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# What are the Most Important Classes of Information Systems for eSourcing Service Providers? Experiences from Three Case Studies in the Chinese eSourcing Market

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## ABSTRACT

Information and Communications Technology (ICT)-enabled international sourcing of software-intensive systems and services (eSourcing) is increasingly used as a means of adding value, reducing costs, sharing risks, and achieving strategic aims. To maximally reap the benefits from eSourcing and mitigate the risks, providers and clients have to be aware of and build capabilities for the entire eSourcing life-cycle. China is in a remarkable position to become a superpower for eSourcing service provisioning within the next 10 years. Yet, the extant literature does not offer a comprehensive enough guidance for eSourcing management in the Chinese context. This research project will probe the eSourcing life-cycle in Information and Communications Technology Outsourcing (ICTO), Business Process Outsourcing (BPO), and Knowledge Process Outsourcing (KPO) contexts. It will provide as generalizable scientific knowledge as possible concerning the most important business practices and classes of information systems for eSourcing service providers from the viewpoint of service provisioning, breakdown recovery, and the redesign of the eSourcing life-cycle.

## Keywords

eSourcing Life-cycle, Information Systems, Chinese eSourcing services market, ICT Services Outsourcing (ICTO), Business Process Outsourcing (BPO), Knowledge Process Outsourcing (KPO)

## INTRODUCTION

Businesses need to be managed and run effectively in order to meet environmental, organizational, technological, and other requirements; to improve productivity, product and service quality, and competitiveness; and to create good jobs. Management can employ many strategies to reach these objectives such as business process reengineering (through standardization and automation) and knowledge management. The use of Information and Communications Technology (ICT) plays a key role in most strategies. ICT-enabled international sourcing of software-intensive systems and services (eSourcing) is another important strategy that managers can use to achieve the above objectives. More than 50% of the American Fortune 500 firms and an increasing proportion of Western European and Japanese firms are users of offshore software sourcing (Carmel and Agarwal, 2002; Sahay, Nicholson and Krishna, 2003). India, Russia, Ireland, China and Philippines are the most important countries for service provisioning.

China is in a position to become a superpower for eSourcing service provisioning within the next 10 years (Chan, 2004). However, to fully achieve the potential, Chinese client organizations must further develop their eSourcing cultures so Chinese service providers can have large and demanding domestic markets that stimulate and provide financing for the design and productization of innovative and competitive high value services and products. The extant literature does not offer a comprehensive enough guidance for eSourcing management in the Chinese context. It mainly helps manage eSourcing activities and relationships from the clients' viewpoint in European and North American settings. The eSourcing research focused on service providers, including the eSourcing Capability Model for Service Providers (CMU 2009), has primarily addressed Indian providers servicing the North American markets and the lessons learnt are not necessarily applicable to Chinese providers.

For example, most Chinese providers leverage the mediated offshore outsourcing business model, whereby a small or a medium-sized Chinese provider delivers offshore software services to a larger foreign ICT client that contracts

and interfaces with the actual end-clients onshore (Järvenpää and Mao, 2008). This business model typically restricts the providers to small, low-value projects and hampers the sharing of knowledge with end-clients, severely impeding the capability and business development of Chinese providers. The extant literature does not extensively address this business model and ways to overcome its limitations. Such knowledge is needed because most Chinese eSourcing service providers are smaller, on average, and cannot productize services as effectively as Indian providers. Chinese providers must overcome these barriers for China to become a superpower in global eSourcing.

eSourcing can be divided into three categories: ICT services outsourcing (ICTO), business process outsourcing (BPO), and knowledge process outsourcing (KPO). ICTO occurs when an organization contracts a service provider to perform an ICT function instead of performing the function itself. The service provider could be a third party or another division or subsidiary of a single corporate entity (ITAC, 2003). BPO involves the outsourcing of noncore business functions and supporting ICT services to a third party. It enables clients to focus on their primary business operations and to achieve a combination of lower costs, improved productivity, and flexible staffing options (Marc, Ashlyn, Johns and Dara, 2007). KPO helps clients move core business processes requiring a high level of domain expertise out to third parties (DataMonitor, 2009). KPO can be an important opportunity for traditional BPO and ICTO providers, because it offers access to the core of a client's business and enhances the provider's role in the eSourcing relationship.

This research project will study one service provider in each of these three contexts to provide as generalizable scientific knowledge as possible concerning the most important business practices, activities, and classes of information systems for eSourcing: (1) ICT services, (2) business processes, and (3) knowledge processes. The project will investigate the three contexts, respectively, through the following three eSourcing project domains in the Chinese eSourcing market: eSourcing of (1) software testing services, (2) third-party logistics (i.e., integrated operation, warehousing, and transportation) services, and (3) credit risk management services for banking. The three research cases are Huiling Technology (hereafter called HLT, <http://www.testage.com.cn/>), PG Logistic (hereafter called PGL, <http://www.pgl-world.cn/>) and Evalueserve (hereafter called EVS, <http://www.evalueserve.com/Home.aspx>).

The three project domains and the specific firms have close connection with Chinese government's current strategy. In 2006, the Ministry of Commerce set up the "1000-100-10 Project" to nurture 1000 outsourcing companies, to attract 100 major foreign companies to use offshore services in China, and to establish 10 outsourcing parks (Carmel, Gao and Zhang, 2008). Testing services are a part of this "1000-100-10 Project" because the majority of Chinese companies can offer them. In order to overcome the current global financial crisis, the Chinese government has set up a top ten industrial restructuring and revitalization plan. Logistics services are one of the ten industries (XNA, 2009). Modern logistics services, where the ICT infrastructure and the business strategy are successfully aligned (Hughes and Kaplan, 2009), are a suitable context to probe how ICT-enabled business processes create business value and improve service quality. Financial services industry is also interesting because Chinese banks are experiencing significant changes. Chinese financial system had its first stage of reform from 1978 to 1992. Since then, the main goal has been to transform the mono-banking system into a plural-banking system consisting of a central bank and various kinds of financial institutions. State-owned commercial banks have modernized the banking system and began to move toward a market-oriented economy (Okzazki, 2007).

There are two reasons for selecting Huiling Technology (HLT) as the case company for the testing services research. First, this firm is one of the leading Chinese professional service providers of software testing with plenty of practical experience. Second, it is also a software testing training service provider offering training services such as company-internal and vocational training. There are two reasons for selecting PG Logistics (PGL) as the second research case. First, PGL is the largest, the most influential, and the leading third-party logistics enterprise in the Chinese market. It is also the first Chinese company to use modern logistics concepts to provide clients with integrated logistics services. Second, PGL has developed its own third-party logistics information integration platform, which is scalable and applicable to a variety of logistics services. EVS is a pioneer in providing Knowledge Processes Outsourcing (KPO) services. It offers investment research services to a wide range of clients in the financial services domain. As part of its credit risk management offering, it can develop and deploy models enabling the clients to identify and analyze loss exposures and examine alternative risk management techniques. In this research, it is possible to probe how KPO service providers with deep stocks of domain knowledge and experienced staffs can offer highly complex knowledge-intensive services for their clients.

## RESEARCH OBJECTIVES AND QUESTIONS

This research project will focus on the abilities of Chinese eSourcing service providers in ICTO, BPO, and KPO domains (1) to overcome the limitations of the mediated offshore outsourcing model, (2) to establish and execute efficient business practices throughout the eSourcing life-cycle; (3) to recover from unanticipated coordination breakdowns quickly and effectively; (4) and to proactively redesign the practices and enabling information systems to ensure long-term effectiveness and to reduce the likelihood that the encountered breakdowns would happen again.

Mass-customization and productization are the key strategies that will be investigated to help Chinese eSourcing providers to transcend the limitations of the mediated offshoring model. For example, HLT, one of the case firms in this study, has standardized its services and is trying productize them further. Its service production and delivery are rigorously enacted using a strictly defined and standardized process for all customers. It believes the standardized high-quality process differentiates it from other testing service providers. When testing service providers can productize and sell testing services to the extent that the volumes of similar systems to be tested become high enough, it will be feasible to establish asset bases of reusable test cases. The strategic reuse of test cases in testing similar systems is then likely to help shorten the testing life cycles and reduce costs, providing successful providers with competitive edge. Similar asset development and reuse strategies can also be deployed in BPO and KPO domains.

The research project will address the following research question: which eSourcing practices, associated activities, and enabling classes of information systems are the highest priority ones for service providers from the viewpoint of executing the eSourcing life cycle, recovering from coordination breakdowns during execution, and redesigning the life-cycle practices, activities, and systems to ensure organizational long-term effectiveness? This project will probe the research question in the context of three categories to provide as generalizable scientific knowledge as possible.

## THEORETICAL FOUNDATIONS

The eSourcing Capability Model for Service Providers (eSCM-SP) is one of the building blocks of this research project. According to eSCM-SP, the eSourcing life-cycle involves three phases from the service provider's viewpoint. (1) *Initiating an engagement* involves gathering and negotiating requirements with a client, contracting, and designing, resourcing, and deploying the service. (2) Service is *delivered* according to the commitments established for the engagement. (3) The *engagement is completed* in the end of the life-cycle primarily by transitioning the resources from the provider to the client or to a third party (CMU, 2009). Numerous specific practices are enacted in each phase. The authors of eSCM-SP convincingly argue that (1) it is applicable in all three eSourcing categories and (2) it can help service providers improve their capabilities related to both ongoing, phase specific, and engagement specific eSourcing practices throughout the eSourcing life cycle (CMU, 2009). Yet, eSCM-SP has not been used and studied extensively in China. We expect only a subset of the best practices envisioned in eSCM-SP to be relevant for Chinese service providers during the study period, mainly because most providers are in relatively early phases of eSourcing capability development and thus cannot use the most advanced practices of eSCM-SP. It is also likely that some entirely new practices will be necessary to take into account the intricacies of the Chinese eSourcing market, such as the strong role of the government in structuring the market.

The most challenging and crucial part of this research is the cross-case analysis needed to span three different eSourcing domains. Therefore, the expected conclusions will abstract the common and variable aspects of the eSourcing life-cycle among the different eSourcing domains. Domain engineering literature and Alter's research on service system fundamentals are used as a theoretical basis to overcome the challenge. These two bodies of literature help the researchers create abstractions that enable the comparison of three eSourcing service domains. Domain engineering is used to identify, model, construct, catalog, and disseminate a set of software artifacts that can be applied to develop and maintain software in each eSourcing service domain (Akoka, 2005).

Service systems produce all services of significance and scope. A service system is thus a useful fundamental unit of analysis for understanding, analyzing, and designing services and better service systems in marketing, operations, and information systems research (Alter, 2008). Alter (2008) presents three frameworks that provide a foundation for understanding and analyzing service systems. These frameworks can be used to organize and access a wide range of relevant concepts and principles.

- The work system framework uses nine basic elements (customers, products and services, work practices, participants, information, technologies, environment, strategies, and infrastructure) to provide a system-oriented view of any system that performs work within or across organizations. Service systems are work

systems. A work system is a system in which human participants and/or machines perform work practices using information, technology, and other resources to produce products and/or services for internal or external customers (Alter, 2006).

- The service value chain framework augments the work system framework by introducing functions that are associated specifically with services. It presents a two-sided view of service processes based on the common observation that service providers and customers typically coproduce services.
- The work system life cycle model looks at how work systems (including service systems) change and evolve over time. It treats the life cycle of a system as a set of iterations involving planned and unplanned change.

## RESEARCH METHODOLOGY

Offshoring of services is critically dependent on a supply of providers that have operational and strategic capabilities to offer comparative cost advantage, satisfactory quality, and on time delivery despite the differences in distance, time zones, and culture (Carmel and Tjia, 2005). According to Ma's survey, language and time zone are not obstacles for Chinese suppliers to enter the western eSourcing market (Ma, Li, Chen, Conradi, Li and Liu, 2008). Therefore, comprehensive advice is needed to help service providers focus on the most value adding business strategies, eSourcing life-cycle phases, activities, and enabling classes of information systems that best improve their capabilities for service design and provisioning. This research will classify eSourcing practices into clearly bounded ICTO, BPO, and KPO categories and then study each category respectively. After that, in the cross-case study and final doctoral dissertation, this research will summarize the common and variable aspects among these categories and draft a generalizable result from service provider's viewpoint. This research will use project domains to classify eSourcing into the categories. One category is studied every year. In the fourth year, the cross-case study is conducted and the doctoral dissertation is completed.

This research will answer the following eSourcing life-cycle related sub questions from service providers' viewpoint. (1) What are the major activities in each phase and how are these activities managed? (2) What are the performance measures of each phase? (3) Which information and communication technology tools best support the eSourcing life-cycle and each phase? (4) What are the internal relationships between the organizational structure, enabling classes of information systems, information systems architecture, the eSourcing life-cycle, and business strategy? The sub questions will be deployed in all case studies and in the final cross-case study to guide data collection and analysis. The resulting knowledge will help practitioners: (1) to establish and execute efficient business models and eSourcing practices; (2) to recover from unanticipated coordination breakdowns quickly and effectively; (3) to proactively redesign the business models and practices; and (4) to design and use information systems and the technology infrastructure for the enactment, breakdown recovery, and redesign of the eSourcing life-cycle.

It is important to establish and execute efficient business processes throughout the eSourcing life-cycle, because routine enactment is the key for achieving efficient organizational performance. Recovering from unanticipated coordination breakdowns quickly and effectively is also important. By analyzing breakdowns and their underlying causes, researchers and actors in the workplace can identify the problems that are not easily visible in normal routines. Redesigning the eSourcing life-cycle, when breakdowns cannot be resolved in other ways, ensures organizational survival and effective long-term enactment of routines. Analyzing specific eSourcing activities and enabling information systems holistically as work systems (Alter, 2006) will help uncover: (1) which eSourcing practices and associated activities have the highest priorities for service providers to ensure organizational long-term effectiveness and (2) which enabling classes of information systems help the most in accomplishing the business objectives. When work systems are used as the units of analysis, the importance of an information system used by a work system is determined by (1) the importance of the work system to the business as a whole and (2) the extent to which the information system can support the work system in attaining the goals set for the work system. For example, instances of a class of software project benchmarking and estimation systems (see Chapter 20 in Bundschuh and Dekkers, 2008) can be deployed in almost all the phases of the eSourcing of software products and services to estimate and track effort, time, and costs involved in eSourcing engagements (Käkölä, 2008). The instances are useless and can be even harmful if the work systems responsible for program and project management, requirements engineering, contracting, and/or technical implementation of software projects do not have the practices and skills in place to leverage the instances.

During each case study and the cross-case study, this research will analyze the data by iterating between two phases. First, the data about the routines and the information systems they use, the most significant breakdowns in routines,

and the practices and information systems used for recovering from breakdowns will be compared to the eSourcing phases and practices prescribed by the eSCM-SP. The research is especially interested in breakdowns that are caused by poorly designed, poorly used, and/or entirely missing information systems. Interactions between the eSourcing strategy, practices, activities, organizational structure, and information systems are analyzed to define the most important information systems for the eSourcing life-cycle and its phases. Second, the results are shown to the case companies, feedback from the managers and the project staff is collected, and the results are revised as necessary and summarized.

Before the in-depth case studies will be started in the three project domains, a preliminary eSourcing life cycle model will be synthesized based on eSCM-SP and other relevant literature. The model is essential to help data collection and analysis. After the case study research has been completed, the cross-case analysis will draft a generalizable eSourcing life cycle model detailing the eSourcing practices, activities, and enabling classes of information systems that are most important for Chinese eSourcing service providers. The model is expected to be beneficial in helping Chinese providers to design and leverage new business models that favor larger, higher value engagements directly with clients than the dominant mediated offshoring business model.

### **CURRENT STATUS OF THE PROJECT AND A SHORT DESCRIPTION OF TESTING LIFE-CYCLE**

Research on the testing services of Huiling Technology has been ongoing for several months. Data collection focuses on the following four areas: (1) the practices and relevant information systems in the testing life-cycle, (2) the strategy for creating reusable domain test cases and reusing them in engagements, (3) the frequency and types of unanticipated breakdowns in routines and ways for recovering from breakdowns, and (4) the productization of testing services. The interviewees include the CEO and several project managers. This research will uncover the practices and enabling information systems most important for testing services outsourcing. Current research focuses on the roles of reusable domain test cases in improving services quality and customer satisfaction, reducing resource requirements, and shortening time-to-market. Breakdowns that affect the services delivery and the preventive and corrective actions necessary to deal with them are also being analyzed.

Given the time and cost constraints, the key issue of software testing is what subset of all possible test cases has the highest probability of detecting the most of (at least) the most important errors. The study of test-case-design methodologies supplies answers to this question. Testing, however creative and seemingly complete, cannot guarantee the absence of all errors. Test-case design is so important because complete testing is impossible. The obvious strategy, then, is to try to make tests as complete as possible (Myers, 2004). Another strategy is to reuse domain test cases to shorten time-to-market and improve service quality. Huiling can offer functional and performance testing services. The authors are attempting to abstract these two testing life-cycles into one model and analyzing the reuse of test cases in these two classes of testing. Based on eSCM-SP and the testing processes of Huiling, the preliminary testing life-cycle is described in Figure 1.

Future research will complete the testing life-cycle and probe important activities and relationships in the life-cycle such as the identification and management of threats to the organization's ability to meet client requirements. This research will analyze the routine enactment, the unanticipated coordination breakdowns, and the redesign of business models and processes to deal with and proactively eliminate breakdowns. Finally, the roles of information systems and the technology infrastructure in the life-cycle are investigated to find out which eSourcing practices, associated activities, and enabling classes of information systems have the highest priority for eSourcing ICT service providers.

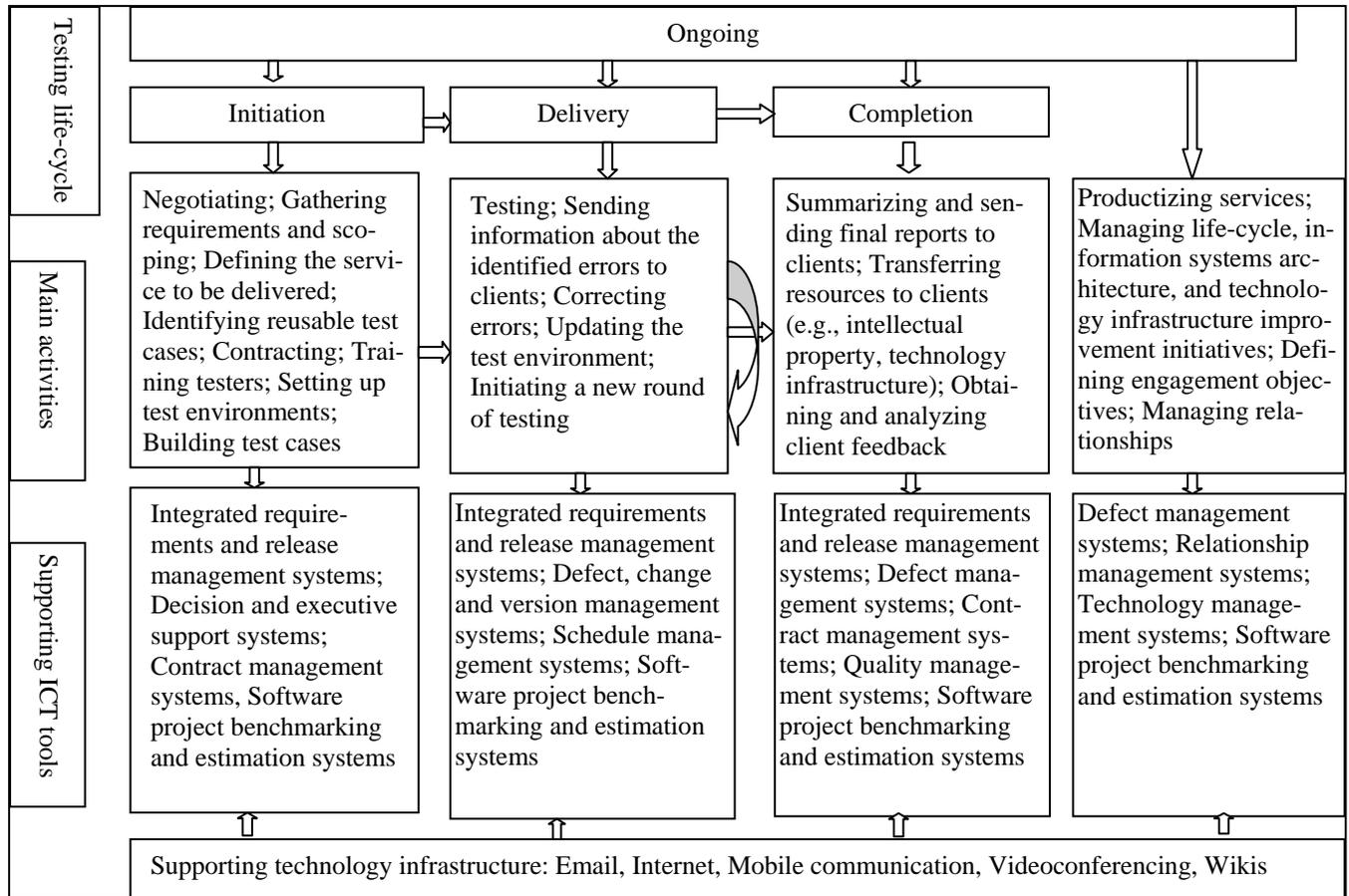


Figure 1: Testing life-cycle of a software testing service provider

## CONCLUSION

This research will provide the studied eSourcing domains with detailed guidance concerning the best practices, resource allocation, and strategy and process decision support. Especially small and medium-sized eSourcing service providers will benefit from the revised eSCM-SP model. The primary expected research result will be a generalizable eSourcing life cycle model detailing the eSourcing practices, associated activities, and enabling classes of information systems most important for Chinese eSourcing service providers. The model is expected to be beneficial in helping Chinese providers to design and leverage new business models that favor large, high-valued engagements directly with Chinese and international clients. The research results will also help Chinese eSourcing service providers improve their service quality and clients develop a better understanding of China's eSourcing services industry, so the clients can successfully embrace Chinese providers in their offshore sourcing strategies.

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