



# Firm-level outsourcing decision making: A balanced scorecard-based analytic network process model



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## ABSTRACT

We combine the Analytic Network Process (ANP) and the Balanced Scorecard (BSC) to build a cohesive decision model for determining firm level IT outsourcing strategy. Although prior research has confirmed the existence of interactions among BSC indicators and the potential impact of those interactions on firm level performance, interactions have hitherto not been fully understood and implemented, due to lack of adequate tools. In this paper, we take advantage of the strength of the ANP technique to address the interaction issues between indicators when applying the BSC. The ANP establishes the interactions among the indicators, prioritizes the indicators under the four BSC perspectives, and then identifies the best outsourcing strategy through synthesis. A case company is used to study the feasibility of our approach at firm level outsourcing decision making. Finally, we examine the robustness of the model through sensitivity analysis, and demonstrate the importance of incorporating indicator interactions when operationalizing BSC. Managerial insights and implications derived through model analysis are discussed.

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## 1. Introduction

Beginning with Kodak's 1989 contract with IBM (Applegate and Montealegre, 1991), IT outsourcing has grown steadily as a strategic IT management option. During this period, the pressure of globalization, rapid technological evolution, and the necessity for cost reduction have motivated if not compelled companies to turn to outsourcing. In the early 1990s, the two primary objectives for IT outsourcing were cost savings and technical efficiency. Today, the number of outsourcing objectives has increased along with their significance to the firm and, as a result, outsourcing has become a strategic option for firms seeking to improve their overall business performance (Lee et al., 2003). Dahlberg and Nyrhinen (2006) pointed out that in the current environment, outsourcing objectives are not only economic, but also *strategic* (e.g., aligning IT with corporate objectives and focusing on the core business), *technological* (e.g., ensuring the availability of technology and technology skills, and standardizing hardware, software and business processes), and *social* (e.g., improving the quality and availability of services, as well as user satisfaction). In a broader sense, outsourcing allows firms to develop alliances, to keep pace

with technology advancement, to expand their IT infrastructure, and to extend the reach of their operations.

A strategic focus is also required in order to manage the inherent risks associated with outsourcing (Osei-Bryson and Ngwenyama, 2006). Strategic factors that can put the client at risk include specialization of the product and/or vendor, uncertainty of the business environment, interdependence between client and vendor business processes, and the level of client and vendor expertise with both the IT operation and outsourcing in general (Bahlia and Rivard, 2005). In light of these risk elements, a successful firm should understand and prioritize its objectives, set specific and obtainable goals, select the right vendor(s), and negotiate an enforceable contract with vendor(s) (Chen and Bharadwaj, 2009; Corbett, 2004; Domberger, 1998). In daily operations, the firm should engage in effective communications and monitoring in pursuit of successful vendor relationships management.

Toward this end, management requires a structured approach that considers the elements of decision making involved in the outsourcing process: i.e., the objectives sought through outsourcing, the associated benefits and costs, and the set of financial and non-financial concerns for making outsourcing decisions in specific situations. The Balanced Scorecard (BSC) method provides such elements within a framework that assesses strategic performance. The Analytic Network Process (ANP), in turn, provides a structure and process that guide the decision maker in weighing the various criteria and choosing actions intended to achieve the

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stated objectives. In this paper, we focus on outsourcing issue and employ the combined BSC and ANP model. We show how a BSC-based ANP model is useful in identifying the optimal strategy, and how important managerial insights may be derived by exploiting sensitivity analyses of the model.

### 1.1. The balanced scorecard (BSC)

As organizations endeavor for value creation and future growth, conventional unidimensional financial measures increasingly become inadequate and irrelevant (Francis and Shipper, 1999). To provide a more comprehensive measurement, Kaplan and Norton (1992) developed the multidimensional Balanced Scorecard (BSC). It has been widely adopted as a performance evaluation framework (Cobbold and Lawrie, 2002a; Rigby, 2001). Marr and Neely (2003) reported that the BSC was employed by more than 60% of the fortune 1000 companies.

The BSC reflects a balance between short- and long-term objectives, financial and non-financial measures, lagging and leading indicators, and external and internal measures. It emphasizes linking and aligning multiple measures to strategic objectives, and conceptualizing the strategic alignment between business goals and specific tactics. The BSC evaluates an organization from four perspectives: financial measures, customer satisfaction, internal operations, and company learning and growth. The BSC permits organizing indicators within the four perspectives and also indicates the interactions among them. To implement a BSC framework, a manager must establish the strengths of all relationships and determine their relative importance.

### 1.2. The analytic network process (ANP)

As a multicriteria decision making (MCDM) tool, the Analytic Hierarchy Process (AHP) allows subjective judgments in addition to quantitative information to enter into the evaluation process. Its framework is straightforward and comprehensive, and adaptable to both group and individual decision making, thus allowing better communication among decision-makers. The AHP uses 9-point scale for comparison, namely unimportant=1; somewhat important=3; important=5; very important=7; and extremely important=9.

The ANP is a generalization of the AHP (Saaty, 2001, 2005). While AHP uses a unidirectional hierarchical relationship to model decision levels, ANP allows for complex interactions and influences among the various components of the decision problem, thus making it a better choice for studying more complex decision problems. ANP brings all of the decision objectives, criteria, alternatives and actors (such as decision makers, stakeholder, and influencers) into a single unified framework, and it facilitates interaction and feedback of elements (alternatives, criteria and actors) within groups (inner dependence) and between groups (outer dependence) (Saaty, 2001). ANP has been applied to a number of complex real-world decision such as transportation project selection (Shang et al., 2004; Tjader et al., 2010), policy decisions (Saaty, 2005), and supply chain management analysis (Meade and Sarkis, 1998; Nakagawa and Sekitani, 2004). See Saaty and Vargas (2006) for details.

The organization of the paper is as follows. In Section 2 we reviewed the outsourcing theories and multicriteria outsourcing decision models. We discuss the literature that utilizes the BSC/ANP approach in other application. Section 3 describes the case firm by whom our research was motivated, and discusses the performance metrics the firm helped build from the four BSC perspectives. Based on the indicators developed and validated by the management team, we build a combined BSC-ANP model and report the model results in Section 4. Section 5 shows the

robustness of the proposed model and provides managerial insights through sensitivity analyses. The limitations of our model as well as the summary of our findings are given in Section 6.

## 2. Literature review

### 2.1. The outsourcing decision

The outsourcing decision has been the object of a number of studies. Loebbecke and Huyskens (2009) use a logistic regression model to identify criteria for netsourcing decision. Osei-Bryson and Ngwenyama (2006) present a mathematical model to show firms the value of outsourcing, identify outsourcing risks, and construct mutually satisfactory vendor incentive schemes. Amarel and Tsay (2009) describe the cognitive influences and biases that impact decision making among vendors and clients in a distributed outsourcing (supply chain) environment. A comprehensive review of 191 articles on IT outsourcing can be found in Lacity et al. (2009).

Lacity and Willcocks (2000) classify the outsourcing strategies into three categories: Insourcing, Outsourcing, and Selective Outsourcing. In *Insourcing*, companies retain the management and provision of more than 80% of the IT budget internally. In *Outsourcing*, firms transfers IT assets, leases, staff, and management responsibility to an external IT provider which correspond to more than 80% of its IT budget. Finally, the *Selective Outsourcing (Select-Out)* strategy selects IT function from external provider(s) while still providing between 20% and 80% of the IT budget internally

#### 2.1.1. Outsourcing theories

Several researchers have studied the theoretical basis of outsourcing. Since cost saving is a primary objective of businesses, the transaction cost theory (TCT) dominates the sourcing studies (Ang and Straub, 1998; Lyons, 1995; Osei-Bryson and Ngwenyama, 2006; Walker and Weber, 1984, 1987; Nam et al., 1996; Hui and Beath, 2002). The theory was pioneered by Coase (1937) and developed by Williamson (1985). It deemed that firms are rational and opportunistic in their profit pursuit, and the classic question is: should a firm produce in-house or buy from market? Firms weigh between the production costs (P) and transactions cost (T), and if savings ( $P-T > 0$ ) exists, outsourcing occurs. The cost elements of the transaction involve (i) operational costs: information searching, and (ii) contractual costs: bargaining and writing the agreement, and monitoring and enforcing the contract.

Recently, TCT has been criticized for its singular focus on cost minimization. Douma and Schreuder (2002) contend that a resource-based view (RBV) should be used to understand outsourcing decisions and outcomes. The knowledge-based theory (KBT), which evolved from resource-based theory (RBT), views a firm as bundles of resources or sets of knowledge (Nickerson and Zenger, 2004; Wernerfelt, 1984). Firms using KBT seek to best allocate existing resource and obtain new resources in order to achieve economic efficiency. Likewise, property rights theory (PRT) (Alchian and Demsetz, 1973; Demsetz, 1967; Grossman and Hart, 1986), agency theory (Holmstrom, 1979), and power theory (Rajan and Zingales, 1998) have all been used to either complement with or substitute for TCT. However, no existing theories can provide a comprehensive view to address the outsourcing policy strategy. In this paper, we combine various perspectives of outsourcing concerns into one unified framework, and enable it by the BSC-based ANP model.

#### 2.1.2. Multicriteria decision models

A number of researchers have applied multicriteria model for outsourcing decisions, but none have considered a full, comprehensive

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