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## MULTI-CRITERIA ANALYSIS AS A TOOL FOR MUNICIPAL PROPERTY MANAGEMENT

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**The 51<sup>st</sup> Congress of European Regional Science Association – Barcelona, Spain,  
August 30 – September 3, 2011**

## **MULTI-CRITERIA ANALYSIS AS A TOOL FOR MUNICIPAL PROPERTY MANAGEMENT**

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### **1. Introduction**

In the last decades the new system of values established in the private sector has had an important impact on the organization and management of public sector institutions, more and more concerned with the problem of the efficient use of public sector resources. The new governance of the public sector has drawn upon the approaches and techniques applied by corporate management, though it is not identical to them. Public institutions are oriented towards the rendition of public services which meet the needs of the citizens. In the conditions of budget restrictions, however, these institutions are forced to take into account what they are producing and at what a cost they are offering it to the public at large. The new governance is presented as a quasi-market management approach, which can be defined as a set of market-oriented approaches to the management of public sector institutions and resources.

In this new context, public organizations aim to introduce competition and market discipline, which could encourage the more effective use of public resources and bring more benefits to society. Accordingly, “the new public management” requires a series of changes in both the organization of public institutions and the established model of their management.

The management of municipal properties represents a major component of the public management, which also has to ensure a change in the public nature of municipal property, an improved reporting of municipal property as a productive asset which generates cash revenues, the applying of private sector practices to the management of

municipal property, a particular focus on the efficiency, effectiveness, and quality of public services, etc.

It is fully acknowledged that the improvement of the quality and effectiveness of local government activity is inseparably connected with the functioning and development of municipal property. Municipal property is seen as a key element and an engine of change in local government and this is essentially connected with the municipalities' policy for a targeted and sustainable strategic development, the formation of a high living standard, an increase in the welfare of the population, the improvement of public services quality, the maintenance and establishment of a functional environment and a high-quality infrastructure.

For the well-functioning and development of municipal property the creation of a strategic portfolio of municipal property is necessary. The portfolio of municipal property may be defined as a set of properties which are managed in a parallel and joint manner with the help of a single management mechanism. The creation of a strategic portfolio requires grouping and enlargement of municipal property on the basis of a detailed system for the classification of municipal property.

The management of the portfolio of municipal property is characterized by a high level of integration of the types of property it includes, the pursuit of a balance and optimal allocation of the resources among the types (categories) of property. The management of this portfolio is aimed at the achievement of a high degree of diversification of municipal property (by purpose, use, financial goals, etc.). Thus the overall risk in the municipal property management is minimized by distributing it among a multitude of municipal property.

The management of the portfolio of municipal property is closely linked to both strategic planning and the process of management decision making. In this respect the emphasis is put on raising the quality of public services, encouraging local economic development, resolving key urban development issues, increasing revenues and optimizing costs in the municipal property management.

The model representing the process of management of the portfolio of municipal property opens up the opportunity for optimizing the results of the portfolio as a whole, and not just of the separate properties. This model provides a general logical framework

for the management of portfolio of municipal property and assists local government in decision making with regard to the portfolio (the acquisition, management, and disposal of municipal property).

In most decision making situations more than one criterion is involved and, as a consequence, confusion can arise if there is no logical and well structured decision-making process in place. The multi-criteria analysis (MCA) constitute a tool that can help evaluate the relative importance of all criteria involved and reflect on their importance during project management and decision making. MCA is a management tool aiming at supporting decision makers faced with making numerous and conflicting evaluations by deriving a way to come to a compromise.

Based on these overall considerations this paper discusses the employment of MCA in the municipal property management, with the aim of finding the most convenient destinations of municipal assets that can be used for various purposes such as: governmental, business, social use. It presents the results obtained up to now in the on-going project “Municipal Property Management in South- Eastern Cities (PROMISE)”, funded by the ERDF within the South-East Territorial Co-operation Programme, which concentrates on the development of a comprehensive system for municipal property classification and assessment so as to find an appealing combination between the use of properties for their own needs and for attracting investment and promoting sustainable development of their cities and regions.

With these aims in view, the paper is organised as follows. First, the classification of the available real assets is addressed, as a core component of an effective and accountable municipal property management system and a basic step for designing a long-term strategy for each class of properties. Second, the main features of the MCA are presented in connection with the possibilities of applying it in the municipal property management. Third, the system of entries (indicators) for MCA is proposed, followed by fourth, the presentation of the software application created for a user-friendly implementation of MCA. The resulted system is designed in accordance with the strategic goals of the administrative authorities, contributing to an effective municipal property management by optimising and standardising the decision-making procedures.

Finally, it should be mentioned that there is a large variety of the quasi-equivalent terms, formulations employed for addressing municipal property, such as: asset, real property, real estate property asset, real property asset, item, entity, etc. In our paper almost all these terms can be found. They have been used in order to ensure a higher flexibility and an easier connection with the rich international “language” used in this field.

## **2. Classification of municipal properties**

According to international literature, one of the most frequently used classifications is based on *physical characteristics* of the properties, resulting in three basic categories: *buildings, infrastructure assets and land* (RTI International, 2006).

The buildings may be used for administrative purposes, the rendering of services, and for housing purposes. The infrastructure assets usually include systems for the power and water supply, roads, bridges, and others. Land lots are properties which could be put to either permanent or temporary use, such as parking lots and parks. For each property part of the asset could be fixed as a separate object, for instance, water pumps, elevators for buildings, etc.

Another widely employed classification categorizes the public real estates by *their use (functional purpose)*, as follows: *administration use, commercial, business / investment use, social use* (Kaganova and Nayyar-Stone (2000)).

Derived from the above classification, if the potential for the utilization of properties for commercial or other purposes is considered, two groups result, namely *properties used by the municipality and commercial properties*.

The properties used by the municipality are those which are necessary for local government to perform its functions. They may include municipal administrative buildings, police department buildings, health centers, water supply, parks, roads, zones for public parking, the right of transit, transport terminals, and others.

The commercial properties are those which are offered for lease and could be leased or sold for commercial purposes. Examples in this respect are office buildings, land lots for the rendering of commercial services, sport facilities, parking lots.

In various studies relating to municipal property management have identified two groups of municipal real properties, namely traditional types of property (land, municipal housing, buildings for public use) and free property (Kaganova and Nayyar-Stone, 2000).

The properties that are defined as free property are normally those which do not serve the purposes of the performance operational management functions or the public and social services rendered by the municipality. The free properties may have a mixed composition and origin and in terms of functional purposes include two groups: property used for investment purposes; and properties without a deliberate use.

The classification of municipal property, based mainly on *financial purposes*, is a key factor for its effective management. Based on *the concept for a new public management*, the classification system categorizes real estate municipal property into three groups: *properties used by local government*, *properties that serve social needs and free properties*, and defines the different financial purposes of each category of properties.

For example, *the properties used for the rendering of social services* encompass those used to achieve the social goals of local government. They are usually put to the best use (for instance, social housing). The financial goal of these assets is to calculate and reduce the maintenance costs, which could be achieved by: the presentation of real expenditures in order to facilitate the best decision making; the creation of a program with alternative measures to reduce maintenance costs.

The classification of municipal property on the basis of the functional and financial purposes can be used to raise the efficiency of collecting information and reporting, as the different categories of property may require different information. Its advantage is that it can contribute to substantiating a long-term strategy for each category of property and, thus, it is an important factor for the effective management of the municipal property portfolio.

### **3. MCA as a management tool. Overall considerations**

MCA methods are usually employed in order to identify the most preferred option, to rank options, to get a shortlist of a limited number of options for subsequent assessment processes, or to distinguish between acceptable and unacceptable possibilities

(Waterwiki, 2011). The decision-making team has to establish a clear set of targets and also measurable criteria so as to evaluate the possible actions and the degree in which the targets would be accomplished. Hence, the judgment of the decision-making team is crucial in the MCA “in terms of establishing targets and criteria, estimating relative importance weights and, to some extent, in judging the contribution of each option to each performance criterion” (Waterwiki, 2011, p.1)

According to the EC agreed methodology, the MCA is commonly employed for formulating recommendations on budget re-allocations, best practice diffusion, getting feed-backs on the methods used for selection of projects and, thus, improving the project selection process (Sourcebook 2, 2009).

Besides facilitating the participatory approach, the MCA displays a series of other important *advantages*, such as (Department for Communities, 2009): openness and explicitness; the possibility of changing the inappropriate objectives and changes; the use of explicit scores and weights, developed by means of largely accepted techniques; the involvement of experts, using sub-contracts with the decision-making team; enhancing the communication within a wider community; the provision of an audit trail, based on scores and weights.

In accordance with this decision making process, in order to perform a multi-criteria analysis several *steps* have to be followed (ESCAP, 2003), namely:

1. Identifying the problem to be addressed
2. Identifying the options for achieving the objectives
3. Identifying the criteria to be used to compare the options
4. Scoring the alternatives in relation to the criteria
5. Weighting the scores according to the weights assigned to the criteria
6. Evaluating the Alternatives
7. Ranking the Alternatives and Making a Recommendation

As regards the *multi-criteria techniques*, they encompass a large family of methods of which 40 or more different approaches are distinguishable in the literature, from the highly sophisticated through to simple rating systems (Bana and Costa, 1990; Nijkamp et al, 1990).

The common rationale of these methods is to establish a broad framework for assessing the impact of making a choice, simplifying the decision into its constituent elements. In most cases the method requires developing a complete set of alternative solutions to a problem (the options), assessing all relevant performance information for criteria which judge the value or utility of the options, and ‘trading-off’ the relative significance of the criteria to resolve the problem.

Some of the best known MCA methods are: analytic hierarchy process (AHP), analytic network process (ANP), weighted sum model (WSM), multi-attribute value theory (MAVT), multi-attribute utility theory (MAUT), goal programming, ELECTRE, PROMETHÉE, data envelopment analysis, value engineering (VE), value analysis (VA), etc.

The choice of which model is most appropriate depends on the problem to be solved and may be to some extent dependent on which model the decision maker is most comfortable with. The commonly used criteria for the selection of techniques are: “internal consistency and logical soundness; transparency, easy of use; data requirements not inconsistent with the importance of the issue being considered; realistic time and manpower resource requirements for the analysis process; ability to provide an audit trail, and software availability, where needed” (Department for Communities, 2009, p. 20).

An important step in the MCA process is the *standardization procedure*, involving a transformation of the original data sets in order to allow for data aggregation as a part of in the decision making process. In the statistics context, standardization refers to the process of transforming the raw data into dimensionless measures (derived by various formulae) to create compatibility, similarity, uniformity for different variables.

The standardization procedure is usually preceded by scoring the alternatives in relation to the established criteria. The scores are included in a performance matrix, in which each row describes an option and each column describes the performance of the options against each criterion. The expected consequences of each option are assigned a numerical score on a strength of preference scale for each option for each criterion.

Referring to the municipal properties’ case, the decision makers involved in evaluation have to take into account many criteria implying the use of different variables, which are measured according to various scales. For instance, when estimating the value



of a property, they have to deal with *heterogeneous* scales to model such diversified notions as location, date and mode of acquisition, surface, revenues, aesthetics, maintenance costs, etc. The final decision represents a prioritization of alternative courses of action or projects, based on the relative performances on all the criteria involved in the decision making. It implies the need to compare the alternatives by bringing together all the criteria (variables) into one synthetic value per alternative and to rank them accordingly.

Problems will occur if there are differing scales of measurement or magnitudes among the variables. Generally, there are two main levels of measurement – quantitative and qualitative- that can be further subdivided into more specific scales: nominal, ordinal, interval or ratio scale (Nijkamp et al, 1983).

The evaluation criteria, measured according to different scales, do not allow for direct aggregation of the values. Moreover, bigger values usually stand for better performance (e.g. profit), but sometimes bigger values may reflect poor performances, as in the case of cost, or noise. Consequently, *there is a need to standardize the values prior to aggregation.*

Whenever the attributes are in different units, the standardization method allows for bringing all the variables to a common ground, so they can be compared.

There are several variants of the standardization procedure, such as: ranks, standardization to maximum, the 0-1 range standardization method, the inter-decile range standardization method, Z-score standardizing.

#### **4. Indicators used for applying the MCA in municipal property management**

Literature offers various options for systemizing basic groups of indicators which provide the information necessary for the managers to make effective decisions with regard to the municipal property management. In the context of the PROMISE project a classification has been chosen which systemizes the measures of municipal property in three major groups of indicators – individual indicators, specific indicators and general indicators.

Individual indicators (Table 1) are applied for the assessment of municipal property management and the achievement of the goals of local government.

**Table 1. Individual indicators**

<b>INDICATOR</b>		<b>ENTRY 1</b>	<b>ENTRY 2</b>
<b>DEFINITION</b>	<b>FORMULA</b>		
1. Ratio of use of building area	Used area / Pure building area	Used area (sq.m.)	Pure building area (sq.m.)
2. Useful area per 1 employee	Useful area / Employees	Useful area (sq.m.)	employees (number)
3. Used area per 1 employee	Used area / Employees	Used area (sq.m.)	employees (number)
4. Area for rendering services to 1 person	General area / Serviced population	General area (sq.m.)	Serviced population (number)
5. Accessibility to urban center	Distance of the location of municipal property to urban center	ESSL * (Equivalent speed along straight line)	
6. Accessibility to public transport	Distance of the location of municipal property to public transport	ESSL * (Equivalent speed along straight line)	
7. Accessibility to commercial center	Distance of the location of municipal property to commercial center	ESSL * (Equivalent speed along straight line)	
8. Accessibility to parking lot	Distance of the location of municipal property to parking lot	ESSL * (Equivalent speed along straight line)	
9. Energy efficiency of building	Heated area** / Built-up area	Heated area (sq.m)	Built-up area (sq.m)
10. Ratio of energy efficiency (EMAS)	Energy used from renewable sources / Overall energy costs	Energy used from renewable sources (MWh/year)	Overall energy costs (MWh/year)
11. Energy consumption per unit of area	Consumed energy / overall area	Consumed energy (KWH)	Overall area (sq.m.)
12. Operational costs on property per unit of area	Overall operational costs / Overall area	Overall operational costs (in national currency)	Overall area (sq.m.)
13. Maintenance costs on property per unit of area	Overall maintenance costs / Overall area	Overall maintenance costs (in national currency)	Overall area (sq.m.)
14. Maintenance	Overall maintenance	Overall	Serviced

costs on property per 1 person	costs / Serviced population	maintenance costs (in national currency)	population (number)
15. Costs on current repair works of property per unit of area	Overall costs on current repair works / Overall area	Overall costs on current repair works (in national currency)	Overall area (sq.m.)
16. Costs on overhaul of property per unit of area	Overall costs on overhaul / Overall area	Overall costs on overhaul (in national currency)	Overall area (sq.m.)
17. Costs on reconstruction of property per unit of area	Overall costs on reconstruction / Overall area	Overall costs on reconstruction (in national currency)	Overall area (sq.m.)
18. . Costs on construction of property per unit of area	Overall costs on construction / Overall area	Overall costs on construction (in national currency)	Overall area (sq.m.)
19. Costs on purchase of property per unit of area	Overall costs on purchase/ Overall area	Overall costs on purchase (in national currency)	Overall area (sq.m.)
20. Revenues generated from sale of property per unit of area	Revenues generated from sale of property/ Overall area	Revenues generated from sale (in national currency)	Overall area (sq.m.)
21. Rent per unit of area	Overall revenues generated from rent / Overall area	Overall revenues generated from rent (in national currency)	Overall area (sq.m.)
22. Revenues generated from awarding concession per unit of area	Overall revenues generated from awarding concession / Overall area	Overall revenues generated from awarding concession (in national currency)	Overall area (sq.m.)

**Source:** Authors' proposal (PROMISE - Bulgarian team)

\* A measure of accessibility to the given point independently of the distance between the two points

\*\* Walls, windows, roof, floor

In the management of municipal property a number of criteria and requirements must be taken into account such as accessible environment, energy efficiency, area needed for the rendering of public services, good communication location of the properties through which the municipality renders public services. Above all municipal property must provide suitable premises for conducting current activities. The size of the property and

its utilization must be taken into consideration in this respect. Accessibility may be a relevant factor for some categories of real estate property. Consumers need good access for their vehicles or access for supplies may be required. Such considerations may be applied with a view to the routes for access to roads, to the routes for public transport, proximity to urban center, etc.

At the same time the current management of property must be assessed with regard to the achievement of a goal related to various market criteria. For instance, when the terms of the lease agreement and the rate of lease of the municipal property do not meet the key criteria of the portfolio, action may be taken to reconsider or change the lease agreement (restrictions on the use of the property, obligations for repair works and others.) or for its termination. The market rates of lease may be pointed out for a specific property. The managers may determine criteria related to the range of possible difference in percent for the rent of a specific real estate property from market rates (for instance for municipal housing).

Also the knowledge of rent rates, the capital values (based on revenues generated from rent) of previous transactions may facilitate decision making with regard to acquisition, sale or financing. Such a study may reveal a previous interest of a third party to a specific real estate property. Such approaches may concern the plans for sale or may reveal the value of the asset, which would otherwise go unnoticed. the knowledge of, investment activities conducted near the real estate property may reveal the potential opportunities for public-private partnership, sale, creation of servitudes or other agreements with private investors.

Just like economic activities, a number financial criteria may be established such as the assessment of the productivity of municipal property falling within the portfolio such as: rate of rent of the property in reconsideration, the price of lease of the property under better terms, the value in sale, the internal return on investment, management costs, economic productivity, risk, liquidity, etc. When such criteria are not met, decisions must be made based on the management or disposal of the real estate property.

By applying specific indicators information is obtained on the intensity of the use of the properties, their accessibility, costs on maintenance and repair works, the revenues generated from the management and disposal of real estate property, etc. This

information is used to prepare a forecast of capital expenditures, the spending, the growth of rent, the changes in the yield and the general return on investment of the municipal properties.

The maintenance of municipal property must meet certain standards which ensure the rendering of municipal public services. The definite norms and standards provide for the application of specific indicators (Table 2) for the assessment of municipal property, classified by functions - administrative, housing, educational, social, health, sport, commercial, etc, as a potential depending on the municipality's needs for property. . These indicators help assess the capacity of the properties which ensure the rendering of services at a specific standard in compliance with the needs for services of the various groups of the population.

**Table 2. Specific indicators**

INDICATOR		ENTRY 1	ENTRY 2
DEFINITION	FORMULA		
1. Housing area per 1 occupant	Housing area / Occupants	Housing area (sq.m.)	occupants (number)
2. Municipal housing per consumer unit	Municipal housing / consumer units	Municipal housing (number)	consumer units (number)
3. Housing rooms per 1 occupant	Housing rooms / Occupants	Housing rooms (number)	occupants (number)
4. Occupancy rate of municipal housing	occupants in municipal housing / housing rooms	occupants in municipal housing (number)	housing rooms (number)
5. Occupancy rate of municipal housing	Unoccupied municipal housing / Overall municipal housing	Unoccupied municipal housing (number)	Overall municipal housing (number)
6. Places in municipal kindergartens per 100 children	Places in municipal kindergartens / children in the respective age bracket / 100	Places in municipal kindergartens (number)	children in the respective age bracket (number) / 100
7. Area of municipal kindergarten per 1 child	Area of municipal kindergarten / children	Area of municipal kindergarten (sq.m.)	children in the respective age bracket (number)
8. Area of municipal school per 1 pupil	Area of municipal school / Pupils	Area of municipal school (sq.m.)	pupils in the respective age bracket (number)
9. Hospital beds in	Hospital beds in	Hospital beds in	population of

municipal hospitals per 1000 residents	municipal hospitals / population of municipality /1000	municipal hospitals (number)	municipality (number) / 1000
10. Places in municipal social care centers per 1000 occupants	Places in municipal social care centers / occupants / 1000	Places in municipal social care centers (number)	occupants (number) / 1000
11. Area of municipal social care center per 1 occupant	Area of municipal social care center / occupants	Area of municipal social care center (sq.m.)	occupants (number)
12. Municipal sport facilities per 100 sq.m. of territory	Municipal sport facilities / Territory of municipality	Municipal sport facilities (number)	Territory of municipality (sq.m.) / 100
13. Municipal sport area per1 resident	Municipal sport areas / population of municipality	Municipal sport areas (sq.m.)	population of municipality (number)
14. Municipal commercial area per 1000 residents	Municipal commercial area / population of municipality / 1000	Municipal commercial area (sq.m.)	population of municipality / 1000
15. Municipal commercial per 100 sq.m. of territory	Municipal commercial / Territory of municipality	Municipal commercial (number)	Territory of municipality (sq.m.) / 100
16. Municipal greenery area per1 resident	Municipal greenery areas/ population of municipality	Municipal greenery areas (sq.m.)	population of municipality (number)
17. Ratio of intensive renewal of property	Acquired property/ Sold property	Acquired property (number)	Sold property (number)
18. Ratio of intensive renewal of property	Acquired property / Sold property	Acquired property (sq.m.)	Sold property (sq.m.)
19. Ratio of leased property	leased properties / Sold property	leased properties (number)	all properties (number)
20. Ratio of leased property	leased properties/ all properties	leased properties (sq.m.)	all properties (sq.m.)
21. Ratio of use of property for own needs	Properties used for own needs / all properties	Properties used for own needs (number)	all properties (number)
22. Ratio of use of property for own needs	Properties used for own needs / all properties	Properties used for own needs (sq.m.)	all properties (sq.m.)

**Source:** Authors' proposal (PROMISE - Bulgarian team)

Identifying the variation from the regulatory values and the shortage of property are the basis for the assessment of the necessary property in terms of the range and type of rendered services, as well as the prediction of needs for ownership for the rendering of public services. We must take into account the impact of demographic such as the overall number of the population, its structure in terms of age and sex, consumer units and their structure. The needs for services are to be assessed by surveys and analyses of the demographic condition and on this basis strategies for development on the respective fields must be drafted (education, social services, sport, etc.)

In determining the purpose, the necessary area and the urban planning regime and building up of the land lots general indicators are used (Table 3), in which the regulatory values are determined.

**Table 3. General indicators**

INDICATOR		ENTRY 1	ENTRY 2
DEFINITION	FORMULA		
1. Density of building up of regulated land lot	Built-up area of building/ Area of regulated land lot (%)	Built-up area of building (sq.m.)	Area of regulated land lot (sq.m.) / 100
2. Intensity of building up of regulated land lot	unfolded (overall) built-up area of building / Area of land lot	unfolded (overall) built-up area of building (sq.m.)	Area of land lot (sq.m.) / 100
3. Absorption of regulated land lot	Overall built-up area of all buildings / Area of land lot (sq.m.) (%)	Overall built-up area of all buildings (sq.m.)	Area of land lot (sq.m.) / 100
4. Greenery of regulated land lot	Area covered by natural greenery / Area of land lot (sq.m.) ( %)	Area covered by natural greenery (sq.m.)	Area of land lot (sq.m.) / 100
5. Free yard area	Area of regulated land lot (sq.m.) – built-up area of building (sq.m.)	Area of regulated land lot (sq.m.)	built-up area of building (sq.m.) / 100
6. Share of free unbuilt-up regulated land lot	Overall area of free unbuilt-up land lot / Overall area of land	Overall area of free unbuilt-up land lot (sq.m.)	Overall area of land lot (sq.m.) / 100

	lots (%)		
7. . Share of free unbuilt-up regulated land lot	free non-built-up land lots / all land lots (%)	free non-built-up land lots (number)	all land lots (number) / 100
8. Share of unoccupied non-housing buildings	Overall area of ha unoccupied non-housing buildings / Overall area of non-housing buildings (%)	Overall area of unoccupied non-housing buildings (sq.m.)	Overall area of non-housing buildings (sq.m.) / 100
9. Share of unoccupied non-housing buildings	unoccupied non-housing buildings / total of non-housing buildings (%)	unoccupied non-housing buildings (number)	total of non-housing buildings (number) / 100
10. Share of ownership of a definite level of building	Area of a definite level of building / Overall area of building (%)	Area of a definite level of building (sq.m.)	Overall area of building (sq.m.) / 100
11. Share of ownership of a facility in building	Area of a facility in building / Area of common parts of building (%)	Area of a facility in building (кв.м.)	Area of common parts of building (sq.m.) / 100
12. Share of ownership of a property in land lot	Size of right of construction of a facility in building / Area of land lot (%)	Size of right of construction of a facility in building (sq.m.)	Area of land lot (sq.m.) / 100
13. Share of ownership of a building in land lot *	Size of right of construction in building / Area of land lot (%)	Size of right of construction in building (sq.m.)	Area of land lot (sq.m.) / 100
14. Floors in building	Overall built-up area / Non-built-up area (%)	Overall built-up area (sq.m.)	built-up area (sq.m.) / 100
15. Physical suitability of property of massive construction	Useful life since year of construction / Useful life of property of massive construction (%)	Useful life since year of construction (years)	Useful life of property of massive construction (years) / 100
16. Physical suitability of property of panel construction	Useful life since year of construction / Useful life of property of panel construction (%)	Useful life since year of construction (years)	Useful life of property of panel construction (years) / 100
17. Physical	Useful life since	Useful life since year	Useful life of



suitability of property with paneling construction	year of construction / Useful life of property with paneling construction (%)	of construction (years)	property with paneling construction (years) / 100
18. Physical suitability of property with frame-built construction	Useful life since year of construction / Useful life of property with frame-built construction (%)	Useful life since year of construction (years)	Useful life of property with frame-built construction (years) / 100
19. Share of properties with technical public planning and utilities **	Overall area of Share of properties with technical public planning and utilities / area of all properties (%)	Overall area of Share of properties with technical public planning and utilities (sq.m.)	Area of all properties (sq.m.) / 100
20. Share of properties with technical public planning and utilities**	properties with technical public planning and utilities / all properties (%)	properties with technical public planning and utilities (number)	All properties (number) / 100
21. Share of properties with improvement ***	Overall area of Share of properties with improvement / Area of all properties (%)	Overall area of Share of properties with improvement (sq.m.)	Area of all properties (sq.m.) / 100
22. Share of properties with improvement	Properties with improvement / All properties (%)	Properties with improvement (sq.m.)	All properties (sq.m.) / 100

**Source:** Authors' proposal (PROMISE - Bulgarian team)

\* In case there is more than one building on the land lot

\*\* Power supply, water supply, sewerage, heating installation

\*\*\* Elevators, waste collection, telecommunication systems, fire system, air conditioning system, basements, security, garages, parking lots

The indicators for the building up of the separate types of territories, urban development zones and separate terrains and properties are defined in the special legislation of the EU countries regulating the urban development and building up of the territory. They are basically technical indicators through which the municipal urban development plan is implemented. We must point out the resultant secondary obtaining of these indicators for

a given period in the plan. They are obtained on the basis of the structure and size of the separate properties adopted for a specific period. What is more, the capacity of the properties must be in line with the needs in compliance with the separate indicators.

The general indicators are used to meet the needs for the programming of municipal property and in this context they are of greatest significance in its management. To perform the municipal activities it is essential that the respective properties are ensured. Because the municipal property is not homogeneous in nature, certain physical and space characteristics of the properties must be taken into consideration such as the size, quantity, quality, category, form, location, age and condition. The increase of the useful life of the properties and their depreciation has an impact on the quality of the rendered public services. In addition, the longer the usage of the properties, the greater the costs on their maintenance and repair. The construction of buildings has an impact on both the opportunities for their reconstruction and the physical wear and tear of the properties, considering the passed useful life. The indicators pertaining to the scope of the terrain, the relation between its area and the overall built-up area, the floors and the size of the unoccupied properties provide data for decision making on new construction and the expansion of existing properties.

It may be summarized that the structuring of the indicators for the monitoring and assessment of municipal allows the information generated from them to be used for surveys, conclusions, and the development of a strategy for the management of the portfolio of municipal property.

## **5. A MCA based methodology for municipal assets ranking**

In order to improve the monitoring of properties, in accordance to different purposes and also to support the decision making procedures of the municipality bodies that deal with municipal property management, appropriate tools have to be developed to classify municipal properties and to evaluate the economic performance of properties. They need to be based on a comprehensive system of indicators and criteria for municipal property, adapted to the strategic goals of the administrative authorities.

The methodology proposed in this paper for the evaluation of the economic performance of municipal properties is based on the previous MCA technique and it is aiming to satisfy diverse objectives of the municipal management:

- It provides the management bodies the necessary synthetic information regarding property costs and revenues.
- It allows the assessment costs for the municipal budget and external costs.
- It enables the evaluation of the economic performance of each portfolio of properties and individually, as well.
- It creates a benchmarking system in order to compare the economic performance of different municipal properties.

The methodology is organised as a software package based on a programme written in C# language (proposal by the Romanian team). This language has been chosen for its user-friendly interface.

The main steps that are followed in the programme are:

1. Selecting the envisaged destination – administration, social, business purposes
2. Selection of the indicators for the destination chosen
3. Assigning importance quotients (scores) to each indicator (  $s_j$  )
4. Filling in the fields (entries) of the indicators employed for each analysed property
5. Calculation of the variable value based on the corresponding indicator entries for each analysed property
6. Variables standardization using the 0 – 1 range standardization method:

The variables are transformed into 0-1 range by applying the formula:

$$y_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)},$$

for a “more is better” attribute ( higher values reflect better performance, e.g. profit), or:

$$y_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)},$$

for a “less is better” attribute (smaller values reflect better performance, e.g. costs),

where:

$y_{ij}$  - standardized values ranging from 0 (worst) to 1 (best);

$x_{ij}$  - case (property) i, variable j;

$\max(x_j)$  - the maximum value taken by variable j in the current dataset;

$\min(x_j)$  - the minimum value taken by variable j in the current dataset.

7. Calculation of the relative rank for each property by means of the following formula:

$$r_i = \sum y_{ij} \cdot rs_j ,$$

where:

$r_i$  - relative rank for property i (as an overall performance index)

$rs_j$  – relative importance (relative score) of variable j

$$rs_j = s_j / \sum s_j$$

8. Displaying the ranking for all analysed properties

It should be mentioned that both variable standardisation and relative rank calculation are in the programme “blackbox”, so as to make it as user-friendly as possible.

## 6. Concluding remarks

Our inquiry into the employment of MCA in the municipal property management process has proven its usefulness for finding the most appropriate use of each property. A rational balance should be found between administrative, social services and business uses, in accordance with the concept of new public management. When both functional and financial purposes are taken into consideration, the requirement of raising the efficiency of collecting information and reporting has to be met, keeping in mind that different categories of property may require different information. As a useful tool in the process of ranking the properties, MCA should be carefully applied, with a strong emphasis on experts' opinion, in order to avoid subjectivism in choosing the criteria, the indicators and the importance quotients, as basic ranking ingredients.

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## References

Bana e Costa, C. and Vansnick, J.C. (1994), „MACBETH: An interactive path towards the construction of cardinal value functions”, *International Transactions in Operational Research*, 1 (4), 489-500

Department for Communities and Local Government (2009), *Multi-criteria Analysis: A Manual*, London, available at: [eprints.lse.ac.uk/12761/1/Multi-criteria\\_Analysis.pdf](http://eprints.lse.ac.uk/12761/1/Multi-criteria_Analysis.pdf)

ESCAP (2003), “Steps in Multi-Criteria Analysis”, ESCAP Virtual Conference on Integrating Environmental Considerations into Economic Policy Making Process, available at [http://www.unescap.org/drrpad/vc/orientation/M5\\_lnk\\_8.htm](http://www.unescap.org/drrpad/vc/orientation/M5_lnk_8.htm)

Kaganova, O. and Nayyar-Stone, S. (2000), “Municipal Real Property Asset Management. An Overview of World Experience, Trends and Financial Implications”, *Journal of Real Estate Portfolio Management*, 6(4), pp. 307-324

Nijkamp, P., Rietveld P. and Voogt H. (1990), *Multicriteria Evaluation in Physical Planning*, North-Holland, Amsterdam

Nijkamp, P., Leitner, H., Wringley, N. (eds) (1983), *Measuring the Unmeasurable*, Martinus Nijhoff, The Hague

RTI International (2006), *A Toolkit for Municipal Asset Management*, University of North Carolina at Chapel Hill, available at: [www.docslibrary.com/a-toolkit-for-municipal-asset-management](http://www.docslibrary.com/a-toolkit-for-municipal-asset-management)

Sourcebook 2 (2009), *Evaluating Socio-Economic Development: Methods and Techniques – Multi-Criteria Analysis*, available at: [http://ec.europa.eu/regional\\_policy/sources/docgener/evaluation/evalsed/sourcebooks/method\\_techniques/evaluating\\_alternatives/multi\\_criteria/index\\_en.htm](http://ec.europa.eu/regional_policy/sources/docgener/evaluation/evalsed/sourcebooks/method_techniques/evaluating_alternatives/multi_criteria/index_en.htm)

Waterwiki (2011), *Multi-Criteria Analysis*, available at: [http://waterwiki.net/index.php/Multi\\_Criteria\\_Analysis](http://waterwiki.net/index.php/Multi_Criteria_Analysis)