Criterial suppliers’ evaluation model aimed at SCM performance, production and engineering process’s improvement

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ABSTRACT

This paper focuses on the suppliers’ evaluation and selection and aims to develop a criterial model of suppliers’ evaluation as an innovative method for engineering and business education. This new method comes with the purpose of organisational supply chain management performance growth, by improving the entire supply chain system and engineering process, and bringing contribution to the specialty literature in this field. The research methodology is based on qualitative research. The bibliographic research from various secondary sources is used, such as diverse books, scientific articles, reports and information material.

In order to achieve a high performance in an organisation it is necessary to monitor and control the procurement process. Certain gaps have been identified in identifying a supplier rating and selection system based on both logistical, financial, price or quality aspects. As an own contribution, this paper proposes a criterial model of evaluating and selecting suppliers, based on specific aspects related to the product, services, delivery and to the financial situation. The motivation of choosing this model is found in its capacity of noticing the negative aspects regarding the relationship between an organisation and its suppliers and finding out the improvement aspects, with a high impact on the engineering process’ and supply chain management’s improvement. The model offers the possibility to benchmark the suppliers, aspect which favours the potential collaboration with future suppliers.

Keywords: suppliers’ evaluation; criterial model; suppliers’ selection; performance.

INTRODUCTION

In the context of an economy in constant change, the improvement of supply chain management performance is growing in importance. Satisfying customers and achieving efficiency and effectiveness in a company is closely related to the relationship between the company and the suppliers. This must be based on trust and security for a good collaboration, a timely delivery, in contracted transport conditions, with the agreed quality and costs. By creating and using a benchmarked supplier management process will result in a more effective supplier evaluation and selection process, thus making current resources more effective. (AIAG, Automotive Industry Action Group, 2012)

The paper aims as a primary objective the evaluation and selection of suppliers as an innovative method for engineering and business education in order to increase the supply chain management performance within an organisation and to develop the specialty literature in this field, focusing on the development of a benchmarked model for suppliers’ evaluation based on a criterial analysis.
As the main research methodology, the qualitative research based on exploratory bibliographic research from secondary sources is used, such as books, reports, scientific articles and information materials. This is a quick and less costly method, which involves the use of available data from different sources, such as books, treatises, scientific papers, internal reports, various informative materials.

Therefore, as a result of the undertaken research it is desired to seek out a benchmarked model for suppliers’ evaluation aimed at organisational supply chain management performance growth. This model, as a new method of engineering and business education, could develop the education in the field of logistics and engineering.

Given the presented arguments, the objectives and the methodological aspects, we can say that the approach to this theme contributes to the development of the supply chain management, to the improvement of its quality, in this case the company’s relationship with the suppliers. Also through this approach, the paper contributes to the development of specialisation research as well as to the development of supplier evaluation methods and models. Given the arguments presented in terms of the content of the paper, the methodological aspects and the proposed objectives, we can state that the approach to this topic contributes to the development of supply chain management, making real contributions to the assessment and selection of suppliers using the benchmark method in order to improve its performance and quality, while increasing the effectiveness and efficiency of the organisational resources, increasing the performance of the engineering and production process and thus reducing costs for the entire supply chain management.

**THE IMPORTANCE OF SUPPLIERS’ SELECTION AND EVALUATION**

In order to achieve a high performance of supply chain management, it is necessary to constantly monitor and control the operations within a company, to optimise functions and processes and to develop a plan of action and control of the entire supply chain, from supplier to the end-consumer.

Often, procurement management is neglected in importance, with the purchasing department being integrated into other departments of the organisation, its main focus being on managing contracts and serving diverse internal needs.

However, lately, in some organisations, procurement management is gaining importance, and it is even used as a means of regulating stocks and liquidity. Thus, procurement management focuses on the purchase of goods and/or services at an optimal total cost, in the desired quantity and quality, in the established terms of delivery, for the direct or indirect use of companies or end-users. This drive for performance increase, together with a close working relationship, following a win-win mentality, will better serve the collaboration of both organisations to continuously improve their performance and become benchmarks for a world-class supplier selection, evaluation and development model. (Johnson Controls – Power Solutions, 2012)

In order to optimise the entire supply chain, the selection of suppliers increases in importance. The entire engineering process of production, sales and customer satisfaction depends on the company’s relationship with the suppliers, honouring orders in a timely manner, in the quality and the planned costs. The opposite may lead to high costs that can jeopardize the performance of the entire company.

**SUPPLIERS’ EVALUATION CRITERIA**

Procurement management and, implicitly, the relationship with suppliers in order to ensure optimum conditions for the provision of raw materials, adjacent materials and services has gained a great deal of importance, from which the importance of the initial choice of suppliers and their subsequent evaluation also arises.
According to the bibliography in this field, among the criteria that should be considered in the supplier evaluation process, the following can be considered: (Florea), (Elanchezian, Vijaya Ramnath, & Kesavan, 2010)

1. On time delivery;
2. Supply flexibility;
3. Products’ quality;
4. Frequency of deliveries;
5. Price/costs;
6. Transportation costs;
7. Actual performance of the supplier and its professionalism.

As a result of the bibliographic study undertaken it has been noticed that some gaps are present in terms of identifying an evaluation and selection system for suppliers, which should be based on logistic, price, financial and quality aspects. These gaps have a high impact on the entire supply chain management, as well as on the entire production and engineering system, influencing the organisational performance and growth. Therefore, as own contribution, we propose a model for evaluating and selecting suppliers, which focus on aspects of product, service, delivery and financial situation, with the main motivation of improving the supply chain management performance, developing the specialty literature and specific engineering and business education in these terms. The originality of this criterial model stays in taking into consideration aspects of different areas, that determine a weighted evaluation based on all important characteristics that have to be considered in analysing the suppliers’ evaluation and selection process.

Regarding the product, the criteria of price, quality and payment term are taken into account, considering the price as most important. Payment term can be calculated as the number of days from the date of invoice emission until its payment.

Regarding the delivery, aspects such as transportation costs, available quantity, delivery time and transport conditions are important. The delivery is the most important. The delivery time represents the number of days from the order’s confirmation to the goods’ delivery. (Choi, Bai, & Geunes, 2007)

The criteria services refer especially to additional services (specific installation services, certain insurance packages offered or others) and guarantee.

Selecting the right supplier depends also on its economic and financial situation. It depends on certain indicators such as profitability rate, overall debt ratio, inventory turnover rate, equity rentability rate or equity turnover rate, that can influence its activity and its services’ quality.

**CRITERIAL MODEL OF SUPPLIERS’ EVALUATION**

Following the bibliographic study undertaken, there have been some gaps in identifying a supplier rating and selection system based on price, financial, logistical, or quality aspects. Thus, as an own contribution, a model for the assessment and selection of suppliers is proposed, based on the criterial analysis, which takes into account aspects on a weighted base related to the product, delivery, services and, last but not least, to the financial situation. (Rippa, n.d.)
Supplier rating and selection is based on a score. This is comprised of 40% of the product, 30% of delivery, 15% of various services offered, and 15% of the supplier’s financial situation. Supplier rating is based on a scale from 1 to 10 where 1 is the weakest note and 10 represents the best grade. If the supplier gets a score of up to 3 points, he should be avoided as a supplier. If he scores between 3-5 points, it is advisable to choose the respective supplier only in extreme situations, if there is no other solution. If the score is between 5 and 7 points, it is average, and if the score is over 7 points, the supplier can be chosen with confidence, being a good supplier in terms of the characteristics analysed.

As far as the product is concerned, price, quality and payment criteria are taken into account, considering the price to be more important compared to the other two criteria. Payment term means the number of days from the date of issue of the invoice to actual payment. As a result, the price is assigned a 50% weight, and the payment term and quality account for 25%. In terms of delivery, the delivery time is considered to be the most important, with a 40% weight. Delivery term means the number of days from the order confirmation to the actual delivery. Compared to transport conditions, the transport cost and the available quantity are assigned a weight of 20%. In the service category, 70% of the guarantee is covered and 30% additional services are provided. In the category of additional services may come the installation, certain insurance, packages offered or others. The choice of a supplier also depends on his economic and financial situation, in close connection with his ability to honour his orders under the preconditions, respectively the quality and within the set deadline. This depends on specific solvency, rentability and activity indicators. As a solvency indicator, we have chosen as a relevant degree the general indebtedness with a weight of 40%. Regarding the rentability indicators, we chose the profit rate and the return on equity ratio, with a cumulative weight of 30%. In the activity indicators category, we included the rate of equity rotation and stock rotation speed, with a cumulative weight of 30%.

These indicators are defined as follows: (Bîrsan, 2001), (Rapoarte financiare- Financial reports)

**Overall indebtedness**
The indicator highlights the proportion of total company’s debts in total equity. A level of overall indebtedness exceeding 50% could trigger an alarm signal to creditors, indicating a low level of self-financing. A level of less than 30% indicates a credit reluctance.

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\text{Overall indebtedness} = \frac{\text{Total debts}}{\text{Own equity}} \times 100
\]

**Profit rate**
The profit rate is calculated by dividing the net profit after taxes to the turnover. The profit rate depends on the industry where you activate.

\[
\text{Profit rate} = \frac{\text{Net profit}}{\text{Turnover}} \times 100
\]

**Return on equity ratio**
The Return on Equity Ratio is calculated as the ratio between the net profit of a company and the invested capital, indicating the degree of profitability of the investment.

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\text{Return of financial rentability} = \frac{\text{Net profit}}{\text{Own equity}} \times 100
\]

**Rate of equity rotation**
The rate of equity rotation indicates how many times a company advances and recovers, during a financial year, the own resources it manages.

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\text{Rate of equity rotation} = \frac{\text{Turnover}}{\text{Own equity}}
\]

**Stock rotation speed**
The stock rotation speed shows the speed at which a company rotates its inventory to support a certain level of sales. The recommended level of this index is 10, a high value of it indicates a favourable situation for the economic agent.

\[
\text{Stock rotation speed} = \frac{\text{Turnover}}{\text{Stocks}}
\]
### Table 1: General model for suppliers’ evaluation

| Evaluation criteria       | Share | Scale / Grade | Result |
|---------------------------|-------|---------------|--------|
| **Product**               | 40 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Price**                 | 50 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Quality**               | 25 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Payment term**          | 25 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Delivery**              | 30 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Delivery term**         | 40 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Shipment cost**         | 20 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Available quantity**    | 20 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Transport conditions**  | 20 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Services**              | 15 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Warranty**              | 70 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Additional services**   | 30 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Financial situation**   | 15 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Solvency**              | 40 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Overall indebtedness**  | 100 % | 1 2 3 4 5 6 7 8 9 10 |        |
| **Rentability**           | 30 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Profit rate**           | 50 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Return on Equity Ratio**| 50 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Activity**              | 30 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **Rate of equity rotation**| 50 % | 1 2 3 4 5 6 7 8 9 10 |        |
| **Stock rotation speed**  | 50 %  | 1 2 3 4 5 6 7 8 9 10 |        |
| **TOTAL**                 | 100 % | 1 2 3 4 5 6 7 8 9 10 |        |

- Up to 3 points: to be avoided as supplier;
- 3-5 points: only if there is no other solution;
- 5-7 points: average, acceptable;
- 7-8,5 points: good supplier;
- over 8,5 points: very good supplier.
CONCLUSIONS

Supply chain management and, implicitly, procurement management are in constant change and development, depending on market dynamics, with highly favourable prospects. Their importance derives from the need to maintain a trust-based relationship with suppliers in order to ensure products and services contracted under optimum conditions of delivery at the quality and prices established, with a high influence on the performance of the production and engineering process and on the entire supply chain management.

Supply Chain Management has, according to our own opinion, greatly increased in importance, focusing especially on the relationship between the company and the supplier, in order to establish a trust-based relationship focusing on ensuring the products and services contracted under optimum conditions of delivery at the quality and prices established. In order to optimise the procurement process and, implicitly, the Supply Chain Management process, the evaluation and selection of suppliers becomes an extremely important process, where the need for developing a model for the evaluation and selection of suppliers and to improve the engineering and business education in this sense arises.

In the general supplier assessment system, different criteria are proposed such as price, quality, payment deadline, shipping conditions, delivery time, cost of transport, available quantity, warranty, additional services offered, different financial activity indicators, solvency and profitability and each rated provider is assigned a score of 1 to 10, where 10 is the most favourable score. Thus, a benchmarking of suppliers is possible, which favours decision-making in terms of potential collaboration with future suppliers.

According to our own opinion, a supplier evaluation system must be available in every organisation to improve organisational performance in order to develop the engineering and business education in this matter, this system should be implemented also in the university curricula and should be found as well in the specialty literature in this field.

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