OUTSOURCING AND INTERNAL LOGISTICS SERVICES

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Abstract

An important contribution for the enterprise is an analysis of the supply chain and market in the area of outsourcing of logistics activities. The paper presents the determination of suitable ways of its application in the selected enterprise. With the help of application of suitable methods, the paper selected and evaluates suppliers and internal logistics activities in order to implement possible outsourcing to the enterprise. The solution is also based on the analysis of identified supplier at the market and evaluation of the selected potential partners on the base of defined criteria. The part of the final analysis is an evaluation of the selected supplier by determined multi-criteria decision methods.

Keywords: Outsourcing, logistics, internal activities, evaluation

1. INTRODUCTION

Outsourcing is considered to be a trend of modern logistics. The main reason is to unload enterprises from side activities and focuses on the main working activity with direct profit. An important step is a detailed analysis of internal logistical activities with the aim to find out the possibilities of the outsourcing implementation. The main task of the realized case study was to design a suitable way of outsourcing implementation by the help of an analysis of the present state of the evaluated enterprise. It was essential to consider the possibilities of outsourcing implementation in comparison with the realization of all defined activities in the own activity of the enterprise. After analysis and evaluation of suppliers, it was put the accent on the defined criteria that helped to make a better decision. The main task of the case study was to find the best supplier on the market that would be able to provide selected internal activities, including storage. The evaluation of the suppliers was realized by the help of the methods of multi-criteria decision making, namely by the method FDMM, ratio-index method, and Saaty`s method.

2. BASIC TERM OF THE RESEARCH ACTIVITY

Outsourcing is a very common term used today. It presents the potential in the area of external sources implementation to the own business. The responsibility for intra-plant activities are increasingly moving to external subjects and there is a developing rate of its use in the Slovak market, too. The term outsourcing is defined as a long-term contractual relationship with “someone” outside of own organization for providing services in one or more areas of its activities. With the help of outsourcing is possible to achieve the determined aims and objectives of the enterprise, and it is a strategic element of modern logistics management [1]. An enterprise allocates activities for external suppliers, through which it can reduce costs, increase productivity or progress in the competitive market. It is important to realize the right decision about selected activities for outsourcing. The most frequently outsourced activities are customer service, human resource management, accounting and personnel services, transport, storage, etc. The result of the process of outsourcing can be an increase in the company-wide productivity and performance [2]. Basic characteristics of the outsourcing are presented by:

1. Long-term employment contract - contract among an enterprise and supplier of the outsourcing service is concluded for several years, by the type of activity;

2. Cooperation - by the signing of a contract, it is possible to emphasize the relation between two parties, the conditions of the contract should lead to the achievement of the objectives on both sides;
3. Strategical aims - the decision about the outsourcing is realized on the strategical level of the enterprise by top management in line with the strategical aims of the enterprise;
4. Responsible partner - a contractor must meet the requirements of the customer, be strong and persistent in the complex outsourcing process;
5. Outsourced activity is not realized by the enterprise in its own directories.

Components and structure of outsourcing are presented by:

1. Customer - a customer means an enterprise (organization, person) that disposes of internal activities for the external organization. A customer requests a supplier for the realization of a service within the frame of a certain extent.
2. Supplier - a supplier provides services in various areas. There is a legal relationship with the customer and a supplier realizes the required service for the customer. A supplier is mostly an external partner, but it can be also a parent company of the enterprise.
3. Project - the initial project has the base in the decision of an enterprise about outsourcing. In the beginning, it is needed to analyze internal activities and create a preliminary work plan. A valid project originates after a customer`s agreement with the contractor, and the signed contract is an obligation to realize the required service in full liability [3]. According to relationships between the supplier and the customer, the resulting project is also being developed.

Advantages and disadvantages of outsourcing implementation are very often associated with the benefits and risks to which it is important to take into account by the decision-making process. Benefits of outsourcing are divided into this groups:

1. Tactical benefits - use of outsourcing is a quicker solution to achieve objectives and aims of the enterprise. It monitors the state of costs and calculates with their quick saving by the required quality of services.
2. Strategical benefits - a strategical plan of the outsourcing is focused on the meeting of the long-term aims of the enterprise [4]. There are created new partnerships in the direction of increasing of the added value of the enterprise.

The process of outsourcing implementation is based on these steps: 1. Strategical analysis of functional areas, 2. Analysis of areas determined for outsourcing, 3. Definition of requirements for the supplier, 4. Selection of supplier, 5. Determination of contractual conditions, 6. Control of transient phase of outsourcing.

3. MATERIAL AND METHODS OF THE RESEARCH FOR THE CASE STUDY

The right selection of a supplier is an important step for each enterprise. It is a difficult and complex process with the aim to determine the most suitable supplier. By the case study, criteria for evaluation were defined by the evaluated enterprise and experts of the research team and also by the help of [5]. The case study used heuristics methods as a combination of empirical and exact methods. As it was said in the previous part, the case study. i.e. suppliers were evaluated by three different methods, namely ratio-index method, FDMM and Saaty`s method. These methods used the following abbreviations: α_i - standardized scale of the *i*-criterion, k_j - non-standardized scale of the j-criterion, u_{ij} - utility of the j-variant (supplier) by the i-criterion, U_j - total utility of the variant (supplier) - index of stability. By evaluation of suppliers, 5 basic criteria were selected. Criteria were arranged by the importance: 1. Price (K1) - subcriteria: price level, payment conditions, 2. Reference research (K2) - subcriteria: references on the market, real visit of a supplier, 3. Innovations (K3) - subcriteria: an initiative of supplier, research, development, know-how, 4. Quality (K4) - subcriteria: defined standards and norms, certifications, 5. Market stability (K5) - subcriteria: financial stability, the position at the market [6]. Based on the above-mentioned expert analysis, the evaluated production enterprise selected the three best suppliers. These suppliers belong to perspective and developing suppliers of the integrated contract logistics.

They have their logistical centres in several regions, and also in Slovakia. At the beginning of the evaluation it was determined the range of criteria by the importance - from the most important.

Ratio-index method used assignment of points by the defined point scale for evaluation of the criteria. According to the meaning of the criteria, it had assigned scoring from the scale, and the criterion obtained non-standardized scale (k_j). It is always necessary to convert non-standardized scale into standardized (α_i) with which the total utility of the variants is calculated. The standardized scale of the criteria is the result of the value of the i-criterion and the total sum of non-standardized scales.

Table 1 Assign scales to criteria [own study]

Criteria		Non-standardized scales k_j	Standardized scales α_i
Price	K1	5	0.25
References	K2	5	0.25
Innovations	K3	4	0.2
Quality	K4	3	0.15
Stability	K5	3	0.15
∑		20	1

Indices for the utility of suppliers are from the cardinal rate <1, 10>, the index 10 presents 100 %. The method is solved maximizing (**Table 2**).

Table 2 Calculation of utility for suppliers [own study]

Criterion		Supplier A	Supplier B	Supplier C
		Utility u_{ij}	Utility u_{ij}	Utility u_{ij}
Price	K1	9	7	5
References	K2	9	5	7
Innovations	K3	5	7	9
Quality	K4	7	9	5
Stability	K5	5	9	7
∑		35	37	33

Values of utility were assigned on the base of suppliers rating for each criterion (according to the **Tables 1 and 2**). At the best placement in the given criterion the supplier received the most points. In the point rating the supplier B has the best rating with the utility (u_{ij}) 37. For the calculation of the total utility of variants it was needed to multiply the scale of the i-criterion (αi) with the corresponding partial utility of the given criterion (uij) for each supplier (**Table 3**).

Table 3 Calculation of the total utility of variants by the ratio-index method [own study]

Criterion		Scale of criterion α_i	Supplier A		Supplier B		Supplier C	
			u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$
Price	K1	0.25	9	2.25	7	1.75	5	1.25
References	K2	0.25	9	2.25	5	1.25	7	1.75
Innovations	K3	0.2	5	1	7	1.4	9	1.8
Quality	K4	0.15	7	1.05	9	1.35	5	0.75
Stability	K5	0.15	5	0.75	9	1.35	7	1.05
∑			U_j =	7.3	U_j =	7.1	U_j =	6.6

By counting of the multiplied values of each supplier it was obtained the total utility of the variant (U_j). In this case, the best is the first variant in the form of the supplier A with the total utility (U_j) 7.3.

By the FDMM on the base of paired comparison the criteria were ranked among themselves. The most important criterion in the pair was assigned the value 1 and less important criteria the value 0 (**Table 4**). Then it was the sum (k_i) and the standardized scale (α_i) of each criterion is by ratio of the sum (k_i) for the i-criterion and the total sum of the values (k_i).

Table 4 Paired comparison of criteria [own study]

Criterion		Price	References	Innovations	Quality	Stability	∑= ki	Standardized scale α_i
		K1	K2	K3	K4	K5		
Price	K1	-	1	1	1	1	4	0.4
References	K2	0	-	1	1	1	3	0.3
Innovations	K3	0	0	-	1	0	1	0.1
Quality	K4	0	0	0	-	0	0	0
Stability	K5	0	0	1	1	-	2	0.2
						∑	10	1

The same procedure of evaluation was used to compare variants (suppliers) with respect to each criterion. The sum of the values (k_i) in the row of the specific supplier for the criterion was divided by the total sum of the values (k_i) of all suppliers. Calculation of the total utility of variants U_j by the method FDMM - it is presented by the sum of multiplied scale of the i-criterion (α_i) and the relevant utility of the supplier (u_{ij}) and it presents the total utility of the variant (U_j). This procedure was applied for all suppliers with the aim to calculate the highest utility (**Table 5**).

Table 5 Decision table for the FDMM [own study]

Criterion		Scale of criterion α_i	Supplier A		Supplier B		Supplier C	
			u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$
Price	K1	0.4	0.667	0.267	0.333	0.133	0	0
References	K2	0.3	0.667	0,2	0	0	0.333	0.1
Innovations	K3	0.1	0	0	0.333	0.033	0.667	0.067
Quality	K4	0	0.333	0	0	0	0	0
Stability	K5	0.2	0	0	0.133	0.133	0.333	0.067
Utility			U_j =	0.467	U_j =	0.3	U_j =	0.233

The method was solved maximizing. From the result it is evident that the highest utility (U_j) has the first variant, respectively the supplier A (46.7 %).

Saaty`s method - The first step was the matrix of criteria and their comparison. Criteria got values from the point scale according to importance. If the criterion in the row is more important that the criterion in the column, to the top triangle matrix is written the value of the scale (x - z point scale) and to the bottom part its reverse value (1/x) (**Table 6**). By this way we got the non-standardized scales for all criteria.

Table 6 Comparison of criteria [own study]

Criterion		Price	References	Innovations	Quality	Stability
		K1	K2	K3	K4	K5
Price	K1	-	3	5	7	7
References	K2	1/3	-	5	7	5
Innovations	K3	1/5	1/5	-	7	5
Quality	K4	1/7	1/7	1/7	-	1/5
Stability	K5	1/7	1/5	1/5	5	-
∑		0.8190	3.5429	10.3429	26	17

The scales in the column for each criterion were counted. The standardized scales were obtained by dividing of the values in the rows with the total sum of values in the column. The total sum was summed up in the line for each criterion. The standardized scale (α_i) was calculated by dividing the sum in the row for that criterion and the total sum in the column. The resulting sum of the standardized scale is always one. Standardized scales were later used in the final evaluation of the total utility of variants (**Table 7**). The same way was used by comparison of criteria among variants - by the specific suppliers. The support indicator is the value of the partial utility (u_{ij}) of each variant. Calculation of the total utility of variants U_j by the Saaty`s method - it was multiplied the scale of each criteria (α_i) with the related partial utility of the variant (u_{ij}) for each criterion. The total utility of variant (U_j) results from the count of values ($\alpha_i * u_{ij}$) for suppliers. These values are final and according to them the best supplier is determined (**Table 7**).

Table 7 Calculation of the total utility of variants by the Saaty`s method [own study]

Criterion	Scale of criterion α_i	Supplier A		Supplier B		Supplier C	
		u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$	u_{ij}	$\alpha_i * u_{ij}$
K1	0.4013	0.5069	0.2034	0.3722	0.1494	0.1208	0.0484
K2	0.2901	0.5069	0.1470	0.1208	0.0350	0.3722	0.1079
K3	0.1721	0.1875	0.0323	0.3750	0.0645	0.4375	0.0752
K4	0.0480	0.2426	0.0117	0.4491	0.0216	0.3083	0.0148
K5	0.0855	0.1208	0.0107	0.5069	0.0449	0.3722	0.0329
∑	1	U_j =	0.4051	U_j =	0.3145	U_j =	0.2795

The task was solved as maximizing, the highest value (U_j) is the best. The result of this method is a determination of the best variant by the determined criteria and for this case it is the supplier A with the total utility (U_j) 40.51 %.

Criteria of evaluation are specific indicators to measure the importance of variants of a solution of the problem. Definition of criteria depends on evaluated variants. The enterprise determined criteria which will give them an economic and commercial advantage (for example reducing costs, improve service quality, generation of profit, an increase of productivity, etc.).

The evaluated production enterprise decided to outsource all internal activities. One of the reasons was delimitation of marginal activities in order to focus on the main activity - production. The part of storage is outsourced by an external partner. The aim was to outsource all storage activities and internal logistical activities. With the help of expert analysis were selected suppliers according to the requirements of the enterprise (3 suppliers A, B, C). The steps of expert analysis: 1. Setup of the expert team, 2. Problem

clarification, 3. Division of tasks and responsibility, 4. Gross selection of suppliers (the first step), 5. Fast analysis, 6. Selection of suppliers (the second step), 7. Evaluation. The case study created a specifications manual by the decision about outsourcing of internal logistical activities. It included all conditions for the supplier. Data in this specification were requirements for the supplier. All requirements and activities in the specifications were set by the way that it can create the required volume of production. The manual contains a summary of the activities and also activities that are realized in the warehouse and they are the subject of the outsourcing. It would have been done by an external contractor, so it was them notified only in the context of the final selection procedure. The manual also includes procedures of work and identification of keys that lead to the desired business performance. The main activities in the specification: 1. Material flow (control and monitoring of material, administration), 2. Material storage, 3. Supply of production, 4. Management of reverse package, 5. Export of final products. On the base of research and analysis of each supplier it was specified the range of suppliers. A supplier with the best fulfilling of criteria had the range 1, and a supplier with the worst result in the criteria had the number 3. **Table 8** presents the final rank of suppliers for determined criteria. **Table 9** presents the final reviewing of the results of realized methods.

Table 8 Final rank of suppliers for determined criteria [own study]

Criteria (in order of priority)		Supplier A	Supplier B	Supplier C
K1	Price	1.	2.	3.
K2	Reference research	1.	3.	2.
K3	Innovations	3.	2.	1.
K4	Quality	2.	1.	3.
K5	Market stability	3.	1.	2.

Table 9 Final reviewing of the results of realized methods [own study]

Used method	**Supplier A**	Supplier B	Supplier C
Ratio-index method	7.3	7.10	6.60
FDMM	0.47	0.30	0.23
Saaty`s method	0.41	0.32	0.28
Rank	**1.**	2.	3.

4. FINAL SELECTION OF THE SUPPLIER

The final evaluation compared the best supplier (supplier A) with the evaluated production enterprise. The enterprise had a position of a standard. The primary plan was to integrate an external enterprise to the logistics of the enterprise, but it was realized an analysis and evaluation of all criteria among the evaluated production enterprise and the supplier A (**Table 10**).

Table 10 Comparison of supplier A and the evaluated production enterprise [own study]

Criteria (in order of priority)		Supplier A	Evaluated production enterprise
K1	Price	2.	1.
K2	Reference research	1.	2.
K3	Innovations	1.	2.
K4	Quality	2.	1.
K5	Market stability	2.	1.

From this table, it is evident, that the evaluated production enterprise has the first place in three basic criteria. The price and financial stability belong to important factors in this comparison. The realized analysis shows that from an economic point of view, the evaluated production enterprise has a better and more stable background as a supplier A. The criterion of quality is presented by the fact, that the evaluated production enterprise is more successful in the form of training of its employees. In the area of innovation, the evaluated production enterprise presents its problems, in the result of the lack of space and resources, all the attention is paid to the production sector. In the reference, research has the enterprise the second place because this enterprise does not realize these activities by its own employees.

From the final part of this study is evident that the most suitable external partner for the evaluated production enterprise is the supplier A. It had the best evaluation in the analysis and evaluation of all methods. Nevertheless, the management of the evaluated production enterprise decided that all internal logistics activities will be performed in its own direction. This decision was supported by the last comparison of the evaluated production enterprise and supplier A.

5. CONCLUSION

The case study was focused on the problem of outsourcing in the conditions of Slovak market and in the area of providing internal logistics services. The case study started by definition of procedures and processes of outsourcing, which formed the basis for its application in the selected and evaluated enterprise. The research team realized the selection and definition of logistics activities for outsourcing, for each activity were defined procedures of activities related to their fulfillment. On the base of defined criteria and requirements of the evaluated enterprise, the research team and the team of experts realized the selection and evaluation of the external supplier. The market analysis and selection of three perspective suppliers were realized on the base of expert analysis. It was realized by the special team of the evaluated enterprise. The result was evaluation and selection of the supplier by three multi-criteria decision-making methods, namely by the ratio-index method, FDMM and Saaty`s method. Supplier A received the best rating. This supplier was compared to the evaluated production enterprise at the end of the evaluation process, and the evaluated production enterprise had a position of a standard by this decision process. Taking a careful consideration of all criteria between the supplier A and the evaluated production enterprise it was decided that internal logistics activities would retain in the own direction of the evaluated production enterprise. One of the reasons was the fact that all activities would be under the control of the enterprise. It follows that also an advantage for the criterion of quality and safety. The production enterprise has a better control over the management and in case of possible variations, it can immediately intervene. The secondary reason was the price. The final price for the requested services and total costs associated with it were lower than at the supplier A. But we must say that this decision was very difficult and it was based mainly on the resulting quality of service and the efficiency. The result of the study was a comparison of the selected supplier and evaluation of the enterprise. The enterprise was in this case as a standard. The final decision had conclusions that the evaluated production enterprise can manage its internal logistics activities more profitable by its own activities. And the result of this study was successful in practice. Positive results are presented by the effective management of the defined activities. This study can be instructions for evaluation of external services for outsourcing implementation in practice.

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