Process capability and performance in business services offshoring

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Abstract: Service providers continually seek ways to improve their offshore delivery performance. In this study, we analyse detailed performance data from a large service provider that implemented a framework to enhance its process capability for services offshoring. We evaluate the extent to which process capability influences service delivery performance, and how the effect of process capability differs based on task complexity, process synergies, and length of experience with the new processes. Our results indicate that for non-complex tasks, service delivery performance improves significantly over time after new processes are introduced, particularly when process synergies are present. In contrast, for complex tasks there is an initial decline in performance after new processes are adopted. However, over time, performance on complex tasks increases at a faster rate than performance on non-complex tasks. Task complexity also reduces the effect of process synergies on performance, but this reduction attenuates over time.

Keywords: process management; service management; offshoring; task complexity; organisational learning; process capability; process synergies.

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1 Introduction

Organisations that specialise in the provision of information technology (IT) and business services have grown dramatically in size and number over the last two decades, both within the US and abroad (Sheehan, 2006). Service providers send work to offshore delivery centres to take advantage of economies of scale, differences in labour rates, or differences in time zones (Tambe and Hitt, 2012). Despite the apparent advantages of offshore service delivery centres, there are several challenges in effectively executing these models. Firms using an offshore service delivery centre model will disaggregate work and move it to wherever it can be done most efficiently and effectively (Mukherjee et al., 2013). However, given the disaggregation of tasks across locations, firms are likely to experience more variations in service delivery. High turnover is also a characteristic of many of these firms, and the ability to hire new employees and train them on organisational practices quickly is critical (Levina and Su, 2008).

Additionally, task complexity can be a challenging issue in offshore service delivery. Complex services contain multiple components and information cues and may require different processes for completion of the work (Nordin and Kowalkowski, 2010). Task complexity increases uncertainty about causal linkages between processes in task performance. This uncertainty can increase the difficulty of coordination within and across tasks. In addition, when there is persistent complexity in tasks, workers must be able to accommodate exceptions and adapt to necessary changes on a continual basis. This can be especially difficult in an offshoring context (Gregory et al., 2013).

For these reasons, the need to have consistent and effective methods for service delivery within and across locations is extremely important (Den Hertog et al., 2010). Many organisations have implemented process improvement frameworks such as control objective for information and related technology (COBIT) to help them improve their process capabilities and service delivery performance. Broadly defined, process capability is "the implementation of new or significantly improved production or delivery methods, including significant changes in techniques, equipment and/or software" (OECD, 2005). Improved service delivery processes must be designed and implemented in a holistic manner in a services context. Processes for completing tasks in one area or job function must work well in conjunction with processes from other areas. When implementing process frameworks, service providers must therefore ensure that capabilities build upon and complement each other. Process synergies, i.e., related capabilities, are also important to service delivery firms that provide multiple services across different areas.

In this study, we empirically examine the performance impacts arising from a process capability initiative at a delivery centre of a multinational firm that provides IT and business services, or what are popularly referred to as 'back-office' processes. Our study analyses a detailed, longitudinal dataset of delivery performance outcomes for a range of IT and business services collected both before and after the implementation of an organisation-wide process capability framework. We examine quality-related outcomes and cost-related outcomes, two categories of performance outcomes that are relevant to services firms. We also examine the effects of task complexity and process synergies on the relationship between process capability and performance for these outcomes. While many prior performance studies have focused on a single, organisation-level measure such as production units or waste reduction as the outcome variable, we examine the impact of process capability across multiple quality and cost outcomes within an offshore business unit of this firm.

2 Theory and hypotheses

2.1 Process capability and performance outcomes

Prior work in manufacturing and software development has demonstrated that process improvement can have heterogeneous effects on different dimensions of performance such as cost, quality, and cycle time (Harter et al., 2000; Krishnan et al., 2000; Kannabiran and Sankaran, 2013). In the services setting, two categories of internal performance outcomes are relevant to the IT and business services context (Paulk et al., 2005), which we will refer to as service delivery quality and cost. *Quality* indicates outcomes that are evaluated against organisational standards or guidelines, whether created internally or imposed externally. It includes accuracy and completeness, the avoidance of errors, timeliness, and internal satisfaction. Quality is particularly relevant in the offshoring environment because organisations have reduced control over the operations of outsourcing vendors (Ye et al., 2014). Although some studies have measured timeliness separately from quality, in most business process outsourcing, services delivery time is considered a quality attribute and is included as a critical service level agreement (SLA) criteria (Rust and Miu, 2006). *Cost* indicates outcomes that reflect the cost or effort associated with performing a task. It includes resource-oriented outcomes such as labour productivity, detailed costs such as payroll, and variances in inputs that may affect costs or productivity.

An initial step in the implementation of process frameworks is an analysis of the firm's existing processes and an adaptation of these processes to the processes in the new framework, thereby increasing process capability. As a baseline, we expect that this increase in process capability will lead to higher performance outcomes. We further anticipate that there are dimensions of performance improvement vis-à-vis process capability that are more likely to emerge over time. Human labour is the primary factor of production in services, and particularly in offshoring (Rai and Sambamurthy, 2006; Jayaraman et al., 2013). Consequently, an important mechanism for performance improvement in services is the direct effect of learning and knowledge creation (Schmenner, 2004). Because process frameworks increase consistency they facilitate learning through repetition and experience, the primary mechanism underlying the 'learning curve' (Argote, 1999). Over time, consistency in execution allows the individuals performing the tasks to learn from experience more effectively. Consistent task execution leads in turn to consistency in outputs, an outcome that is associated with further performance improvement (Anderson et al., 1994). When performance improves as a result of process capability, the producer encounters less rework and fewer exceptions (Dehning et al., 2007). This form of improvement in cost outcomes can be described as an indirect effect of cumulative, incremental learning in quality performance (Reed et al., 1996).

Process frameworks also make it easier for employees to learn a fixed, documented set of processes (Dessein and Santos, 2006). This has two effects: employees may be more easily substitutable for one another, and employees are better able to apply process knowledge to multiple tasks (metalearning). Therefore, process capability can also increase efficiency by reducing the need for coordination among individuals in a single work unit, because managers are less constrained when assigning tasks (Dessein and Santos, 2006). Process frameworks can further enable firms to create new procedural knowledge and routines, which can be used over time to reduce costs (Linderman et al., 2004; Pan et al., 2007). However, learning these processes and exceptions requires purposeful, targeted effort, and performance improvements as a result are expected to take significant time to materialise.

2.2 Process synergies

While repetition increases learning and efficiency, organisations may also develop combinative capabilities to help them learn from related knowledge. *Combinative capabilities* are a function of the organisation's ability to exploit existing knowledge and the unexplored potential of new knowledge or learning (Kogut and Zander, 1992). Such capabilities can increase both the rate of learning and the rate of performance improvement that ensues as a result of learning. More broadly, combinative capabilities are indicative of an organisation's ability to assimilate knowledge from a variety of related experiences, i.e., performing not a single task but learning through other, related tasks (Schilling et al., 2003).

Process frameworks typically contain many processes which are related to each other in various ways. For example, a framework may contain a process for monitoring consumption of monetary or personnel resources. Resource consumption information is fundamental to engagement performance tracking and project management, so processes tied to those tasks may also benefit from the resource monitoring process. We define *process synergies* as the combination of knowledge across related processes, a concept which is closely related to the idea of 'knowledge spillovers' within firms (Argote, 1999). Consistent procedures and policies may increase combinative capabilities (Van den Bosch et al., 1999). These programmed behaviours are often a large component of process frameworks.

An organisation's ability to combine related knowledge across processes should lead to an increased level of performance improvement. Processes that are implemented for one task may be relevant but unused in other tasks; to the extent that the knowledge in the related processes is exploited, performance should improve even further (Hargadon and Sutton, 1997). As new process capabilities are implemented over time, synergies among processes increase, improving the overall effect of these capabilities on performance. The ability to combine knowledge across processes is particularly important in an offshoring context because task and environmental conditions may vary among locations. We therefore hypothesise that:

H1 Over time, process synergies will enhance the positive effects of process capability on performance.

2.3 Task complexity

Task complexity reflects the extent to which the task is analysable and has a known, consistent procedure that specifies the sequence of steps for execution (Poole, 1978). Complex tasks have a greater number of distinct components and information cues than do non-complex tasks (Wood, 1986). Task complexity is particularly problematic for offshore services, where the delivery process often contains intangible components that are difficult to observe (Bowen and Ford, 2002). For example, invoice approval and payment only has one tangible component – the payment itself. However, the person performing the payment may need to spend significant time searching through records or talking with others before the approval can be granted. Even multiple repetitions of complex service transactions may not lead to learning through experience, since conditions are likely to differ in each execution of the task. More complex tasks will also contain a greater number of exceptional cases that require different methods or procedures for completion of the work (Poole, 1978; Dellarocas and Klein, 2000). Exception handling with services often requires substantial coordination and personal interaction to complete, consuming additional time and resources (Larsen et al., 2013). In short, complex tasks have more coordinative complexity and require more procedural flexibility so that the individual performing the task can accommodate exceptions or other conditions (Pentland, 2003). For tasks that exhibit high complexity, we make a distinction between the initial effects of process capability and the effects over time.

Initially, a process framework may be incongruent with the organisation's established methods for completing tasks. As individuals are learning the new processes in the framework, they may experience cognitive overload while trying to fit the new processes into their daily work. In the short-term, this cognitive overload can result in a decreased ability for the individuals involved in providing the service to meet the unique requirements of a task (Victor et al., 2000). For complex tasks, cognitive interference may be particularly harmful, since these tasks are more likely to have unique requirements or exceptions that must be addressed. This would suggest that the implementation of process frameworks is less beneficial for tasks with high complexity, perhaps even to the extent that performance is reduced. According to this view, task complexity would impede the employee's ability to engage in learning through experience, a process that would otherwise be facilitated by the implementation of a process framework. As individuals are learning the new processes, they will especially struggle to meet the differing requirements of complex tasks (Liu and Aron, 2015).

In complex or variable task environments, organisations are likely to dedicate efforts to activities that increase meta-learning or absorptive capacity. In terms of combinative capabilities, this relates most closely to processes which govern communication and coordination among employees (Van den Bosch et al., 1999). However, these synergies will take time to develop; initially, they may add to the cognitive overload that is inherent in implementing new processes. Moreover, the increased cognitive effort may also impede the organisation's ability to react to quality issues in complex tasks, limiting the benefits from process synergies, at least initially. This leads to our next hypotheses:

H2a Initially, the performance benefits of process capability will be lower for complex tasks.

H2b Initially, the performance benefits of process synergies will be lower for complex tasks.

At the organisation level, any initial reductions in quality or cost performance as a result of implementing process frameworks must eventually be mitigated for the organisation to continue operating in the long run. Therefore, over time, implementing a process framework may help individuals to recognise and develop new and efficient routines for exception handling in complex tasks. At the individual level, as the service provider's employees learn and become accustomed to the new processes, they will be able to react to variations in tasks more easily (Feldman and Pentland, 2003). Process capability has been shown to increase conceptual learning or meta-learning in which individuals 'learn to learn' more efficiently, enabling them to adapt more effectively to changing environments (Mukherjee et al., 1998). Synergies among related processes can also be identified and exploited as metalearning occurs (Chen et al., 2013). While task complexity may weaken employees' ability to recognise opportunities for efficiencies among processes initially, this effect will diminish over time as the effects of task complexity are reduced. These factors will contribute to an increased level of performance in outcomes for complex tasks over time, such that:

H3a The initially lower performance benefits of process capability for complex tasks will be attenuated over time.

H3b The initially lower performance benefits of process synergies for complex tasks will be attenuated over time.

3 Research setting

3.1 Process framework

The framework we examine in our study is the eSourcing Capability Model for Service Providers (eSCM-SP) (Hyder et al., 2009). This framework was developed by the IT services qualification centre (ITSqc) at Carnegie Mellon University specifically for providers of services outsourcing and offshoring. The framework addresses issues that are critical to outsourcing vendors such as client communications, attrition, and documentation (Palvia et al., 2011). The eSCM-SP consists of 84 procedures for services outsourcing, each consisting of a set of activities that must be implemented before the process is considered to be complete. Within the framework, these procedures are referred to as practices. Each eSCM-SP Practice may be characterised along several dimensions, including capability level, sourcing life-cycle (initiation, delivery, completion, or ongoing) and capability area (e.g., contracting or people management). An example practice is tch03, "Establish and implement procedures to track and control changes to the technology infrastructure". This practice is at capability Level 2 (consistently meeting requirements), in capability area 'technology management', and is an ongoing practice within the sourcing life-cycle.

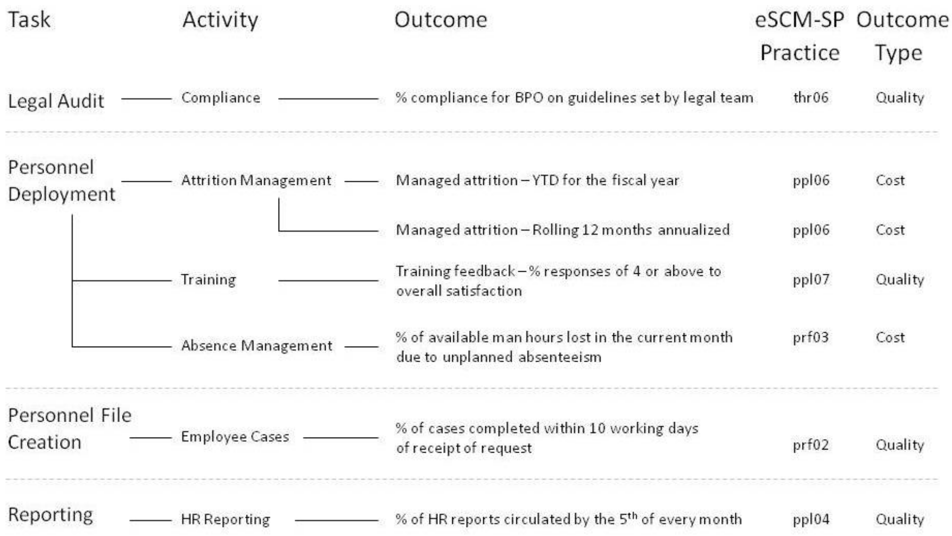
3.2 Research site and data

Our study examines detailed performance data from an offshore service delivery centre of a large, multinational company based in the US. The delivery centre has several thousand employees and has received certification in the eSCM-SP. The centre provides 'back-office' business services directly to its clients, and also provides internal services to other delivery centres within the organisation (i.e., insourcing). For our analyses, we focus on the delivery centre's internal service processes, which include accounting, finance, procurement, IT, human resources (HR), training, and facilities management.

The research site provided a database archive containing all of its recorded internal performance outcomes from April 2004 to August 2006. Importantly, only outcomes that are present in the dataset both before and after eSCM-SP certification are included in our analyses. Detailed archival data such as these are uniquely suited to performance studies because the data are objective and not subject to measurement bias, response bias, or response rate issues. Because the site received eSCM-SP certification during the sample period, the database contains records related to each performance outcome both before and after the program was adopted, making *ex ante* and *ex post* comparisons possible. At the same time, because the data cover a limited time period, factors such as macroeconomic or technological changes should have a negligible impact.

The dataset contains information including the description of the performance outcome, method of calculation, frequency of calculation, business line, task, and date. Prior to the eSCMSP certification process, the research site defined a list of internal business lines and tasks to organise and track performance outcomes. Each *business line* corresponds to one of the organisation's internal process areas as defined by the research site; an example business line is HR. A task is a logical unit of work within a business line and may consist of sub-tasks or *activities*, which we will describe later. Examples of tasks are provided in Figure 1: for example, 'legal audit' and 'personnel deployment'. Figure 1 illustrates sample data for the HR business line. This figure depicts some of the tasks, activities, performance outcomes, eSCM-SP Practices, and outcome categories associated with that business line.

Figure 1 Data structure with examples from HR business line



3.3 Dependent variable

The unit of observation for the study is the actual value of a particular performance outcome recorded during a particular calendar month. While most of the outcomes were expressed as percentages, some (13% of the observations) were expressed in other units such as dollars or work-hours. To further facilitate comparisons across outcomes, these outcomes were converted to percentages by dividing the actual value by the target value. Consequently, each performance outcome is scaled from 0 (low) to 100 (high), with 100 as the best possible outcome. In a few cases (2% of all observations), the actual value exceeded the target value, resulting in percentage values greater than 100%. For example, Figure 1 depicts an outcome called '% of cases completed within 10 working days of receipt of request'. A value of 90 for this outcome would mean that 90% of personnel file creation tasks were completed within ten working days; a value of 70 would mean that only 70% were completed, a less desirable outcome.

Our dataset contains over 100 distinct performance outcomes which we coded into one of two major outcome categories. Based on the prior literature on performance studies (e.g., Harter et al., 2000; Paulk et al., 2005; Ramasubbu et al., 2008), we developed a list of criteria to designate each outcome as either *quality* or *cost*, as defined earlier. For example, the outcome in Figure 1 called '% of cases completed within ten working days of receipt of request' is coded as a 'quality' outcome because the description suggests a measure of timeliness against organisational standards or guidelines. In contrast, the outcome in Figure 1 called '% of available man hours lost in the current month due to unplanned absenteeism' has to do with a resource-oriented measure that may affect productivity, and is thus coded as a 'cost' outcome. Importantly, an observed value of 100 also indicates the highest possible performance for cost outcomes; in other words, a higher outcome for cost performance does not indicate higher costs, but rather better performance in managing costs, or higher efficiency.

3.4 Independent variables

3.4.1 Capability

Implementation of a particular process capability is indicated by a binary variable for each eSCM-SP practice, based on the assessment date of the particular practice, where 1 = practice satisfied and 0 = practice not satisfied. The variable is turned 'on' (i.e., set to 1) for the eSCM-SP Practice in the month and year when the practice is satisfied. As noted earlier, certification is performed at the capability level, but each practice is assessed to determine whether it satisfies its requirements. We mapped each activity performed by the site to an eSCM-SP practice. This assignment was based on the alignment of the activity with the performance objectives of the particular practice. For example, in Figure 1 the outcomes for 'attrition management' activity are tied to the eSCM-SP practice ppl06 (workforce competencies). From the description of the practice objectives, we can see that it is intended to "Maintain the necessary workforce competency levels in order to ensure that the organisation has the necessary skills to meet its clients' requirements and achieve its long-term organisational objectives" (Hyder et al., 2009). Only the practices that were implemented by the site and validated during the certification process were considered in this mapping. Because this practice was satisfied in February 2005, all observations for this activity that occur after this date would be considered 'process-capable'. Dates for certification assessment were defined exogenously by the organisation based on the implementation schedule of the model, and are not related to any particular business line or set of outcomes in our data.

3.4.2 Task complexity

The dataset contains performance outcomes for eight business lines and 57 distinct tasks; these were defined by the organisation. Our measure of task complexity assesses the difficulty of task execution by counting the number of distinct activities that characterise each task. An *activity* is a facet of the task that requires action; it may be thought of as a sub-task, or a unit of work within a task. The number of activities for a particular task is derived from the descriptions of all of the unique performance outcomes for that task. Our measure of task complexity is most similar to Wood's (1986) definition of component complexity, which is "a direct function of the number of distinct acts that need to be executed in the performance of a task". The identification of distinct activities for each task was assessed by one of the authors and validated by an independent coder. The independent coder agreed with the author's initial assessments in 55 out of 57 cases (96.5%); the remaining two cases were reconciled through subsequent discussion. Because the measure of task complexity is continuous and is interacted with other variables, we have centred it so that its mean is zero (Aiken and West, 1991).

3.4.3 Synergy

In addition to capability areas, the eSCM-SP describes explicit relationships amongst Practices. For example, the documentation for practice del07 (service modifications) states that it is closely related to practice cnt11 (amend contracts). These relationships indicate synergies, or related knowledge, between practices; in other words, the fact that the organisation has a process for service modifications should be beneficial in managing a process for amending contracts. We define synergy as the number of related practices that have been satisfied for a particular practice at a particular point in time. For example, the practice ppl07 (plan and deliver training) has three synergistic relationships with other practices as defined in the model. Two of those practices were satisfied in February 2005, so at that point the synergy variable is set to two; the other practice was satisfied in May 2005, and at that point the synergy variable is set to three. This variable is also centred so that its mean is zero.

3.4.4 Time since capability

This variable is a counter that indicates the numbers of months that have elapsed since the requirements for a practice tied to an activity are satisfied. Thus, higher values of this counter reflect greater organisational experience with the new processes related to that activity. This variable is also centred so that its mean is zero.

3.4.5 Outcome types

As described earlier, we mapped each performance outcome to one of two types, cost or quality. To control for outcome types in our analysis, we introduced a binary variable which is set to '1' for cost outcomes and '0' for quality outcomes. Quality outcomes are used as the 'base' type in the analyses, and the coefficient on the binary variable cost reflects the mean differences in performance for cost outcomes relative to quality outcomes.

3.5 Control variables

Each observation is assigned to one business line, i.e., accounting, finance, IT, etc. We include dummy variables for each business line to control for unobserved heterogeneity in performance across business lines. We also include the time trend variable *month counter* to control for performance improvements over time that may be independent of process capability. This variable is set to '1' for the first month in the observation period and is increased by one in each subsequent month. Finally, we interact the time trend variable with the binary indicator for cost outcomes to control for changes over time that may be specific to different outcome types.

3.6 Statistical model

The data have been constructed in panel form with the individual performance outcome as the panel identifier *i* and the calendar month as the time identifier *t*. A Hausman model comparison test did not indicate the presence of autocorrelation in the data ($\chi^2 = 7.37$, $p > 0.10$).However, an additional Hausman test did confirm the presence of heteroskedasticity ($\chi^2 = 168.62$, $p = 0.000$). Therefore, we used a panel-corrected feasible generalised least squares (GLS) model for the analysis. This type of specification is appropriate for data with a large number of panel groups, and allows us to correct for heteroskedasticity across panel groups (Baltagi, 2005). The fully specified model is as follows:

$$
\begin{aligned}
Performance_{it} = {} & \beta_1 capability_{it} + \beta_2 \left(capability_{it} \times cost_i \right) + \beta_3 synergy_{it} + \\
& \beta_4 \left(synergy_{it} \times cost_i \right) + \beta_5 complexity_i + \beta_6 \left(complexity_i \times cost_i \right) + \\
& \beta_7 \left(synergy_{it} \times complexity_i \right) + \beta_8 \left(synergy_{it} \times complexity_i \times cost_i \right) + \\
& \beta_9 \left(compability_{it} \times complexity_i \right) + \beta_{10} \begin{pmatrix} capability_{it} \\ \times complexity_i \times cost_i \end{pmatrix} + \\
& \beta_{11} \left(time\_since\_capability_{it} \times capability_{it} \right) + \\
& \beta_{12} \left(time\_since\_capability_{it} \times capability_{it} \times cost_i \right) + \\
& \beta_{13} \left(time\_since\_capability_{it} \times capability_{it} \times synergy_{it} \right) + \\
& \beta_{14} \left(time\_since\_capability_{it} \times capability_{it} \times synergy_{it} \times cost_i \right) + \\
& \beta_{15} \left(time\_since\_capability_{it} \times capability_{it} \times complexity_i \right) + \\
& \beta_{16} \left(time\_since\_capability_{it} \times capability_{it} \times complexity_i \times cost_i \right) + \\
& \beta_{17} \begin{pmatrix} time\_since\_capability_{it} \times capability_{it} \\ \times complexity_i \times synergy_{it} \end{pmatrix} + \\
& \beta_{18} \begin{pmatrix} time\_since\_capability_{it} \times capability_{it} \\ \times complexity_i \times synergy_{it} \times cost_i \end{pmatrix} + \\
& \beta_{19} cost_i + \beta_{20} BL_i + \beta_{21} month\ counter \\
& + \beta_{22} \left(month\ counter_t \times cost_i \right) + \varepsilon_{it}
\end{aligned}
$$

Note that the term BL_i is a vector of fixed effect dummies that are used to control for average differences in performance across business lines.

4 Results

Descriptive data and correlations are reported in Tables 1 and 2. Coefficients and standard errors for the GLS regressions are reported in Table 3. For brevity, we have suppressed the coefficients on the business line dummies, although these results are available upon request. Results for the hypotheses tests are reported in Table 4. The hypotheses are tested using linear combinations of coefficients. For all hypotheses, we have two sets of variables in question: a 'variable of interest' and the interaction of that variable with a binary variable indicating the difference in cost-related outcomes, relative to quality-related outcomes which are the base. These composite coefficients are then tested using Wald linear tests. The coefficients used in the hypotheses tests are drawn from Table 3, Column 3, which is our main set of results.

Table 1 Descriptive data

Variable	*Mean*	*Std. dev*	*Min*	*Max*
Performance	95.005	14.803	0	128
Capability	0.778	0.407	0	1
Complexity	3.464	2.374	1	8
Time_since_capability	6.721	6.559	0	25
Synergy	1.244	1.615	0	6
Cost	0.246	0.431	0	1
Business line: I/T	0.286	0.452	0	1
Business line: HR	0.181	0.386	0	1
Business line: commercial	0.016	0.124	0	1
Business line: expansion	0.046	0.209	0	1
Business line: facilities	0.307	0.461	0	1
Business line: procurement	0.026	0.159	0	1
Business line: training	0.041	0.199	0	1
Business line: accounting	0.097	0.296	0	1
Month counter	16.466	6.937	1	29

To test Hypothesis 1, the impact of process synergy on performance over time, we differentiate our model with respect to synergy and time_since_capability: [∂^2 performance / ∂ capability ∂ time_since_capability ∂ synergy]. After dropping the terms with complexity as it is a zero-mean variable, we are left with β_{13} and β_{14}. For quality outcomes, the impact of process synergy on performance over time is $\beta_{13} = 0.029$, $p = 0.006$. For cost outcomes, the impact of process capability on performance over time is $\beta_{13} + \beta_{14} = 0.085$, $p = 0.281$. Thus, while H1 is supported for quality outcomes, it is in the expected direction but not supported for cost outcomes. As noted above, quality outcomes have a higher baseline level of performance and less room to improve. One interpretation of this result is that process synergies help organisations to ‘squeeze out’ additional performance benefits after they have become difficult to obtain.

To test Hypothesis 2a, the initial impact of process capability on performance for complex tasks, we differentiate our model with respect to capability and complexity as follows: [∂^2 performance / ∂ capability ∂ complexity]. We then evaluate this derivative at the time initially after new capabilities are implemented, in other words where time_since_capability = 1. However, because we centred this variable in our model we use an adjusted value of –5.72 in the evaluation. For quality outcomes, the impact of process capability on performance for complex tasks is $\beta_9 + \beta_{15} \times (-5.72) + \beta_{17} \times (-5.72) = -0.023$, $p = 0.882$. For cost outcomes, the impact of process capability on complex tasks is $\beta_9 + \beta_{10} + \beta_{15} \times (-5.72) + \beta_{16} \times (-5.72) + \beta_{17} \times (-5.72) + \beta_{18} \times (-5.72) = -2.522$, $p = 0.002$. Thus, H2a is supported for cost outcomes and is in the expected direction but not supported for quality outcomes. Figures 2 and 3 illustrate the predicted differences between complex and non-complex tasks for quality and cost performance when synergies are absent based on our coefficient estimates. The vertical lines in these graphs around month ten indicate the point when the majority of processes are satisfied.

Table 2 Correlations

		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1	Performance	1.000														
2	Capability	0.133*	1.000													
3	Complexity	–0.099*	–0.177*	1.000												
7	Time since capability	0.180*	0.531*	–0.151*	1.000											
5	Cost	–0.374*	–0.186*	0.292*	–0.263*	1.000										
6	IT	0.158*	0.042	–0.097*	0.127*	–0.267*	1.000									
7	HR	–0.070*	–0.004	–0.074*	–0.043	0.192*	–0.298*	1.000								
8	Commercial	–0.026	–0.127*	0.241*	–0.104*	0.220*	–0.080*	–0.059*	1.000							
9	Expansion	–0.005	–0.269*	0.327*	–0.225*	0.302*	–0.139*	–0.103*	–0.028	1.000						
10	Facilities	–0.032	0.053*	0.042	0.047*	–0.167*	–0.421*	–0.314*	–0.084*	–0.146*	1.000					
11	Procurement	0.020	0.039	–0.101*	–0.070*	0.149*	–0.103*	–0.077*	–0.021	–0.036	–0.109*	1.000				
12	Training	0.017	0.042	0.186*	0.060*	0.000	–0.132*	–0.098*	–0.026	–0.046*	–0.139*	–0.034	1.000			
13	Accounting	–0.107*	0.052*	–0.225*	–0.013	0.032	–0.207*	–0.154*	–0.041	–0.072*	–0.218*	–0.053*	–0.068*	1.000		
14	Month counter	0.155*	0.672*	–0.189*	0.852*	–0.200*	0.084*	–0.067*	–0.145*	–0.229*	0.038	0.014	0.056*	0.078*	1.000	
15	Synergy	–0.069*	0.300*	0.005	0.053*	0.132	–0.104*	0.132*	–0.097*	0.058*	0.002	–0.049*	0.193*	–0.120*	0.245*	1.000

Note: *Significant at $p = .05$.

Table 3 GLS regression results with performance as dependent variable

	(1)	*(2)*	*(3)*	*(4)*
	Control variables	*Main effects*	*Full model*	*With panel-specific AR1 correlation*
Process capability		0.480	0.676	0.465
		(0.206)*	(0.300)*	(0.225)*
Process capability * cost		–1.577	0.717	–0.746
		(1.436)	(2.131)	(1.267)
Synergy		–0.013	–0.239	–0.300
		(0.046)	(0.082)**	(0.104)**
Synergy * cost		–0.354	0.881	1.002
		(0.432)	(0.528)+	(0.655)
Complexity		–0.186	–0.389	–0.365
		(0.036)**	(0.123)**	(0.114)**
Complexity * cost		–1.595	–0.462	–0.996
		(0.332)**	(0.787)	(0.740)
Synergy * complexity			–0.117	–0.100
			(0.040)**	(0.054)+
Synergy * complexity * cost			0.683	0.680
			(0.271)*	(0.407)+
Capability * complexity			0.189	0.203
			(0.134)	(0.102)*
Capability * complexity * cost			–1.155	–0.705
			(0.711)	(0.488)
Time_since_capability * capability			0.041	–0.082
			(0.028)	(0.049)+
Time_since_capability * capability * cost			0.450	0.413
			(0.198)*	(0.229)+
Time_since_capability * capability * synergy			0.029	–0.004
			(0.011)**	(0.014)
Time_since_capability * capability * Synergy * cost			0.056	0.122
			(0.080)	(0.098)
Time_since_capability * capability * complexity			0.021	0.013
			(0.007)**	(0.007)+
Time_since_capability * capability * complexity * cost			0.166	0.030
			(0.062)**	(0.082)
Time_since_capability * capability * complexity * synergy			0.016	0.018
			(0.005)**	(0.007)**
Time_since_capability * capability * complexity * synergy * cost			0.076	0.079
			(0.042)+	(0.060)

Notes: ***p < .001, **p < .01, *p < .05 +p < .10.

Table 3 GLS regression results with performance as dependent variable (continued)

	(1) *Control variables*	*(2)* *Main effects*	*(3)* *Full model*	*(4)* *With panel-specific AR1 correlation*
Cost	–19.481	–15.649	–9.441	–9.604
	(1.239)**	(1.555)**	(3.008)**	(3.124)**
Month counter	0.017	0.009	0.011	0.111
	(0.007)*	(0.010)	(0.026)	(0.045)*
Cost * month counter	0.493	0.438	–0.051	–0.029
	(0.076)**	(0.111)**	(0.161)	(0.153)
Constant	99.237	97.944	97.605	95.441
	(0.527)	(0.600)	(0.783)**	(1.419)**
Wald X^2	561.01***	659.03***	897.26***	273.79***

Notes: ***p < .001, **p < .01, *p < .05 +p < .10.

Table 4 Hypothesis tests

	Quality		*Cost*		*Supported for*
	Beta	*P-value*	*Beta*	*P-value*	
Hypothesis 1: Time since capability × capability × synergy	0.029	p = 0.006	0.084	p = 0.281	Quality
Hypothesis 2a: Capability × complexity	–0.022	p = 0.882	–2.561	p = 0.002	Cost
Hypothesis 2b: Synergy × complexity	–0.206	p = 0.001	0.043	p = 0.826	Quality
Hypothesis 3a: Time since capability × capability × complexity	0.021	p = 0.001	0.187	p = 0.002	Quality and cost
Hypothesis 3b: Time since capability × capability × complexity × synergy	0.016	p = 0.002	0.092	p = 0.030	Quality and cost

Interestingly, we see a different pattern for process synergies. To evaluate Hypothesis 2b, we differentiate our model with respect to capability, synergy and complexity as follows: [∂^2 performance / ∂ synergy ∂ complexity]. We again evaluate this derivative at the time initially after new capabilities are implemented, using an adjusted value of –5.72 in the evaluation. For quality outcomes, the initial impact of process synergy on performance for complex tasks is $\beta_7 + \beta_{17} \times (-5.72) = -0.206$, p = 0.002. In other words, process synergies have a significantly lower initial impact on quality outcomes for complex tasks. For cost outcomes, the impact of process capability on complex tasks is $\beta_7 + \beta_8 + \beta_{17} \times (-5.72) + \beta_{18} \times (-5.72) = 0.043$, p = 0.826. Thus, H2b is supported for quality outcomes but not supported for cost outcomes.

Figure 2 Effect of process capability over time for quality performance

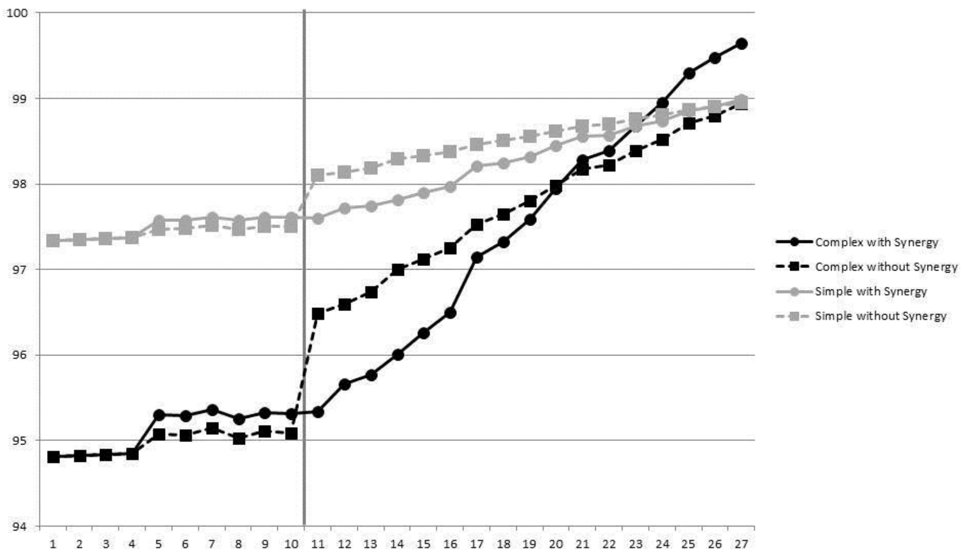
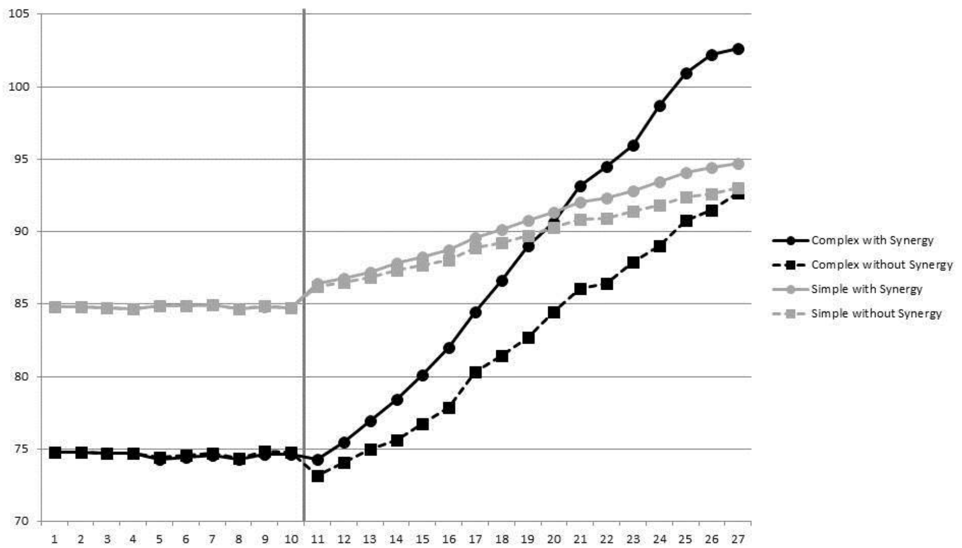


Figure 3 Effect of process capability over time for cost performance



However, our results also show that the negative effect of process capability for complex tasks is attenuated over time. To test Hypothesis 3a, the impact of process capability on performance for complex tasks over time, we differentiate our model with respect to capability, time since capability, and complexity as follows: [∂^3 performance / ∂

capability ∂ time_since_capability ∂ complexity]. For quality performance, the rate of change for complex tasks over time due to process capability is $\beta_{15} = 0.021$, $p = 0.001$. For cost performance, the rate of change for complex tasks over time due to process capability is $\beta_{15} + \beta_{16} = 0.187$, $p = 0.002$. Thus, H3a is fully supported for both quality and cost outcomes. For cost outcomes, the initial negative impact of process certification for complex tasks (–2.522) is approximately 13 times greater than the performance improvements for complex tasks associated with certified processes that occur over time (0.187), for each month. This suggests that after approximately thirteen months, the positive temporal effect of process capability implementation on cost performance will have 'caught up' with the initial negative decrease resulting from process capability implementation for complex tasks.

Finally, we examine the impact of process synergy on performance over time for complex tasks. To test Hypothesis 3b, the impact of process synergy on performance for complex tasks over time, we differentiate our model with respect to capability, time since capability, synergy, and complexity as follows: [∂^4 performance / ∂ capability ∂ time_since_capability ∂ synergy ∂ complexity]. For quality performance, the rate of change for complex tasks over time due to process synergy is $\beta_{17} = 0.016$, $p = 0.002$. For cost performance, the rate of change for complex tasks over time due to process synergy is $\beta_{17} + \beta_{18} = 0.092$, $p = 0.030$. Thus, H3b is fully supported for both quality and cost outcomes. For complex tasks, our results indicate that synergies help to improve performance over time. Figures 2 and 3 illustrate that for both quality and cost outcomes, the combination of task complexity and process synergies leads to a very high rate of performance improvement over time.

5 Discussion

Our results provide nuanced insights into the performance effects of implementing a process capability framework in IT and business services offshoring. Figure 2 suggests that improvements in quality performance are enhanced by process synergies that emerge over time, as we hypothesised in H1. As more processes are introduced individuals learn to combine knowledge across those processes, and to apply that knowledge to multiple organisational tasks. Stated differently, process synergies facilitate the learning of higher level 'processes about processes', or metalearning, and as a result performance increases over time occur (Dessein and Santos, 2006). In addition to combining knowledge that is inherent to the process framework itself, individuals may also realise potential combinations of knowledge that occur as a result of applying the process framework to organisational tasks. Process capability frameworks can enable firms to identify new exceptions in daily tasks and to create routines for handling them, increasing efficiency over time (Linderman et al., 2004). Metalearning is also related to the idea of conceptual learning, or in our case not just knowing *how* processes work but *why* they work (Pisano, 1994). This type of learning has shown to be more applicable to quality performance in the offshore software development context (Ramasubbu et al., 2008), and our results show that may be the case in services offshoring context as well.

Hypotheses 2 and 3 incorporate the moderating effect of task complexity on process capability and process synergies. Task complexity is a salient characteristic of work in services offshoring. In many cases firms use offshore delivery centres because labour rates are lower, so more work is done by hand. Manually completing tasks can lead to more variations in task performance. As a result, there is less consistency and fewer opportunities to codify process knowledge. In addition, employee turnover is higher in many typical offshoring locations, making the preservation and consolidation of knowledge even more challenging. In the presence of all of these factors contributing to task complexity, the identification and handling of exceptions is very difficult and must be managed systematically (Karpinnen et al., 2014). A process capability framework like the eSCM-SP is therefore expected to be particularly effective for complex tasks in a services offshoring scenario.

The results show that in the presence of task complexity, performance on cost outcomes initially decreases after process capability is introduced (H2a). In the short-term individuals may experience difficulty trying to fit new processes into their existing ones, particularly when performing complex tasks. At the same time these tasks are more likely to contain unique requirements or exceptions, so cognitive overload is particularly harmful. The fact that this decrease manifests only for cost outcomes is probably related to the nature of quality outcomes in services. Adherence to (SLAs) is paramount for maintaining customer satisfaction in the services setting service delivery centres must adhere to their internal SLAs, which are captured as quality outcomes in many BPO organisations. Thus, if any performance must suffer it will be performance related to the cost or efficiency of meeting those SLAs. However, the results also suggest that initially, process synergies are not helpful for quality performance outcomes for complex tasks (H2b). Since process synergies are related to metalearning this result makes sense; cognitive overload in the presence of task complexity should make the combination of process knowledge across tasks more difficult.

The initial effects of process capability under conditions of task complexity can be contrasted with the long-term effects. Over time, both cost and quality performance outcomes improve to a greater extent for complex tasks than for simple tasks after process capability is introduced (H3a). As employees learn the new processes in the framework, they may apply them to meet specific task requirements, particularly for complex tasks. In addition, the effect of process synergies increases over time for complex tasks (H3b). This suggests that for both cost and quality performance, the organisation may be engaging in directed, continuous metalearning where new routines and rules are examined (Ittner et al., 2001). Directed efforts such as this often take place when the organisation perceives a gap between actual and potential performance (Sitkin et al., 1994), as our organisation experienced after the initial implementation of the process improvement framework.

6 Conclusions

This study has examined the effects of process capability on performance in the context of offshore service delivery of IT and business services. This context is growing globally and has unique characteristics with implications for organisational learning and task complexity. The eSCM-SP framework was created specifically for this context, and this study is among the first to empirically examine the impact of this framework on a variety of performance outcomes within a single organisation. We find that the implementation of the eSCM-SP framework resulted in significant performance improvements for our research site over time. While complex tasks experienced an initial decrease in cost performance after process capability was implemented, the rate of improvement over time for complex tasks was greater than that of noncomplex tasks. Quality performance on complex tasks also increased at a faster rate over time than quality performance on non-complex tasks. Finally, the results show that process synergies moderate the effect of process capability on performance, particularly for quality outcomes but also for cost outcomes over time.

This study contributes to the existing literature in a number of ways. First, our study advances the understanding of when and how process capability generates performance improvement in the context of services offshoring. Specifically, we demonstrate the impact of process capability on two categories of improvement that are particularly important to service organisations – cost performance and quality performance. Second, we introduce the concept of process synergies and theorise the impact of process synergies on performance improvement via metalearning over time. We also identify task complexity as an important factor that influences the performance improvements resulting from process capability in the context of services offshoring. The inherent variability and complexity of service delivery makes the development and adaptation of routines a particularly salient characteristic of process improvement in this setting.

Our results have implications for service practitioners who are considering adoption of process capability frameworks. Service organisations that are experiencing quality issues are more likely to realise benefits from process capability. However, our results indicate that there is not a corresponding short-term cost improvement; in fact, cost performance may suffer. This is particularly true for service organisations that must deal with high levels of task complexity. Service organisations should, therefore, make a concerted effort to record and retain information that will enable them to improve cost performance over time, so that the potential to exploit process synergies can be maximised. Performance improvements following the adoption of the model appeared for a wide variety of outcomes across all internal services within the organisation, which should also be encouraging to other potential adopters.

Like any study, ours has limitations. Our study focuses on a single organisation. Focusing upon a single organisation enables us to better isolate the effects of process improvement and task complexity independent of industry-level variation, giving our results higher internal validity. Our organisation is a large service provider, typical of major companies in this industry. In addition, our dataset covers over 100 different outcomes across a number of business lines and organisational tasks that are typical for many large service providers. Therefore, the results should be generalisable to a number of organisations that provide IT and business process outsourcing services. An interesting direction for future research would be to examine firm-level characteristics that may affect the impact of process capability on performance.

Our study also focuses on process capability in the context of IT and business services. We do not make the assertion that process capability frameworks are appropriate, or will lead to performance improvement, for all service tasks. Our study examines ‘back-office’ tasks such as accounting, IT, procurement and HR which should be more amenable to improvement via process capability. Extending our research to other types of services would be a natural direction for future work.

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