



AHP-based approaches for supplier evaluation: Problems and perspectives

Giuseppe Bruno^a, Emilio Esposito^a, Andrea Genovese^{a,b}, Renato Passaro^{c,*}

^a Department of Business and Management Engineering (DIEG), University of Naples Federico II, Italy

^b Logistics & Supply Chain Management Research Centre, University of Sheffield, UK

^c Department of Technology (DIT), University of Naples Parthenope, Centro Direzionale di Napoli, Isola C4, 80143 Naples, Italy

ARTICLE INFO

Article history:

Received 10 November 2010

Received in revised form

17 April 2012

Accepted 31 May 2012

Available online 20 June 2012

Keywords:

Supplier evaluation

Supplier selection

Supply system management

AHP

ABSTRACT

Supplier evaluation has assumed a strategic role in determining competitiveness of large manufacturing companies. An increasing number of researches have been devoted to the development of different kind of methodologies to cope with this problem. Nevertheless, while the number of applications is growing, there is little empirical evidence of the practical usefulness of such tools with a dichotomy between theoretical approaches and empirical applications. Considering this evidence, the goal of this paper is to contribute to understand the above dichotomy by implementing, in a corporate environment, a model for supplier evaluation based on the Analytical Hierarchical Process (AHP), one of the most prominent methodologies used to address the problem. The analysis of the implementation process of the methodology allows the identification of strengths and weaknesses of using formalized supplier selection models to tackle the supplier evaluation problem, also highlighting potential barriers preventing firms to adopt such methods. Relevant issues arising from the application and managerial implications for both customer and suppliers are discussed.

© 2012 Elsevier Ltd. All rights reserved.

1. Introduction

Outsourcing has always represented a key component of firms' strategy aimed at enhancing quality and competitiveness levels. The phenomenon has remarkably grown in the last few decades. Nowadays, in manufacturing companies, the purchasing share typically ranges from 30% to 90% of the total turnover (Ronchi, 2003). As a consequence, business management literature has highlighted the crucial importance of supplier relationships within a supply network (de Boer et al., 2001, 2003; de Boer and van der Wegen, 2003; Bhutta, 2003; Kamann and Bakker, 2004). Many have observed the need to move from an *adversarial relationship* perspective to one based on cooperation and reciprocal trust (Hines, 1996; Cox and Lamming, 1997; Barrat, 2004; Soosay et al., 2008). Others have stressed that selecting the appropriate suppliers represents a critical success factor for any outsourcing decision (Dahel, 2003; Choy and Lee, 2003; Prahinski and Benton, 2004). Indeed, the supplier evaluation process allows the selection of suitable suppliers in order to develop a supply relationship system able to rapidly react to market requirements and to innovation dynamics (Reck and Long, 1988; Gules and Burgess, 1996; Van Weele, 1999; Prahinski and Benton, 2004; Sarkara and Mohapatrab, 2006; Saen, 2007; Esposito and Passaro, 2009a, 2009b).

An increasing number of researches have been devoted to the development of different kind of methodologies to cope with this

problem. Nevertheless, while the number of applications is growing, there is little empirical evidence of the practical usefulness of such tools (Weber et al., 1991; de Boer and van der Wegen, 2003). Very often, the proposed models are tested on generic applications, numerical examples and computational experiments (Bhutta and Huk, 2002; Dahel, 2003; Saen, 2007; Ting and Cho, 2008; Ordoobadi, 2009), with less emphasis on the problems emerging in the practical implementation of the methodology, on its strengths and weaknesses, and on the appreciation given them by the practitioners and managers involved in decision making processes.

Considering this evidence, the goal of this paper is to contribute to understand the above dichotomy by implementing, in a corporate environment, a methodology for supplier evaluation based on the Analytical Hierarchical Process (AHP), one of the most prominent methodologies used to address the problem (Saaty, 1980, 1994). After a thorough literature review, highlighting the relevance of the problem in the literature and the main methodologies employed to cope with the problem, the analysis of the implementation process of the methodology allows the identification of strengths and weaknesses of using AHP-based models (and, generally, formalized supplier selection models), also highlighting potential barriers preventing firms to adopt such methods.

The paper is organized in 7 sections. Following this Introduction, in Section 2, an extensive analysis of published articles on the supplier selection problem during the last few decades is provided; in Section 3, a focus on AHP-based approaches for supplier selection is shown. The objectives of the research are then illustrated in Section 4, and some context information about the case study and the unit of analysis are provided in Section 5.

* Corresponding author. Tel.: +39 081 5476785; fax: +39 081 5476777.
E-mail address: renato.passaro@uniparthenope.it (R. Passaro).

Table 1
Surveys on articles about supplier selection.

Author/s	Articles	No. of Journals	Period	Articles per year	Annual articles per journal	Research area (%)
Weber et al. (1991)	74	21	1966–90	3.1	0.147	MN/OM:10.7; SCM:56.8 OR/CS: 9.5; GM: 23.0
Bhutta (2003)	154	68	1986–02	9.6	0.142	MN/OM:18.3; SCM:60.8 OR/CS: 4.2; GM:16.7
Sonmez (2006)	147	54	1985–05	9.6	0.136	MN/OM:14.5; SCM:34.2 OR/CS:25.2; GM:26.1
Bruno et al. (2009)	218	68	2003–08	36.3	0.531	MN/OM:28.9; SCM:18.4 OR/CS: 35.8; GM: 16.9

MN/OM: Manufacturing and Operation Management; SCM: Purchasing/Supply Chain. Management; OR/CS: Operational Research and Computer Science; GM: General Management.

The implementation of the AHP-based methodology is shown in Section 6, while Section 7 hosts a discussion of the lessons learned during the implementation process, after conclusions are drawn.

2. The Supplier Selection Problem: a literature review

The Supplier Selection Problem (SSP) consists of the definition of models and methods to analyze and measure the performance of a set of suppliers (vendors) in order to improve customer competitiveness. It is an intrinsically multi-attribute problem, since many qualitative and quantitative factors, very often conflicting with each other, should be taken into account (Bhutta and Huk, 2002; Bhutta, 2003; Sonmez, 2006; Ramanathan, 2007; Ordoobadi, 2009).

In order to deepen the interest in the literature on the SSP, there has been a wide review of the related articles published in recent years on the most significant scientific journals. Considering the international journals listed in the web-based tool Google Scholar (which includes all the most popular academic search engines) and searching for the words “Supplier Selection”, “Vendor Selection”, “Supplier Evaluation”, “Vendor Evaluation” within title, key-words and abstract of the surveyed population of articles for the period 2003–2008, 68 journals have been analyzed (Bruno et al., 2009).

This analysis has been compared with three previous similar analyses. Table 1 shows a description at a glance of four surveys published since 1991 and covering the period 1966–2008. Observing data reported in the surveys, a specific initial focus on the supplier selection since 1966 clearly emerges. In the last column, articles are divided into four scientific areas: Manufacturing and Operations Management (MN/OM); Purchasing/Supply Chain Management (SCM); Operational Research and Computer Science (OR/CS); and General Management (GM). Even though we take into account that the periods analyzed in the surveys overlap each other and that the four samples are not completely homogeneous, it emerges that:

- the more balanced distribution share among the four areas could be interpreted as the result of the fact that supplier selection has no longer been under the almost exclusive domain of Purchasing/Supply Chain Management area since the expansion of the outsourcing phenomenon has determined a general interest in different research directions;
- the increasing attention in the OR/CS and MN/OM could be the consequence of the increasing search for methodological and technical viable solutions to the problem;
- an increasing interest (testified by a massive number of annual articles per journal) appears since the early 1980s due to the relevance played by the topic both in theory and practice.

Table 2
Supplier selection 2003–2008 articles of articles.

Year	2003	2004	2005	2006	2007	2008	Total
Papers	23	17	21	40	49	68	218

Table 3
Top 5 contributors for publications in the period 2003–2008.

Top 5 contributors	Articles	Area
International Journal of Production Economics	22	MN/OM
Expert Systems with Applications	19	OR/CS
International Journal of Production Research	15	MN/OM
European Journal of Operational Research	10	OR/CS
Journal of Purchasing and Supply Management	9	SCM
Total Number of Articles	75	
Percentage on Total Articles	34.40%	

In particular, data from more recent surveys reveal that the attention devoted to this topic is strikingly increasing, as depicted in Table 2. The number of articles published soared from 23 in 2003 to 68 in 2008; a total of 218 articles were published in this period.

As for journals, the top five contributors account for 75 articles, 34.40% of the total sample (Table 3).

Another perspective is offered by the analysis of the geographic origin of the articles. Considering the country where the institution of the first author is based, USA is the main contributor to the literature with 49 articles, followed by Taiwan (36), Turkey (27), China (21), India (16), and Iran (14) as shown in Table 4.

This evidence testifies that the SSP is a relevant issue involving academics and practitioners of several countries, especially those—such as the Asian ones—where manufacturing is the prominent economic activity and/or is based on the attraction of investment by large foreign companies.

In recent years there has been a great focus on the mathematical side of the SSP. 97 out of 218 articles were developed using mathematical methodologies trying to answer to the complexity of the problem, intrinsically multi-attributed. Among these, several approaches are becoming more and more popular in facing this issue; Analytical Hierarchical Process, and its network-based counterpart, Analytical Network Process (Saaty, 1980, 2001a) are among the most utilized. AHP/ANP-based approaches account for 53 articles (15 single models and 38 combined with other models) out of 218. This underlines how the combination of AHP with other methodologies is very common: the use of AHP/ANP with fuzzy set theory is widely accepted (14 articles), especially to deal with qualitative evaluation attributes. AHP/ANP is also used with optimization methods (15 articles), in many

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات