Characteristics and determinants of insourced and offshored projects: A comparative analysis

Kallol Bagchi [a,1,*], Peeter Kirs [a,1], Godwin Udo [a,1], Robert Cerveny [b,1]

[a] Department of Information & Decision Sciences, The University of Texas at El Paso, TX 79968, United States
[b] Department of IT and OM, Florida Atlantic University, Boca Raton, FL, United States

ARTICLE INFO

ABSTRACT

Similar in-house (or insourced) and offshored software development data were paired to find differences (if any) on four project performance criteria: project elapsed times, size, data quality, and same-source nations. For each paired project, the differences between five technical variables (development type, application type, architecture, development platform, and programming language) were considered. The resource dependency theory was used to examine the technical differences between matched projects. Additionally, Hofstede's cultural dimensions were used to analyze the performance of offshored software projects. Data from the International Software Benchmarking Standard Group (ISBSG) was used. The main empirical findings were as follows: project completion time is significantly shorter for in-house development projects; and firms prefer offshoring for new projects, client-service platforms, and newer application languages. Some of Hofstede's cultural dimensions do affect project quality and work effort for offshore projects.

© 2014 Elsevier Inc. All rights reserved.

1. Introduction

Prior to the 1960s organizations typically relied on their in-house (IN) information systems (IS) development teams to develop and maintain their applications. Two primary reasons are generally given for the use and expansion of IS outsourcing (Bunyaratavej, Hahn, & Doh, 2008; Hirschheim & Lacity, 2000). First, managers have long questioned the value generated by IS for an organization, a debate that continues (Lampel & Bhalla, 2011; Rosebush, Leavell, & Maniam, 2012). Second, to maintain or gain a competitive advantage, firms considered it essential to focus on their core competencies and outsource non-core business functions, including the IS function (Lampel & Bhalla, 2011; Quinn, 1992). Subsequently, managers thought it prudent to shift IS functions to external organizations, primarily to reduce costs.

Over time, it became clear that maximization of cost savings requires offshoring (OFF) or the relocation of business processes from the host country to another country where wages are significantly lower and skilled labor is easier to find (Agrawal, Khatri, & Srinivasan, 2012; Carmel & Tjia, 2005). The trend toward OFF was promoted by the refinement of the Internet and advances in telecommunication technologies. This allows software development projects to be electronically transferred through secure channels at each phase of development for examination and comment by the outsourcer. Additional reasons cited for OFF include gains in efficiency, productivity, and quality.

More recently, a number of variations of sourcing decisions have appeared (e.g., near-sourcing, back-sourcing, best-sourcing, right-sourcing, multi-sourcing), and combinations of IN and OFF have resulted. Dibbern, Goles, Hirschheim, and Jayatilaka (2004), in an attempt to categorize outsourcing types, suggested that four parameters define the type of sourcing arrangement: degree (total, selective, and none); mode (single vendor/client or multiple vendors/clients); ownership (totally owned by the company, partially owned, or externally owned), and time frame (short-term or long-term).

This paper focuses only on projects that were IN (developed in-house, onshore) or OFF (developed by an offshore, outsourced vendor). In part, this is driven by our dataset and in part by the multitude of possible combinations associated with the Dibbern framework, which would be infeasible to cover completely in a single paper.

Software development, together with technical support, website design, and information technology (IT) infrastructure development was a $90 billion industry by 2005 (BusinessWeek, 2006). Outsourcing has continued to grow since then. According to Gartner Inc. (2011), the worldwide business process outsourcing

---

* Corresponding author. Tel.: +1 915 747 5496; fax: +1 915 747 5126.
  E-mail address: kbagchi@utep.edu (K. Bagchi).
[1] All authors contributed equally to the project.

Table 1
Overview of theories applied in IN/OFF.

Theories	Basic assumptions	Main variables/focus	IT to be outsourced
Agency theory	Asymmetry of information, differences in perceptions of risk and uncertainty	Agent costs, optimal contracts, uncertainty, risk aversion, length of relationship	Only IT functions where the vendor and client have common goals & the same degree of risk willingness/aversion
Contractual theory	Outsourcing contract provides a legally bound and institutional framework in which each party's rights, duties, and responsibilities are codified	Number of contracts, opportunists	IT functions where the firm can expect and secure that a vendor and client will have the same contractual behaviors
Core competencies theory	Activities that are not core competencies are to be outsourced; otherwise in-housed	Asset specificity, sunk cost, technology, firm-specific competence, resource deployment, competencies	IT functions that are peripheral to the company's production of goods and services
Eclectic paradigm (OLI-model)	Transactions are made within an institution if transaction costs on free market are higher than internal costs	No; joint ventures, presence of global oligopoly, number of licenses, product life cycle	Only IT whose development cost is lower if done by vendors
Firm boundaries theory	Outsourcing is a means by which the boundary of the firm can be adjusted to meet the market demand	Cost	All IT functions that satisfy several of the other theories, mainly resource-based theory and transaction theory
Game theory	Ceteris paribus actors make rational decisions to maximize profit	Decisions under certain situations	Not specified
Innovation theories	Innovation (generally, but not always) occurs in stages	Adoption and diffusion	Not specified
Power, politics, and cultural theories	Power, idiosyncratic interests, politics, and cultural values play major roles in org. decision-making	Different degrees of power, organizational politics, cultural dimensions	Not specified
Relationship theories	Parties in a relationship assume that the outcome of a relationship is synergistic	Cooperation, interactions, social, and economic exchanges	Not specified
Resource theories	A firm is a collection of resources, and resources are central to a firm's strategy	Internal resources, value, rareness, imperfect immutability	IT functions where there are no sufficient strategic resources, e.g., unique, valuable, difficult-to-imitate resources
Social exchange theory	Assumption of rewards and obligation to return rewards drive participation in exchange	Exchange of activities, benefits/costs, reciprocity, balance cohesion, power exchanges	IT functions are of self-interest to both parties who can mutually achieve individual goals without hurting the other
Stakeholder theory	Stakeholders' expectations and goals of outsourcing are various; outsourcing success requires satisfying these interests based on moral management	Stakeholders' interests, effective communications among stakeholders	Only IT functions where a balance can be achieved between stakeholders
Transaction cost economics	Cost incurred in making an economic exchange	Search and information costs; bargaining costs; policing and enforcement costs	Not specified

(BPO) market was forecast to grow 6.3% in 2011 and 5% in 2012, with faster growth in such areas as Western Europe (8.9%) and Asia/Pacific (17.9%). It has been reported that more than 80% of European companies engaging in OFF are satisfied with the results and that the cost savings realized have generally ranged between 20% and 40% (UNCTAD, 2004).

Performance and technical aspects of IN vs. OFF software development/enhancement have received little research attention. This study addresses this deficiency by incorporating three performance measures (the time taken to complete the project), project quality (the number of errors), and the number of person-hours needed for project completion and five technical measures (project development type, application type, system architecture, development platform, and programming language).

The theoretical bases for understanding outsourcing are intended to be comprehensive, and a number of theories have been proposed as appropriate for IS research (see Table 1). Recently, resource-based views (RBV) and resource dependency theory (RDT) have gained prominence, although additional theories remain applicable and pertinent. Definitions of what constitutes a resource vary somewhat, however. Wade and Hulland (2004) apply a composite definition of resources, based on those of Sanchez, Heene, & Thomas (1996) and Christensen and Overdorf (2000), as assets and capabilities that are available and useful in detecting and responding to market opportunities or threats. From this perspective, our study focuses on a single resource, application software, and a single capability, the ability to produce the application.

The present study tries to identify which technical resources are predominant in OFF and which are predominant in IN. Resource dependency theory is used to explain IN/OFF technical differences since it emphasizes the firm's external environment and proposes that actors lacking in essential resources seek to establish relationships with others to obtain them. However, RDT does not help explain why IN and OFF projects may vary with respect to project performance. For these considerations, we are guided by cultural theories, which assume that national culture differences can either interact or conflict with project implementation (Straub, Weill, & Stewart, 2002).

Using data from the versatile Data Repository of the International Software Benchmarking Standard Group (ISBSG), the present study compares and contrasts IN and OFF software projects with respect to the performance and technical variables described above. The ISBSG database contains data on 3024 projects. However, when the projects were matched with respect to size, comparable beginning and ending dates, and data quality, the data set was significantly reduced. Consequently, we examined 57 paired IN and OFF software projects in various nations undertaken from 1991 to 2003, the latest year for which data were available to us. It should also be noted that IN/OFF activities were at a peak worldwide during this time, and we chose this data set to see whether we could profitably learn anything about what was going on at the time. For projects where the completion time differed, we further examined how some selected technical factors varied.

Some of the unique features of this study include an analysis of 57 paired projects, an analysis of IN/OFF project technical differences using a RDT framework, an analysis of IN/OFF project performance differences using a cultural theory framework, a 17-nation multinational scope, and a longitudinal analysis between 1991 and 2003 of projects matched according to start time.