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# Contemporary decision-making of mid-size city in the Czech Republic using Multiple Criteria Decision-making

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**Abstract.** The strategic planning process has been implemented into the local governance environment in the Czech Republic during last two decades. But the strategic goals that are expressed in the strategic development documents on the local level are only the part of the issues that are to be fulfilled or solved by the local government. In the everyday practical governance there is always a list of projects that appear from the actual technological, technical, public or political demand. The contemporary decision-making process is based on the personal or collective political decision or on the actual technical demand. But there are also municipalities that are already implementing strategic planning and want to avoid unsystematic interventions and decision-making processes. They try to adopt some attitudes from the corporate sphere to make the decision-making process more open and clear. This paper deals with the methodology of the mid-size city and tries to discuss it and offer some improvements. The paper's other goals are to offer comparison of typical projects that could be found on the local level and to make a model of results provided by the different methodologies used for the decision-making process, specifically weighted sum average and analytic hierarchy process.

## 1. Introduction

City governance is a very complicated issue combining many different needs of entities across many fields. Local government is the closest to the public. In the central European environment inhabitants know their mayor and municipality employees usually in person. Therefore the responsibility for the outputs and outcomes of management and city development is much higher than on other levels of governance. This close interaction of the local stakeholders is a positive contribution to the local development but include some threats as well. The group of decision-makers faces new challenges; and the threat of the conceptual lock-in and not absorbing new ideas and impulses from society (Rydin, 2010), (Barry, 2001). To prevent this situation the main goals of the local society are expressed in the strategic development documents. These documents are created in the cooperation of four main groups of actors in

the city/region - local government plus public authorities, private companies, universities and the public (Pozoukidou *et al.* 2017) (Robert *et al.* 2010). They set up the direction of the local development, define the goals and aims. The everyday work on the action level is up to the local government. As mentioned above the local government has to balance not only the strategic goals but also national and EU regulations, the goals of their regional policies and of course the duty of ordinary city maintenance.

There are many attitudes to city management. The way implemented in Central Europe tends to the more open and clear way of governance (Wolf and Steven, 2013). The first step of the process was the implementation of principles of strategic planning and of project management (Spee and Paula, 2011). After more than 15 years of experience, some cities recapitulated the processes (Shrader *et al.* 1984) and decided to move forward by adopting output-focused attitudes (Šilhánková, 2011) and a clear and fair decision-making processes. The methodology introduced in this paper is the practical example of the Czech city that is developing its internal processes more clearly and transparently. The city is collecting projects and project ideas, which are periodically evaluated and ranked by different departments of the city according to their responsibilities. The final list is an on-going document that shows the actual position of each project in the investment hierarchy. The purpose of this paper is to evaluate the impact of different methods of ranking to the position of the projects on the list. The hypothesis of the paper is the following assertion:

The position of the projects chosen for practical realization or implementation in local government is affected by the methodology used for the evaluation. Figure 1 shows the process flow of project selection at the local government of the city studied in this paper.
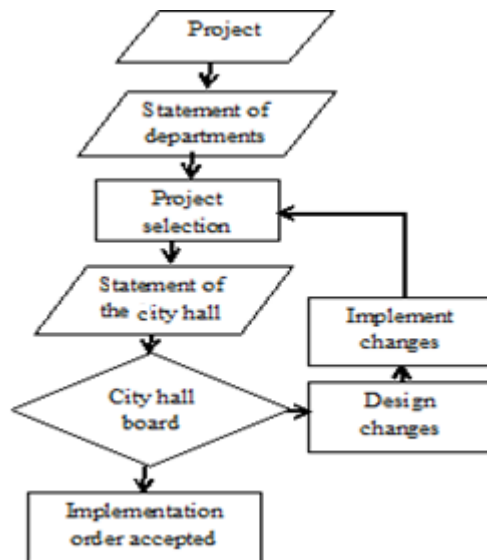


**Figure 1.** Process flow of project selection Source: own elaboration.

## 2. Methodology

In the past few decades the project selection task has been performed using multiple criteria decision-making (MCDM). In this paper, the project selection process of a mid-sized city administration using weighted sum average and analytic hierarchy process is discussed. The change in ranking of projects as the priorities of criteria, interval of points and decision-making methods vary, are also shown in the paper.

- Multiple criteria decision-making

MCDM is one branch of decision-making that studies decision problems where the decision space is continues; there are many MCDM methods and each has its own characteristics. There are many ways to classify these methods based on the data used such as deterministic, stochastic and fuzzy or on the number of decision-maker involved (Panos, 2000).

There are well-known multiple criteria decision-making methods, of which: Weighted sum method (WSM), Analytic hierarchy process (AHP), Analytic network process (ANP), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). WSM is the most straight forward and commonly applied method, the total value of an alternative is the total sum of each criteria weight multiplied by the value of the alternative (Panos, 2000). Analytic hierarchy process (AHP) is a pairwise comparison method that uses ratio scales. AHP has been and is still applied in solving different problems, as a methodology for facilities layout design problem (Yang and Kuo, 2003), Utilizing the analytic hierarchy (AHP) in SWOT analysis (Kurttila *et al.* 2000) is the most used method in publication (Vaidya and Kumar, 2006), (Tramarico *et al.* 2015). There is also commonly used extension of AHP for fuzzy analysis, fuzzy AHP (Yu-Cheng and Thomas, 2011). Another method based on pairwise comparison ratio is ANP, a generalization of AHP. This method is also used in different fields especially when a problem cannot be explained hierarchically, for instance, for selecting software products for a company (Bayazit, 2006; Diederik, 2007; Haile, 2014; Yuksel and Dagdeviren, 2007). TOPSIS is a method that measures the distance of alternatives from ideal and negative ideal solution and it is applied in solving different problems such as supplier selection (Shahroudi and Tonekaboni, 2012). Many scholars have also researched and applied hybrid of these methods, machine selection by using AHP and TOPSIS (Karim and Karmaker, 2016), for development of strategy on China's rural drinking water supply (Jia *et al.* 2016), application of the Multi Criteria Decision-making Methods for Project Selection (Prapawan, 2015). In this paper, AHP and WSM are discussed. WSM was chosen for its simplicity; the AHP method was used in the paper to compare the results of the method with WSM to show consistency of results from the two methods and to provide an alternate method for decision-makers in situations where point evaluation for projects is not possible.

- Analytic hierarchy process (AHP)

AHP was originally developed by Thomas L. Saaty; it is a method that derives ratio scales from paired comparisons. Input for the method can be obtained from actual measurement such as price, weight, cost, or from subjective opinions such as preference; it allows some inconsistency in judgment. The ratio scales are derived from the principal Eigen vectors and the consistency index is derived from the principal Eigen value. The AHP method consists of three levels of hierarchy. The first hierarchy level is the goal of the decision-making, the second level of hierarchy is how each of the existing criteria contributes to the goal achievement, and the last level of hierarchy is to find out how each of the alternatives contributes to each of the criteria. But the hierarchy could increase based on the type problem. AHP uses the 9-point rating of Saaty (2001a; 2001b; 2005) for pairwise comparison. Where the 'reciprocal matrix' has all positive elements and has the reciprocal:

$$s_{ii} = 1 \ \ i = 1,2, \dots, k \qquad\qquad [1]$$
$$s_{ji} = 1/s_{ij} \ , i,j = 1,2, \dots, k \qquad\qquad [2]$$

**Table 1.** The Saaty's 9-points rating scale Source: Saaty (1996)

| Intensity of Importance | Definition | Explanation |
|---|---|---|
| 1 | Equal importance | Two activities contribute equally to the objective |
| 3 | Moderate importance | Experience and judgment slightly favour one activity over another |
| 5 | Strong importance | Experience and judgment strongly favour one activity over another |
| 7 | Very strong importance | An activity is strongly favored and its dominance demonstrated in practice |
| 9 | Absolute importance | The evidence favoring one activity over another is of the highest possible order of affirmation. |
| 2,4,6,8 | Intermediate values | When compromise is needed |
| Reciprocal of above non-zero numbers | | If activity *i* has one of the above nonzero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*. |

The criteria weights or variant values are then normalized by geometrical mean of lines of matrix S (Saaty, 2008):

$$v_i = \frac{\left[\prod_{j=1}^{k} s_{ij}\right]^{1/k}}{\sum_{i=1}^{k}\left[\prod_{j=1}^{k} s_{ij}\right]^{1/k}} \quad i = 1, 2, \dots, k \qquad [3]$$

Experts provide weights of criteria or alternatives in comparison to other criteria or alternative using Saaty's 9-points rating scale of preference (Saaty, 1996) shown in Table 1.

In performing pairwise comparison inconsistency could happen. For instance if there are three criteria and an expert evaluates that the first criterion is slightly more important than the second criterion and second criterion is slightly more important than the third criterion. Inconsistency in pairwise comparison arises if the expert evaluates by mistake that the third criterion is equally or more important than the first criterion. A consistent evaluation would be that the first criterion is more important than the third criterion. AHP incorporates an effective technique for checking consistency of the evaluations made by experts.

$$CI = \frac{x - m}{m - 1}, \qquad [4]$$

where *x* is a scalar average of the elements of the vector whose $j^{th}$ element is the ratio of the $j^{th}$ element of the vector *A·w* to the corresponding element of the vector *w*. A perfectly consistent decision-maker obtains *CI*=0, but small values of inconsistency are tolerated (Panos, 2000), (Cliff, 1996):

$$\frac{CI}{RI} < 0.1 \qquad [5]$$

**Table 2.** Consistency index. Source: Cliff (1996)

| N  | 1 | 2 | 3    | 4   | 5    | 6    | 7    | 8    | 9    | 10   |
|----|---|---|------|-----|------|------|------|------|------|------|
| RI | 0 | 0 | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

- Spearman's coorelation coefficient

Spearman's rank correlation is a nonparametric statistic that allows an investigator to describe the strength of an association between two variables X and Y without making the more restrictive assumptions of the Pearson product-moment correlation (r) (Ruscio, 2008).

$$r_s = 1 - \frac{6 \sum_{1}^{n} d_i^2}{N(N^2 - 1)}, \qquad [6]$$

where $r_s$ is Spearman's correlation coefficient, $d_i$ are the differences in the ranked scores on X and Y for each pair of cases and N is the sample size. Spearman's correlation could be used in situations where: both variables are measured in ordinal scale, if one of the variables is

measured in ordinal scale but the other in interval or ratio scale, both variables are measured in interval or ration scale but the requirements for Pearson's correlation coefficient test are not met (Liwen,  2001).

In this paper, Spearman's rank correlation was used to test the correlation of orders of alternative projects in applying different methods of MCDM and different intervals of evaluation points.

- Weighted sum method (WSM)

WSM is probably the most commonly used approach if there are *m* alternatives and *n* criteria then the best alternative is the one that satisfies most. The assumption that governs this model is the additive utility assumption. That is the total value of the alternative is equal to the sum of the products (Panos, 2000).

$$A_i^{WSM} = \sum_{j=1}^n w_j a_{ij}, for\ i = 1,2,3 \dots, m. \qquad [7]$$

where $w_j$ denotes the relative weight of importance of the criterion $C_j$ and $a_{ij}$ is the performance value of alternative $A_i$ when it is evaluated in terms of criterion $C_j$.

In this paper, selection of project and the change in ranking of projects with respect to weights and the interval of evaluation points are discussed using the WSM and AHP. These methods were selected instead of TOPSIS and ANP because of the way the data were represented. In order to apply TOPSIS the evaluation points need to have positive values. The ANP was not applied in this paper since there is no dependency among the crriteria set selected for the selection process.

## 3. Strategic planning on the local level

Strategic planning was introduced in corporations in the 1950s and 1960s. Influential scholars in strategic planning at the time included Alfred Chandler, Philip Selznick, Igor Ansoff and Peter Drucker. But it was used in the public sector a few decades later, one of the scholars who agues strongly about the importance of strategic planning in the public sector and nonprofit organizations is John M. Bryson. The environment of public and nonprofit  organizations has become not only increasingly uncertain in recent years but also more tightly interconnected; thus changes anywhere in the system reverberate unpredictably and often chaotically and dangerously throughout society. Strategic planning can help leaders and managers of public and nonprofit organizations think, learn and act strategically (Bryson, 2011).  The social-political changes in the late 1980s and the early 1990s in Eastern Europe brought not only new freedom but also new challenges for citizens, companies and governance system. This paper is focused to the situation in the Czech Republic where the whole public sector was democratized; it was given the local power (and responsibility) to local governments and at the beginning of the new

millennium also to newly-established regional bodies. The enthusiasm for freedom and defiance to the strict socialistic planning led to abandonment of planning overall. In some cities years passed when the only valid plans were the budget (annual) and master plan (focused strictly to spatial division of functions in the city and restricting the building activities). Such a situation was unsustainable. Therefore cities started to use at least triennial budgets and economic outlooks. In the late 1990s the three-year outlook became insufficient for planning city development and "new" tools - economic development plans – were adopted. But these documents were still focused on economic issues. The late 1990s in the Czech Republic were the years of rising economic and social problems when there was the demand for new attitudes of governance (Haile *et al.* 2016).

*Analysis and results*

Projects selected and implemented at the local level have to be complemetary to the strategic plan. Therefore it is important to use a systematic approach in selecting these projects. The criteria that are designed by the local government and used by the sample municipality for selecting projects are:

- urgency,
- availability of external sources,
- economy,
- readiness,
- compliance with city strategic development plan, and
- synergy with other projects.

Based on the professional experience and the discussion with other researchers we would enlarge the list with:

- the compliance with other sectoral plans,
- compliance with politiclal proclamations and
- "public demand".

The description of the criteria is as follow:

Urgency – there are projects that are not a part of the strategic development documents but they would be fulfilled. Typically it would be the reaction to disasters, unexpected problems with the technical infrastructure or other unexpected problems like terrorist attacks.

Availability of external sources – the investment reality in Central and Eastern Europe has been linked to the huge amount of subsidies for the last decade. Many local governments have invested only in projects that were supported by the EU or national subsidies. However, this is not an ideal attitude, the subsidies have to be linked to the EU or national policy. Therefore the

local governments could have helped to fulfill the goals on these levels. Anyway the availability of the external support is a very important issue during the decision-making project on the local level.

Economy – this point expresses the level of expected future mandatory expenditures of the municipality budget. This point would help to keep the long-time sustainable budgeting on the local level.

Readiness – especially "hard" investment projects in the Czech Republic are run for the long-distance. Very complicated laws together with many stakeholders who are supposed and authorized to affect the process would extend the needed planning and permitting process to years.

Compliance with a strategic plan – the strategic plan would be the base for the development of each settlement and each project of the local government. Although the quality of the documents is very variable, the main idea of the strategic plan as the main planning tool (together with master plan and budget) remains.

Compliance with other sectoral plans – there are the issues on the local level that have to be worked out more deeply (energy, social care, nature protection, climate change resilience/adaptation, security). Therefore the sectoral plans are created. Although they would be in compliance with the strategic plan, we recommend to keep them as a special point of the evaluation.

Compliance with political proclamations – as mentioned above, the strategic plan would be the main and crucial document for the development of the municipality. The goals expresseed in the strategic plans would be the goals of all the society, all stakeholders. The political representatives elected in the Czech Republic for four years usually declare their pririties in the declaration of their political goals and aims.

"Public demand" – this criterion is designed to be used in the exact city this paper is about. The municipality of the city has a long experience with strategic planning and evaluation of its impacts on the life of the city. The system of indicators has more than 100 items which are evaluated periodically. Based on these indicators there could be expressed the level of "public demand". However we would suggest to design the obligatory methodology for this criterion to avoid mistakes of interpretation or manipulation.

Synergy with other projects – several projects are linked to each other. As a typical example would serve reconversion of public spaces linked to the reconstruction of all the infrastructure below the surface. This is also the criterion that would be taken into acount.

The practical part of the paper is based on the modelling of the ranking of the typical projects appearing in the everyday life of local governance. The selection and design of typical projects is based on discussion with the representatives of the city and brainstorming of the experinced professionals. They have designed five typical projects that usually appear in the city´s everyday life.

- The first project is the project of the infrastructure that is at the end of its lifetime period and urgently needs inventions. The project is administratevely prepared but not in compliance with the strategic development documents.

- The second project is a typical project that is not urgent but is invovlved in the strategic documents, ready to implement and the government is waiting just for the financial sources.

- The third project is the project that is not a part of any strategic document and is not needed operationally. The only reason for implementing this project is available resources (subsidy) and political will. Such an attitude of governance is not appropriate but it can be seen in practise and therefore we have included it.

- The fourth project is not urgent but is involved in all the long-term development documentation as well as supported by the public.

- The fifth project is urgent and ready to implement, there are available external sources and it is neutral to the strategic development document. T

The municipal representatives demanded the level of difference of the final ranking when using different ranking scales and weights. The weights used for this paper were split in a relatively balanced way. In the time when the paper was proposed, there were no final weights of the criteria established by the working group yet. Outputs of the project were supposed to serve as support for this decision. It will be done regarding the impacts that the different methodology can cause.

**Table 3.** Weighted sum method comparison with the same weight of criteria.

| Criteria | wght | Prj 1 | Prj 2 | Prj 3 | Prj 4 | Prj 5 |
|---|---|---|---|---|---|---|
| Urgency | 0.11 | 0.22 | -0.10 | -0.10 | 0.00 | 0.22 |
| Availability of external sources | 0.11 | 0.00 | 0.20 | 0.22 | 0.00 | 0.22 |
| Economy | 0.11 | -0.10 | 0.00 | -0.10 | 0.00 | 0.00 |
| Readiness | 0.11 | 0.22 | 0.10 | 0.11 | 0.22 | 0.22 |
| Compliance with Strategic plan | 0.11 | -0.10 | 0.20 | 0.00 | 0.22 | 0.00 |
| Compliance with other sectorial plans | 0.11 | -0.10 | 0.10 | 0.00 | 0.22 | 0.00 |
| Compliance with political proclamation | 0.11 | 0.22 | 0.10 | 0.22 | 0.22 | 0.00 |
| "Public demand" | 0.11 | 0.00 | 0.10 | 0.11 | 0.22 | 0.00 |
| Synergy with other projects | 0.11 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 |
| **WSM** | | 0.33 | 0.90 | 0.44 | 1.11 | 0.67 |
| **Rank** | | 5 | 2 | 4 | 1 | 3 |

Project values discussed below in the tables were assigned values (-2.2) or (-5.5), the intervals show the compatibility of projects with respect to each criterion where -2 or -5 show that projects refered to as (Prj) in the tables have least compatibility whereas 2 or 5 show most compatibility with the criteria. The two different evaluation intervals (-2.2) and (-5.5) were used to test if the intervals could result in a different rank of projects.

The change of project ranking with respect to the change in weight is demonstrated using WSM and Analytic Hierarchy process methods. Table 3 shows the rank of projects where all criteria have the same weight.

The ranks in Table 3 were calculated using WSM; that is to multiply the weight based on the results obtain in the table project 4 (prj 4). the project that is not urgent but is involved in all the long-term development documentation is the first choice to add more values to the city and satisfy more criteria. Project 1 (infrastructure) is the least favourable project to implement. If the weight is changed the rank of project will also change accordingly. Table 4 shows the change in rank as the weight changes.

**Table 4.** Weighted sum method comparison with different weights of criteria.

| Criteria | Wght | Prj 1 | Prj 2 | Prj 3 | Prj 4 | Prj 5 |
|---|---|---|---|---|---|---|
| Urgency | 0.20 | 0.40 | -0.20 | -0.20 | 0.00 | 0.40 |
| Availability of external sources | 0.10 | 0.00 | 0.20 | 0.20 | 0.00 | 0.20 |
| Economy | 0.20 | -0.20 | 0.00 | -0.20 | 0.00 | 0.00 |
| Readiness | 0.20 | 0.40 | 0.20 | 0.20 | 0.40 | 0.40 |
| Compliance with Strategic plan | 0.05 | -0.05 | 0.10 | 0.00 | 0.10 | 0.00 |
| Compliance with other sectorial plans | 0.05 | -0.05 | 0.05 | 0.00 | 0.10 | 0.00 |
| Compliance with political proclamation | 0.10 | 0.20 | 0.10 | 0.20 | 0.20 | 0.00 |
| "Public demand" | 0.05 | 0.00 | 0.05 | 0.05 | 0.10 | 0.00 |
| Synergy with other projects | 0.05 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 |
| **WSM** | | 0.70 | 0.55 | 0.25 | 0.90 | 1 |
| **Rank** | | 3 | 4 | 5 | 2 | 1 |

Based on the new weight, project 5 - urgent operational project - which is ready to be implemented, is the first choice to add more values to the city and satisfy more criteria. Project 3 - a project that is not a part of any strategic document and is not needed operationaly - is the least favorable project to implement.

- Analytic hierarchy process

AHP was applied for the project selection process since the project selection problem can be represented hierarchically. Figure 2 shows the hierarchy for project selection discussed in this paper.
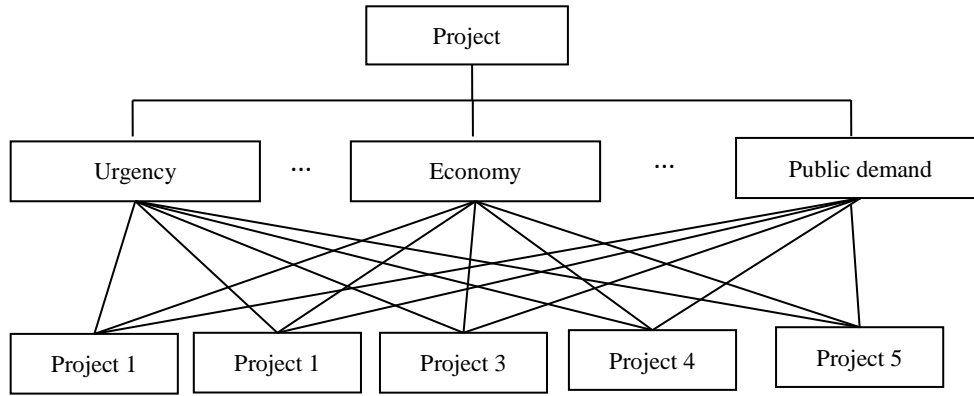
**Figure 2.** AHP for project selection.

Based on the points provided by experts, a pairwise comparison matrix was prepared. Table 5 shows the pairwise comparison of projects for the first criterion, urgency. The total value of the projects was then calculated and ranked using 0.11 (weight 1) for all the criteria.

**Table 5.** Comparison of projects using AHP**.**

|           | Project 1 | Project 2 | Project 3 | Project 4 | Project 5 | GeoMean | Weight |
|-----------|-----------|-----------|-----------|-----------|-----------|---------|--------|
| **Project 1** | 1 | 7 | 7 | 5 | 1 | 3.01 | 0.08 |
| **Project 2** | 0.14 | 1 | 1 | 0.33 | 0.14 | 0.37 | 0.01 |
| **Project 3** | 0.14 | 1 | 1 | 0.33 | 0.14 | 0.37 | 0.01 |
| **Project 4** | 0.20 | 3 | 3 | 1 | 0.14 | 0.76 | 0.02 |
| **Project 5** | 1 | 7 | 7 | 5 | 1 | 3.01 | 0.08 |

Based on the results in Table 5, project 4 is not urgent but is involved in all the long-term development documentation is the first choice that will add more values to the city and satisfy more criteria. Project 3 is not a part of any strategic document and is not needed operationally. is the least favorable project to implement.

**Table 6.** Results of AHP comparison.

| Criteria | wght | Prj 1 | Prj 2 | Prj 3 | Prj 4 | Prj 5 |
|----------|------|-------|-------|-------|-------|-------|
| Urgency | 0.11 | 0.04 | 0.01 | 0.01 | 0.01 | 0.04 |
| Availability of external sources | 0.11 | 0.01 | 0.03 | 0.03 | 0.01 | 0.03 |
| Economy | 0.11 | 0.01 | 0.03 | 0.01 | 0.03 | 0.03 |
| Readiness | 0.11 | 0.03 | 0.01 | 0.01 | 0.03 | 0.03 |
| Compliance with strategic plan | 0.11 | 0 | 0.04 | 0.01 | 0.04 | 0.01 |
| Compliance with other sector plans | 0.11 | 0 | 0.03 | 0.01 | 0.06 | 0.01 |
| Compliance with political proclamation | 0.11 | 0.03 | 0.01 | 0.03 | 0.03 | 0.01 |
| "Public demand" | 0.11 | 0.01 | 0.02 | 0.02 | 0.05 | 0.01 |
| Synergy with other projects | 0.11 | 0.02 | 0.05 | 0.02 | 0.02 | 0.02 |
| **Sum** | 0.99 | 0.15 | 0.23 | 0.15 | 0.27 | 0.19 |
| **Rank** | | 4 | 2 | 5 | 1 | 3 |

The resulting ranks of projects obtained above by using different methods is then compared to see if there is a correlation. using Spearman's correlation, (equation 6). Figure 3 shows the correlation between the ranks of projects obtained using WSM and AHP where the weight of all criteria is 0.11.
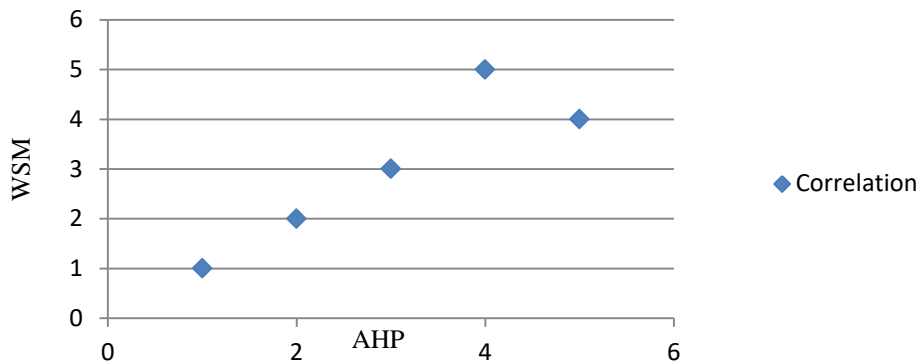


**Figure 3**. Spearman's correlation of results from WSM and AHP.

Based on the graph and the result calculated using Spearman's correlation coefficient, 0.9, there is a strong similarity of results obtained using the two different methods. The same methods were used to compare the same projects with different intervals of project points. Table 7 shows the evaluation of projects where weight is 0.11 for all criteria and the point interval is -5 to +5. According to Table 7 the most effective project is project 4 while projects 1 and 2 are equally least desired.

The results obtained from the interval -5 to +5 shows the mean of the results obtained from the two methods WSM and AHP with the interval -2 to +2. Spearman's correlation coefficient was also used to compare the results obtained from the two intervals (-2.2 and -5.5).

**Table 7.** Results of projects comparison with interval points [-5.5].

| Criteria | Wght | Prj 1 | Prj 2 | Prj 3 | Prj 4 | Prj 5 |
|---|---|---|---|---|---|---|
| Urgency | 0.11 | 0.56 | 0.56 | 0.00 | 0.11 | 0.56 |
| Availability of external sources | 0.11 | 0.11 | 0.11 | 0.56 | 0.11 | 0.56 |
| Economy | 0.11 | -0.11 | -0.11 | 0.00 | 0.11 | 0.11 |
| Readiness | 0.11 | 0.56 | 0.56 | 0.33 | 0.56 | 0.56 |
| Compliance with Strategic plan | 0.11 | 0.00 | 0 | 0.11 | 0.56 | 0.11 |
| Compliance with other sectorial plans | 0.11 | 0.00 | 0.00 | 0.11 | 0.56 | 0.11 |
| Compliance with political proclamation | 0.11 | 0.56 | 0.56 | 0.56 | 0.56 | 0.11 |
| Public demand | 0.11 | 0.11 | 0.11 | 0.33 | 0.56 | 0.11 |
| Synergy with other projects | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| **WSM** | | 1.89 | 1.89 | 2.11 | 3.22 | 2.33 |
| **Rank** | | 4 | 4 | 3 | 1 | 2 |

**Conclusions**

The two methods discussed above, WSM and AHP, were used to analyze the same data set and the results were tested using Spearman's correlation which showed that there is a strong correlation between the results obtained from the two methods. These methods have their advantages and disadvantages. The obvious advantage of WSM is its simplicity to apply. and to incorporate posistive and negative values. The AHP is useful when only ordinal values are provided for evaluating projects and to compare identifying criteria. In this case a pairwise comparison could be used to compare alternatives and criteria. In this paper. the change in ranking of projects as the evaluation interval changes was also tested for correlation.
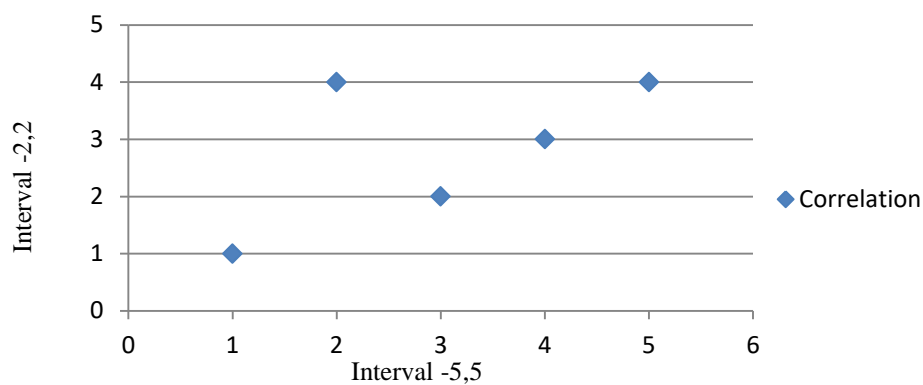


**Figure 4.** Spearman's correlation of results from interval [-5.5] and [-2.2]

Figure 4 shows the correlation among the results obtained from the interval -2.2 and -5.5. The calculated correlation coefficient also shows that there is 0.65 correlation among the two results. The evaluation and comparison of projects using AHP and WSM have shown that the results from the two methods are consistent therefore either method could be used for project selection based on the type of evaluation data obtained from experts.

The outputs of the paper will serve local government as one of the sources used for the final internal methodology for the project-ranking in the city decision-making process. The presented objective methods helped to simulate different situations in the planning process.

The results of the modelling have shown that the strictly mathematic attitude of weighted decision process brought to the non-model-fitting reality of the governance could affect the results of the process. The implementation of the model-selected projects could prevent the political prioritization of any projects but on the other it is very sensitive to its tuning. The weights and used methodology are clear and could be expressed publicly by the local government but could also cause the lack of responsibility of local politicians. Their decisions could be perceived as a result only of a mathematical model. As any other tool used for the city/regional development. the presented methodologies could be very helpful but during their implementation we have to consider what is the level of mathematization and automatization we want to accept in our lives.

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