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Management the risks of outsourcing: Time, quality and correlated costs

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ABSTRACT

Cost, quality and time to market are three main factors for outsourcing management. A game theoretic model is used to design optimal outsourcing contracts including these three factors for a buyer and a supplier under Full Information (F) case and Asymmetric Information (A) case where the buyer does not share her internal variable cost information with the supplier. Optimal outsourcing contracts are derived and results of numerical experiment are also presented. Several insights of managing the outsourcing risks due to the Asymmetric Information are given for various industries, like cost-sensitive industry, time-sensitive industry, and quality-sensitive industry.

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1. Introduction

With the market becoming more competitive, many companies focus on improving the efficiency of operations and logistics management. Outsourcing is currently being used as an important strategy by many companies in the US to focus on the core competency, reduce cost and increase profit. Besides the cost savings, outsourcing has some other advantages, including decreasing the time to market and increasing the quality of work. If a company does not have skills or expertise for a certain work, outsourcing or working with a supplier is one of best strategies. The supplier can help the buyer company to reduce the product development time and logistics time, like faster start-up, development and scalability for new operations. Accenture and Procter & Gamble's (P&G) won 'Most Innovative' Outsourcing Excellence Award in 2013. According to Accenture, Marco Ziegler, a managing director from Accenture states that Accenture "is helping P&G realize greater agility and flexibility in the front office and enabling it to meet its changing business needs more effectively, drive improved productivity and innovation, accelerate the start-up of new services and realize lower IT costs." Wang et al. (2015) point out that outsourcing is one of effective ways to improve the service supply chain management. But the outsourcing is not a trouble free solution. The outsourcing strategy has proven to be an effective way to reduce the cost and shrink the time-to-market but brings with it significant quality risks that must be recognized and properly managed.

All three important outsourcing factors of cost saving, market time reduction, and quality assurance need to be addressed simultaneously when discussing the outsourcing management. These three factors are often competing constraints. Increased quality typically means increased time and increased cost; a market time reduction constraint could mean increased costs and reduced quality; and a cost saving could mean increased market time and reduced quality. In this

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research, we study that a supplier and a buyer initialize an outsourcing relationship and need to sign an outsourcing contract before establishing a long term trust outsourcing relationship. Hence, managing a new outsourcing work is like managing a new project that a set of activities need to be completed within the constraints of cost, quality, and time. Project Management Triangle model (PMI, 2013) recognizes three key constraints, cost, time, and scope (quality), for a project. Here we see the need to discuss the cost, time, and quality simultaneously in the outsourcing management.

In outsourcing, a firm is relying on a third party to run certain business functions, like producing products or offering services. The third party may hold some private information. The Asymmetric Information creates uncertainty for decision making and hence increases the supply chain risks. If not properly managed, the firm might negatively affect its performance. One of the major concerns is the quality of outsourcing work. If the outsourcers cannot get the expected quality level, the company may decide to stop outsourcing in most cases. Dell stopped routing corporate customers to a technical support call center in India because of quality issues in 2003. The quality of the particular call center was unsatisfactory leading to corporate customers' dissatisfaction. To avoid getting hurt, Dell promptly decided to channelize those calls to a higher quality onshore center. Individual customers, on the other hand, got shifted to the lower-cost offshore centers (Huettel, 2004). Gadde and Hulthen (2009) shows that many companies have taken outsourced functions back in-house to ensure the quality of products or services. This shows that quality of outsourcing work, in addition to outsourcing price and time-to-market, plays an important role in outsourcing decisions.

In this research, we consider a company, or a buyer, that outsources part of its works to a supplier in order to reduce the cost, time-to-market, and maintain a certain level of outsourcing quality. We use a game theoretic model to design the optimal contracts between the buyer who seeks outsourcing and the supplier under a Full and an Asymmetric Information case. Asymmetric Information is more like real business scenario where the buyer does not share her internal variable cost information with the supplier. Asymmetric Information creates decision making under information risks. We discuss the risks of outsourcing management by comparing Full Information and Asymmetric Information case. The expected loss due to Asymmetric Information could be viewed as the expected information risks that are measured by the difference of Asymmetric Information and Full Information.

2. Literature survey

Outsourcing have been widely used, from manufacturing outsourcing (Tsai et al., 2007), call center outsourcing (Gans and Zhou, 2003, 2007; Akşin et al., 2008), IT outsourcing (Gopal et al., 2003; Kalnins, 2004; King and Torkzadeh, 2008), to Business Process Outsourcing (Kenion, 2005). Researchers study outsourcing from various aspects. Tsai et al. (2007) study cost savings from remanufacturing outsourcing decision by integrating the Activity-Based Costing (ABC) approach. Ho and Zheng (2004) develop a market share model to study how a firm might choose a delivery-time commitment to influence its customer expectation, and delivery quality in order to maximize its market share. Li et al. (2009) develop a model for ride service outsourcing. Hsiao et al. (2010) study the logistics outsourcing focus on service benefits. Tsai et al. (2012) study the dark side of logistics outsourcing. Kouvelis and Mukhopadhyay (1999) use a duopolistic non-cooperative game theoretic framework to study the design quality competition in a durable product market. Dixit (2003) uses moral hazard model and Lizzeri (1999) focuses on adverse selection to study quality competition under Asymmetric Information.

Outsourcing increases the complexity of global supply chain. Meixell and Gargeya (2005) review decision support models for the design of global supply chains and outsourcing network, and assess the fit between the research literature and the practical issues. Zhen (2014) studies an integrated optimization problem on outsourcing and production decisions in the context of the global supply chain. Reeves et al. (2010) report on an empirical study that examined a suite of outsourcing distribution and logistics services within the automotive supplier industry.

Outsourcing can be used to reduce the product deliver time and the logistic time. Sheu (2007) discusses an emergency logistics distribution approach for quick response to relief demand in disasters. Logistic outsourcing could be used in a quick response system. Tsai et al. (2012) identify and empirically examine the potential risk factors and their structural relationships that can cause a logistics outsourcing relationship to fail. De Mello Bandeira et al. (2015) adopt an empirical approach using qualitative and quantitative techniques to propose a set of factors that affects the logistics outsourcing decision-making process in the Brazilian context, as well as the level of importance attributed to each decision factor.

Supply Chain Risks Management became one of important research topics for many years. Many different types of supply chain have been studied. Nagurney and Toyasaki (2005) study the reverse supply chain. Sheu and Talley (2011) review the green supply chain. Nagurney and Matsypura (2005) study the risks in global supply chain. Yue et al. (2010) study a make-to-order manufacturer in the sourcing selection process. Their research provides a decision model to develop a portfolio allows the manufacturer to make trade-offs between cost and reliability to finish the job on time. Dong and Tomlin (2012) discuss how to manage the disruption risk by study the interplay between operations and insurance. Researchers use various approaches to mitigate or manage the supply chain risks. Chiu and Choi (2013) give an extensive review of using mean-variance models to manage the supply chain risks. Sheu (2010) uses a dynamic relief-demand management model to study emergency logistics operations under imperfect information conditions in large-scale natural disasters. Mishra et al. (2009) propose to share the demand forecast information to improve the supply chains. Choi (2011) uses a new technology RFID (Radio-frequency identification) to reduce the risks in VMI (Vendor-managed inventory) and hence to coordinate the whole supply chain. Zeng and Xia (2015) study a purchasing firm work with its backup supplier in cases of primary supply

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