Supplier selection for strategic development

Strategic supplier selection for lean supplier development
with the analytic hierarchy process

Richard Calvi
CERAG, Grenoble University, School of Business Administration (IAE)
Domaine Universitaire, BP 47, 38040 Grenoble Cedex 9, France,
Phone: +33 476 827855, Fax: +33 476 825999
E-Mail: richard.calvi@iae.upmf-grenoble.fr

Marie-Anne le Dain
G-SCOP, Grenoble Institute of Technology, School of Industrial Engineering
46 Avenue Felix Viallet, 38031 Grenoble Cedex 1, France
Phone: +33 476 574816, Fax: +33 476 574695
E-Mail: marie-anne.le-dain@g-scop.inpg.fr

Thomas C. Fendt
Chair of Logistics, University of Technology Berlin, Institute of Technology and
Management
Strasse des 17. Juni 135, 10623 Berlin, Germany
Phone: +86 21 2898 1071, Fax: +86 21 6888 1222
E-Mail: thomas.fendt@logistik.tu-berlin.de

Clemens J. Herrmann
Grenoble Institute of Technology, School of Industrial Engineering
46 Avenue Felix Viallet, 38031 Grenoble Cedex 1, France
Phone: +49 511 10536726, Fax: +33 476 825999
E-Mail: clemens.herrmann@gi-etu.grenoble-inp.fr

Abstract: This article describes the application of the analytic hierarchy process to the
supplier selection decision for strategic development of lean suppliers at a large German
industrial company. Relevant criteria were elaborated from a literature survey and from
explorative interviews. The criteria include supplier improvement potential through buyer
involvement, strategic factors of the supplier development program as well as project success
factors in supplier development. Consequently a decision model based on the analytic
hierarchy process was developed and applied to the supplier selection. In the article all steps
of the model development are described in detail and it’s application is illustrated.
Key words: Supplier Selection, Supplier Development, Analytic Hierarchy Process

Paper Submission as a working paper

1 Corresponding author
Supplier selection for strategic development
Strategic supplier selection for lean supplier development with the analytic hierarchy process

This article describes the application of the analytic hierarchy process to the supplier selection decision for strategic development of lean suppliers at a large German industrial company. Relevant criteria were elaborated from a literature survey and from explorative interviews. The criteria include supplier improvement potential through buyer involvement, strategic factors of the supplier development program as well as project success factors in supplier development. Consequently a decision model based on the analytic hierarchy process was developed and applied to the supplier selection. In the article all steps of the model development are described in detail and it’s application is illustrated.

Key words: Supplier Selection, Supplier Development, Analytic Hierarchy Process

Introduction
The markets in which firms compete are increasingly influenced by international competitors, demanding customers, rapid technological change and shorter product life cycles (Krause, Handfield, and Scannell, 1997). As a consequence many firms have decided to concentrate on core competences and to outsource to suppliers. With a supplier value addition share of 50 to 70 percent in many industries (Dyer and Singh, 1998), companies have become very dependent on their suppliers. Having a pool of qualified and capable suppliers as well as excelling in core competences is therefore crucial for competing in today’s market environment.

As a means of improving operations many companies have started to adopt Toyotas production philosophy also known as “lean manufacturing”. These principles aim for quality and value oriented production that focuses on customer needs and a company mindset that focuses on constant improvement and employee engagement. In order to maintain a pool of qualified suppliers many companies carefully evaluate and select their suppliers. Additionally some companies have started to strategically improve their supplier’s capabilities and thereby their supply base’s competitiveness through knowledge transfer or buyer involvement (Krause and Ellram, 1997). In line with the internal implementation of lean principles and following the example of Toyota, improvement of the supply base through the implementation of the lean principles at suppliers can be observed as an advanced method of strategic supplier development. However with a large number of suppliers and limited resources in supplier development, not every supplier in the supply base can be improved and a supplier selection problem emerges.

While a lot of literature exists about the selection of suppliers for strategic partnerships little research has been done on how to select suppliers for strategic supplier development. Yahya and Kingsman (1999) apply the analytic hierarchy process to select suppliers for a government-sponsored program to develop the Malaysian furniture industry. However their selection criteria are rather based on the classic vendor selection decision than on strategic needs of developing suppliers. Narasimhan, Talluri and Mendez (2001) evaluate and cluster suppliers using data enveloped analysis but propose to select suppliers in need of development mainly based on the supplier’s efficiency. The purpose of this paper is therefore to propose a method and relevant criteria for selecting suppliers for supplier development activities that focus on the strategic improvement of suppliers.

Methodology
Research was performed during a case study at a large German industrial company with several thousand suppliers and production facilities spread around the globe. The company
has put a strong focus on the lean philosophy and started a strategic supplier development program for implementing the lean principles at their suppliers several years ago. Much effort is put into the development of a single supplier and actions in a supplier development project include the transformation of a supplier’s production line as well as knowledge transfer and extensive workshops about quality management, production management, and related topics. Research was carried out in four phases: (1) First existing literature was surveyed for supplier selection criteria and methods. Focus was put on the classic vendor selection, supplier selection for strategic partnerships, supplier selection in international markets and supplier development literature\(^2\). Furthermore drivers of value creation through suppliers from the perspective of the buying company identified by Ulaga (2003) were used to derive criteria for potential benefits of creating a lean supplier. The analytic hierarchy process (AHP) was chosen out of the methods used in literature due to its advantages such as consideration of quantitative and qualitative criteria, easy quantification and modification of criteria weights and the possibility for distributed evaluation. In order to reduce the number of detailed supplier evaluations a pre-filter based on Spekman (1989) was established to decide if supplier meet the minimum requirements for supplier development. (2) In a second step further criteria were gathered through explorative interviews with members of the supplier development team and the purchasing department, company brochures, internal documents and an evaluation of the supplier management system in place. These criteria include targets of the company’s supply strategy as well as risk factors encountered in supplier development. (3) Subsequently the AHP based decision model was developed in a five-step process: first all relevant criteria were structured in a hierarchy and discussed with the manager of the supplier development program. Then minimum requirements for the supplier development program were defined. Afterwards standardized questionnaires with rating scales and detailed instructions for distributed evaluation were created. Subsequently scores were attributed to the rating scale and finally criteria weights were derived through criteria comparisons of the supplier development manager. (4) The model developed during the research was finally tested with the evaluation of past suppliers and steps for continuous revision and improvement of the model were defined.

**Preliminary Results**

We developed a model along with relevant criteria for selecting suppliers for supplier development activities that focus on the strategic development of lean suppliers. The model is applied in three steps: first all suppliers are screened for fulfilling the minimum requirements. Suppliers passing the filter are then evaluated in detail and finally ranked using the AHP based decision model. The model allows for distributed evaluation of suppliers through standardized questionnaires, easy adaptation of criteria weights in case of change in strategic focus or change in business environment. Scores for suppliers can easily be visualized and discussed. Based on the relevant criteria and recommendations found in literature, it was decided by the manager of the supplier development program that a structure with three main categories best represents the criteria: (1) Potential direct benefits to the buying company of improved suppliers in terms of price savings, purchasing part quality improvements, delivery quality improvements or internal operational cost savings. (2) Project success factors such as supplier project-relevant internal capabilities, top-and mid-management support for the buyer-involvement, previous relationship quality and the buying’s company potential of supporting the project. (3) Strategic factors of supplier development, such as buying company’s dependency on the supplier, the supplier’s competitiveness, the supplier’s long-term risks and the supply base effects of an improved supplier.

\(^2\) Key references are listed below
The extensive literature research and internal interviews gathered a comprehensive list of criteria, but the decision on the criteria importance was mainly based on recommendations in literature and experience from previous supplier development projects. A retrospective evaluation of selected suppliers and success of the selection can therefore be used to learn about importance of influencing factors and therefore allow a continuous improvement of the selection process. Furthermore the model was developed for the strategic development of lean suppliers, however the methodology and the logic of creating the criteria can also be used for any strategic supplier development program that targets at improving the supplier through buyer involvement.

**Key References**


