

# The AHP method used in assessment of foundry enterprise position

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## Abstract

Complex assessment of activity of a selected foundry enterprise based on a modern AHP (Analytic Hierarchy Process) method has been presented. Having defined the areas of analysis, which include: marketing (products, distribution channels, sales organisation and client concentration), personnel (skills, managerial abilities, organisation climate, effectiveness of incentives, personnel fluctuations), production (availability of raw materials, technical level of production, effective use of production capacities), organisation and management (foundry structure, organisation culture, management performance), the analysis was made using the weighted sum of evaluations. The second step consisted in a comparative assessment of Foundry position using Saaty's scale modified by Weber and the AHP method with examination of a hierarchy structure involving the main (parent) problem and its direct evolution into sub-problems. The assessment of Foundry position made by AHP enables introducing changes and/or innovations which are expected to improve the overall production effectiveness.

**Keywords:** Analysis of foundry position; AHP method; Comparative assessment; Weighted sum of evaluations

## 1. Introduction

Correct and reliable analysis of foundry position is a good point of departure for multi-faceted economic decisions. For example, it can be used as a point of departure for comprehensive analysis of the Make or Buy type. The first step is to determine the area of the analysis. The areas considered most frequently are:

- *Marketing* (products, distribution channels, sales organisation, client concentration);
- *Personel* (skills and qualifications of managers, organisation climate, effectiveness of incentives, personnel fluctuations);
- *Production* (availability of raw materials, technical level of production, effective use of production capacities);
- *Organisation and management* (management performance, foundry structure, organisation culture).

- *Finance and accountancy* (financial resources, capital structure, credit capacity, cash liquidity).

In our assessment of the position of a selected Foundry, the issues comprised in the area called „Finance and Accountancy” will be disregarded. The above mentioned list of the areas covered by analysis can be regarded as an object presentation of foundry enterprise. The real object, i.e. the Foundry, has been described with five, and in this specific case four, characteristics displaying the main fields of activity, i.e. marketing, production and management. A population of these characteristics expressed in a vector form constitutes a model of the examined Foundry. The vector notation adopted in further part of this study enables fully consistent identification of individual characteristics without the necessity of looking for their meanings. The adopted sequence of components in vector approach is arbitrary and has no substantial

meaning. A common schematic representation of the vector notation includes only an ordered list of meanings that various characteristics may have. In some cases the notation is completed with conveniently assigned descriptions of the meanings of a characteristic (Fig. 1). It can be assumed that the model of a general object, which the foundry enterprise is, should serve the determination of Foundry position.

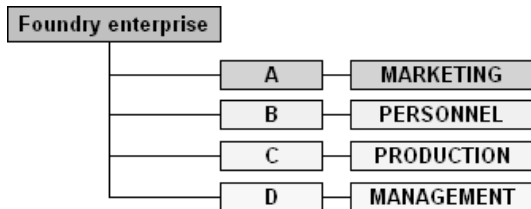


Fig. 1. Graph presenting the model of an enterprise

To determine the specific position that this particular Foundry occupies is the main goal of the model. The selected components described by appropriate characteristics should be examined through an interrelation that they have with the adopted goal, and so they should answer the question in what way the activity within the area depicted by a given component affects the assessment of Foundry position.

## 2. Profile formation

Usually, for selected components, no natural scales to measure their effect on Foundry position are available. Therefore, as a first step, it is recommended to prepare the, so called, foundry profile. The company profile is created when we can make positioning with reference to each component on the same scale but without any premises or reasons for aggregation of the measurements. The procedure adopted in profile formation usually involves the following steps:

- The first step – one versatile scale is adopted for all characteristics; it enables evaluating, separately and according to a subjective or objective measurement, the activity level of each characteristic in achievement of the main goal.
- The second step – a list of characteristics is made, assigning to each of them a respective graphical presentation of the scale.
- The third step - each characteristic gets a respective scoring on the scale.
- The fourth step – the points indicated on respective scales are joined with sections, and one point-to-point curve, otherwise called profile, is plotted.

For subjective scoring, an ordered scale is used most frequently. It indicates the subjectively grasped meanings with the assigned scores (Table 1).

A point critical in this procedure is assigning of scores to individual components. They are marked with symbols  $v_i$ .

Table 1.

Selection of the subjectively grasped meanings and scores assigned to them [1]

Verbal evaluation	Score evaluation
Weak	1
Satisfactory	2
Good	3
Very Good	4
Outstanding	5

Usually, to make our evaluation more objective, a questionnaire is circulated among a group of people, and the outcome obtained for each characteristic is defined as a *statistical measure of position*. In the case of an ordered scale, this can be a *median* or *modal value*. It is not permitted to use a mean from the calculated scores. The evaluation was based on the following data [4]:

● **MARKETING** – The department searching for new clients and taking care of the regular ones. To get new clients they use: foundry website, advertising in local press, participation in tenders organised at foundries, recommendation of regular clients. To keep the „old” clients, they use the following tools: questionnaires investigating client’s satisfaction, „just on time” deliveries, price reduction for regular clients, flexibility to tailor orders in respect of quantity and quality, quick response to possible complaints and replacement of rejected products, sending information on new products by electronic means. Scoring for this area – 4.

The scoring reflects the fact that the Foundry is capable of using properly and effectively all principal marketing tools with planning at all stages of production and careful scheduling of the sales, observed throughout the time of order execution and strongly influencing also the supply of all components used in production. The scoring can be raised, providing one of the most powerful marketing tools, i.e. the direct marketing, or direct contact with the regular and potential new clients, is effectively used. Contacts of this type are usually made at the low tiers of organisation structure with responsibility shared by the personnel from marketing department and the staff at different levels of management.

● **PERSONNEL** – Workers employed by the Foundry have adequate qualifications necessary for performance of the duties assigned to them at individual work posts. The workers’ qualifications are checked at the very beginning during the recruitment and later at different stages of the work performed under a provisional contract of employment. Also regular workers are subject to verification. Depending on the worker’s personal involvement and the type of the performed duties, the owner of the Foundry shifts the workers to different posts, providing at the same time training and upgrading of their skills. Workers for production posts are recruited from outside the Foundry, while those performing different managerial duties (foremen, masters and chiefs) are offered jobs from an in-plant recruitment programme. In this way, the Foundry’s own labour resources can be used quite effectively. The workers are, moreover, strongly involved in the production process and identify themselves with the enterprise. Scoring for this area – 5.

● **PRODUCTION** - The Foundry is planning the whole production cycle from the moment they get information that a product is requested until completing the order. An in-plant laboratory develops the technology and (for example) the best composition of moulding sand. The coordination of orders and the delivery of components for production and distribution of the ready products are properly adjusted to the Foundry's operating cycle. Scoring for this area – 5.

● **MANAGEMENT** In the Foundry, the process of management starts with the Chief Executive Officer, whose main task is to ensure the financial liquidity of the Enterprise and acquisition of strategic clients. This means that the responsibility for management of the Foundry extends top-down to the chiefs of individual departments, thus enabling a flexible management of the Enterprise, quick and relevant response to the needs of its clients, and necessary changes in production process and in the time-schedule for ordering of components and distribution of the ready products. The lowest level of management, i.e. the foremen, is also very important for the effective and correct functioning of the Foundry. The persons directly responsible for the correct running of production cycle guarantee the reliable performance of the planned production process. Proper execution of these tasks and management at individual stages of the production process allow the Foundry to operate in a correct way. Proper management ensures the required profit and, as a consequence, enables employing additional workers and offering decent wages for the work performed. Scoring for this area – 5.

It should be added that the task of making company profile has a cognitive meaning only, as it uses numerous assumptions that do not allow for too far-reaching conclusions. First and foremost, each component is assessed separately, that is, in isolation from other components. The evaluations, even if based on the data collected from various questionnaires, are still our own subjective judgements in the meaning of which we are vividly interested. Different studies clearly show that these evaluations are nearly always overestimated in favour of the enterprise. With all these "cons", the created profile can still be a useful tool in further deeper analysis.

### 3. The weighted sum of evaluations

Each of the components reflects a part of the Foundry activity, and so each of them has some impact on the assessment of Foundry position. So, it is logical to ask now a question: *Are all these impacts equal in weight?* The general assumption is that they are not. So, the next question is: *how to rank these impacts to be able to make on the basis of them a general assessment of the Foundry position?* This task belongs to the group of tasks where the studies are focussed on a specific object represented in the model by a finite number of components, and our interest is focussed on a characteristic pertinent to this object with meanings determined by the activity level of components. A characteristic of this type can be denoted by, for example, symbol  $K_0$ . Specifically, the assigned meaning is a numerical value denoting, for example, an evaluation of the object position. The additionally isolated components are described with characteristics that can be denoted by symbols  $K_1, \dots, K_n$ . It is assumed that the result assigned to the object characteristic  $K_0$  is a sum of quantities representing the activity level of individual components.

The model of an object can be depicted graphically in the form of a tree. An example is shown in Figure 2.

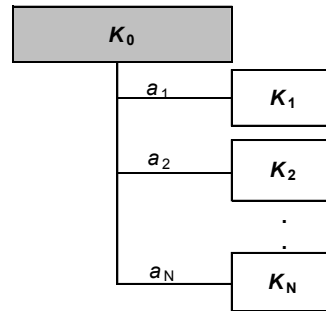


Fig. 2. Schematic graphical representation of the model of an object [1]

In accordance with the assumptions made previously, a result assigned to the object characteristic  $K_0$ , will be denoted by the symbol  $a_0$  and will assume the form of  $a_0 = a_1 + a_2 + \dots + a_N$

One can easily imagine the situation when the activity levels of all components are identical, and on the scale of scores the same weight of, for example, 3 will be assigned to each of them. Let us now think for a while about the possibility of raising the final score, remembering that it can be done through raising by one score the evaluation with reference to either  $K_1$ , or  $K_2$ . The question is whether in each of these situations the global result obtained for  $K_0$  will change (improve) in the same way. If we assume that in each of the situations mentioned above the global result will change in the same way, then we can say that each of the components has the same share (weight) in creation of the global result. If, on the other hand, we reach the conclusion that it is not indifferent whether the improvement is made with reference to component  $K_1$ , or  $K_2$ , this means that it is necessary to introduce some coefficients which will allow for the observed differences. These coefficients are called *structural weights*. The rules adopted in determination of the structural weights are not consistent. One of the possible methods for their determination is described below. The following preliminary assumptions should be adopted:

- 1) the set of components under consideration is represented by characteristics  $K_1, \dots, K_N$ ;
- 2) to the selected components are assigned the numbers ( $w$  – from the word „weight“)  $w_i$ ,  $0 < w_i < 1$ ,  $i = 1, 2, \dots, N$ , the total sum of which must equal one. Quite often, a percent interpretation of these numbers is given, and then each of them is a number from an open interval of 0 to 100, and the sum must equal 100;
- 3) by comparing any arbitrary components, e.g.  $K_i$  and  $K_j$  one of the following conclusions can be reached:
  - $K_i$  is more important than  $K_j$ , which in short is written by indicating  $K_i$
  - $K_i$  is less important than  $K_j$ , which in short is written by indicating  $K_j$
  - both components are equally important, which is marked by the symbol (\*);
- 4) when comparing component  $K_i$  with itself,  $K_i$  should be indicated.

Using the above mentioned rules it is possible to determine the procedure adopted in determination of the numerical values of  $w_i$ , which are called *structural weights*.

The first step is a pairwise comparison of each two components,

where comparing  $K_i$  with  $K_i$  determines the outcome of a comparison between  $K_j$  and  $K_i$ , thus making this comparison unnecessary.

The second step is compilation of the obtained results in a table, while the third step consists in counting for each component how many times it has been indicated as being more important than its counterpart, calculating in this way the frequency of prevalence.

In the fourth step it is assumed that the frequency of prevalence equal 1 will have assigned the weight  $x$ , the frequency of prevalence equal 2 will have assigned the weight  $2x$ , etc. In the fifth step, allowing for the fact that, when summed up, the partial weights must equal 1, an equation with an unknown  $x$  is derived, and after finding its solution the structural weights are calculated for each and every component multiplying the value  $x$  by the frequency of prevalence of a given component.

The evaluation of a component called *Marketing* enabled drawing the following conclusions:

- comparing *Marketing* with *Marketing* means indicating *A*;
- comparing the weight of *Marketing* and *Personnel* in shaping the Foundry position, *Marketing* is indicated as being definitely more important;
- comparing the weight of *Marketing* and *Production* in shaping the Foundry position, *Production* gains as being more important;
- comparing the weight of *Marketing* and *Management* in shaping the Foundry position, *Marketing* is again considered to be more important.

Full presentation of the comparisons and indicated frequencies of prevalence is given in Table 2.

Table 2.

Calculated frequencies of prevalence for the examined Foundry areas

	MARKETING	PERSONNEL	PRODUCTION	MANAGEMENT
MARKETING	MARKETING	MARKETING	PRODUCTION	MARKETING
PERSONNEL	-	PERSONNEL	PRODUCTION	MANAGEMENT
PRODUCTION	-	-	PRODUCTION	*
MANAGEMENT	-	-	-	MANAGEMENT

Assuming now that partial weights will sum up to give a total of 1, the following equation can be derived:

$$3x + x + 3x + 2x = 1 \text{ which gives: } x = 0,111.$$

Multiplying the individual frequencies of prevalence by the calculated value  $x$  the weights given in Table 3 are obtained.

Table 3.

Calculated weights for the examined Foundry areas

Obszar	Frequency of prevalence	Symbol	$x = 0,111$
MARKETING	3	$w_{ma}$	0,333
PERSONNEL	1	$w_{pe}$	0,111
PRODUCTION	3	$w_{pr}$	0,333
MANAGEMENT	2	$w_{za}$	0,223

And so, for example, the weight for *marketing* is  $w_{ma} = 0,333$ , which can be interpreted as a weight of 33,3%, etc. Hence it follows that in shaping the Foundry position the most important is *marketing* and *production*, second is *management*, and the least important is *personnel*.

Knowing the structural weights  $w_i$ , and the activity levels  $v_i$

determined previously, for each and every component one can calculate its weight in the evaluation of Foundry position. This will be:  $a_0 = w_i \cdot v_i$  and hence the global evaluation will be:

$$a_0 = \sum_{i=1}^N a_i = \sum_{i=1}^N w_i \cdot v_i$$

For the evaluated Foundry, having allowed for the value of  $v_i$ , we shall obtain:

$$a_0 = 0,333 \cdot 4 + 0,111 \cdot 5 + 0,333 \cdot 5 + 0,223 \cdot 5 = 4,667.$$

The global scoring is equal to 4,667, which can be interpreted as close to "very good".

The assessment can be made more precise when it is taken into consideration that each of the selected components is representing an area of the activity which by its nature is a complex object, and as such can be represented in the model by a vector of low-level components. By introducing the components according to a list quoted at the beginning of this study, one can create an extended model of the foundry.

Both weights and scorings defined in the procedure used for an assessment of the Foundry are presented in Table 4.

Table 4.

Scores calculated for the components and second-level weights used in an assessment of the examined Foundry

Characteristic of the area	Components of the characteristic	Evaluation of component	Weight of component
MARKETING	Products	4	0,25
	Distribution channels	4	0,25
	Sales organisation	5	0,30
	Cost concentration	4	0,20
PERSONNEL	Skills and qualifications of managers	4	0,30
	Organisational rate	5	0,25
	Effectiveness of incentives	5	0,25
	Personnel fluctuations	4	0,20
PRODUCTION	Availability of raw materials	4	0,40
	Technical level of production	5	0,40
	Effectiveness of production capacities	4	0,20
MANAGEMENT	Management performance	5	0,50
	Foundry structure	5	0,30
	Organisational culture	5	0,20

Using the data from Table 4 and the relationships derived above, one can perform the following calculations:

$$v_{ma} = 0,25 \cdot 4 + 0,25 \cdot 4 + 0,30 \cdot 5 + 0,20 \cdot 4 = 4,3$$

$$v_{pe} = 0,30 \cdot 4 + 0,25 \cdot 5 + 0,25 \cdot 5 + 0,20 \cdot 4 = 4,5$$

$$v_{pr} = 0,40 \cdot 4 + 0,40 \cdot 5 + 0,20 \cdot 4 = 4,4$$

$$v_{za} = 0,50 \cdot 5 + 0,30 \cdot 5 + 0,20 \cdot 5 = 5$$

Knowing the structural weights for the individual characteristics calculated, it is now possible to find a numerical value that will indicate Foundry position on the scale of scorings, analogical to that made for the components:

$$a_0 = 0,333 \cdot 4,3 + 0,111 \cdot 4,5 + 0,333 \cdot 4,4 + 0,223 \cdot 5 = 4,512.$$

The obtained result is close to „very good”, which means that the Foundry has a very strong position.

## 4. Comparative assessment of Foundry position

Most of the assessments done for the internal foundry use are prepared under the *pressure to overestimate the results*, and for this reason it is advisable to carry out a *comparative analysis* next in which the same mode of reasoning will be used for assessment of another Foundry, called Reference Foundry. Sometimes it is even recommended to create an imaginary model of a foundry with achievable activity levels and use it next as a reference standard against which all changes can be traced. Two foundries may be also used in a comparison. In this case, one foundry will be a *Reference Standard to follow*, while the second one will be a *Direct Opponent (Competitor)*. Then the following symbols will be adopted: X – Evaluated Foundry; Y – Reference Foundry; Z – Competitive Foundry.

In principle, using three Foundries in a comparison may mean repeating the calculation of scoring for each of them separately. In the entire procedure, some changes are introduced only to the assessment of individual components at the lowest level subject to control. Considering the Reference Foundry to be better in some areas of activity than our own Foundry, we shall not assign to our Foundry the scoring higher than that which the Reference Foundry has got. This confrontation of the assigned scorings is a very useful element making the whole procedure much more objective, which obviously must affect the final result. If more precise statement about the relations between Foundries X, Y and Z is required, we have to use the procedure in which scorings for each component at the lowest level will be obtained from a pairwise comparison of Foundries under consideration and not from individual procedures. A properly modified AHP method can be used for this purpose. The modification will consist in this that the rules of making comparison and assigning respective numbers from the measuring scale will be used only at the lowest level of hierarchy. The examined objects, i.e. Foundries X, Y, Z, will be evaluated by a pairwise comparison using Saaty's scale with reference to all components in the examined areas.

To better describe the AHP fundamentals it is necessary to examine a fragment of the hierarchy structure, involving the main (parent) problem and its direct evolution in sub-problems. An evolution of this type is schematically represented in Figure 3.

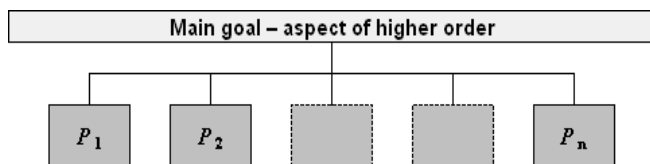


Fig.3. Schematic representation of a hierarchic structure where:  $P_i$  – compared characteristics of the main goal [2]

Saaty's procedure can be performed in a version modified by K. Weber [3], according to which the weights of characteristics are determined on one level with reference to one parent goal. In the first step all attributes comprised in one group are pairwise compared, to determine next the coefficients  $p_{ij} = w_i w_j$ . Having determined for one pair  $P_i$  and  $P_j$  the coefficient  $p_{ij}$ , as  $p_{ji}$  a reciprocal of  $p_{ij}$  is accepted, and hence  $p_{ij} = 1/p_{ji}$ .

In the second step the results are arranged in a table representing matrix  $P$ , while in the third step in each column of matrix  $P$  the coefficients  $p_{ij}$  are summed up. And so we have:  $k_j = \sum_{i=1}^n p_{ij}$

In the fourth step each and every coefficient from column  $j$  is normalised dividing it by  $k_j$  and the new normalised coefficients  $b_{ij} = p_{ij}/k_j$  are obtained, while in the fifth step the normalised coefficients  $b_{ij}$  are summed up in each line and a vector of partial sums  $s_i = \sum_{j=1}^n b_{ij}$  is calculated.

The sixth step is normalising of components in vector  $s$ , obtained by dividing each of the components by  $n$ . As an outcome of this operation we obtain the weights  $w_i = s_i/n$ ; in the last step the consistency of these weights is analysed.

In a comparative assessment described below one can refer to the, determined previously, structural weights (Table 3) and weights of the individual components (Table 4). The idea of making comparisons is as follows. We start with component  $P_i$ , that is, with *Products*. With reference to this component we are successively comparing X and Y, then X and Z, and finally Y and Z. Proceeding in this way, partial evaluations are obtained, which are next used for an assessment of each Foundry with reference to a given component. The same procedure is successively repeated for all areas of the Foundry activity, i.e. *marketing, personnel, production and management*, and for their respective components. The results of comparisons are written down in a table, in which the lines and columns are corresponding to the objects being compared. The information that the component belongs to a *marketing – products* area is given in the upper left corner of the table.

### Evaluation with reference to component from the *marketing – products* area.

Comparison of Foundry X with Foundry Y with reference to *products* component: First it has been decided that Foundry Y gains in respect of Foundry X. In the second step the degree of the supremacy of Foundry Y over Foundry X was established. The subjectively determined degree of supremacy means calculating the value of coefficient  $P_{ij}$  present in the equation. Our opinion is expressed using Saaty's scale. The outcome of the statements and the corresponding evaluations of the degree of supremacy are given in Table 5.

Table 5. Saaty's scale [2]

Supremacy	Degree of supremacy
None	1
Weak	3
Strong	5
Very strong	7
Absolute	9

As a consequence of stating that the degree of supremacy of Foundry Y over Foundry X is 5, it is assumed (in accordance with the rules of AHP) that the degree of supremacy that X has over Y will be determined as a reciprocal, and hence  $1/5$ , that is  $0,2$ . The result is put in the table in a line corresponding to X and in the column corresponding to Y. Comparing Foundry X with X (that is

with itself) and Y with Y (that is with itself) no supremacy is indicated, which is recorded in the table by putting on the main diagonal the number equal to one.

Comparison of Foundry X with Z with reference to *products* component: First it has been decided that Foundry X gains in respect of Z. It has also been decided that the supremacy is „weak”. In the line corresponding to Foundry X and in the column corresponding to Foundry Z the score 3 according to Table 5 was inserted. Next, in the line corresponding to Foundry Z and in the column corresponding to Foundry X the value 1/3, and hence 0,333, was inserted. As a next step, on the main diagonal, the number equal to one was put.

In a similar way the comparison was made for Foundry Y and Foundry Z with reference to *products* component: Table 5 gives all partial results of comparisons made for the Foundries with reference to *products* component along with the respective normalised evaluations.

Table 6.

Partial evaluations with reference to component from the *marketing – products* area including normalised evaluations.

Area MARKETING	Primary evaluations			Normalised evaluations			Sum of evaluations	Final evaluation
	X	Y	Z	X	Y	Z		
Foundry X	1	0,200	3	0,158	0,151	0,250	0,559	<b>0,186</b>
Foundry Y	5	1	8	0,789	0,755	0,667	2,211	<b>0,737</b>
Foundry Z	0,333	0,125	1	0,053	0,094	0,083	0,230	<b>0,077</b>
<b>Sum</b>	<b>6,333</b>	<b>1,325</b>	<b>12,000</b>	<b>1,000</b>	<b>1,000</b>	<b>1,000</b>	<b>3,000</b>	<b>1,000</b>

After summing up (in the lines) the results taken from the table comprising normalised evaluations, a total evaluation is obtained for the examined foundry with reference to the examined component. To ensure a consistency of results throughout the whole procedure, the obtained results were also subjected to normalising. They indicate the evaluation of each of the foundries with reference to the examined component. The higher is the scoring, the higher should be the position of the examined object on the scale. The evaluations are next compared with reference to all the examined components, and the outcome forms a basis on which the position of a selected foundry is assessed (Table 7).

Table 7.

The results of calculations to establish the position of Foundry X

Area	Component	$v_x$	Sub-weights	Structural weights	Evaluation of position X
MARKETING	Products	<b>0,186</b>	<b>0,250</b>	<b>0,333</b>	<b>0,016</b>
MARKETING	Distribution channels	<b>0,244</b>	<b>0,250</b>	<b>0,333</b>	<b>0,020</b>
MARKETING	Sales organisation	<b>0,352</b>	<b>0,300</b>	<b>0,333</b>	<b>0,035</b>
MARKETING	Client concentration	<b>0,376</b>	<b>0,200</b>	<b>0,333</b>	<b>0,025</b>
PERSONNEL	Skills and qualifications of managers	<b>0,260</b>	<b>0,300</b>	<b>0,111</b>	<b>0,009</b>
PERSONNEL	Organisational climate	<b>0,297</b>	<b>0,250</b>	<b>0,111</b>	<b>0,008</b>
PERSONNEL	Effectiveness of incentives	<b>0,522</b>	<b>0,250</b>	<b>0,111</b>	<b>0,014</b>
PERSONNEL	Personnel fluctuations	<b>0,596</b>	<b>0,200</b>	<b>0,111</b>	<b>0,013</b>
PRODUCTION	Availability of raw materials	<b>0,302</b>	<b>0,400</b>	<b>0,333</b>	<b>0,040</b>
PRODUCTION	Technical level of production	<b>0,314</b>	<b>0,400</b>	<b>0,333</b>	<b>0,042</b>
PRODUCTION	Effectiveness of production capacities	<b>0,272</b>	<b>0,200</b>	<b>0,333</b>	<b>0,018</b>
MANAGEMENT	Management performance	<b>0,532</b>	<b>0,500</b>	<b>0,223</b>	<b>0,059</b>
MANAGEMENT	Foundry structure	<b>0,589</b>	<b>0,300</b>	<b>0,223</b>	<b>0,039</b>
MANAGEMENT	Organisational culture	<b>0,239</b>	<b>0,200</b>	<b>0,223</b>	<b>0,011</b>
<b>Sum</b>					<b>0,350</b>

As indicated by the results of calculations, the evaluation of Foundry X yields a value of 0,350; the evaluation of Reference Foundry Y is equal to 0,454, while the value calculated for a comparable competitor/opponent Z is 0,196. Hence it may be concluded that there is not much difference between the Evaluated Foundry (X) and Reference Foundry (Y), while compared pairwise with the Competitive Foundry (Z), the Evaluated Foundry (X) definitely gains in supremacy.

## 5. Summary and conclusions

When the position of an enterprise is assessed for the first time, there is an imminent risk of introducing too many subjective opinions and statements which may raise numerous doubts. Obviously, there is always the possibility to repeat the whole analysis and introduce the corrected evaluations, considered more objective, but it is certainly much more valuable to repeat the analysis periodically according to a worked out scheme. The results of the studies have proved that what really matters is the possibility to trace changes in the obtained results. Checking constantly the Foundry position can be a valuable guideline showing if the modifications or innovations introduced to our Foundry are capable of improving its position.

It is certainly worth noting that the sum of the results obtained with reference to the evaluated component taken from a selected area of the Foundry activity equals 1, which means that it can be interpreted as a percent share of weights that a given object has in the overall assessment. No such interpretation is, however, recommended, remembering that quite different motivation has been lying behind the evaluations made during comparisons. Since they are based on comparisons of the type: „how many times an object is more important than its counterpart”, the obtained results should be interpreted as coefficients determining a ratio between the evaluations done on specific objects. Therefore it should be assumed that the results may be interpreted as measurements taken on a quotient scale. To ensure that the above evaluations of Foundry position done by the AHP method gain in significance, our own statements should be re-analysed carefully, checking if in the case when they are not sufficiently impartial, a change introduced to any of them will result in the need to introduce some major corrections to the results of final evaluations.

## References

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