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POSSIBILITIES OF UTILIZING THE METHOD OF ANALYTICAL HIERARCHY PROCESS WITHIN THE STRATEGY OF CORPORATE SOCIAL BUSINESS

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Abstract

The paper deals with the analysis of the theory of corporate social responsibility, risk management and the exact method of analytic hierarchic process that is used in the decision-making processes. The Chapters 2 and 3 focus on presentation of the experience with the application of the method in formulating the stakeholders´ strategic goals within the Corporate Social Responsibility (CSR) and simultaneously its utilization in minimizing the environmental risks. The major benefit of this paper is the application of Analytical Hierarchy Process (AHP).

Key words

corporate social responsibility, risk management, method of analytic hierarchic process

Introduction

Every day, each of us has to decide among lots of choices of our actions. Of course, we have some criteria connected to the solution that impact our action. The solutions can be both objective and subjective. Analytical Hierarchy Process (AHP) is a simple tool developed to solve various issues and to objectify the solutions to social problems. In this paper, we want to show how to use AHP method and how it works in practice.

CSR and AHP

Corporate social responsibility (CSR)

There are many definitions of corporate social responsibility (CSR) in references but we

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can mention the one according to the EU where the CSR is: "A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis."

Socially responsible business includes all the activities that are beyond the legitimate requirements of maximum and beyond the activities that help companies to understand and satisfy the stakeholders´ expectations. **Definitions of CSR are based on general ethical principles like neutrality, engagement, active cooperation with stakeholders, transparency, and they are usually characterized by the common features:**

- ***they are universal,***
- ***they emphasize voluntary approach,***
- ***they are based on active cooperation with its stakeholders,***
- ***they are committed to contributing to the development of quality of life,***
- ***they are focused on development, not only growth,***
- ***they mention three crucial and specific areas of*** *a society, based on a triple-bottom-line while focusing on the economic growth, and social and environmental consequences.*

The questions concerned with corporate transparency and building good relationship with stakeholders that have an impact on economic activity of the company (investors, owners, customers, suppliers, business partners, etc.) represent the **economic pillar** of CSR.

Social pillar of CSR can be divided into internal and external areas. Internal area concern social policy and external business area focuses mainly on philanthropy, altruism and cooperation with local community.

In **environmental pillar** of CSR, companies focus on reducing the negative impact of their activities on the environment.

Analytical hierarchy process

The AHP method characterization

Analytical hierarchy process is a structured technique to manage complex decisions. It provides a comprehensive and coherent approach to structuring the problem, quantifying its elements related to the overall objectives and evaluating alternative solutions. AHP is used in various fields. It is used worldwide in the fields such as government, commerce, industry, health and education. It has been used in many decisions in the field of economy, energy management, environmental, transport, agriculture, industry and the military ones [2].

Structure of AHP method

AHP method as a flexible model for decision making, clarifying the issues which have several possible solutions. AHP is performed by expert method and then by performed mathematical one, which divides the main problem into smaller and more detailed elements.

Decision by AHP method can be divided into three different levels [2]:

1. hierarchy,
2. priorities,
3. consistency.

Explanation of the AHP hierarchy

Designing a structured AHP hierarchy means developing a system consisting of a goal of decisison making process, a group of experts and their criteria and other alternatives, arranged like a tree [2].

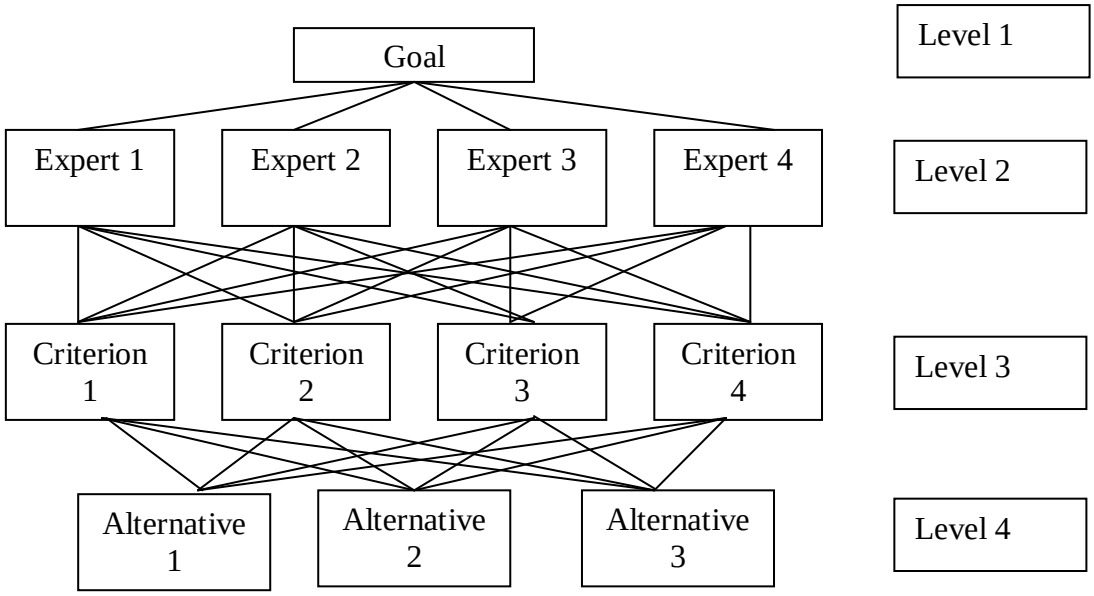

Fig. 1 *AHP method structure*

Priorities

After sorting their own set of criteria and the establishment of a hierarchical structure at all levels of assessment, various alternatives or criteria that affect the assessment through verbal explanations and figures are compared. The result is given by the weight in proportion to the scale of alternatives and criterions [2].

Weight allocation

The correct and responsible determination of the individual sub-scales of assessment criteria is one of the key tasks in solving multicriterial problems. It is therefore necessary to know the solved issue well and know the importance and impact of the criteria used to evaluate the result achieved [2].

AHP in stakeholders´ strategic goals formulation

The aforementioned AHP method is designed to deal with such decision-making situations that are repeated and where the relationships between elements are expressed quantitatively. This method, inter alia, can be used in formulating the stakeholders´ strategic goals in CSR, too.

In dealing with this method, we used Expert Choice software program, the output of which is a wide range of materials for an explicit reasoning of the best alternatives

choice. Expert Choice is a software tool that supports decision making in the selection of the alternative that is characterized by hierarchical layout of criteria and priorities for selection.

Corporate stakeholders represent the decision making subject. Decision making about the stakeholders´ strategic goals is one of the most serious issues company solves within the strategic planning.

The following goals were selected in the decision making process from various goals:

- ***carrying out ergonomic audit in the manufacturing process,***
- ***implementing an eco-effective project,***
- ***doing nothing.***

We carried out the decision making process in a company where it was necessary to determine which of the proposed CSR goals would be the most useful for the stakeholders. A group of experts involved shareholders, managers and employees (internal stakeholders). Three criteria were assigned to each expert, which have an impact on decision making in selecting the best alternative.

The goal was to find a strategic goal within the CSR generally acceptable for stakeholders. We proceeded as follows: first, we set the main objective solution (to find a generally acceptable strategic goal), then, we set various strategic goals and designed the hierarchic structure (see Fig. 2; 4 levels – the goal, the experts, criteria and alternative). We identified the importance of experts and their criteria by the pairwise comparison, after that, we decided about the alternative importance according to rated criteria by the pairwise comparison, too.

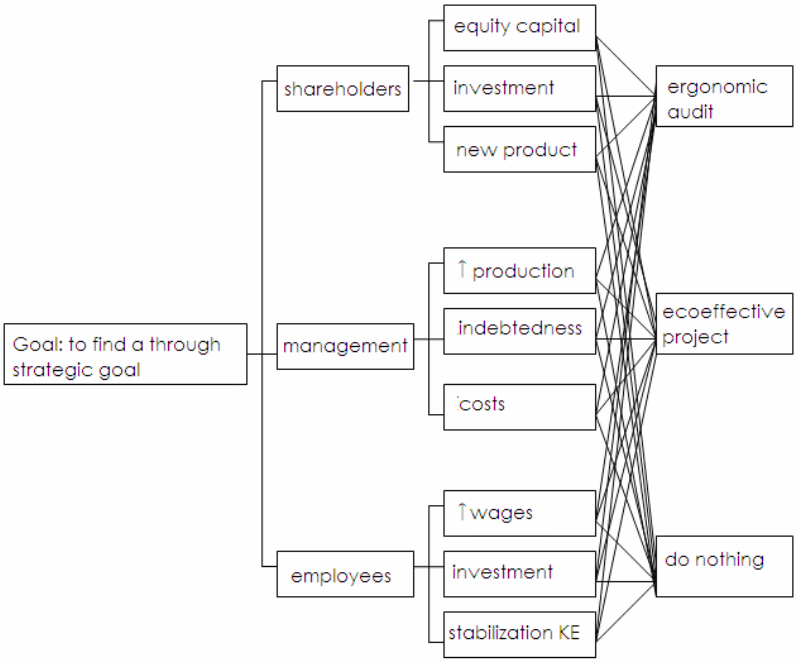

Fig. 2 *Hierarchical structure of decision-making process*

After designing a hierarchical structure, we continued in the decision making process and its most important part of the paired comparisons. First, using an analytical form, we found out the experts importance in finding a strategic goal. According to the matrix that was compiled (Table 1) on base of the form, it can determined that shareholders are four times

more important than the managers and employees and managers that are twice as more important than employees. Expert Choice software assessed that the most important role in decision making is that of the shareholders (more than 66 %), followed by management (nearly 21 %) and employees (represented by 13 %).

MATRIX OF PAIRWISE EXPERT COMPARISON Table 1

	shareholders	**management**	**employees**
shareholders	**1**	**4**	**4**
management	**¼**	**1**	**2**
employees	**¼**	**1/2**	**1**

We continued with the criterion of evaluation (by alternatives) in the same way as mentioned above. It was necessary to draw three matrixes.

The result was as follows:

- ***Shareholders*** *- the most important criterion for them seems to be the equity capital with 66%, followed by investments with more than 18% and finally the implementation of a new product with almost 16% importance.*
- ***Management*** *- essential for them is to ensure the growth of labour productivity with 55%, followed by the cost of claims with 24% and the remaining 21% is company's indebtedness.*
- ***Employees*** *–they prefer the wage increase with 61%, then follows investment into the working environment with nearly 27% and only 12% belongs to the key personnel stabilization.*

Finally, it was necessary to evaluate the alternatives according to individual criteria and subsequently nine matrixes (regarding nine criteria) in the size 3x3 were compiled on the basis of the evaluated analytical forms. As there were too many matrixes, we decided to show at least one that shows a comparison of alternatives according to criteria of equity capital (Tab. 2). When evaluating alternatives, we counted with local and global weight of individual criteria too.

COMPARISON OF ALTERNATIVES ACCORDING TO THE CRITERION OF EQUITY CAPITAL Table 2

equity capital criterion	**ergon. audit**	**ecoeffective project**	**do nothing**
ergonomic audit	**1**	**4**	**2**
eco effective project	**1/4**	**1**	**1/5**
do nothing	**1/2**	**5**	**1**

The result of the decision making process was to determine the alternative with the highest priority. **Software Expert Choice determined the order according to the calculations follows:**

1. carrying out ergonomic audit in manufacturing process

2. ***doing nothing– do not realize any project with priority 29,4%***
3. ***implementating eco- effective project with 25.5 % priority***

The output of decision making process of looking for the stakeholders´ strategic goal within the CSR strategy was the implementation of ergonomic audit in the manufacturing process. The whole process of decision making was verified by mathematical calculation.

AHP in minimization of environmental risks

We verified the AHP method in the field of the environmental risk management in the company strongly orientated on the environmental protection and safety and occupational health. Afterwards we described the solving step by step as it was implemented.

In step 1, we had to define the goal or problem solution. This was in connection with the examination of environmental risk management defined as follows: "Minimization of environmental risks". The goal was based on the problem we identified in the company, i.e. the needs to minimize or eliminate the use of hydrazine substance. The substance is highly toxic, carcinogenic and it has toxic effect to aquatic organisms. Effective solution to the problem should therefore results in effective elimination of environmental risks and the risks associated with protection, safety, and occupational health of employees who are exposed to the effect of the substance.

In step 2, alternatives were designed. Although the proposal of alternatives was on the last level of the hierarchical structure of AHP, we made it in step 2. This step is a very important part of designing, since the alternatives have to be realistic and feasible in order to be used.

In this case, we used the following alternatives:

- ***A1- volume changes in purchasing and handling hydrazine,***
- ***A2- hydrazine replacement or technology change,***
- ***A3- to do nothing.***

The role of the suggested alternatives was to cover the full range of alternatives to solve this problem. We considered the keeping the substance in the company in the first alternative, but with some changes we tried to minimize or eliminate its potential risks. The second one is when we wanted to completely remove the substance from the company and the last option was designed to examine what would happen if we did nothing.

In step 3, we suggested the criteria that comprise restrictions for the alternatives limiting the outputs of problem solving or goal. There are criteria that were designed for our application in Tab. 4.

The calculations of standardized scale, tests of consistency and finding the optimal alternative or the most important criterion are in the next steps. This can be done both manually and by using the software tool for solving AHP method – Expert Choice 11.5. Because of the limited size of this article it is not possible to describe the whole process in detail (foe details, see NAŇO, T. *The Utilization of the AHP Method in Decision Making in Environmental Risk Management of SE, a.s. EBO.* In *SSC 51: 51th International Student´s Scientific Conference. 6th May 2010, Zvolen*. Zvolen: Technical University in Zvolen, 2010, ISBN 978-80-228-2053-0.

In step 4, we compared criterions by pairwise comparison (Tab. 3) of criteria using Saaty assessment matrix which compared all the criteria.

CRITERIONS PAIRWISE COMPARISON MATRIX Table 3

	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**
C1	1	1/3	3	1/7	3	1/4	1/7	1/9	1/8	1/2
C2	3	1	3	1/4	3	1/3	1/5	1/8	1/8	1/2
C3	1/3	1/3	1	1/3	2	1/3	1/5	1/9	1/8	1/4
C4	7	4	3	1	7	4	1/3	1/9	1/8	1/2
C5	1/3	1/3	1/2	1/7	1	1	1/7	1/9	1/8	1/6
C6	4	3	3	1/4	1	1	1/5	1/5	1/4	1/4
C7	7	5	5	3	7	5	1	1/2	1	2
C8	9	8	9	9	9	5	2	1	2	2
C9	8	8	8	8	8	4	1	1/2	1	2
C10	2	2	4	2	6	4	1/2	1/2	1/2	1

The result of the comparison was finding the order of the criterions importance. **The three most important criteria were as follows:**

1. ***ensuring protection and safety and occupational health,***
2. ***ensuring environmental safety solutions,***
3. ***reality and sustainability of solution.***

We compared the alternatives regarding each criterion in the final step 5. The goal of the comparison was to find optimal solution to the defined goal. The final assessment and optimal solution can be seen in Tab. 4.

Optimal alternative for the defined goal – to minimize environmental risks – is an alternative A2 - **hydrazine replacement or technology change** in Tab. 4.

ALTERNATIVE FINAL ASSESSMENT Table 4

Criterion	**Weight**	**Weight in %**	**A1**	**A2**	**A3**
Ensuring protection and safety and occupational health	0.270	27.05	0.03	**0.21**	0.03
Ensuring environmental safety solutions	0.204	20.39	0.051	**0.102**	0.051
Reality and sustainability of solution	0.166	16.57	0.1123	**0.032**	0.0217
Company standards compliance	0.103	10.25	0.054	**0.0146**	0.0344
Possibility of exemption from the law 261/2002 statute	0.089	8.9	0.0209	**0.0612**	0.0069
Possibility of measuring and regulation	0.051	5.07	0.0053	**0.0325**	0.0132
Economic effectiveness of solution	0.042	4.18	0.0089	**0.0056**	0.0275
Staff preparation in direct and indirect contact with hydrazine	0.033	3.27	0.0024	**0.0053**	0.0252
Time effectiveness of solution	0.023	2.33	0.0034	**0.0016**	0.0181
IT requests	0.020	1.99	0.0040	**0.0013**	0.0147
Total:	1	100%	**0.292**	**0.466**	**0.243**

Conclusion

When applying AHP method in the field of stakeholders´ strategic goals, the most suitable alternative goal oriented on the CSR was the implementation of ergonomic audit according to the estimates of company experts. According to the selected criteria, it was also found that doing nothing rank the second alternative, while eco effective project was considered the least suitable option. It should be noted that sequence of these alternatives was influenced by the established criteria of individual experts.

Furthermore, to minimize environmental risks, the best alternative was the application of replacement of substances and a change of technologies. The other alternative was the change of the volume of purchasing and handling the substance, and the option "doing nothing" ranged the last.

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