

Selection of logistics service provider: An analytic network process (ANP) approach

Sanjay Jharkharia^a, Ravi Shankar^{b,*}

^aDepartment of Mechanical Engineering, Bundelkhand Institute of Engineering and Technology Jhansi, Jhansi 284128, India

^bDepartment of Management Studies, Indian Institute of Technology Delhi, New Delhi 110 016, India

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Abstract

This article presents a comprehensive methodology for the selection of a logistic service provider. The proposed methodology consists of two parts: (i) preliminary screening of the available providers, and (ii) analytic network process (ANP)-based final selection. The criteria, which are relevant in the selection of a provider, have been identified and used to construct an ANP model. Thereafter, the application of ANP for the final selection of a provider has been demonstrated through an illustrative example. The results of this example indicate that compatibility between the user and the provider companies is the most important determinant, which influences the final selection process. This approach also enables the decision-makers to better understand the complex relationships of the relevant attributes in the decision-making, which may subsequently improve the reliability of the decision.

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1. Introduction

The outsourcing of logistics activities to third-party logistics service providers, 3PL (hereinafter called provider), has now become a common practice. The commonly known drivers for outsourcing are [1–4] needs of the organizations to concentrate on core competencies, cost reduction, development of supply chain partnerships, restructuring of the company, success of the firms using contract logistics, globalization, improvement of services and efficient operations, etc. One of the most important reasons for outsourcing is the capabilities of the providers to support their clients with the expertise and experience that otherwise would be difficult to acquire or costly to have in-house [1]. According to

the Langley et al. (2003) 3PL survey [5], the most common outsourced activities are warehousing, outbound transportation, customs brokerage, and inbound transportation.

Keeping in view the growing trend of logistics outsourcing, many providers are now offering a variety of services. These services mainly involve business-to-business relationships, where not only the user is a critical stakeholder but also his customers who are directly affected by the quality of service of the provider [6]. Therefore, the user must exactly identify what it needs from the provider. Regarding logistics outsourcing, many researchers [1,6–8] have discussed, besides other issues, the criteria for the selection of a provider. However, the selection of a proper provider, which suits the needs of the outsourcing company (hereinafter called user), is not an easy task. The complexity of this task increases with an increase in the number of selection criteria [9].

Analytic hierarchy process (AHP) [10] is one of the widely used approaches to handle such a multi-criteria decision-making problem. However, a significant

* Corresponding author. Tel.: +91 11 26596421;
fax: +91 11 26862620.

E-mail addresses: sjharkharia@yahoo.co.in (S. Jharkharia),
ravi1@dms.iitd.ernet.in, rs@rediffmail.com (R. Shankar).

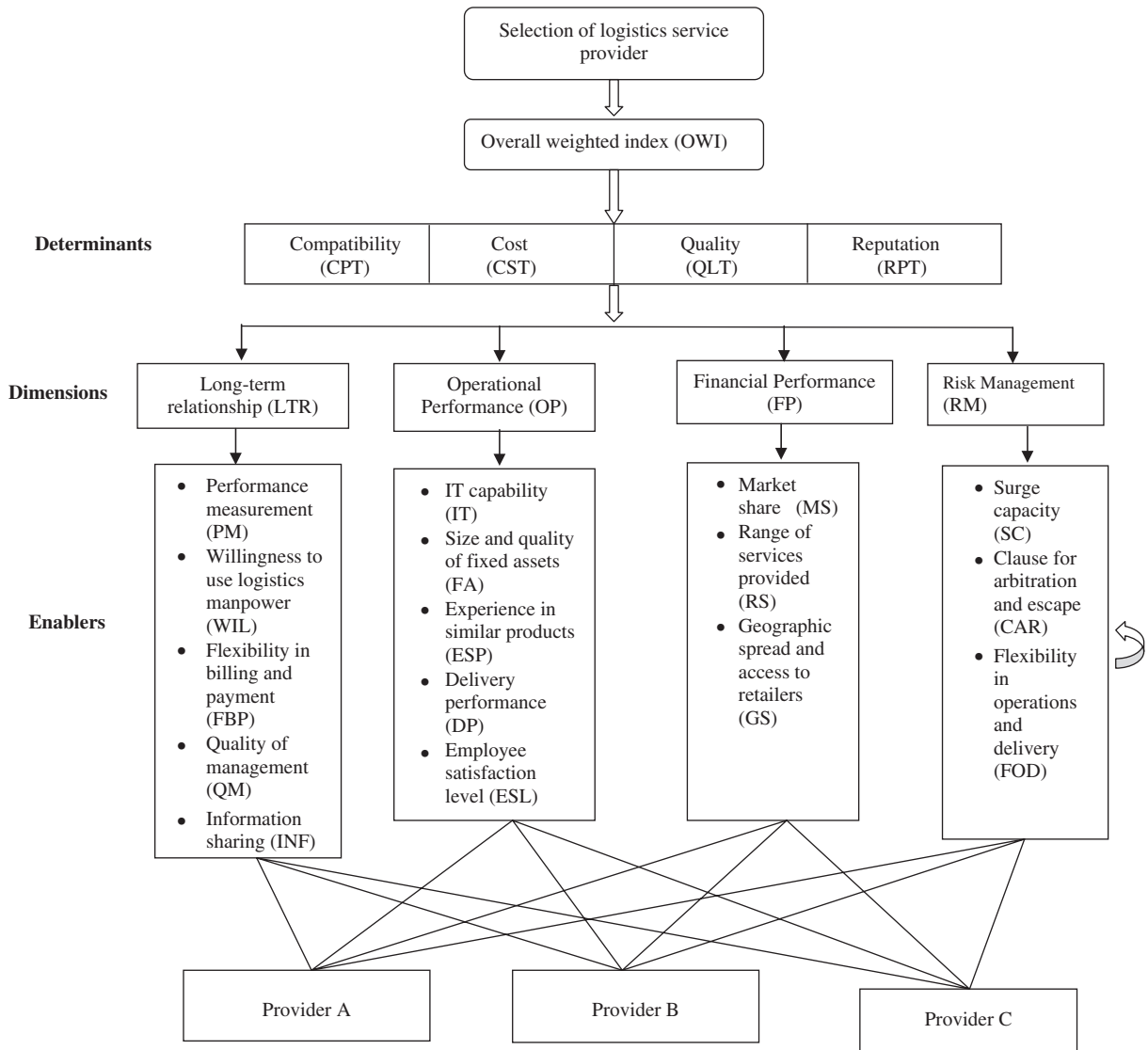


Fig. 1. ANP-based model for the selection of a logistics service provider.

limitation of AHP is the assumption of independency among various criteria of decision-making. Analytic network process (ANP), on the other hand, captures interdependencies among the decision attributes and allows a more systematic analysis. It also allows inclusion of all the relevant criteria (tangible or intangible, objective or subjective, etc.) that have some bearing in arriving at the best decision [11]. Sarkis [12] has observed that ANP has been effectively used in decisions related to energy policy planning, product design, and equipment replacement.

Contrary to AHP, ANP provides a more generalized model in decision-making without making assumptions about the independency of the higher-level elements from lower-level elements and also of the elements within a

level. Despite all these merits, the applications of ANP are not very common in a decision-making problem. However, in recent years, there has been an increase in the use of ANP in multi-criteria decision-making problems. In the selection of a provider, the criteria are of both the types, subjective and objective. These criteria also have some interdependencies, which cannot be captured by the popular AHP method. Therefore, instead of using the commonly used AHP approach for solving such types of problems, we recommend the use of an ANP-based model for the selection of a provider.

The objective of this paper is to introduce a comprehensive decision methodology for the selection of a provider that logistics managers and decision-makers can apply to their

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