ESTIMATION OF SUPPLIERS AS AN IMPORTANT ELEMENT OF THE RATIONALIZATION OF SUPPLY PROCESSES – CASE STUDY

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ABSTRACT. To increase the efficiency of the business in times of the globalization and increasing competition, the management of the companies looks for opportunities to achieve higher incomes or to reduce the costs of inputs. One of possible methods to obtain higher efficiency is to put the emphasize on the relationships with suppliers. This is very important element of an effective management of the company, because by determining the economical conditions of the cooperation, it is possibly to reduce the cost of business activities. The reliable classification of the suppliers is depended on the level of the detail of an assessment criteria and the scoring method. The main problem is the risk of the objective estimation of individual offers received from the suppliers. For this reason, the classification of suppliers is one of the key problems of the logistics controlling. Based on practical example, this paper presents the complexity of the problem of the classifications and the selection of suppliers according to different hierarchy of the importance of various criteria.

Key words: logistics controlling, analysis of suppliers, procurement, purchasing.

INTRODUCTION

The basic economical aim of each company is the profitability. It means that the company must earn to be able to develop and fulfil various social functions. The purchasing of raw materials and services necessary to performs tasks of the company is one of the important elements, which affects the rentability of the company. Therefore, the Purchasing Department, which aims to reduce the costs and influences the profitability of the whole company, plays an important role in this company. It is particularly important in the conditions of the economic slowdown or even the financial crisis in the global markets. The strong trend to centralize the purchasing activities in large-scale enterprises, corporations or holdings can be observed in recent years. The unification of these processes aims to the selection of key suppliers and to the creation of the cooperation based on partner relationships. In long terms, it leads to rationalizing of procurement processes. Therefore, the reliable assessment of the suppliers according to various criteria is an important element of the process. In addition, the process of the selection of the suppliers should not be based only on the lowest prices offered by them. Quite often, the logistic conditions could be more important than the lower price, because from point of view of all processes (purchasing, logistics and sales) the supplier offering the lowest price could be, in fact, the more expensive one. The aim of this paper is to present one of the mechanisms to evaluate the supplier. The Authors present the method of the selection of the supplier based on a specific numerical scoring system, which takes into account the specific criteria for individual branches of business. The criteria having an impact on the selection of the supplier in food industry are presented in this paper.

CASE STUDY OF THE EVALUATION OF SUPPLIERS AS THE PERFORMANCE TO OPTIMIZE THE PROCESS OF PROCUREMENT

According to J.J.Coyle [2003] and K.Lyson [2006], the process of procurement consists of 11 steps. However, within this case study, only a part of these activities will be analyzed with particular emphasis on the evaluation of the conditions of the cooperation with selected suppliers to identify the key supplier for the analyzed raw materials. The following actions will be conducted:

- − identification of possible suppliers,
- − pre-selection of possible sources of the supply,
- − evaluation of other suppliers,
- − selection of the supplier.

The suppliers of key raw materials necessary for production are:

- − Supplier 1 – D1,
- − Supplier 2 – D2,
- − Supplier 3 – D3,
- − Supplier 4 – D4,
- − Supplier 5 – D5.

The nine criteria of the evaluation of suppliers were chosen and their importance for the company was determined as follows:

1. Price   S1,
2. Quality of raw material   S2,
3. Punctuality of deliveries   S3,
4. Terms of payments   S4,
5. Discounts   S5,
6. Terms of complains and returns   S6,
7. Approach to client's demands   S7,
8. Transport   S8,
9. Packaging   S9.

It should be emphasized, that the hierarchy of established criteria are not significantly different from European standards, which results from a study conducted by H.Ch.Pfhol [2010]. In order to maintain the strong market position, companies often are obliged to compete in the area of an offered price and the use of optimal logistics processes. The price is the main cost driver of purchased raw materials. Therefore, this criterion is considered as the main criterion of the selection of the suppliers used by many companies, operating on Polish, European as well as global market. The similar importance is put on the quality criterion, which has a strong impact on the attractiveness of the products and ensures their marketability. The companies strive to manufacture the products by the use of raw materials of the highest quality, which are often inspected in the laboratories for the compliance with appropriate standards. The punctuality of deliveries is important for the companies due to increasing expectations of the effectiveness of the logistics customer service. This factor is also important in the processes related to the optimization of the stocks levels, because the shorter lead-times enable to keep lower levels of safety stock as well as the periodic stock used for current needs.

The three above-mentioned criteria (price, quality, punctuality of deliveries) play the leading role in the companies and form the core of logistics and management activities. In practice, the big majority of the companies in Poland use mainly these criteria in processes related with the selection of

suppliers. The criteria following above-mentioned ones, in the order of their importance, are trade criteria, like payment conditions or discounts. These criteria have an impact on financial management, cash flow and the level of the capital invested in stocks of raw materials (acting capital). The terms of complains and returns as well as the approach to customers' needs are also important, as they affect positively on the material flow management in the company. The transport and package criteria were classified at the last position due to the high popularity of the outsourcing of transport processes and hence the forwarders and logistics operators are responsible for these factors, which optimize them on their own.

The price level is measured using the comparative scale. This scale determines the ranking of suppliers according to the price level for a product.

Table 1. Price measure
Tabela 1. Miara ceny

Level	I	II	III	IV	V
Points	10	7	5	2	1

Source: own work

The quality of the raw material is measured as the percent of raw materials inconsistent with the quality standards (level of shortages).

Table 2. Measurement of the quality
Tabela 2. Mierzenie jakości

Percentage of shortages	0-2%	3-5%	6-10%
Points	10	8	4

Source: own work

The punctuality of the deliveries is measured as a number of days of delays in the order fulfilment. The date of the delivery is confirmed each time by the suppliers within 24 hour after receiving the order.

Table 3. Measurement of the punctuality of the deliveries
Tabela 3. Mierzenie terminowości dostaw

Days	0-2	3-4	5-7	8-10
Points	10	8	5	1

Source: own work

The terms of payment are considered with regard to two elements: the crediting of the deliveries and non-cash settlement option.

Table 4. Measurement of the terms of payment
Tabela 4. Mierzenie warunków płatności

Element	yes	no
Crediting of deliveries	5 points	0 points
non cash settlements	0 points	5 points

Source: own work

The discounts are measured as the percentage of discount offered by the supplier for the order amount of 10000 PLN.

Table 5. Measurement of discounts
Tabela 5. Mierzenie upustów cenowych

Percentage	0-1%	2-3%	4-5%	6-7%	8-10%
Points	0	2	4	6	8

Source: own work

The terms of complains and returns are measured in days, within which the raw material can be claimed or returned to the supplier.

Table 6. Measurement of terms of complains
Tabela 6. Mierzenie warunków reklamacji

Days	0-2	3-6	7-9	10-11	12-14
Points	1	4	6	8	10

Source: own work

The customer's requirements are the subjective evaluation conducted at various management levels (operational staff, managers of purchasing departments, management board). The following types of behaviours were distinguished: flexible – 10 points, negotiating – 5 points, inflexible – 0 points.

The comparison of transport conditions was made by the comparison of the terms of the cooperation with suppliers:

−   the supplier covers transport costs – 10 points,

−   the supplier does not cover transport costs – 0 points.

The 50 kilograms boxes were determined as the most convenient ones for the transport purposes (with loading and unloading processes) for the analyzed case.

Table 7. Measurement of the importance of the package
Tabela 7. Mierzenie znaczenia opakowania

Kilograms per box	20 kg	50 kg	100 kg
Points	7	10	2

Source: own work

The determination of weights of the criteria is also very important in addition to the selection of these criteria. The method to determine the importance of the weight in the hierarchy of the criteria is shown in Table 8. The criterion S1 (price) was placed at the higher position in the hierarchy (the frequency of advantage over other criteria – 8).

Table 8. Weights of criteria
Tabela 8. Wagi dla poszczególnych kryteriów

	S1	S2	S3	S4	S5	S6	S7	S8	S9	Frequency of advantage	Weight
S1		x	x	x	x	x	x	x	x	8	0,222
S2			x	x	x	x	x	x	x	7	0,194
S3				x	x	x	x	x	x	6	0,167
S4					x	x	x	x	x	5	0,139
S5						x	x	x	x	4	0,111
S6							x	x	x	3	0,083
S7								x	x	2	0,056
S8									x	1	0,028
S9										0	0,00
Total										**36**	**1,00**

Source: own work

The Table 9 shows the results of the study of terms of the cooperation with suppliers with regard to analyzed criteria.

Table 9. Terms of the cooperation with suppliers
Tabela 9. Warunki współpracy z dostawcami

	Supplier 1	**Supplier 2**	**Supplier 3**	**Supplier 4**	**Supplier 5**
Price	1,14 zł/kg	1,20 zł/kg	0,95 zł/kg	0,98 zł/kg	1,06 zł/kg
Quality	1% of shortage	4% of shortage	7% of shortage	5% of shortage	8% of shortage
Punctuality	6 days of delay	3 days of delay	7 days of delay	1 day of delay	5 days of delay
Terms of payment	non-cash without credits	non-cash without credits	cash credits	non-cash without credits	cash credits
Discounts	2% at 10 000 PLN	7% at 10 000 PLN	3% at 10 000 PLN	3% at 10 000 PLN	5% at 10 000 PLN
Terms of complains and returns	up to 6 days	up to 10 days	up to 9 days	up to 7 days	up to 12 days
Approach to client's requirements	negotiating	flexible	negotiating	inflexible	flexible
Transport	not provided	provided	not provided	not provided	provided
Packaging	20 kg per box	50 kg per box	50 kg per box	20 kg per box	100 kg per box

Source: own work

The Table 10 shows the points obtained by every supplier without taking into account the weights of the criteria.

Table 10. The score of suppliers
Tabela 10. Punktacja dostawców

	D1	**D2**	**D3**	**D4**	**D5**
S1	2	1	10	7	5
S2	10	8	4	8	4
S3	5	8	5	10	5
S4	0	0	10	0	10
S5	2	6	2	2	4
S6	4	8	6	6	10
S7	5	10	5	0	10
S8	0	10	0	0	10
S9	7	10	10	7	2
Total	**35**	**61**	**52**	**40**	**60**

Source: own work

Based on the results presented in the Table 10, it can be concluded, that the best supplier is the Supplier 2 (D2), because it received the highest amount of the points, which means it offers the best services among potential suppliers of raw material. However, this supplier received only a slight advantage over the supplier at the second place (60 points – Supplier 5 – D5). The supplier D1 (Supplier 1) definitely received the lowest amount of points (35). The above presented results do not take into consideration the significance of discussed criteria.

The Table 11 shows the points obtained by every supplier with taking into account the weights of the criteria.

Table 11. The score of suppliers with taking into consideration the weight of criteria
Tabela 11. Punktacja dostawców z uwzględnieniem wag

	Weight	**D1**	**D2**	**D3**	**D4**	**D5**
S1	0,222	0,444	0,222	2,222	1,556	1,111
S2	0,194	1,944	1,556	0,778	1,556	0,778
S3	0,167	0,833	1,333	0,833	1,667	0,833
S4	0,139	0,000	0,000	1,389	0,000	1,389
S5	0,111	0,222	0,667	0,222	0,222	0,444
S6	0,083	0,333	0,667	0,500	0,500	0,833
S7	0,056	0,278	0,556	0,278	0,000	0,556
S8	0,028	0,000	0,278	0,000	0,000	0,278
S9	0,000	0,000	0,000	0,000	0,000	0,000
Total	**1,000**	**4,056**	**5,278**	**6,222**	**5,500**	**6,222**

Source: own work

Taking into the consideration the weight of criteria in the process of selection of the best supplier, it turned out that two companies are the best ones: Supplier 3 (D3) and Supplier 5 (D5).

The Supplier D2 has the first position with 61 points in initial estimations, but after the verification of these estimations by the application of weights of criteria, this supplier became the next to last position. In the first phase of calculations without the application of weights of criteria, the Supplier D2 was dominant, because it gained the highest scores in three last criteria (of lowest weight): transport, package and approach to client's requirements. Regarding the criteria of key importance for the company, the scores of D2 range from minimum to almost maximum, but they do not have a bigger impact on final results. In the contrast to surprising results, gained by Supplier D2, the result of Suppliers D5 is the situation, which could be expected. It reached the second position with 60 points in initial classification (practically the same as D2), but after taking into consideration the weights of criteria, it reached the first position. It is a result of the consistent balancing between maximal and minimal point values for each criterion (usually obtaining the average ones) as well as collecting the highest amount of maximal points. The interesting situation is the case of the Supplier D3, which "jumped" from last positions to the first one. It resulted from the lowest price, which is the most important criterion. The Supplier D3 does not received any points or only small number of points in case of low rated criteria, which also does not affect or affects only very slightly its position in the ranking after taking into consideration the weights of criteria.

Comparing the two "winning" (after taking into consideration the weights of criteria) suppliers, the Supplier D5 was better in the matter of secondary criteria, gaining three times the maximum amount of points. The Supplier D3 is definitely the better one in the matter of criteria, being most important for the company, where it gained twice the maximal amount of points while Supplier D5 achieved only average values there. As these criteria are more important, it seems to be reasonable to prefer the Supplier D3.

SIMULATION OF CHANGES IN THE CRITERIA HIERARCHY OF SELECTION OF SUPPLIERS

Due to the ongoing discussion and the dispute between Logistics Department and Trade Department regarding the method of the determination of an appropriate hierarchy of importance of the criteria, the simulation of two possible variants were conducted. These variants applied the different hierarchy of importance of the criteria. The quality criteria, logistics, and operational criteria (punctuality, packaging, transport, possibility of returns) were of the same importance in the first

variant. The suppliers, which offer favourable financial conditions (low price, crediting of supplies, discounts) are preferred in the second variant.

Variant I (Logistics Variant)

The hierarchy of the importance of the criteria:

1. Quality of raw materials		S2
2. Punctuality of deliveries		S3
3. Packaging		S9
4. Transport		S8
5. Terms of complains and returns		S6
6. Approach to client's requirements		S7
7. Price		S1
8. Discounts		S5
9. Terms of payments		S4

The determination of the weight of the criteria.

Table 12. The determination of the weight of criteria in Variant I
Tabela 12. Określenie wag w Wariancie I

	Frequency of advantage	Weight
S1	2	0,0556
S2	8	0,2222
S3	7	0,1944
S4	0	0,0000
S5	1	0,0278
S6	4	0,1111
S7	3	0,0833
S8	5	0,1389
S9	6	0,1666
Total	**36**	**1**

Source: own work

The comparison of points with taking into account the weights of criteria.

Table 13. The comparison of points with taking into account the weights in Variant I
Tabela 13. Zestawienie punktów z uwzględnieniem wag w Wariancie I

	Weight	D1	D2	D3	D4	D5
S1	0,0556	0,111	0,056	0,556	0,389	0,278
S2	0,2222	2,222	1,778	0,889	1,778	0,889
S3	0,1944	0,972	1,556	0,972	1,944	0,972
S4	0,0000	0,000	0,000	0,000	0,000	0,000
S5	0,0278	0,056	0,167	0,056	0,056	0,111
S6	0,1111	0,444	0,889	0,667	0,667	1,111
S7	0,0833	0,417	0,833	0,417	0,000	0,833
S8	0,1389	0,000	1,389	0,000	0,000	1,389
S9	0,1666	1,167	1,667	1,667	1,167	0,333
Total	**1**	**5,389**	**8,333**	**5,222**	**6,000**	**5,917**

Source: own work

The winner of the simulation of the variant oriented on the logistics aspects of the cooperation is the Supplier D3. The low level of returns (4%), good punctuality of deliveries and very good characteristics of the packaging characterize it.

Variant II (Financial Variant)

The hierarchy of the importance of the criteria:

1. Price   S1

2. Discounts   S5

3. Terms of payments   S4

4. Quality of raw materials   S2

5. Terms of complains and returns S6

6. Punctuality of deliveries   S3

7. Packaging   S9

8. Transport   S8

9. Approach to client's requirements S7

The determination of the weight of the criteria.

Table 14. The determination of the weight of criteria in Variant II
Tabela 14. Określenie wag w Wariancie II

	Frequency of advantage	Weight
S1	8	0,2222
S2	5	0,1389
S3	3	0,0833
S4	6	0,1667
S5	7	0,1944
S6	4	0,1111
S7	0	0,0000
S8	1	0,0278
S9	2	0,0556
Total	**36**	**1**

Source: own work

The comparison of points with taking into account the weights of criteria.

Table 15. The comparison of points with taking into account the weights in Variant II
Tabela 15. Zestawienie punktów z uwzględnieniem wag w Wariancie II

	Weight	D1	D2	D3	D4	D5
S1	0,2222	0,444	0,222	2,222	1,556	1,111
S2	0,1389	1,389	1,111	0,556	1,111	0,556
S3	0,0833	0,417	0,667	0,417	0,833	0,417
S4	0,1667	0,000	0,000	1,667	0,000	1,667
S5	0,1944	0,389	1,167	0,389	0,389	0,778
S6	0,1111	0,444	0,889	0,667	0,667	1,111
S7	0,0000	0,000	0,000	0,000	0,000	0,000
S8	0,0278	0,000	0,278	0,000	0,000	0,278
S9	0,0556	0,389	0,556	0,556	0,389	0,111
Total	**1**	**3,472**	**4,889**	**6,472**	**4,944**	**6,028**

Source: own work

The winner of the simulation of the variant oriented on the financial aspects of the activities of the company is the Supplier D3. It was the best business partner, offering the optimal business terms and conditions:

- lowest price,

- terms of payments – very good (the possibility of non-cash settlements and the crediting of supplies),

- discounts – acceptable (3% at 10 000 PLN).

SUMMARY

The analysis of four different variants were conducted: without taking into account the weight of criteria, with taking into account the weight of criteria, a logistics variant (importance of logistics criteria) and a financial variant (importance of financial criteria). The Table 16 presents the summary of the scoring and ranking of the suppliers in each analyzed variant.

Table 16. The ranking of suppliers for each variant
Tabela 16. Ranking dostawców dla poszczególnych wariantów

Variant	Ranking of suppliers and points		
	Supplier 1	Supplier 2	Supplier 3
Without weights	D2 - 61	D5 - 60	D3 - 40
With weights	D3 - 6,22	D5 - 6,22	D4 - 5,50
Logistics	D2 - 8,33	D4 - 6,00	D5 - 5,92
Financial	D3 - 6,47	D5 - 6,03	D4 - 4,94

Source: own work

According to the above table, both the Supplier D2 (in the variant without weight and logistics one) and the Supplier D3 (in the variant with weights and financial one) became twice the winner. The Supplier D2 is much better from the logistics point of view, while the Supplier D3 is preferred by the Trade Department because of the low price. One should be also aware, that the streamlining of logistics processes needs much more efforts to be put in, than the negotiation of appropriate terms and conditions.

The proposal to resign from the condition, that the Supplier D2 covers the transport costs, is the additional argument to choose this supplier. The Trade Department could negotiate the prices of raw materials, so that the reduction of the price would compensate the cost of own transport. It should be emphasized that, the Supplier D3 does not provide nor cover transport costs, which affects negatively its final position in the comparison, because in case of successful price negotiations with the Supplier D2, both the Supplier D2 and the Supplier D3 could be price comparable.

As a conclusion of this comparison of suppliers, it should be emphasized that, the method of estimation of suppliers could be introduced in the company only if it will be incorporated into organizational structures of this company. The formalization of this process as a procedure of this company is an important element, which is underlined by Magdalena Dąbrowska-Mitek [2008]. The implementation of a clear procedure, including instructions of proceedings in each step, the responsibilities, and the frequency of individual actions gives the clear overview, how this process should function. The formalized and described process is also more protected against the fluctuation of employees and allows monitoring continuously the effectiveness of the process of the estimation of suppliers.

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OCENA DOSTAWCÓW JAKO ISTOTNY ELEMENT RACJONALI-ZACJI PROCESÓW ZAOPATRZENIA - CASE STUDY

STRESZCZENIE. W czasach globalizacji i narastającej konkurencji, aby zwiększyć efektywność działalności gospodarczej, kadra kierownicza przedsiębiorstw szuka możliwości osiągnięcia większego przychodu lub oszczędności ekonomicznych w postaci obniżenia kosztów nakładów. Jednym ze sposobów zwiększenia efektywności jest skupienie uwagi na relacjach z dostawcami. Jest to niezwykle ważny element efektywnego zarządzania przedsiębiorstwem, gdyż poprzez określenie ekonomicznych warunków współpracy, można wpłynąć na obniżenie kosztów działalności gospodarczej. Rzetelna klasyfikacja dostawców jest uzależniona od szczegółowości opracowanych kryteriów oceny oraz sposobu punktacji. Zasadniczym problemem jest ryzyko obiektywnej oceny poszczególnych ofert, otrzymanych od dostawców. Z tego względu proces klasyfikacji dostawców jest jednym z kluczowych problemów controllingu logistyki. W niniejszym artykule autorzy podjęli próbę przedstawienia na praktycznym przykładzie złożoności problemu klasyfikacji i wyboru dostawców względem różnej hierarchii ważności poszczególnych kryteriów.

Słowa kluczowe: controlling logistyki, analiza dostawców, zaopatrzenie, zakupy.

DIE BEWERTUNG DER LIEFERANTEN ALS EIN WESENTLICHES ELEMENT DER RATIONALISIERUNG DES BESCHAFFUNGS-PROZESS – EINE FALLSTUDIE

ZUSAMMENFASSUNG. In der Zeiten der Globalisierung und des anwachsenden Wettbewerbs, die Führungskräfte der Unternehmen suchen nach Möglichkeiten der größeren Einkommen oder ökonomischen Ersparnissen in Form der Senkungen von Kosten um die Effektivität der Unternehmen zu steigern. Eine der Methoden zur Steigerung der Effektivität ist auf die Beziehungen mit Lieferanten zu konzentrieren. Das ist ein äußerst wichtiges Element der effektiven Unternehmensverwaltung, da durch richtige Bestimmung der ökonomischen Bedingungen der Zusammenarbeit, kann die Senkung der Unternehmenskosten erreicht sein. Die zuverlässige Klassifizierung der Lieferanten ist abhängig von der Ausführlichkeit der Bewertungskriterien und des System der Punktwertung. Das Hauptproblem ist das Risiko der objektiven Bewertung der einzelnen Angebote der Lieferanten. Aus diesem Grund ist das Prozess der Klassifizierung der Lieferanten eines der wichtigsten Probleme des Logistik-Controllings. Die Autoren dieser Artikel, basierend auf ein praktisches Beispiel, versuchten die Komplexität des Problems der Klassifizierung und der Auswahl von der Lieferanten gegenüber verschiedenen Hierarchie der Wichtigkeit der verschiedenen Kriterien zu präsentieren.

Codewörter: Logistik-Controlling, Analyse von Lieferanten, Beschaffung, Einkaufen.

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