



## A Study of Outsourcing Material Availability Decision-Making

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### Abstract

Effective supply chain design calls for robust analytical models and design tools. Previous works in this area are mostly Operation Research oriented without considering manufacturing aspects. Recently, researchers have begun to realize that the decision and integration effort in supply chain design should be driven by the manufactured product, specifically, product characteristics and product life cycle. In addition, decision-making processes should be guided by a comprehensive set of performance metrics. In this paper, we relate product characteristics to supply chain strategy and adopt supply chain operations reference (SCOR) model level I performance metrics as the decision criteria. An integrated analytic hierarchy process (AHP) and preemptive goal programming (PGP) based multi-criteria decision-making methodology is then developed to take into account both qualitative and quantitative factors in supplier selection. While the AHP process matches product characteristics with supplier characteristics (using supplier ratings derived from pairwise comparisons) to qualitatively determine supply chain strategy, PGP mathematically determines the optimal order quantity from the chosen suppliers. Since PGP uses AHP ratings as input, the variations of pairwise comparisons in AHP will influence the final order quantity. Therefore, users of this methodology should put greater emphasis on the AHP process to ensure the accuracy of supplier ratings.

**Keywords:** Outsourcing, logistics, materials handling, transaction cost economics, resource based, network-based, framework.

## Introduction

Outsourcing, in particular the make-or-buy decision, has received much attention in practice and in the academic literature over recent years. Such descriptions usually focus on the outsourcing of parts manufacturing. Examples of such frameworks include and .Outsourcing of materials handling activities is less well covered, although a number of researchers have reported on the outsourcing of logistics in general. Logistics is defined as “that part of supply chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements” . Materials handling is an element of the logistics function, and is defined as the operational procedure that takes place when the materials are handled along a materials flow. Materials handling excludes supply chain planning and supply chain management.

The focus of this article is on the outsourcing of materials handling of parts in automotive production. Industrial practice, as witnessed by the authors and also described, shows that materials handling covers a confined set of relatively labour-intensive activities, which may not necessarily be core elements of the primary function of a production company. Materials handling may therefore be a good area for intensive study for companies seeking to minimise. Outsourcing may be an option worth considering, but the existing literature offers little guidance. Most of the authors mentioned generally describe the decision whether to outsource the (broader) logistics function or not. Possible options for outsourcing of materials handling specifically (including the choice of supplier/service provider, location of the activities, integration with other activities) have not been given much attention.

However, recent social and economic changes, such as the rising cost of labour in emerging countries, the rising cost of oil, the volatility of currency exchange rates, and an increased awareness of the inflexibility, non-responsiveness, and hidden costs often associated with offshore suppliers have led researchers to reconsider the implications of such events on outsourcing developments . These changes have also led companies to replace global sourcing, or at least to combine it with the domestic purchasing or near sourcing strategies they had followed in the past. Near sourcing is defined as manufacturing or procuring products and services from foreign suppliers located in continental regions rather close to the company’s own facilities and customers for the purpose of ensuring more responsiveness at what are still relatively low prices . Despite the potential benefits of near sourcing, there is still little analysis of the advantages this approach can offer to the supply chain (SC). Additionally, global

sourcing requires the development of SC configurations to meet the associated transportation and lead-time requirements so that decreasing the geographical distance from the supplier base demands substantial efforts in business process reengineering. For these reasons, companies are just beginning to take the first steps toward near sourcing, particularly in those industries where the increased price of oil exacerbates the already high salience of transportation costs, such as furniture, apparel, footwear, and steel. Additionally, American-based multinational companies like Caterpillar and Ford have recently moved their production facilities back to the United States and Mexico due to the combined effects of rising labour costs, currency strengthening in Far East countries, and incentives offered by governments to invest in local manufacturing activities as a way to alleviate periods of economic crisis. Outsourcing and offshoring have been important business strategies since the early 1990s and continue to be of significant practical and scholarly interest. Outsourcing refers to moving internal activities outside of the company and offshoring refers to the geographical dimension of where to perform such activities, ranging from captive offshoring (make) to offshore outsourcing (buy) options. In the past, make-or-buy decisions often resulted in outsourcing to reduce costs and transfer risks and responsibilities to suppliers located offshore. More recently, however, studies suggest that managers are increasingly reconsidering some previous outsourcing and offshoring decisions causing them to revoke some of these, thus reshaping their supply. The integration and linkage of these two broad sets of operational and behavioral theory literature arises where they overlap. The operational make–buy literature rather exclusively assumes a rational decision making approach by the firm, where a programmed, rules-based and optimal decision is made given the known factors and the known uncertainty dimensions. There are two limitations here. First, typically it is not a firm that makes a decision; rather, in most cases it is a human being who makes the decision. There is a strong human component to this form of corporate decision making. Second, the human being is likely to augment any rules-based decision analysis approach with other information, sensitivities and biases. As such, the operational make–buy literature to date has not adequately addressed the human level aspect of this important decision. In contrast, the behavioral decision making literature by definition addresses individual human level aspects. This literature and its central theories have been developed and applied in a wide variety of business contexts to understand, for example, consumer behavior, negotiation techniques and management decision-making. But, to the best of our knowledge, this literature and its concomitant theories have not been applied to explore or investigate the behavior of managers involved in a supply chain make–

buy decision. The integration of these two broad literatures presents an opportunity to close a significant research gap in the understanding of the make-buy decision. This paper aims to contribute in two ways. First, we aim to start to fill the gap by applying behavioral decision making concepts to the operational make-buy context. Our conceptual framework posits personal and task characteristics that influence a supply manager's make-buy decisions. In all, we posit that economic/cost, intellectual capital and supply risk factors will influence a supply manager's decision, and that these factors interact and are themselves further influenced by the format of the information available to the decision maker. Understanding the relative influence

and interactions of these factors contributes to theory and aids in practical prescription to both OEMs and vendors in the make-buy situation. Second, we aim to contribute by illustrating and applying a novel research methodology uniquely suited for study of behavioral decision-making in the operational make-buy context. This empirical method is the controlled behavioral experiment implemented via a questionaire instrument to real supply managers. To the best of our knowledge, this approach has not been presented in the extant operations management literature. It is an especially valuable investigative technique because of its ability to control factors, test many combinations of hypothesized causal relationships, and isolate behavioral issues. All of these would otherwise be infeasible in many sampling contexts.

## Review of literature

(Mantel, Tatikonda, and Liao 2006) studied "A Behavioral Study of Supply Manager Decision-Making: Factors Influencing Make Versus Buy Evaluation" found that and This paper investigates behavioral factors influencing a supply manager's decision to insource or outsource the manufacture of a product component. To do so we posit a theoretical framework that integrates the heretofore distinct operational make-buy literature and the behavioral decision-making literature. Within the framework three factors influencing the make-buy decision are brought into account: the decision-maker's perception of supply risk or "strategic vulnerability", the degree of core competency represented by the product component under consideration and the formality of the information about supply alternatives. The results of a controlled experimental survey show that: strategic vulnerability and core competency do influence the make-buy decision, strategic vulnerability has greater influence than core competency and information formality moderates the make-buy decision when the strategic



vulnerability and core competency conditions are mixed. The practical implications of these results include the notion that management can ensure a more rational make-buy decision if they understand the biases that influence the decision and point these biases out to the decision maker.

(Bals, Kirchoff, and Foerstl 2016) studied “Exploring the Reshoring and Insourcing Decision Making Process” found that and Firms’ decisions to move previously offshored value creation activities back to domestic locations or to reintegrate outsourced value creation activities back into their organization are often referred to as reshoring and insourcing, respectively. The reshoring and insourcing phenomena are not new topics in the literature, yet both are still considered emerging research areas. In particular, the complexities of global production location and sourcing decisions among international organizations require a more in-depth investigation. While outsourcing and insourcing have been studied extensively (, the (reverse) decision in terms of reshoring and/or insourcing are not yet well understood. Only recently have studies shed more light on these decision making processes, e.g. for production reshoring and insourcing in Denmark and US manufacturing reshoring.

(Cagliano et al. 2012) studied “A decision-making approach for investigating the potential effects of near sourcing on” found that and Purpose: Near sourcing is starting being regarded as a valid alternative to global sourcing in order to leverage supply chain (SC) responsiveness and economic efficiency. The present work proposes a decision-making approach developed in collaboration with a leading Italian retailer that was willing to turn the global store furniture procurement process into near sourcing. Design/methodology/approach: Action research is employed. The limitations of the traditional SC organisation and purchasing process of the company are first identified. On such basis, an inventory management model is applied to run spreadsheet estimates where different purchasing and SC management strategies are adopted to determine the solution providing the lowest cost performance. Finally, a risk analysis of the selected best SC arrangement is conducted and results are discussed.

## Conclusions

This study aimed to understand individual influence in corporate decision-making and, to that end, integrated operational and behavioral literature in a way that has not been done before. The conceptual framework sets a base for further study of the human element in operational decision-making. And the empirical results show that the behavioral decision-making process for make-buy evaluation is indeed highly nuanced, with certain factors having greater



influence under specific conditions. This paper also presented a research method that allows tests of causal relationships through a controlled experiment format with a sample of real managers, without incurring the infeasibility of a single, centralized laboratory setting. While the work here investigates supply manager decision-making, the method can generalize to a wide variety of operational contexts where what is typically perceived as a “firm” level decision is made by one or more humans. Representative contexts include portfolio decision-making for product and process development, and assessment of and decision-making around SBU-level operations strategy alternatives.

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