

HIERARCHIZATION AND PRIORITIZATION OF FACTORS INFLUENCING WELFARE AND LIVING CONDITIONS OF THE MUNICIPAL RESIDENTS

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Abstract

The main goal of the present study is to outline the optimal strategy of the municipal development with the use of the Analytic Hierarchy Process. Terminology associated with development strategy is summarized and legal framework of municipal authorities is outlined. Brief description of the municipal Grybów is provided. Using the AHP method, theoretical model reflecting the municipal development strategy is constructed. The chapter also briefly explains the key issues associated with the AHP method developed by Saaty. Numerical priorities for main criteria and subcriteria with respect to the main goal: improvement of welfare and living conditions of the municipal residents, are derived based on the interviews with the relevant experts. The key objectives to be fulfilled by local authorities, private organizations, citizens and economic entities should be as follows: entrepreneurship development and creating new jobs, health protection and social assistance, infrastructure development and improvement of educational system. Specific objectives are presented in form of 3 models of development strategy of the municipal. The highest priority weight (0.423) is in case of the model which suggests paying attention to the following elements of the municipal development strategy: organization of small and medium entrepreneurship, handicraft production, construction and handicraft services, technical infrastructure, increased level of education of young people through modernization of high school education. The main source of the municipal development is better use of human, material, environmental and cultural resources. The AHP method may successfully solve the problems not only in delineating the optimal development strategy of the municipal, but also many other economic, managerial, organizational and social ones.

1. INTRODUCTION

Decentralization of public activities in the late 90s resulted in transfer of responsibility for their realization onto self-governments (The Municipal Self-Government Act. The Official Law Journal 142, item 1591 of 8.03.1990 with amendments, version of

The Official Law Journal 214, item 1806 of 1.01.2003). The municipal self-governments have been obliged, in particular, to fulfill the needs of local communities. However, transfer of responsibilities is not always coupled with transfer of the finances for realization of tasks and investments.

It can be observed that over recent years (2001–2005), the investments of the municipal self-governments in Poland have decreased. It is perhaps the result of some negative events, including decrease of self-governments' income, reduced part in the national tax system, increase in participation of subsidies and donations, and limited amount of credits that can be incurred by a self-government. One has to remember that economic situation can only be improved by the investments, which create new jobs, and in turn provide new incomes to the budget.

It is important to be familiar with new possibilities of financing the investments, outside the sector of public finances, such as public-private partnership. Substantial funds can be gained from the EU credits. In any case, it is necessary to improve flow of incomes and expenditures. All activities of the municipal self-governments are referred to as 'public tasks', in the sense that they serve in fulfilling common needs of local communities, as well as at national level. Yet, the scopes of those activities may vary.

In a narrow sense, it is the fulfillment of the immediate, recurring and at the same time typical social needs, i.e. health care and education. The broader definition embraces the fulfillment of all needs, including those indirect ones, such as sustainability and development of cultural and environmental resources. Local self-government realizes public activities that guarantee certain living standards for local societies. It also undertakes regulatory operations, through i.e. administrative decision specifying the citizens' access to particular goods or their obligations (Niewiadomski, 2001).

The assigned tasks can be divided into different categories according to a variety of the criteria, i.e. normative acts, different types of planning, individual. The municipal self-governments usually have to fulfill two types of tasks: own and contracted. The self-government's optional tasks can be defined as those which are not mandatory; self-governments decide on whether or not they must be undertaken, while in case of mandatory tasks, self-governments are obliged to complete them.

To receive the financial support, it is necessary to prepare local development strategy (municipality, district and voivodship), which should be in line with the national development strategy and take into account the conditions of receiving the specific funds.

Regional development can be viewed as a product of all activities and undertakings, initiatives and innovations taking place within and outside a region. The development is driven by better use of human, material, cultural and environmental resources of the region. Regional development strategy should contribute to creation of new jobs, improvement of qualifications, promotion of entrepreneurship and inventiveness, attracting new capital and activation of the existing ones, as well as gaining external funds. Development strategy of a region must be multi-entity and will require involvement of and support from institutions, organizations and other entities participating in, or having the influence on economic processes in the region. Strategic plan enables the municipal self government making changes, improving and strengthening the position,

and above all, realization of the main objective of the development of local community, which is ensuring high quality of life for the residents.

Strategic planning is an important tool in municipal management, as it allows better information flow and higher effectiveness of decisions taken (Adamowicz, 2003).

Management in public administration units is based on the strategy adopted as a condition for their faultless functioning and development. Such strategies should be built based on the strengths of the region. The role of a municipality is to support the citizens by taking over realization of public activities that cannot be performed by an individual or a family. The municipality will always be the space of living for all citizens, regardless who is responsible for partial spaces. At the same time, the municipality will be associated with a given state of fulfillment of individual needs, and with the continuous process that should be constantly improved in order to meet new requirements of the residents, located usually at higher level (Adamus, 2002b).

2. RESEARCH OBJECTIVE, SUBJECT AND METHOD

The main objective of the present study is to identify needs and values of the municipal residents and to prioritize strategic factors of local development. On this basis, the optimal alternative will be selected from amongst several variants prepared for the municipal development. Such problems have already been considered using the AHP method, i.e. by Adamus & Vinohradnik (2001) and Adamus & Lalicka (2005). The research subject was either the whole country or malopolska region.

Our study focuses on the municipality of Grybów in malopolska region. The municipality of Grybów is situated in southeastern part of the region, in river Biała valley. Number of residents is 22.000, living in the area of 153 km². The municipal area is located in submontane climate zone, with average temperature of 7°C, and has large height differences: from 290 to 882 meters above the sea level. Economic activity in this municipality is conducted by 550 enterprises, and is based on trade, construction and repair services, transportation, carpentry and gastronomy. Agriculture is extensive due to low quality soils and hilly land forms which hinder the mechanization of agriculture. Instead, the agriculture in this area is small-scale, based on traditional forms, labor-intensive, with medium productivity and low production level. The average farm size in this region is 3 hectares.

Technical infrastructure in transportation, telecommunication, gas sector, water and waste management is considered to be of good quality. Social infrastructure in terms of cultural and leisure centres, health care, sport and education is estimated as of average quality in relation to the overall malopolska region.

For the purpose of selection of the best path of development for the municipality in question, the Analytic Hierarchy Process (AHP) will be used in this study (Saaty, 1980; Adamus & Szara, 2000).

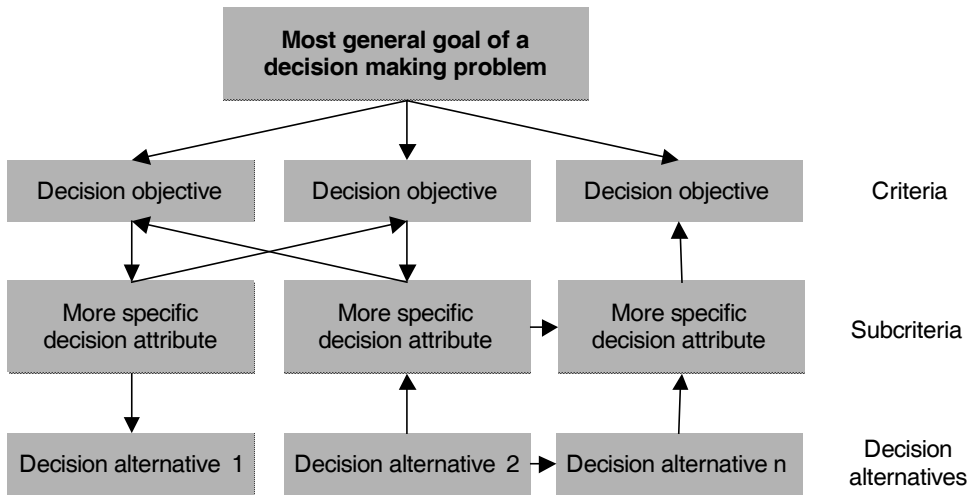


Figure 11.1: Standard form of Decision Making Schema in the Analytic Hierarchy Process: Hierarchy of “n” Levels (Saaty, 2003)

The AHP is one of mathematical methods applied to the problems requiring multi-criteria decision making. The method has been developed by T.L. Saaty, an american mathematician from the University of Pittsburgh, USA. The AHP is a general theory of measurement, linking various concepts from the areas such as mathematics, psychology and informatics. In this method, decision making hierarchy is constructed through decomposition of a complex decision problem into decision hierarchy, consisting of the following components: main goal, decision objectives, attributes and decision alternatives. The main goal is placed on top of the hierarchical structure, while decision alternatives form the lowest level (Figure 11.1).

Pairwise comparison is the process of comparing the relative importance, preference, or likelihood of two decision elements with respect to an element in the level above, in order to obtain priorities for the elements being compared. Decision makers make pairwise comparisons for each level of the hierarchy, using verbal or numerical scale by Saaty (Table 11.1), from equal to absolute dominance importance, preference or likelihood.

Table 11.1: The 9-point Scale for Pairwise Comparisons

Weight attributes for pairwise comparisons	
Numeric scale	Verbal scale
1	equal
3 (1/3)	weak dominance
5 (1/5)	strong dominance
7 (1/7)	demonstrated (very strong dominance)
9 (1/9)	absolute dominance
2, 4, 6, 8 (1/2, 1/4, 1/6, 1/8) 2	further subdivision or compromise is needed

It has been proven by psychologists that humans better communicate verbally than using numbers (Erev & Cohen, 1980; Budescu & Wallsten, 1995). Words are perceived as more flexible and less precise, hence they seem more convenient for ambiguous descriptions. In the AHP, priorities are expressed numerically, based on pairwise comparisons, followed by calculations of relative weights via normalization of eigenvector from pairwise comparisons matrix.

People tend to regard numerical assertions as more precise, serious and certain than verbal ones. Thus, it is recommended to quantify all verbal information before transferring it. Based on verbal comparisons, additive model is constructed in the quotient scale that describes a decision maker's preferences. This model is called priority function. Decision alternative with the highest priority function is considered the best and is recommended for further actions.

It has to be emphasized that final decisions are taken during the process of gradual reduction of the scope of autonomy of the participating actors – experts who make the decision.

The solution has been produced using the Expert Choice 2001 software (Saaty, 2001). The software supports decision making process by reducing uncertainty and limiting the need for speculations. In this software, hierarchical analysis of a problem is applied (Analytic Hierarchy Process), which produces logical connection between analytical and intuitive thinking of a decision maker, and allows browsing through all alternatives. The Expert Choice 2001 software also enables comparisons between measurable and non-measurable data. Such tool, allowing the existence of uncertainty, facilitates individuals and groups to multi-faced analysis of variants taking into account limitations and subjective preferences of the decision maker. One of the characteristics and strengths of the Expert Choice 2001 software (and of the AHP method) is that the main technique of gathering data from decision makers is based on determining the degree of mutual dominance between the variants and pairwise comparisons for each level of the hierarchy.

3. DETERMINING DEVELOPMENT STRATEGY OF THE MUNICIPALITY

In order to define and determine the development strategy of the municipality of Grybów, it is necessary to follow the specific schema that uses the AHP method.

The Analytic Hierarchy Process in selection of the best alternative of the development strategy of the municipality consists of the following steps:

- (1) Define a decision-making problem and present it in form of a hierarchical tree consisting of attributes (needs, objectives and values of the municipal residents), with respect to a general goal to be achieved.
- (2) Identification of the main goal, which describes the decision goal, that is: an improvement of welfare and living conditions of the municipal residents, realized by public administration units, private organizations, citizens and enter-

- prises, whose objective is to stimulate economic development and attractiveness of the municipality.
- (3) Building decision making tree in form of a hierarchical structure, representing the key elements of the problem (goal, criteria, subcriteria and alternatives, with all their mutual dependencies) (**Figure 11.2**).
 - (4) In order to reduce the level of ambiguity, defining each element of the hierarchy.
 - (5) Revealing opinions, reflecting knowledge and experience of the experts who build the development strategy of the municipality, concerning the most important needs of the municipal citizens.
 - (6) Making verbal pairwise comparisons of the elements at each level of the hierarchy with respect to an element in the level above, in other words, estimating the relative importance (dominance) of the related attributes of the improvement of welfare and living conditions of the municipal residents. Participating decision makers or experts made pairwise comparisons using verbal scale from equal to absolute dominance (**Table 11.1**). The pairwise comparisons were made for each level of the hierarchy, that is, each criterion was pairwise compared with respect to the goal, and each sub-criterion with respect to the corresponding criterion.
 - (7) Presenting verbal comparisons as numbers using the Saaty's 9-point scale for pairwise comparisons (**Table 11.1**). Value "1" indicates that both elements are of equal importance in realization of the goal, while "9" points to the absolute dominance of one element over another.
 - (8) Using the above numbers to calculate priority weights of the elements in the hierarchy with respect to their impact on the main goal and on the related criteria, through normalization of eigenvector (**Table 11.2**). The resulted priority structure represents the opinions of experts or decision makers on the relative importance of individual elements in decision hierarchy. A method of calculation of the priorities has been explained in a number of earlier works (i.e. Adamus, 2002; Saaty, 2001).
 - (9) Building a few different models of development strategies, which are our decision alternatives (Models A, B, C).
 - (10) Pairwise comparisons of the importance of decision alternatives (A, B, C) with respect to each element at the lowest level of the hierarchy.
 - (11) Evaluating decision alternatives (variants) based on the relative weights of decision elements.
 - (12) Synthesis of the final results – selection of the optimal development strategy of the municipality. From amongst the set of three alternatives (A, B, C), we select the one which has the highest global priority, indicating that it contributes the most to realization of the main goal, which is the improvement of welfare and living conditions of the municipal residents.
 - (13) Sensitivity analysis of the outcome of the decision (importance ranking of models A, B, C) to changes in the priorities of the major elements of the decision problem. More specifically, examining the changes of the priorities and the ranking of the alternatives through increasing or decreasing the weight of individual elements in the hierarchy.

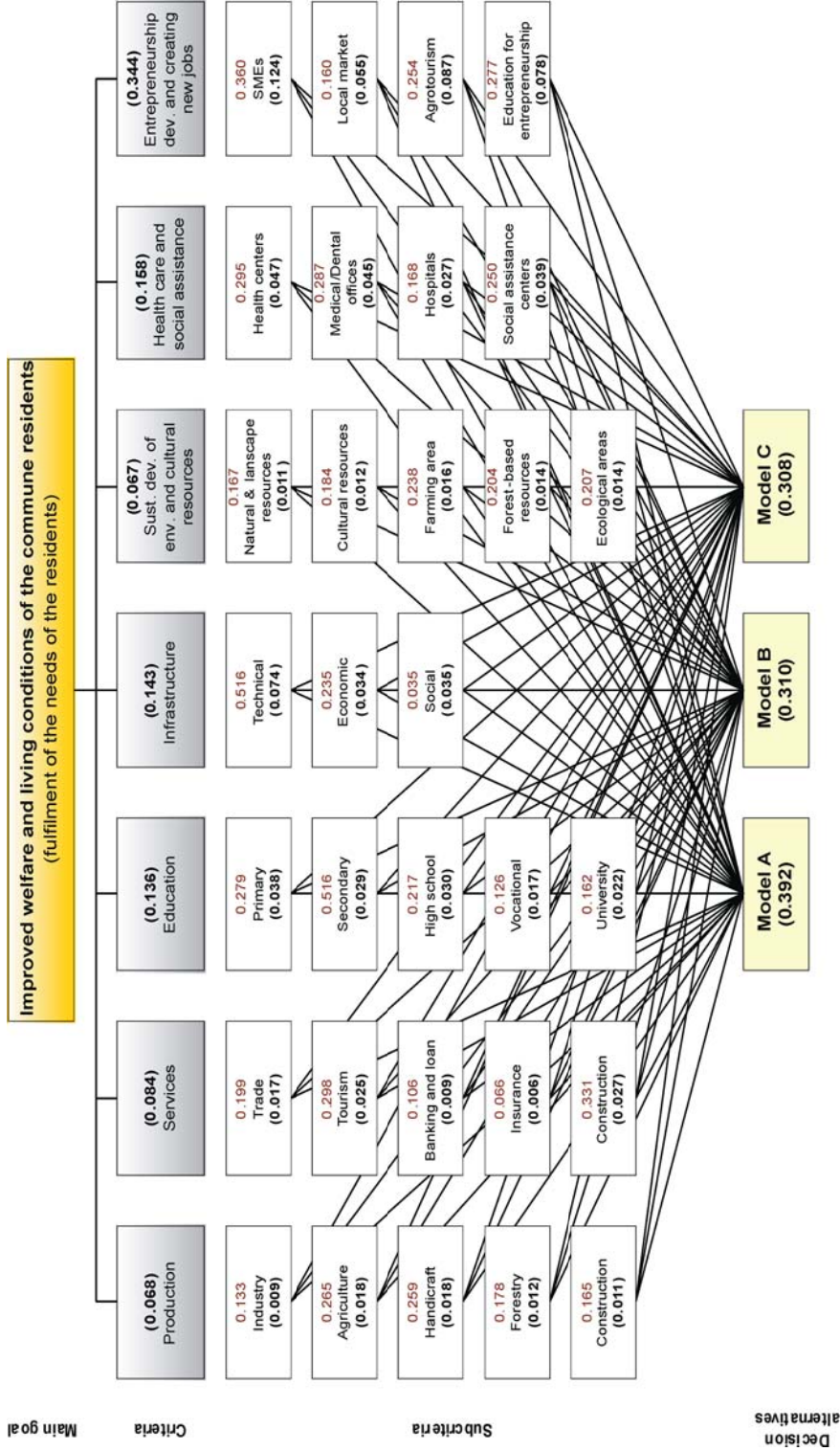


Figure 11.2: Hierarchical Structure of the Optimal Realization of Needs of the Municipality of Grybów Residents (Improvement of Welfare and Living Conditions of the Municipal Residents)

In order to collect the data, face-to-face interviews were conducted with 20 experts, using a specially constructed questionnaire. The respondents consisted of the local public administration workers of the municipal self-government in Grybów (i.e. councilors, chairs of the council) and local community representatives. The presented priority scores are based on the aggregation of individual judgments using the arithmetic mean. Consistency ratio (CR) was checked for each respondent and with respect to each judgment. Since it was in each case lower than 10%, all responses were included into the analysis. All calculations were performed using the *Expert Choice 2001* software.

Table 11.2: Local and Global Priorities for Main Criteria and Subcriteria

Main criteria	Priorities	Subcriteria	Local priority	Global priority
Production	0.068	industry	0.133	0.009
		agriculture	0.265	0.018
		craft	0.259	0.018
		forestry	0.178	0.012
		construction	0.165	0.011
Services	0.084	trade services	0.199	0.017
		tourism (hotels, gastronomy)	0.298	0.025
		banking and loan services	0.106	0.009
		insurance services	0.066	0.006
		construction and craft services	0.331	0.027
Education	0.136	primary education	0.279	0.038
		high school education	0.217	0.030
		university education	0.162	0.022
		secondary (gymnasium)	0.216	0.029
		vocational education	0.126	0.017
Infrastructure	0.143	technical infrastructure	0.516	0.074
		economic infrastructure	0.235	0.034
		social infrastructure	0.249	0.036
Sustainable development of environmental and cultural resources	0.067	protection and development of natural and landscape resources	0.167	0.011
		protection and development of cultural resources	0.184	0.012
		protection and development of farming area	0.238	0.016
		protection and development of forest-based production resources	0.204	0.014
		protection and development of ecological areas	0.207	0.014
Health care and social assistance	0.168	health centers	0.295	0.047
		medical/dental offices	0.287	0.045
		hospitals	0.168	0.027
		social assistance centers	0.250	0.039
Entrepreneurship development and creating new jobs	0.344	organization of small and medium entrepreneurship	0.360	0.124
		development and organization of the local market	0.160	0.056
		organization of agrotourism	0.254	0.087
		education for entrepreneurship	0.227	0.078
Total				1.000

Local priorities result directly from pairwise comparisons of the subcriteria with respect to the criteria, while global priorities are calculated as multiplication of priorities for the criteria by the priorities of the subcriteria. The weights of global priorities indicate the impact of a given subcriterion on the main goal, that is, the improvement of welfare and living conditions of the municipal residents.

Priorities presented in **Table 11.2** and in **Figure 11.2** indicate the degree of fulfillment of needs of the municipality of Grybów residents with respect to the main goal. Entrepreneurship development and creating new jobs received the highest priority weight (0.344). It is reasonable, since the worsening economic situation after 1989 led to the unemployment with a relatively high growth rate, especially during the first years of economic transformation. It has created and still does many problems, since those who are unemployed, especially at the beginning, tend to look for the support from the social assistance. It is reflected in the second important criterion (0.158): Health care and social assistance. The criteria *Sustainable development of environmental and cultural resources* (0.067), *Production* (0.068) and *Services* (0.084) received relatively low weight scores. The latter two criteria are reflected in the above mentioned criterion *Entrepreneurship development and creating new jobs* (0.344).

Local priorities calculated for the subcriteria (**Table 11.2** and **Figure 11.2**) indicate the degree of fulfillment of needs and/or values of the municipality of Grybów residents within the respective criteria. For instance, under the criterion Production, the respondents believed that subcriteria such as Agriculture and Handicraft are best fulfilling the needs of residents, as they received the highest weights in this category (0.265 and 0.259, respectively). In the currently occurring economic transformation, the results of the past industrialization policy of the southwestern regions are mainly reflected in liquidation of state-owned enterprises and reducing the excessive workforce. Despite the extensive farming system in this region, people dismissed from industry undertakes work in agriculture.

The next step is to calculate global priorities for each subcriterion (**Table 11.2** and **Figure 11.2**). Global priorities indicate the fulfillment of needs by a given subcriterion with respect to the main goal, which is to improve welfare and living conditions of the municipal residents. In this case, *Organization of small and medium entrepreneurship* appeared to be the most pertinent (priority weight of 0.124), while *Protection and development of farming area was considered irrelevant*, as reflected by the lowest priority (0.06).

In order to select the best development strategy for the municipality of Grybów, three alternative solutions were built based on the needs of local society. Their construction was based on the Pareto's principle 20/80 which states that, for many events, 80% of the effects come from 20% of the causes. In this case, focusing on 20% of the most important needs will fulfill the needs at the level of 80%. Three models of development strategy of the municipality are presented subsequently.

Models of Development Strategy of the Municipality – Strategic objectives

A MODEL:

- Development of handicraft production;
- Creating conditions for development of construction and handicraft services;

- Increased level of education of young people through modernization of high school education;
- Development of technical infrastructure (roads, water and waste management);
- Protection and development of ecological areas;
- Entrepreneurship development and creating new jobs through organization of small and medium entrepreneurship;
- Improvement of public health and social assistance, especially for the unemployed.

B MODEL:

- Development of forestry;
- Creating condition for development of tourism and agrotourism;
- Development of economic infrastructure (economic administration, purchase, supply);
- Protection and development of cultural resources;
- Improvement of public health through creation of new Medical/Dental offices;
- Increased level of education through promotion of university education.

C MODEL:

- Development of agricultural production;
- Creating conditions for tourism;
- Increased level of education through development of vocational education;
- Development of social infrastructure (education, culture, local public administration, social organization, political organization, sport, safety of the residents, religious infrastructure);
- Protection and development of natural and landscape resources;
- Improvement of public health through modernization of local health centres;
- Entrepreneurship development through education for entrepreneurship.

The results of pairwise comparisons of the development strategies for the municipality of Grybów (Models A, B, C), with respect to all subcriteria, are presented in **Table 11.3**.

Table 11.3: Results of Pairwise Comparisons of Models A, B, C with Respect to All Subcriteria

No	Subcriteria determining improvement of welfare and living conditions of the municipal residents	Model		
		A	B	C
1	industry	0.006	0.002	0.001
2	handicraft	0.013	0.003	0.002
3	agriculture	0.001	0.004	0.013
4	forestry	0.001	0.009	0.002
5	construction	0.008	0.002	0.001
Total	(1 + 2 + 3 + 4 + 5)	0.029	0.020	0.019
6	trade services	0.009	0.004	0.004
7	tourism	0.002	0.018	0.005
8	banking and loan services	0.004	0.002	0.003

9	insurance services	0.001	0.001	0.004
10	construction and craft services	0.019	0.003	0.005
Total	(6 + 7 + 8 + 9 + 10)	0.035	0.028	0.021
11	primary education	0.016	0.010	0.012
12	secondary education (gymnasium)	0.015	0.008	0.006
13	high school education	0.022	0.004	0.004
14	vocational education	0.003	0.001	0.012
15	university education	0.002	0.018	0.002
Total	(11 + 12 + 13 + 14 + 15)	0.058	0.041	0.036
16	technical infrastructure	0.058	0.011	0.005
17	economic infrastructure	0.004	0.026	0.004
18	social infrastructure	0.005	0.002	0.028
Total	(16 + 17 + 18)	0.067	0.039	0.037
19	protection and development of natural and landscape resources	0.001	0.002	0.008
20	protection and development of cultural resources	0.002	0.009	0.001
21	protection and development of farming area	0.007	0.006	0.003
22	protection and development of forest-based production resources	0.004	0.009	0.001
23	protection and development of ecological areas	0.010	0.002	0.002
Total	(19 + 20 + 21 + 22 + 23)	0.024	0.028	0.015
24	health centers	0.017	0.006	0.024
25	medical/dental offices	0.008	0.033	0.004
26	hospitals	0.021	0.003	0.003
27	social assistance centers	0.020	0.014	0.005
Total	(24 + 25 + 26 + 27)	0.066	0.056	0.036
28	organization of small and medium entrepreneurship	0.103	0.011	0.010
29	development and organization of the local market	0.030	0.010	0.015
30	organization of agrotourism	0.005	0.069	0.013
31	education for entrepreneurship	0.006	0.015	0.057
Total	(28 + 29 + 30 + 31)	0.144	0.105	0.095
Total	Priorities of the development strategy of the municipality of Grybów	0.423	0.317	0.259

Model A received the highest priority weight in terms of the improvement of welfare and living conditions of the municipal residents (0.423), a fact indicating its highest contribution to the realization of the community's needs. Model B was given lower priority (0.317), while Model C appeared to be the least appropriate strategy (0.259).

4. SUMMARY AND CONCLUSIONS

Development strategy of the municipality, which needs to be painfully developed, implemented and constantly modified dependent upon internal (dependent upon the municipal management decisions) and external (independent on the municipal management decisions) conditions, is decisive in achieving success.

The key of the successful development strategy is, through improvement of welfare and living conditions, creation of the uniqueness that allows local authorities, private organizations, entrepreneurs and local community distinguishing their municipality from the other, competitive municipalities.

Strategic planning is the process that requires determining the mission. It requires to know the position where we want to be (what we want to achieve), the position where we currently are, and the path of transition from the present to the desired situation, in view of the current conditions, both internal and external.

Regional development is a product of all activities, undertakings, initiatives and innovations taking place within and outside a region. The driving force behind the development is better use of human, material, cultural and environmental resources of the region.

Being supported by the AHP method, based on the opinions of experts from the municipality of Grybów, it can be asserted that in attempt to improve welfare and living conditions, local authorities, private organizations, entrepreneurs and local communities should focus on the following main objectives (criteria):

- Entrepreneurship development and creating new jobs (0.344);
- Health care and social assistance (0.158);
- Infrastructure development (0.143);
- Education (0.136).

Within these objectives (criteria), strategic (specific) objectives (subcriteria) were formulated, for which more specific implementation programs can be further built. Their achievement contributes to realization of the mission.

Specific objectives have been described as three models of development strategy (A, B, C). The highest priority in realization of the optimal fulfillment of the municipal needs, in terms of the improved welfare and living conditions, was achieved by Model A (0.423). Model B received lower value (0.317), while Model C the lowest one (0.259).

The strategy represented by Model A is expected to contribute to creation of new jobs, improving qualifications and competencies of workers through education, promoting entrepreneurship and initiatives, attracting new capitals and activation of the existing ones, as well as obtaining external funds. The presented development strategy of the municipality of Grybów will require involvement and support from institutions, organizations and other key actors participating or having a real influence on local economic situation in the municipality.

The following conclusions can be drawn from the above presented study:

- (1) The role of the municipal self government is to recognize needs and priorities of the municipal residents, and respond to them through taking on the realization of public activities, in order to improve welfare and living conditions.
- (2) Hierarchical structure of determinants of the improvement of welfare and living conditions constitutes an important information source in the municipal management.
- (3) In public administration management, each alternative should be expressed numerically – as a priority of the decision.
- (4) In attempt to achieve better welfare and living conditions, public authorities should focus on the key criteria and subcriteria in development strategy, as pointed out by the municipal residents.
- (5) The AHP method may be helpful not only in building the municipal development strategy, but also in solving many economic, managerial, social and organizational problems.

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