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A STUDY OF MULTICRITERIA DECISIONMAKING FOR SELECTING SUPPLIERS OF LINEAR MOTION GUIDE

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Goran S. Petrović[1], Vesna Sekulić[2], Miloš Madić[1], Jelena Mihajlović[1]

[1]Faculty of Mechanical Engineering, University of Niš, Niš, Serbia
[2]Faculty of Economics, University of Niš, Niš, Serbia

Abstract. *Supplier evaluation and selection is becoming more and more important for companies in today's logistics and supply chain management. Decision making in supplier selection domain, as an essential component of supply chain management, is a complex process due to the fact that a wide range of diverse criteria, stakeholders and possible solutions are embedded into this process. This paper focuses on the application of some single and hybrid multi criteria decision making approaches for the selection of suppliers of transportation and logistics equipment. The analytic hierarchy process (AHP), stepwise weight assessment ratio analysis (SWARA) and technique for the order preference by similarity to ideal solution (TOPSIS) have been implemented in the "Lagerton" company in Serbia for evaluation and selection of the supplier in the case of procurement of THK Linear motion guide components. The best ranked supplier has been suggested to the company and the sensitivity analysis of ranking orders according to the criteria weights variations has been done.*

Key words: *Supplier selection, MCDM, AHP, TOPSIS, Linear motion guide*

JEL Classification: C44, C52.

INTRODUCTION

In today's highly competitive and interrelated environment, the effective selection of suppliers is very important to the success of a logistics and supply chain management functions in an industrial setting. These functions deal with the analysis, design and management of flows of row materials, goods, information, people and energy, and involves a wide range of activities such as: transportation (internal and external), handling,

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Corresponding author: Goran S. Petrović
Faculty of Mechanical Engineering, Aleksandra Medvedeva 14, 18000 Niš, Serbia
E-mail: goran.petrovic@masfak.ni.ac.rs

packaging, storage, scheduling and inventory management, purchasing, energy supplies, service, maintenance, life cycle cost management, customer relationship management, etc. (Madić & Petrović, 2016). Today, organizations are under tremendous pressure of global competition, and companies strive to achieve excellence in delivering high quality and low cost products and services to their customers by improving the efficiency of their supply chain system to gain competitive advantages (Moghaddam, 2015).

Including all of the activities related to the capital, material and information flows between its members, supply chain involves the suppliers, manufacturers, distributors, retailers, and customers who are accompanying with each other in satisfying the end customers' requirements and needs (Bowersox at al., 2002). The process of supply chain management seeks to relate and integrate these activities to enable the supply chain and its members to realize their goals. Supply chain management is considered as one of the most important competitive strategies used by modern companies which main aim is to connect and integrate various suppliers in order to satisfy market demand. Namely, the modern companies establish their own supply chain striving to find more efficient suppliers in order to increase their supply chain competitiveness. So, a key issue in establishing a supply chain and improving its efficiency and competitiveness is to find or select more collaborative suppliers who can develop long term efficient relationships. One of the most important activities that impacts the company's performance as well as the entire supply chain competitiveness is evaluation and selection of suppliers.

Supplier evaluation and selection is a multi-criteria decision making problem (MCDM) involving a set of different and opposite criteria. Information and communication technology, financial position, flexibility in meeting customer needs, reputation and position in industry, attitude, flexibility, packaging ability, management and organization, geographical location, production facilities and capacity, personnel capability, warranties and claim policies, repair service, payment options, parity, cost can be considered as main criteria that influence the supplier selection of a given product in a supply chain management (Madić et al., 2014).

1. LITERATURE REVIEW

In this section, some studies that were performed in previous years on the multi-criteria supplier selection were analyzed in order to determine the criteria and appropriate methods that were used for the selection of suppliers. According to international scientific journals and books, available in electronic databases such as Elsevier's Science Direct, Taylor & Francis, Springer and Wiley, there has been a steady increase in research for the last five years in the area of multi-criteria supplier selection. Such distribution of the published papers and books is presented in Figure 1.

Various MCDM methods and different optimization techniques have been proposed to aid the supplier selection process. According to Yıldız & Yayla (2015) 16 percent of the supplier selection studies presented in the reviewed literature were from the automotive sector, 13 percent from the manufacturing sector and only 4 percent from the transportation-logistics sector.

A number of very extensive reviews of MCDM methods for supplier evaluation and selection have already been conducted. To the best of authors' knowledge, the most recent reviews have been published by Chai et al. (2013), Govindan et al. (2015), Simić et al. (2017), and Ghorabaee et al. (2017).

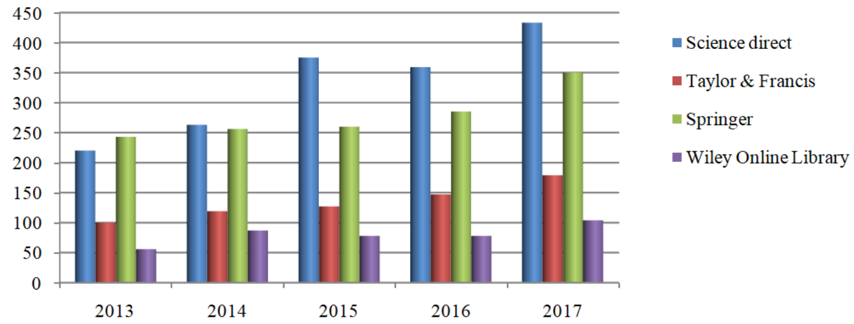

Fig. 1 Increase of researches in supplier selection field for the last five years

Especially in the field of transportation and logistics single MCDM approaches and case studies are considered individually. The case study research done by Cieśla (2016) considers supplier selection of aluminum for a hypothetical manufacturer of transportation equipment located in Poland. Evaluation of five suppliers has been conducted using a weighted scoring method, a strengths and weaknesses method and a graphical method according to the following criteria: price, location, market position, date of payment, completion terms, availability on the market, quality (e.g. ISO certificate). Šimunović et al. (2011) applied AHP method for the purpose of systematic evaluation and selection of suppliers. They considered evaluation and selection of three suppliers of a mechanical part for the company dealing with the assembly of agricultural machines, according to five criteria: cost, delivery time, deferred payment, parity and packing. Shyur and Shih (2006) proposed the usage of AHP and TOPSIS methods as a hybrid MCDM approach for strategic supplier selection. Authors evaluated four vendors according to seven criteria: on-time delivery, product quality, price/cost, facility and technology, responsiveness to customer needs, professionalism of salesperson, and quality of relationship with vendor. Finally, an approach proposed by Jamil et al. (2013) evaluated the effectiveness of five decision making tools based on AHP and TOPSIS methods and their fuzzy extensions. They concluded that all considered MCDM methods are applicable and accurate for supplier selection in automotive industry. However, in case when the number of suppliers (alternatives) becomes large or when more criteria need to be considered, the decision maker may be faced with computational problem in the case of AHP method (pairwise comparison in a big matrix).

As seen from literature, many MCDM methods have been proposed for solving supplier selection problem. AHP method and its hybrid extensions with other MCDM methods represents appropriate decision making tool, but in some cases the results show great variation in the final ranking scores. In those cases, there is a need to compare final ranking scores obtained using AHP method with some other MCDM approaches. In this paper real life example of evaluation and selection of suppliers for linear motion guide components is solved by using different MCDM methods.

Also, summarizing the considered criteria in literature, supplier selection evaluations are generally based on price, logistics costs, quality, delivery characteristics, flexibility, supplier background capacity and rating.

2. SUPPLIER SELECTION STRATEGIES AND CRITERIA

After making a decision to buy the needed resources, it is necessary to make an adequate supplier selection, which means a set of activities within the supply chain management process that includes several different stages – to identify potential suppliers as supply sources, evaluate them, select the right suppliers among them, evaluate supplier performance and develop the productive supplier relationship for future partnership (Hokey, 2015).

The process of searching for the appropriate supplier is often complicated and for making it simpler a company should first explore and leverage the reliable source of information about the potential suppliers. The list of potential suppliers that the company uses to acquire its resources represents a kind of supplier base (Wisner et al., 2012). An effective supplier base significantly contributes to competitive advantage of the company and is often critical to its success. It is thus vital to understand the strategic role of suppliers and relationship with them.

After preparing a short, manageable list of the potential suppliers and gathering information about them, it is necessary to investigate if they are indeed worthy of serious consideration for cooperation. That primarily means to evaluate the suppliers and compare them in terms of their ability to provide right products and/or services with the right price at the right time (Hokey, 2015). This ability can be reflected in certain supplier evaluation attributes, given in Table 1.

Although the importance of these attributes to supplier evaluation can vary between companies, considering these attributes will help to identify the strengths and weaknesses of each potential supplier and select the appropriate ones. Among these attributes, some studies on supplier evaluation (Min & Galle, 1991; Verma & Pullman, 1998) have shown that quality, price, and delivery services/performance are the most dominant factors for evaluating and selecting a particular supplier, strategically important for a company.

However, the process of selecting the competent suppliers for important resources, which can potentially impact the competitive advantage of the company, is a complex one and should be based on multiple criteria. So, in addition to cost and delivery performance, companies should also consider how their suppliers can contribute to product and process technology. This means that in the process of supplier selection companies should consider some of the following factors (Wisner et al., 2012):

- *Process and product technologies* with the help of which suppliers should be competent to produce superior products at a reasonable cost,
- *Willingness to share technologies and information*, which allows the use of the supplier's capabilities and to focus on core competencies,
- *Quality* – high and consistent product quality directly affect the quality of the finished goods,
- *Cost*, including primarily the unit price of the material and the total cost of ownership, which can significantly affect the purchase decision,
- *Reliability* of supplier characteristics,
- *Capacity* of a supplier to fill orders to meet requirements and the ability to fill large orders, if needed,
- *Communication capability*, which facilitates communication between the parties,
- *Location* – geographical location can affect the delivery, transportation and logistical costs,
- *Service* – suppliers should be able to back up their products and provide good services when needed.

Table 1 Supplier evaluation attributes

Criteria	Attributes
Quality	Quality of products
	Warranty
	Quality certification
	Willingness to take the corrective actions
Price	Competitive price
	No hidden costs
Delivery services	Good packaging
	Geographical location
	Delivery on schedule
	Prompt responses to emergent delivery requests
Production capacity and technical capacity	Adequate facility, equipment, and know-how
	Adequate maintenance
	Skilled labour
	Technical ability for innovation
	Information technology
Financial stability	Credit rating
	Cash flow, liquidity, profitability
	Bank reference
Environmental compliance	Environment policy
	ISO 14000 certification

Source: Hokey, M. (2015) The Essentials of Supply Chain Management: New Business Concepts and Applications, Pearson Education LTD, p. 284

There are numerous other strategic and tactical factors that a company should take into account when choosing suppliers. The ability of the company to select competent strategic suppliers directly affects its competitive success.

In the conventional supply chain management, the companies evaluate and select their suppliers based on price, quality, delivery time, and provided services. These criteria should be treated as conventional criteria which mostly play a key role in supplier evaluation and selection. But besides the conventional supplier selection, the number of researches incorporates the environmental and social factors in supplier evaluation and selection (Green at al., 1996; Enarsson, 1998). Namely, with paying more attention to the exhaustible natural resources and industrial pollution, sustainable supply chain management and sustainable supplier selection have been significantly attracted. In order to produce sustainable products in a sustainable supply chain, it must consider the sustainability criteria in selecting the appropriate suppliers.

Supply performance measurement is another important basis for selecting a supplier and negotiates with him. Namely, it is important to hold each logistics activity accountable to business measurements that align the activity with the other logistics activities, which in the final motivate highly competitive performance. Doing so requires a set of financial, productivity, quality, and response-time metrics (Frazelle, 2002). These indicators are a set of measures for monitoring the performance of internal supply organization in the company and the performance of its suppliers. The most important are the supply financial indicators and they include the following: total supply cost (all the costs related to supply planning, supplier management, and procurement execution), purchase order cost (affecting the size of order quantities and related inventories), supplier return on inventory and total acquisition cost (total ownership cost or total logistics cost). All these supplier metrics should be a foundation for a supplier selection and negotiation program (Frazelle, 2002).

3. MCDM Methods - the Methodological Framework of the Research

Decision analysis is concerned with those situations where a decision maker has to choose the best alternative among several candidates while considering a set of conflicting criteria (Chatterjee, 2011). In order to evaluate the overall effectiveness of the candidate alternatives, rank and select the most appropriate (the best) supplier, the primary objective of a MCDM methodology is to identify the relevant supplier selection problem criteria, assess the alternatives information relating to those criteria and develop methodologies for evaluating the significance of criteria. In this section a brief description of the applied MCDM methods is given. In order to calculate criteria weights, AHP and SWARA methods are used, while AHP and TOPSIS methods are used for evaluation of alternatives.

3.1. Analytic hierarchy process method

The Analytic Hierarchy Process (AHP) method was originally proposed by Thomas Saaty (1977, 1980). It represents one of the best known and the most commonly used MCDM method. The AHP can be implemented in a few simple consecutive steps:

Step 1: Computing the vector of criteria weights. The vector of criteria weights can be computed by creating a *pairwise comparison matrix* $\boldsymbol{A}$ where each element a_{ij} of the matrix $\boldsymbol{A}$ represents the importance of the i^{th} criterion relative to the j^{th} criterion. The comparisons between two elements are assembled, using the values from 1 to 9 from fundamental Saaty scale. Final determination of criteria weights w_j is based on geometric mean method as shown by following equation:

$$GM_j = \left(\prod_{j=1}^{n} a_{ij}\right)^{1/n}, \quad w_j = \frac{GM_j}{\sum_{j=1}^{n} GM_j} \tag{1}$$

where GM_j are geometric means of each row and n is the number of considered criteria.

Step 2: Testing the consistency of results. The pairwise comparisons made by AHP method are subjective and this method tolerates inconsistency through the amount of redundancy in the approach. The value that measure consistency of the subjective comparisons is *consistency index CI*:

$$CI = \frac{\lambda_{max} - n}{n-1} \tag{2}$$

where λ_{max} is the maximum eigenvalue of the *pairwise comparison matrix* $\boldsymbol{A}$. Finally, the ratio *CI*/*RI*, that is termed the *consistency ratio CR,* should be less than 0.1. In Eq. 2 *RI* is the *Random Index* (tabular value), i.e. the consistency index when the entries of matrix $\boldsymbol{A}$ are completely random.

Step 3: Comparison of alternatives with respect to each criterion. This step implies determination of pairwise alternative comparison matrix $\boldsymbol{B_j}$, where elements of this matrix b_{kl} represent the preference of the k^{th} alternative relative to the l^{th} alternative according to criterion *j*. The comparisons have to be done using the values from 1 to 9 from Saaty scale in the same way as described in Step 1.

Step 4: Synthesize the global ratings. The final step is the multiplication of local priorities by the weight of the respective criterion and the results are summed up to produce the overall priority of each alternative (global ratings).

3.2. Stepwise weight assessment ratio analysis

The Stepwise Weight Assessment Ratio Analysis (SWARA) method was developed by Kersuliene et al. (2010) with an aim to identify importance of criteria and relative weights of criteria. According to Stanujkić *et al.*(2015) the process of determining the relative weights of criteria using SWARA method can be implemented using five following steps:

Step 1: The criteria should be sorted in descending order based on their expected significances.
Step 2: Starting from the second criterion, the respondent (decision maker) expresses the relative importance of criterion *j* in relation to the previous (*j*-1) criterion, for each particular criterion. This ratio is called the *Comparative importance of average value*, s_j;
Step 3: Determine the coefficient k_j as follows:

$$k_j = \begin{cases} 1 & j = 1 \\ s_j + 1 & j > 1 \end{cases}; \tag{3}$$

Step 4: Determine the recalculated weight q_j as follows:

$$q_j = \begin{cases} 1 & j = 1 \\ \dfrac{k_j - 1}{k_j} & j > 1 \end{cases}; \tag{4}$$

Step 5: The relative weights of the evaluation criteria can be determined as follows:

$$w_j = \frac{q_j}{\sum_{k=1}^{n} q_k}, \tag{5}$$

where w_j denotes the relative weight of criterion *j* and *n* is the total number of criteria.

3.3. Technique for the order preference by similarity to ideal solution

The Technique for the Order Preference by Similarity to Ideal Solution (TOPSIS) method was introduced by Hwang and Yoon (1981). The ordinary TOPSIS method is based on the concept that the best alternative should have the shortest Euclidian distance from the ideal solution and at the same time the farthest from the anti-ideal solution. TOPSIS method can be implemented using following steps:
Step 1: Method starts with determination of a *Decision matrix* $X = (x_{ij})_{m \times n}$, in which element x_{ij} indicates the performance of alternative A_i when it is evaluated in terms of decision criterion C_j, (for i = 1, 2, 3,..., m and j = 1, 2, 3,..., n):

$$X = \left[x_{ij}\right] = \begin{array}{c|c} & \begin{array}{cccc} C_1 & C_2 & & C_n \end{array} \\ \begin{array}{c} A_1 \\ A_2 \\ \vdots \\ A_m \end{array} & \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix} \end{array}; \tag{6}$$

Step 2: Determine the normalized decision matrix which elements are r_{ij} :

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} , \tag{7}$$

Step 3: Obtain the weighted normalized decision matrix whose elements are v_{ij} by multiplying each column j of the normalized decision matrix by its associated weight w_j (obtained using e.g., AHP or SWARA method):

$$v_{ij} = r_{ij} \cdot w_j , \tag{8}$$

Step 4: Determine the positive ideal and the negative ideal solutions:

$$\begin{aligned} V^+ &= (v_1^+, v_2^+, ..., v_n^+) = \{(\max{}_i \{v_{ij} \,|\, j \in B\}), (\min{}_i \{v_{ij} \,|\, j \in C\})\} \\ V^- &= (v_1^-, v_2^-, ..., v_n^-) = \{(\min{}_i \{v_{ij} \,|\, j \in B\}), (\max{}_i \{v_{ij} \,|\, j \in C\})\} \end{aligned} , \tag{9}$$

where B and C are associated with the maximization and minimization criteria sets, respectively.
Step 5: Calculate the separation measures (Euclidean metric) from the positive ideal solution and the negative ideal solution. The separation of each alternative from the positive ideal solution is given as:

$$S_i^+ = \sqrt{\sum_{j=1}^{n} (v_{ij} - V_j^+)^2} . \tag{10}$$

The separation of each alternative from the negative ideal solution is given as:

$$S_i^- = \sqrt{\sum_{j=1}^{n} (v_{ij} - V_j^-)^2} . \tag{11}$$

Step 6: Calculate the *relative closeness* of the *i*-th alternative A_i to the positive ideal solution:

$$P_i = \frac{S_i^-}{S_i^+ + S_i^-} . \tag{12}$$

The relative closeness P_i can have values between [0, 1], whereby, $P_i = 0$ represents negative ideal solution, while $P_i = 1$ stands for positive ideal solution. According to P_i values the alternatives can be ranked. The best alternative has the highest value P_i because it is the closest to the positive ideal solution.

4. CASE STUDY - THK LINEAR MOTION GUIDE SUPPLIER SELECTION

The proposed MCDM methods for supplier evaluation and selection have been implemented in the "Lagerton" company (Limited Liability Company) in Serbia which is the authorized distributor of a number of mechanical components. In order to illustrate and validate the applicability of proposed MCDM methods a real-life problem, considering evaluation and selection of linear motion guide technologies supplier, is solved here.

Linear motion guide is a product of THK Company from Japan. It provides a component that enables linear rolling motion for practical usage in high-precision, high-rigidity, energy-saving, high-speed machines.

The "Lagerton" company procures components for a known buyer (Figure 2):

- Slide block SRS 12 GM UU;
- Rail SRS 12/570 – 10 – 10.

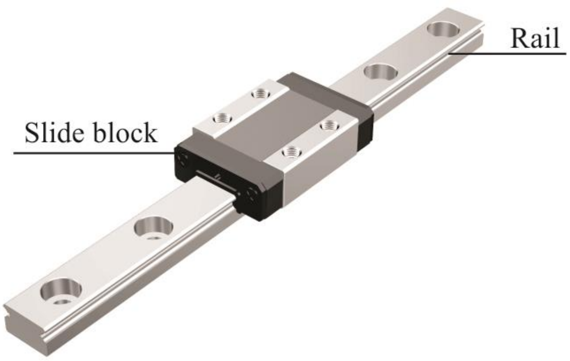

Fig. 2 THK Linear motion guide components

The company acquires components through a selection of the best supplier from European market qualified suppliers. Four companies (S_1, S_2, S_3 and S_4) have been evaluated and the main criteria for evaluation and selection that were used are: product price (C_1), transportation costs (C_2), delivery time (C_3), company rating (C_4) and established cooperation (C_5). The first three criteria are minimization criteria where lower attribute values are preferred. The last two criteria are maximization criteria where higher attribute values are preferable. Company rating (C_4) and established cooperation (C_5) are qualitative criteria and both are numerically represented using the values from 1 to 9 from fundamental Saaty scale.

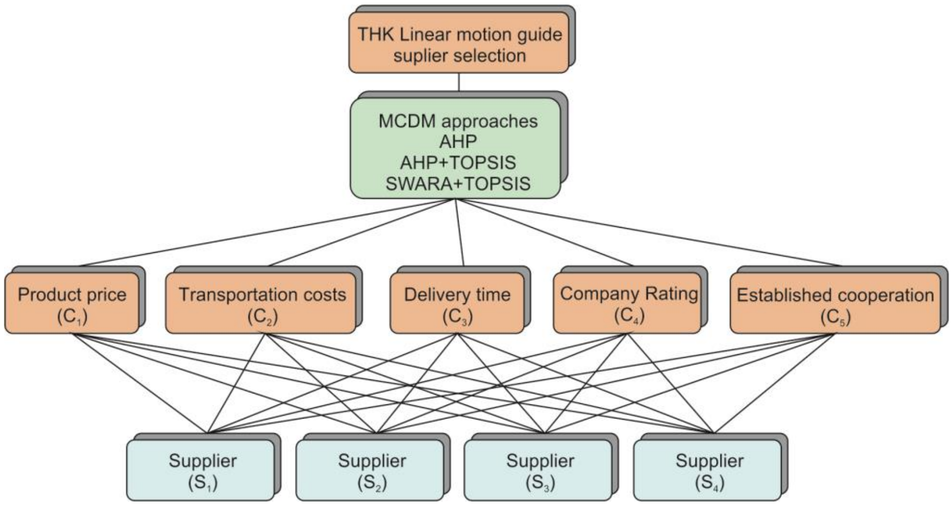

Fig. 3 A model for supplier selection of THK Linear motion guide components

In an interview, the management team of the "Lagerton" company, responsible for evaluation and selection of suppliers, estimated performance ratings of four suppliers and the results are shown in Table 2.

Table 2 Suppliers performance ratings– decision matrix

	Criteria				
	C_1 [EUR]	C_2 [days]	C_3 [EUR]	C_4 [-]	C_5 [-]
Alternatives	min	min	min	max	max
S_1	350	50	15	9	9
S_2	390	60	15	9	1
S_3	400	60	15	5	1
S_4	367	60	7	4	1

Source: The internal documentation of the "Lagerton" company

The management team also evaluated the significance of the defined criteria by creating a pairwise comparison matrix (Table 3):

Table 3 Evaluation of the criteria – pairwise comparison matrix

Criteria	C_1	C_2	C_3	C_4	C_5
C_1	1	3	5	9	0.333
C_2	0.333	1	3	7	0.333
C_3	0.2	0.333	1	5	0.333
C_4	0.111	0.143	0.2	1	0.143
C_5	3	3	3	7	1

Source: The internal documentation of the "Lagerton" company

As described in Section 3, AHP and SWARA methods are used in order to calculate criteria weights. Based on pairwise comparison matrix (Table 3), criteria weights are obtained as shown in Table 4:

Table 4 Criteria weights obtained using AHP and SWARA methods

Criteria weights	C_1	C_2	C_3	C_4	C_5
AHP	0.298	0.170	0.100	0.032	0.400
SWARA	0.242	0.181	0.136	0.119	0.322

Table 4 clearly indicates that management team singled out C_5 - established cooperation as the most important criterion, more significant than C_1 - product price. On the other hand, C_4 - rating of the company is the least significant criterion probably due to the fact that all the considered companies are almost similar in renown, quality etc.

In order to evaluate suppliers AHP method and two hybrid combinations of MCDM methods (AHP+TOPSIS and SWARA+TOPSIS) are used. The application of the proposed hybrid MCDM approaches gives the complete ranking of the suppliers as shown in Table 5. The complete rankings are given according to calculated utility functions (Step 4 for AHP and Eq. 12 for TOPSIS) for each approach.

Table 5 Complete rankings of the suppliers according to different MCDM approaches

Supplier	S_1	S_2	S_3	S_4
AHP	0.459	0.176	0.169	0.196
	(1)	**(3)**	**(4)**	**(2)**
AHP+TOPSIS	0.922	0.033	0.006	0.0846
	(1)	**(3)**	**(4)**	**(2)**
SWARA+TOPSIS	0.876	0.128	0.028	0.128
	(1)	**(2)**	**(4)**	**(2)**

According to this table, the supplier order preference is given below: Supplier S_1> Supplier S_4> Supplier S_2> Supplier S_3. The best choice is Supplier S_1 and the worst choice is supplier S_3.

One of the most interesting research tasks related to the supplier selection decision making problem is to explore the influence of criteria weights variations to the ranking orders obtained according to the selected MCDM approaches. In this study, the Monte Carlo simulation covering 1000 different scenarios of criteria weights was implemented for both hybrid approaches. Values of criteria weights are randomly chosen from the intervals which was defined as ±10%, ±20% ... ±100% of original criteria weights. The changes of alternative ranks relative to the first solution (obtained with original criteria weights) were monitored and the sums of all ranking changes were calculated. The results are shown in Figure 4.

This figure clearly show that different scenarios of criteria weights do not significantly affect the ranking of alternatives in both hybrid combinations of the MCDM methods up to 50 percent of criteria weights changes. It should be noted that the best alternative – supplier S_1 and the worst alternative – supplier S_3 remain unchanged for all scenarios of criteria weights.

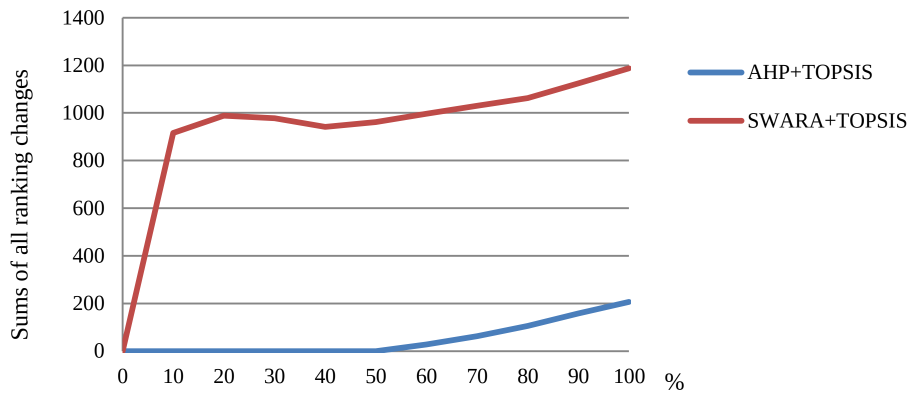

Fig. 4 Stability of the alternative ranks relative to the criteria weights changes

CONCLUSION

This research has demonstrated the applicability of some single and hybrid MCDM approaches (AHP, AHP+TOPSIS and SWARA+TOPSIS) in the selection of suppliers of transportation and logistics equipment. As a final conclusion, few points can be emphasized as follows:

- In the case of THK linear motion guide components procurement all considered approaches give insignificant variation in the final ranking scores. Supplier S_1 is suggested to the Serbian company "Lagerton" as the best choice.
- Application of different MCDM approaches to the problem of supplier selection helps to make more objective and reliable decisions. AHP method is one of the most used for supplier selection in transportation and logistics industries. On the other hand, hybrid approaches, such as combination of different MCDM methods as illustrated in this study, can provide computationally more efficient procedure.
- In the formulation and solving procedure of supplier selection problems MCDM methods often involve active participation of decision makers. This is particularly related to relative importance of criteria formulation as well as to analysis, ranking and selection of the final solution, which means the best alternative. Therefore,the most important future endeavours are directed to the development of expert and intelligent decision making systems.

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STUDIJA VIŠEKRITERIJUMSKOG ODLUČIVANJA ZA IZBOR DOBAVLJAČA LINEARNIH PROFILISANIH VOĐICA

Evaluacija i izbor dobavljača postaju sve važniji za kompanije u današnjoj logistici i upravljanju lancima snabdevanja. Donošenje odluka u domenu izbora dobavljača, kao osnovne komponente upravljanja lancima snabdevanja, predstavlja kompleksan proces zbog činjenice da su širok spektar različitih kriterijuma, različite interesne grupe i mnoštvo različitih rešenja uključeni u ovaj proces. Ova studija je usmerena na primenu pojedinačnih i hibridnih pristupa višekriterijumskom odlučivanju za izbor dobavljača opreme u oblasti transporta i logistike. Metode višekriterijumskog odlučivanja AHP, SWARA i TOPSIS primenjene su u kompaniji "Lagerton" u Srbiji za evaluaciju i izbor dobavljača komponenti linearnih profilisanih vođica proizvođača THK iz Japana.Najbolje rangirani dobavljač predložen je kompaniji i urađena je analiza senzitivnosti određenih rangova na promenu težinskih koeficijenata razmatranih kriterijuma.

Ključne reči: *Izbor dobavljača, MCDM, AHP, TOPSIS, Linearne tehnologije*