, each consisting of a set of activities that must be implemented before the Practice is considered to be complete. Each Practice may be characterized along several dimensions, including:

- **Capability Area**: one of ten logical groupings that represent critical outsourcing functions (e.g., Contracting, Technology Management, or Service Design and Delivery).
- **Practice type**: the type of documentation used when implementing the Practice (e.g., procedure, guideline, or plan).
- **Support**: thirteen Practices in the Model that provide support for Practice institutionalization; they help build infrastructure and corporate culture so that an organization’s methods and procedures become the standardized way of doing business.
- **Capability Level**: there are five capability levels that describe an improvement path for the service provider: Level 1-providing services; Level 2-consistently meeting requirements;
Level 3-managing organizational performance; Level 4-proactively enhancing value; Level 5-sustaining excellence.

- **Sourcing Life-cycle**: the phase within the outsourcing lifecycle where the Practice is used (Initiation, Delivery, Completion, or Ongoing)

Service providers can achieve certification in the Model. Certifications are conducted by a third-party ITSqc-authorized external evaluation team who reviews evidence of implementation of the Model Practices. Their findings are reviewed by the ITSqc who makes the final decision on certification. Once a certification is given it is valid for up to two years.

### 2.2 Assimilating Innovations

Much of the literature on IT implementation, dating back to Cooper and Zmud’s (1990) seminal work, has focused on the differences between an organization’s simple adoption of a technology and the infusion of the technology into everyday use. Organizations that more fully assimilate innovations can be expected to derive greater benefits from them (Fichman, 2004a). Attewell (1992) argued that with complex organizational technologies, firms would need to overcome initial knowledge barriers before they would adopt an innovation; however, once those barriers are overcome and skills related to the technology are developed, the technology can be assimilated. Hardgrave et al (2003) demonstrated empirically that many of the cognitive factors that predict the degree of information technology assimilation also affect the assimilation of process methodologies. Following in this vein, we characterize the assimilation of the eSCM-SP v2 as a two-stage process. In the first stage, the implementation stage, a quality team that has received training in the Model works with process owners throughout the organization. Knowledge about the Model is transferred from the quality team members to the process owners. This is analogous to Cooper and Zmud’s “Adaptation” stage whereby the technology is installed...
but not necessarily used. In the second stage, the certification stage, the process owners work with their respective departments to ensure that the Practices in the Model are fully incorporated within the organization’s processes. The process owners work with end users to transfer knowledge about the Practices. In addition, a central “Quality Team” is responsible for ensuring compliance on an organizational level. This stage is analogous to Cooper and Zmud’s “Routinization” stage whereby the application is used in a comprehensive and integrative manner. Certification in the Model cannot occur until this second stage is complete. Between the Adaptation and Routinization stages is Cooper and Zmud’s “Acceptance” stage, where organization members are encouraged to use the application and the application is initially employed in organizational work. While we do not explicitly model the Acceptance stage within our framework, it is implied within the transfer from the first stage to the second stage. Indeed, encouragement of eSCM-SP v2 usage and its employment in daily tasks are among the necessary certification requirements.

For certification, an independent auditor performs a formal assessment to ensure that the organization is in compliance with each Practice necessary for a particular Capability Level. Each Practice can receive a rating of Satisfied, Partially Satisfied, or Not Satisfied during an assessment. Organizations often choose to perform one or more internal self-assessments between the initial implementation stage and final certification.

Because we wish to examine each of the assimilation stages separately, each of our hypotheses below is stated twice: once in terms of the implementation (adaptation) stage and once in terms of the certification (routinization) stage. For the implementation stage, our primary outcome of interest will be the actual time required to implement each Practice, controlling for initial estimates of the time to implement each Practice. For the certification
stage, our primary outcome of interest will be the likelihood that a Practice receives a “Satisfied” rating during its first assessment.

3. Research Motivation and Hypotheses

Fichman and Kemerer (1997) showed that companies with prior related knowledge and a greater diversity of knowledge are better able to adopt and assimilate technological innovations. Assimilation is less costly for these organizations because prior knowledge and diversity of knowledge make it easier for knowledge transfer across the organization to occur. A large and growing body of research has shown that the transfer of knowledge within organizations may be affected by characteristics of the organization and characteristics of the knowledge itself (Argote, 1999). Szulanski (1996) categorizes factors affecting knowledge transfer into four groups: characteristics of the knowledge, characteristics of the source of knowledge, characteristics of the recipient of knowledge, and characteristics of the organizational context. We will use this framework in our research.

3.1 Characteristics of the Knowledge

Tacit knowledge is knowledge that is difficult to formalize and articulate. It often has a personal quality that requires a common understanding to communicate effectively. Explicit knowledge refers to knowledge that is easily codifiable and transmittable in a formal, systematic language. Much of the knowledge management literature has likened explicit knowledge to declarative knowledge, the knowledge of facts, rules or formal procedures – the “what to do” component of a task. Declarative knowledge is often contrasted with procedural knowledge, the “how to do” portion of the task, which is often likened to tacit knowledge (Anderson, 1985, 1993). Generally, knowledge that is tacit or not well understood is more difficult to transfer than explicit knowledge (Nonaka, 1994). Zander and Kogut (1995) found that knowledge that has
been codified into documents or software is more easily transferred than knowledge that has not been codified. Epple, Argote, and Murphy (1996) also showed that knowledge that is codified and embedded in technology is more easily transferred among members of an organization. An interaction between knowledge explicitness, transferability and organizational structure may also exist. Osterloh and Frey (2000) showed that tacit knowledge is more easily transferred among tightly embedded team members who are intrinsically motivated. Similarly, Uzzi (1996) showed that tacit knowledge is more easily transferred among firms with tightly embedded relationships. This leads us to hypothesize that:

**H1a.** Practices that contain more tacit knowledge will take longer to implement.

**H1b.** Practices that contain more tacit knowledge are less likely to be satisfied in their initial assessment.

The complexity of knowledge also affects its transferability; in general, more complex knowledge is more difficult to transfer. Aside from the explicitness dimension, complexity can be defined in terms of the volume of information or the degree to which the knowledge is interdependent with other knowledge that is being learned simultaneously (Hansen, 1999). Knowledge that is more complex must be understood in larger “chunks” in order to be absorbed effectively, and this makes the learning process more difficult and time-consuming. Gailbraith (1990) showed that the transfer of more complex manufacturing technology was associated with larger losses in initial productivity than the transfer of simple technology. Ouinjan and Carne (1987) also showed that increased complexity reduced the rate of knowledge diffusion. Meyer and Goes (1988) showed that increased complexity reduced the rate of innovation, but that this reduction could be moderated by organizational-level factors such as compatibility, skill, and management advocacy. Thus, we would expect that:
H2a. Practices that are more complex will take longer to implement.

H2b. Practices that are more complex are less likely to be satisfied in their initial assessment.

3.2 Characteristics of the Source

Analyses of knowledge transferability related to the source of knowledge have centered largely on credibility and trust. Sources that are seen as more competent or trustworthy can more easily transfer knowledge to the recipient (Szulanski, 1996). Levin and Cross (2004) found that trust based on competence or benevolence was the primary factor that increased knowledge transfer among individuals with established relationships. Competence in performing a task is often perceived as a function of experience performing related tasks. Close relationships between the source and the recipient have repeatedly been shown to increase the ability to transfer knowledge (Uzzi, 1997; Reagans and McEvily, 2003). Tenkasi and Chesmore (2003) found that the presence of a close relationship was an effective predictor of success in organizational process reengineering projects. Trust in the relationship may increase knowledge receptivity particularly under conditions of causal ambiguity, where the precise reasons for the success or failure of a capability in a new setting cannot be precisely determined (Szulanski et al, 2004). Common understanding between the source and recipient may also facilitate knowledge transfer. A common understanding may arise when the source and recipient share common related knowledge or a common technical language which facilitates communication. Parties that share similar knowledge bases and have a shared understanding of where knowledge resides within the source are more successful at transferring knowledge (Nelson and Cooprider, 1996; Cummings and Teng, 2003). Functional alignment – where the source and the recipient have related or similar work backgrounds or experiences – generally results in an increase in shared
knowledge. Within an organization, this common understanding may be facilitated if the source and recipient come from the same organizational unit (Darr et al, 1995; Argote et al, 2003)\(^1\).

The source of the knowledge in this study is the group of people responsible for implementing the eSCM-SP v2 at the research site. The implementation effort was carried out by eight separate quality teams each consisting of two to seven people. These teams interacted with key process owners within different parts of the organization. We will focus on the credibility of the source in terms of the source’s experience in implementing eSCM-SP Practices. Source credibility should facilitate trust between the source and recipient, promoting more effective knowledge transfer. Thus:

**H3a.** Practices transferred by a source that is less credible will take longer to implement.

**H3b.** Practices transferred by a source that is less credible are less likely to be satisfied in their initial assessment.

### 3.3 Characteristics of the Recipient

The absorptive capacity of the recipient has been shown to be a primary determinant of the ability to transfer knowledge (Cohen and Levinthal, 1990; Tsai, 2001). This capacity is generally related to the recipient’s preexisting stock of knowledge (Szulanski, 1996) because the recipient may be able to associate the new knowledge with what they already know. Reagans et al (2005) showed that individual experience and team experience increased the rate at which knowledge transfers. From an IS implementation perspective, Worley et al. (2005) demonstrated that preexisting business-related knowledge facilitated knowledge transfer during a PeopleSoft implementation. This example may be particularly relevant because the implementation of Enterprise Resource Planning packages such as PeopleSoft usually involves some business

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1. Data on functional alignment were not available at the time of submission of this paper.
process reengineering, similar to a quality methodology. Prior technological knowledge may also lead to a higher degree of post-adoptive use of the technology (Ravichandran, 2005; Lippert and Forman, 2005). In addition, prior experience with a technology has been shown to increase post-adoptive use (Jasperson et al, 2005). Gailbraith (1990) demonstrated that previous experience with the transfer of technology reduced productivity loss during the transfer of new technology. Absorptive capacity may also increase an organization’s flexibility in using technology and the pursuit of strategic follow-on investments or refinements (Fichman, 2004b).

The existence of previous related knowledge may not always have a positive effect on knowledge transfer. Szulanski (1996) found that a recipient’s ability to retain previously learned knowledge was negatively related to the ability to absorb new knowledge. This may be because the previous knowledge has been embedded into organizational routines and must be unlearned before the new knowledge can be implemented (Rampersad, 2004). Purvis et al (2001) found that adoption of a prior methodology reduced the degree of assimilation of a new methodology. However, compatibility between a prior methodology and a new methodology has been shown to increase the degree of assimilation (Purvis et al, 2001; Reimenschneider and Hardgrave, 2002).

Because the eSCM-SP v2 was designed in part to complement existing methodologies, we believe that the existence of prior methodology knowledge will have an increasing, rather than a decreasing, effect on knowledge transfer.

This study will examine absorptive capacity of the recipient largely as a function of previous experience in implementing quality practices. Prior research has revealed that quality programs such as ISO 9000 increase an organization’s ability to codify knowledge at both individual and organizational levels (Benezech et al, 2001). Mukherjee et al (1998) showed that the implementation of quality practices increased both conceptual learning (assessment and
design of abstract concepts) and operational learning (implementing and observing changes). Linderman et al (2004) argue that quality programs help organizations to create and retain future knowledge; the effective creation of this knowledge is a primary driver of the benefits the organization receives from implementing the practices. The codification of knowledge and its embedding into organizational routines has been shown to increase success in the implementation of quality practices such as those embodied in the CMM (Ravichandran and Rai, 2003). The progression of technology usage behaviors into habits or routines is also a significant predictor of post-implementation success (Jasperson et al, 2005). In summary, the existing research suggests that the prior implementation of quality practices would facilitate the implementation of new quality practices. However, this relationship has not been explicitly tested using two formalized quality programs.

For this study, all areas within the research site had previous experience implementing at least one quality methodology prior to implementing the eSCM-SP v2. However, certain areas (e.g. Technology) within the site had separately implemented other quality programs as well, and these programs may affect knowledge transfer within those areas, such that:

**H4a:** Practices transferred to a recipient with less experience in quality practices will take longer to implement.

**H4b:** Practices transferred to a recipient with less experience in quality practices are less likely to be satisfied in their initial assessment.

### 3.4 Characteristics of the Context

Characteristics of the context for knowledge transfer include the organizational structure and environment as well as the presence of specific knowledge transfer mechanisms. Knowledge may be transferred through the movement or sharing of individuals among teams or
organizational units (Allen, 1977; Rothwell, 1978). The movement of personnel may be a particularly effective mechanism when the knowledge to be transferred is tacit in nature (Barry and Broadbent, 1987). Knowledge may be transferred through regular meetings or other forms of communication (Darr et al, 1995). Knowledge may also be transferred via indirect observation or through direct training, particularly if individuals are in the same location (Argote, 1999). In addition, knowledge may be easily stored and transferred in the form of knowledge management systems or other information repositories (Alavi et al., 2005).

At this research site, several knowledge transfer mechanisms were used. Directed training and other forms of face-to-face communication were a primary component of knowledge transfer. In addition, some quality teams shared members, facilitating the transfer of knowledge across teams. Weekly and bi-weekly meetings also facilitated knowledge transfer between teams and process owners. Finally, the research site made use of two separate knowledge management systems. The frequency of usage of any knowledge transfer mechanism can be referred to as its intensity of use (Slaughter and Kirsch 2006). Generally, we would expect that more intense use of these mechanisms would facilitate knowledge transfer, such that:

**H5a**: Practices will take longer to implement the less intense the use of mechanisms in their transfer.

**H5b**: Practices are less likely to be satisfied in their initial assessment the less intense the use of mechanisms in their transfer.

While the intense use of mechanisms should generally facilitate knowledge transfer, different knowledge transfer mechanisms may be even more effective than others depending on the type of knowledge that is being transferred. For knowledge that is tacit and not easily codified, people-based mechanisms (such as direct person-to-person training, face-to-face communication,
and sharing team members) are usually more effective methods of transferring knowledge (Nonaka, 1994). In contrast, knowledge that is explicit and can be easily codified may be effectively transferred using knowledge management systems (Zander and Kogut, 1995). This implies that:

**H6a:** A greater use of people-based mechanisms will reduce the time to implement a Practice, especially if the Practice contains more tacit knowledge.

**H6b:** A greater use of people-based mechanisms will increase the likelihood that a Practice is satisfied in its initial assessment, especially if the Practice contains more tacit knowledge.

**H7a:** A greater use of knowledge management systems will reduce the time to implement a Practice, especially if the Practice contains more explicit knowledge.

**H7b:** A greater use of knowledge management systems will increase the likelihood that a Practice is satisfied in its initial assessment, especially if the Practice contains more explicit knowledge.

### 3.5 Relationship Between Stage Completions

To this point, we have been examining knowledge transfer as an antecedent to implementation and certification success. While characteristics of knowledge transfer are expected to affect each of these stages, the specific relationship between the stages remains unclear. Perhaps owing to the fact that there are so many different assimilation models in the existing I/S literature, there is a lack of consistent research examining the effect that the completion of one stage may have on the completion of a subsequent stage. Understanding this relationship may be particularly important for process-driven innovations because greater assimilation of the processes into everyday use is so critical to success.
For our model, we contrast Practices that take a relatively short time to implement with Practices that take a relatively long time to implement. Controlling for other factors (complexity, tacitness, etc.) a shorter implementation cycle may indicate that the implementation stage was performed hastily or in a manner that was not thorough. This would suggest that further assimilation of the Practice to the point of certification would take longer or be less likely to occur. Conversely, an extremely long implementation cycle (controlling for other factors) may indicate that the organization encountered some difficulties implementing the Practice; for example, the processes contained within the Practice may be significantly different from the organization’s existing processes. Therefore, a lengthy implementation may also suggest that full assimilation would be less likely to occur. In contrast, Practices with intermediate implementation times would have a higher rate of certification success.

The preceding discussion suggests an inverse U-shaped relationship between the time to implement and the likelihood of certification success (please see Figure 1):

**H8:** Practices with relatively short or long implementation times will have a lower likelihood of certification success, and practices with an intermediate implementation time will have a higher certification of success, suggesting an inverse U-shaped relationship.
Figure 1. Hypothesized Relationship Between Implementation and Certification

The hypotheses are summarized below and shown as they related to the constructs we will be exploring (please see Figure 2).
4. Research Design

4.1 Setting

The research setting for our study is a large offshore service delivery center of a multinational company. This site has received Level 3 certification in the eSCM-SP v2 and has several thousand employees. We will study detailed project records and documentation on the implementation of the eSCM-SP v2 in this delivery center.

4.2 Data and Measures

4.2.1 Implementation Timeliness

The primary dependent variable used to test hypotheses 1a through 6a is the actual time to implement each Practice within the Model, log-transformed. This variable is measured using
internal project plan documents from the site. The implementation of the Model at the site was conducted through two distinct projects: one for the financial services business unit and one for the human resources business unit. For Level 3 certification in eSCM-SP v2, 74 Practices must be implemented; therefore, we have a total of \(2 \times 74 = 148\) observations for this site. Because there are underlying differences between the two projects, the data will be analyzed separately for each, although some summary analyses will be run for the entire dataset.

### 4.2.2 Ratings Success

The primary dependent variable used to test hypotheses 1b through 6b will be whether or not each Practice receives a Satisfied rating in its initial assessment. Practices may be deemed Satisfied, Not Satisfied, Partially Satisfied, or Not Applicable. A Practice may be deemed not applicable, for example, if it does not relate to delivered services; not applicable Practices will be dropped from the analysis. As with hypotheses 1a through 6a, we have a total of 148 observations. Separate assessments were conducted for each project.

### 4.2.3 Independent Variables

#### 4.2.3.1 Tacitness

Each Practice was assigned a tacitness rating from one (low) to three (high) by five independent coders who are familiar with the model. Guidelines for coding the level of tacitness were derived primarily from three factors: the degree of prior organizational knowledge required to implement the Practice; the degree to which the Practice requires creative or innovative thinking; and the degree to which the activity must be customized, or adapted to meet engagement- or service-level requirements (Sternberg, 1986). For example, each Practice within the eSCM-SP v2 contains between three and fifteen documentation activities. The description of one activity (KNW02-B1) reads “Identify the information needed by personnel to inform their work”. This activity contains a high level of tacit knowledge because it requires a
prior understanding of relevant business processes and the types of information and personnel that are needed to execute those processes. In contrast, the activity “Provide the information to appropriate personnel” (KNW02-B8) is a more automatic task that requires little or no outside information, given the fact that appropriate personnel have already been identified. Practices with a higher level of activities requiring tacit knowledge would be more likely to receive high tactiness ratings.

Correlations between the coders were checked to ensure reliability. One coder was found to produce ratings that were consistently different from the others; that coder’s ratings were then dropped from the analysis. The remaining ratings were then averaged to generate a mean tacitness score for each Practice.

4.2.3.2 Complexity. In existing research, the degree of tacitness has also been used as a measure of complexity. In this case, we wish to draw a distinction between reliance on related outside knowledge (i.e. measure of tacitness) and complexity based purely on information within the model. The primary measure of complexity that was used is the degree to which the Practice is related to other Practices within the model. This level of relatedness was calculated using UCINET (Borgatti et al, 2002), a prominent social network analysis tool. A map of dependencies among Practices was generated by two of the eSCM-SP v2 authors. Based on these dependencies, UCINET generated a number of centrality measures indicating the degree of interrelatedness for each practice. The complexity measure used for this study will be Eigenvector Centrality, which indicates the closeness of one node (Practice) to all others in the network (model; Hanneman and Riddle, 2005). A higher level of Eigenvector Centrality implies higher complexity.
4.2.3.3. Credibility. Traditional measures of source credibility include organizational tenure or job title. However, in this case there is little variation among implementation team members; many were hired into the organization specifically for the eSCM implementation. Instead, we will use time spent on the implementation project as our measure of credibility. For each Practice, we calculated (in days) the amount of time the responsible team member had spent on the project before starting the implementation of that Practice.

4.2.3.4. Prior Quality Practices. The effect of prior quality practices on model implementation and assimilation has two dimensions. First, each organizational unit within the research site had adopted a unique subset of seven existing methodologies prior to involvement with eSCM-SP v2. This information was obtained from audit reports maintained at the resource site. Second, each Practice within the model has been constructed to be compatible with an existing methodology or set of methodologies. Compatibility between each of the Practices and a set of six existing methodologies has been calculated by the authors of the model. For each existing methodology, each Practice has been rated as fully compatible, partially compatible, or not compatible with the methodology. Binary variables were generated for each program with 0 indicating no prior quality practices in the recipient’s work unit and 1 indicating prior quality practices in the recipient’s work unit. In addition, binary variables were generated for each program and practice combination for partial or full compatibility.

Quality practices will be modeled in two ways. First, we will test for main effects based on whether the Practice is partially or fully compatible with the CMMI or SW-CMM methodologies. CMMI and SW-CMM in particular were chosen for this site because they are the only methodologies for which differences in experience among team members exist. However, all implementation team members had experience with at least one existing quality
methodology. Experience with any quality methodology may improve implementation or assimilation outcomes if the new methodology is also compatible with an existing methodology. Second, we will test for interaction effects based on whether the implementation team member has experience with CMMI or SW-CMM specifically. Individuals with CMMI or SW-CMM experience should be expected to implement or assimilate Practices that are compatible with those methodologies more readily.

4.2.3.5. People-based Knowledge Transfer. Many implementation team members participated in multiple teams, enabling knowledge transfer across Practices. A binary variable was created for each Practice indicating whether members of its implementation team also participated in other teams. This variable will be analyzed both as a main effect (Hypothesis 5) and as an interaction with tacitness (Hypotheses 6a and 6b).

4.2.3.6. Knowledge Management Systems. The implementation site used one knowledge management system (KMS) as a prominent tool during the eSCM implementation process. The number of documents in this system related to each eSCM Practice was tabulated in order to generate a count for each Practice. Although the number of documents present for each Practice does not necessarily indicate ongoing usage of the system, this variable serves as a useful proxy for overall usage. This variable will be analyzed both as a main effect (Hypothesis 5) and as an interaction with tacitness (Hypotheses 7a and 7b).

4.2.3.7. Control Variables. A binary variable was created to designate whether a Practice was an Ongoing Practice or belonged to one of the Sourcing Life-Cycles (Delivery, Completion, or Initiation). Ongoing Practices are more likely to involve persistent changes to organizational processes, while Practices belonging to the other life-cycles are more temporal in nature. In
addition, organizations are more likely to have existing processes that satisfy the requirements of the Practices in the other (not Ongoing) life-cycles.

4.2.4 Mathematical Model and Analysis

The data was analyzed in two phases: first for the implementation stage, and then for the certification stage. The fully specified linear model for the implementation stage for Practice $i$ is

$$\text{LOGDURATION}_i = \beta_0 + \beta_1 \text{TACIT}_i + \beta_2 \text{COMPLEXITY}_i + \beta_3 \text{TIME\_ON\_PROJECT}_i + \beta_4 \text{CMMI}_i + \beta_5 \text{EXPERIENCE}_i + \beta_6 \text{KM\_DOCS}_i + \beta_7 \text{TEAM\_SHARE}_i + \beta_8 \text{TACIT}_i \times \text{TEAM\_SHARE}_i + \beta_9 \text{TACIT}_i \times \text{KM\_DOCS}_i + \beta_{10} \text{ONGOING}_i + \varepsilon_i$$

(1)

We use a standard probit model to examine the factors influencing likelihood that the practice is satisfied in its initial assessment. In particular, we assume that the likelihood of satisfaction of Practice $i$ can be written as:

$$\text{SATISFIED}_i = \beta_0 + \beta_1 \text{TACIT}_i + \beta_2 \text{COMPLEXITY}_i + \beta_3 \text{TIME\_ON\_PROJECT}_i + \beta_4 \text{CMMI}_i + \beta_5 \text{EXPERIENCE}_i + \beta_6 \text{KM\_DOCS}_i + \beta_7 \text{TACIT}_i \times \text{TEAM\_SHARE}_i + \beta_8 \text{TACIT}_i \times \text{KM\_DOCS}_i + \beta_9 \text{TACIT}_i \times \text{TEAM\_SHARE}_i + \beta_{10} \text{ONGOING}_i + \beta_{11} \text{LOGDURATION}_i + \beta_{12} \text{LOGDURATION}_i^2 + \varepsilon_i$$

(2)
We assume the error terms are independent and identically distributed, giving us the standard probit model.

For the models testing certification success, one concern might be that the finish date of the initial implementation would affect the likelihood of receiving a Satisfied rating. Presumably, practices that have implementations that finish earlier would have more time to become embedded into everyday use, promoting a greater likelihood of success. However, this is controlled for in part by including the logged duration as one of the dependent variables in the probit models, so the finish date is not specified separately.

Table 1: Variable Definitions

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TACIT_i</td>
<td>A score of tacit knowledge given to each Practice (by coders)</td>
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<tr>
<td>2</td>
<td>COMPLEXITY_i</td>
<td>Eigenvector centrality score for Practice calculated by UCINET</td>
</tr>
<tr>
<td>3</td>
<td>TIME_ON_PROJECT</td>
<td>Number of days implementation team member had spent on project at beginning of Practice implementation</td>
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<tr>
<td>4</td>
<td>CMMI_i</td>
<td>A binary variable indicating whether the Practice was fully or partially compatible with CMMI</td>
</tr>
<tr>
<td>4</td>
<td>EXPERIENCE</td>
<td>A binary variable indicating the presence of previous CMMI experience for the area in which the eSCM-SP V2 Practice resides</td>
</tr>
<tr>
<td>5, 6</td>
<td>TEAM_SHARE</td>
<td>A binary variable indicating whether or not the implementation team member assigned to a Practice also participated in another team</td>
</tr>
<tr>
<td>5, 7</td>
<td>KM_DOCS</td>
<td>Number of documents in knowledge management system for each Practice</td>
</tr>
<tr>
<td>8</td>
<td>LOGDURATION</td>
<td>(Probit model only) Log-transformed implementation time of Practice</td>
</tr>
<tr>
<td>Control</td>
<td>ONGOING_i</td>
<td>A binary variable that indicates whether the Practice was an Ongoing Practice</td>
</tr>
</tbody>
</table>

5. Results and Discussion

5.1 Time to Implement

Coefficients and standard errors for all linear regression analyses are reported in Table 2. Results for the Financial Services business unit (FS) are reported in column 1, while results for the Human Resources business unit (HR) are reported in column 2. In certain instances (for
example, when the results from the two separate datasets are in conflict), we will examine analyses on the combined dataset.

Table 2: Time to Implement Results

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<tr>
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<td>(0.074)</td>
<td>(0.065)*</td>
</tr>
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<td>complexity</td>
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<td>0.009</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)**</td>
</tr>
<tr>
<td>credibility</td>
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<td>-0.027</td>
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<tr>
<td></td>
<td>(0.001)**</td>
<td>(0.015)~</td>
</tr>
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<td>cmmi_or_sw_cmm</td>
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<td>-0.182</td>
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<tr>
<td></td>
<td>(0.075)*</td>
<td>(0.114)</td>
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<tr>
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<td>0.251</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.128)**</td>
<td>(0.104)**</td>
</tr>
<tr>
<td>km_docs</td>
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<td>0.012</td>
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<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
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<tr>
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<td>0.006</td>
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<tr>
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<td></td>
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<td>74</td>
</tr>
<tr>
<td>R-squared</td>
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<td>0.46</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
~ significant at 10% level; * significant at 5% level; ** significant at 1% level

5.1.1. Knowledge Explicitness. For both the FS and HR implementations, as tacitness increased the time to implement the Practice decreased; this result is in the opposite direction than was predicted in hypothesis 1a. In addition, for the HR implementation this relationship was statistically significant. Therefore, hypothesis 1a was not supported. This finding is somewhat surprising, because the positive link between knowledge explicitness and transferability is well established. It does appear that the amount of explicitness within each practice varies considerably, both by Capability Area and Sourcing Life-cycle. Because the coefficient is relatively small – for example, a change from a 1 (low) rating to a 3 (high) rating would result in a decrease in implementation time of just 1 day - it may be the case that because the steps within
each Practice are codified, each Practice is by nature somewhat explicit and that the variation in tacitness that does exist is immaterial.

5.1.2. Knowledge Complexity. For the FS implementation, as complexity increased the time to implement the Practice also increased. However, this result was not statistically significant. For the HR implementation, as complexity increased the time to implement increased as well, and the relationship was statistically significant at the .01 level. Therefore, we have partial support for hypothesis 2a. Increased linkages between the Practices appeared to make the implementation of those Practices more difficult and time-consuming.

5.1.3. Source Credibility. For both the FS and HR implementations, the time to implement the Practice decreased the longer the source (implementation team member) had served on the project. This result was statistically significant at the .01 level for the FS implementation and marginally significant for the HR implementation. Therefore, hypothesis 3a was fully supported. The fact that this finding was highly significant on both implementations underscores its importance. The perception that an implementation team member is credible and trustworthy is critical to success, particularly when the project involves uncertainty. Changes to business processes or roles such as the ones prescribed in the eSCM-SP v2 are often stressful for employees, so trust in the implementation team’s abilities are particularly important.

5.1.4. Prior Quality Programs. For the FS implementation, compatibility between the Practice and CMMI / SW-CMM reduced the time to implement; this result was statistically significant. Curiously, the interaction between prior experience with CMMI / SW-CMM and Practice compatibility with those methodologies was positive, suggesting the time to implement would increase. Results for the HR implementation ran in the same direction, and the interaction was statistically significant in the positive direction. When the two datasets were combined, both the
main effect and the interaction were significant at the .01 level. Therefore, support for hypothesis 4a was mixed. Compatibility with the methodology reduced implementation time, but prior experience with the methodology increased it.

The opposing signs on the coefficients of these variables provide an interesting contrast. Prior research (Purvis et al, 2001; Reimenschneider and Hardgrave, 2002) showed that compatibility between a new methodology and an existing methodology would promote assimilation; that conclusion is supported here. Since all personnel at the site had experience with prior quality programs, to an extent they had all been exposed to a “process-driven” method of working, so Practices that were compatible with an existing methodology may have seemed more familiar. However, in those areas that were most familiar with the methodology – those experienced with CMMI or SW-CMM – the implementation times actually increased. This may support Szulanski’s (1996) finding that processes may need to be unlearned before others are learned, and this may take additional time. In this case, we only had data to specifically test experience with CMMI and SW-CMM, and this experience was confined to only a few areas. Further testing with other methodologies will be necessary to fully understand this relationship.

5.1.5. Knowledge Transfer Mechanisms. For the FS implementation, when team members were shared across teams the time to implement was reduced. This result was statistically significant at the .01 level. For the HR implementation, the sharing of team members actually increased the time to implement; this result was also statistically significant at the .01 level. For the combined dataset, the relationship was in the expected direction and significant at the .01 level. Therefore, we have partial support for hypothesis 5a. Differences in the effects of team sharing between the FS and HR implementations are somewhat surprising and bear further investigation. Because implementation times per Practice were generally lower for the HR implementation, it is possible
that the coordination costs relative to the total duration did not outweigh the benefits of knowledge transfer via personnel rotation. Understanding the exact nature of this relationship may be important to future implementers of quality models such as the eSCM-SP. For large implementation projects, the division of the project team into groups or sub-teams is a common practice. Sharing team members across teams may increase knowledge transfer among teams and reduce the time required to implement, but only if it is done efficiently.

For both the FS and HR implementations the use of KMS increased implementation times, although the effect was not statistically significant. The magnitude of the coefficient in both cases was relatively small, suggesting that the increased implementation time may have simply resulted from the additional effort needed to produce the documents and enter them into the KMS. The interesting issue then becomes whether the short-term costs of entering the information would be outweighed by the long-term benefits of having the information available in the system. A longitudinal analysis of the research site will probably be needed in order to answer this question effectively.

5.1.6. People Based Mechanisms. For the FS implementation the interaction between tacitness and team sharing was positive, suggesting that as team sharing increased for Practices that contained a higher degree of tacit knowledge the implementation time also increased. Although this relationship was not statistically significant, it ran against expectations. For the HR implementation the interaction between tacitness and team sharing was negative, suggesting that as team sharing increased for Practices that contained a higher degree of tacit knowledge the implementation time decreased. These results were in the expected direction and marginally significant. An analysis of the combined dataset also ran in the expected direction but was not significant. Therefore, hypothesis 6a was weakly supported. The inconsistency of these findings
is not surprising given the counterintuitive relationship between tacitness and implementation time that has already been discussed. A further understanding of the differences between the FS and HR implementations would probably help to elucidate this discrepancy.

5.1.7. Knowledge Management Systems. For both the FS and HR implementations the interaction between tacitness and KMS use was positive, suggesting that as KMS usage increased for Practices that contained a higher degree of tacit knowledge the implementation time also increased. Although this relationship ran in line with expectations, the magnitude of the coefficient was small and not statistically significant. Therefore, hypothesis 7a was not supported. Similar to hypothesis 6a, the inconsistency of these findings is not surprising given the counterintuitive relationship between tacitness and implementation time that has already been discussed.

5.2 Certification Success

Marginal effects and standard errors for all probit analyses are reported in Table 3. Results for the Financial Services business unit (FS) are reported in column 1, while results for the Human Resources business unit (HR) are reported in column 2. Again, analyses on the combined dataset will be examined when the results of the two separate datasets are in conflict.

Table 3: Certification Success Results

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
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</tr>
<tr>
<td></td>
<td>(0.092)</td>
<td>(0.079)</td>
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<tr>
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<tr>
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<td>(0.005)</td>
<td>(0.011)</td>
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<td>(0.076)</td>
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<tr>
<td></td>
<td>(0.017)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>km_x_tacit</td>
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<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(0.028)</td>
<td>(0.045)</td>
</tr>
</tbody>
</table>
5.2.1. Knowledge Explicitness. For the FS project, as tacitness increased the probability of certification success decreased, in line with expectations. However, this result was not statistically significant. For the HR project, the results ran in the opposite direction as expected but also were not statistically significant. The combined dataset also showed a positive relationship that was not statistically significant. Therefore, hypothesis 1b was not supported. This finding is essentially the same as the relationship between tacitness and implementation time encountered when testing hypothesis 1a.

5.2.2. Knowledge Complexity. For both the FS and HR projects, as complexity increased the probability of certification success decreased as expected. However, these results were not statistically significant; therefore, hypothesis 2b was not supported. This is somewhat surprising given that hypothesis 2a was supported, perhaps indicating that complexity is less of a deterrent to the gradual diffusion of a Practice than to its initial implementation. If the specified timeline for assimilation followed by assessment and certification were far enough in the future, the time needed to overcome additional complexity would not be problematic.

5.2.3. Source Credibility. For both the FS and HR projects, the probability of certification success decreased the longer the source (implementation team member) had served on the project, counter to expectations. However, neither of these results was statistically significant. Therefore, hypothesis 3a was not supported. While running counter to expectations, this result is
somewhat understandable. Credibility of the source is probably more important during the implementation phase of the Practice when the source first introduces the Practice to the recipient. The recipient may learn the new process more effectively if he or she believes the source is more credible or trustworthy, but apart from that the source’s credibility is likely to have little effect on the future assimilation of the Practice. An effective strategy may be for the source to take an active role not only in implementation but also in ensuring that the Practice is fully assimilated, provided that the source is perceived as credible.

5.2.4. Prior Quality Programs. For both the FS and HR projects, compatibility between the Practice and CMMI / SW-CMM reduced the probability of certification success, counter to expectations; however, this result was not statistically significant. For the FS project, the interaction between prior experience with CMMI / SW-CMM and compatibility with those methodologies was a perfect predictor of success, so it was removed from the model. For the HR project the interaction was positive, suggesting that prior experience with the methodology increased certification success for Practices that were compatible with it. However, this relationship was not statistically significant. Therefore, hypothesis 4b was not supported.

The interesting finding in these results is that not only are they counterintuitive but also run directly in opposition to the results obtained during the implementation phase. The results may suggest a curvilinear relationship between familiarity with the old and new quality models and diffusion of the model. For example, when a new quality model that is compatible with an existing model is introduced (implementation stage), people who are unfamiliar with the existing model may readily adopt the new model while those who have experience with the existing model must unlearn the existing model and are hesitant to change. After the new model has been present for some time and becomes part of everyday practice (certification stage), people who
were previously hesitant to change have learned to adapt to the new model; at the same time, some of the people who initially accepted the new model have learned it more thoroughly and begun to offer resistance to it, for any variety of reasons. As with the implementation results, more extensive testing with a wider range of methodologies needs to occur in order to understand this relationship more fully.

5.2.5. Knowledge Transfer Mechanisms. For the FS project, as teams shared members the probability of certification success decreased, counter to expectations. For the HR project, the effect ran in the opposite direction. However, neither of these results was statistically significant. The analysis on the combined dataset ran in the opposite direction than was predicted, but was also not significant. Therefore, hypothesis 5b was not supported. In a similar manner to the findings relating to source credibility, these results may not be surprising after all. The sharing of implementation team members would seem to be more important during the implementation stage than the certification stage.

For both the FS and HR projects the use of KMS decreased the probability of certification success, although the effect was not statistically significant. As was the case with initial implementation times, the magnitude of the coefficient in both instances was relatively small. As compared with KMS usage during initial implementation, the insignificance of the KMS variable to the certification outcome may be an even stronger indicator that KMS usage is not critical in this organization. During the certification stage, we might expect to see manifested more of the long-term time-saving benefits from KMS usage. The fact that KMS usage did not appear to affect certification outcomes may suggest that the system was not used effectively, if at all.
5.2.6. **People Based Mechanisms.** For both the FS and HR projects the interaction between tacitness and team sharing was positive, suggesting that as team sharing increased for Practices that contained a higher degree of tacit knowledge the probability of certification success also increased. Although this relationship ran in the expected direction, it was not statistically significant. Therefore, hypothesis 6b was not supported. This is not surprising given the fact that the results related to tacitness and team sharing were also not significant when taken separately.

5.1.7. **Knowledge Management Systems.** For both the FS and HR implementations the interaction between tacitness and KMS use was positive, suggesting that as KMS usage increased for Practices that contained a higher degree of tacit knowledge certification success also increased. The magnitude of the coefficient was small and not statistically significant; however, the relationship ran counter to expectations. Therefore, hypothesis 7b was not supported. Similar to the findings for hypothesis 6b, this may not be surprising given the fact that the results related to the effects of tacitness and team sharing on certification were also not significant when taken separately.

5.3. **Relationship Between Stage Completions**

Before introducing a quadratic term for logged duration into the probit models, we wanted to test the underlying data to ensure that it was an appropriate specification. To perform this test we used the logit method of the Lowess smoothing function within Stata. This function graphs a locally weighted regression of a single independent variable on the dependent variable (Royston, 1991). Analyses on the FS dataset, the HR dataset and the combined dataset all demonstrated a curvilinear relationship between certification success and logged duration.
For both the FS and HR projects the relationship between implementation duration and certification success appeared to be a U-shaped curve, but in the opposite direction from the hypothesis (please see Figure 3). The linear term was negative and statistically significant while the squared term was positive and significant. This suggests that Practices with either short or long implementation durations were more likely to attain a Satisfied rating while Practices with intermediate durations were less likely. For the combined dataset, the same relationship also occurred and was statistically significant. Therefore, we must reject hypothesis 8.
To better understand why this inverse relationship exists, we broke the data into three groups: a left and right portion (low and high implementation durations, respectively) and a central portion with intermediate implementation times. We then performed some exploratory data analyses on each of these regions. For the Practices in the right-side region, the tacitness and complexity scores were significantly higher, suggesting the counterintuitive notion that Practices that are more complex overall would be more likely to become certified. In addition, the sharing of members across teams is lower in this region. This is easily reconcilable with the fact that implementations in this region take longer, but not with the fact that certification is more likely. However, we also discovered that the implementation teams working on the Practices in this region had fewer Practices assigned to them on a per-resource basis. This raises
two possibilities. First, the management team at the site may have recognized that these Practices would be more difficult and consequently assigned what they believed to be the most capable resources to these Practices. These capable resources would do a better job of ensuring that the implementation and certification of these Practices was performed in a satisfactory manner. At the same time, because these Practices were more difficult they would take longer, resulting in higher duration times. A second explanation may result more from the Practice itself. Because these Practices are more tacit, they are more likely to be dependent on organizational-level knowledge coming from outside of the implementation team. Because they are more complex, they are also more likely to have ties to other Practices that are being concurrently implemented. In short, both tacitness and complexity may necessitate that more individuals from either the external organization or other implementation teams are involved in the implementation of the Practice in some way. This may create an implicit system of checks and balances, leading to a higher level of thoroughness that would increase the likelihood of certification. Further testing and interviews with team members will be necessary to further investigate these potential explanations.

In the left-side region, the main differentiating factor is the Sourcing Life-cycle. For the Financial Services business unit, all of the low-duration Practices belong to the Completion, Initiation or Delivery Life-cycles. According to the eSCM-SP v2 developers, most of these Practices contain processes or procedures that most experienced outsourcing providers would already be doing prior to implementation. These Practices may constitute “low hanging fruit” for that business unit – Practices that are easily implemented and certified. For the Human Resources business unit, the lifecycles are spread out more throughout the three regions. However, in the left region there may be more Practices containing processes in which this
business unit is already experienced. Again, further testing and possibly interviews with team members will be necessary to confirm this possibility.

It is possible that the logged duration variable may be partially capturing the effects of the implementation finish date; in other words, the left-side Practices may be more successful at certification because their implementations finished earlier and they had more time to become institutionalized. However, this reasoning would not work for the right-side Practices, since they would also have a high probability of certification success in spite of the fact that they had less time to become institutionalized. If anything, the implicit inclusion of the implementation finish date via duration would bias the results away from being able to detect this U-shaped relationship.

6. Conclusion and Next Steps in the Research

While this study has generated some interesting results, it is not yet complete. We have uncovered several notably counterintuitive results that bear further investigation. Is tacitness a meaningful construct to relate to a quality methodology whose purpose is to codify information and processes? Based on previous research and our knowledge of such methodologies we believe that it is, but the results of our analysis do not yet support this. The existing literature on tacitness does not possess a general instrument that can be used to measure it; measures of tacitness generally seem to be context-specific. The development of an instrument or scale that can be used to assess the tacitness or codifiability of quality methodologies in general would probably be useful for both researchers and practitioners. In addition, prior research into the effect of previous quality methodologies on the acceptance of new methodologies is somewhat mixed, and the results as presented here have not contributed much to the resolution of this issue. More detailed measures with a greater variety of accepted methodologies are needed. A greater
understanding of this issue would without a doubt aid practitioners as well as researchers who may want to develop or refine a quality methodology for a specific purpose.

I/T research examining the different assimilation stages of innovations, technologies, and methodologies is very robust and has a history that spans the I/T literature. However, there exists relatively little research examining the *transitions between* different assimilation stages and the influence that the completion of one stage may have on another. Intuitively, one would expect that if one stage is delayed or takes an excessive amount of time, future stages would also be delayed or take a longer amount of time. In actuality, our results show that this relationship is not that simple; the difficulty of an early stage is not a linear predictor of success in a later stage. Moreover, our results were in exact opposition to what seems a reasonable hypothesis, emphasizing the potential complexity of this relationship. It is possible that the relationship between stages is heavily mediated by organization-level variables that may make the development of a general model somewhat difficult; however, such a model could prove useful to both researchers and practitioners. More qualitative data is needed to understand this important dynamic.

Some methodological refinements are probably in order as well. Our sample size was relatively small, and as more sites implement and receive certification in the eSCM-SP we will continue to collect data in an effort to better understand the assimilation process. The fact that we did not find significant results for any of the hypotheses related to the certification stage was disappointing, and suggests that the overall model probably needs further clarification. In addition, we would like to collect data to enable the development of finer scales for measures such as resource sharing among teams, credibility, and methodology experience.
This study is only the beginning of what we anticipate to be a long stream of research related to capability models for outsourcing. In the near term we will continue to examine implementation issues for service providers, including knowledge transfer between sites, cultural issues, and mechanisms for local customization of practices. As clients begin to adopt outsourcing capability models, we will also examine their implementation processes. In the long term, our primary goal is to measure the impact of outsourcing capability model adoption on service delivery performance. Performance improvements may result in increased revenue, cost savings in specification and delivery, increased organizational learning ability, and improved service quality. Linking performance outcomes to outsourcing capabilities is an important step in understanding the value of outsourcing capability models for service providers and their clients. In addition, because the adoption of outsourcing capability models is anticipated to lower contracting costs, we will also examine the ways in which these models affect governance mechanisms between service providers and their clients (e.g. Williamson, 1985). Finally, a capability model for a service provider may serve as a signal of quality to a potential client (Benjamin and Podolny, 1999). Once outsourcing capability models are well established, we may be able to measure institutional factors related to their perception and adoption.
**Appendix A: Summary Statistics for FS Dataset**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
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**Appendix B: Summary Statistics for HR Dataset**

<table>
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<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
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