Planning support concept to implementation of sustainable parking development projects in ancient Mediterranean cities

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Abstract. This paper proposes a planning support concept (PSC) to implementation of sustainable parking development projects (SPDP) in ancient Mediterranean cities. It is conceptualized by the logic of decision support systems and a multicriteria analysis approach. The purpose of the concept is to support setting of implementation priorities for subprojects (construction of new and/or improvement of existing parking) within a SPDP. Analysing the existing and a planned state of parking within the city a goal tree is established. Subprojects are defined accordingly. Objectives from the last hierarchy level within the goal tree are used as criteria for assessment of defined subprojects. Representatives of stakeholders provided criteria weights by application of AHP and SAW methods. PROMETHEE II was used for priority ranking and PROMETHEE V ensured a definition of project's implementation phases. The result of the presented concept is the implementation plan for such projects. The concept is tested on the city of Trogir.

1. Introduction

Project implementation planning is a very important phase within a project lifecycle, especially when it comes to projects aimed to ensure sustainable

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development. Its importance becomes even greater when it comes to urban infrastructure projects such as road infrastructure. There are several reasons for such high level of importance primarily derived from their complexity because of a lot of their intricate technical characteristics and constituent parts (subsystems). Further, complexity is derived from the need to ensure functioning of the whole system during the implementation of the project (meaning, during undertaking of activities defined within a project on one or more of its components/subsystems at the same time). High financial expenditure required for the implementation of projects in the field of road infrastructure and the limited available resources also contribute to complexity. It is important to take into account a relatively long time required for the implementation of these projects and their impact on activities of several different social groups as well as on the economy of the city. We should note the problem of limited possibilities of spatial expansion of road infrastructure because of a high degree of urbanity within ancient Mediterranean cities (especially in the centers of these cities). Research presented in this paper is focused on modeling of the support concept to planning of implementation of a sustainable development project related only to one segment (part) of the whole urban road infrastructure, i.e., to stationary traffic infrastructure. Stationary traffic infrastructure is an integral part of the constantly growing urban road infrastructure system which is in addition to the aforementioned complexity also a highly dynamic system. The aforementioned reflects on the stationary traffic as well as on other constituents of the road infrastructure system. When planning sustainable development of stationary traffic and during design of projects, beside technical characteristics, both economic and social aspects of the analyzed problem have to be considered for its realization. Specifically, in addition to being technically feasible, the project must be economically feasible and socially acceptable.

City government is mainly the initiator of creation and afterwards of implementation of such projects. During planning of project implementation, city governments usually face with a large number of different decisions and consequences related to these decisions. Because city government takes primary responsibility for consequences of decision-making, it should have the major impact when they are made. However, there is always a question of how much greater impact should be left to the city government at the expense of citizens/users and professionals/experts. Therefore, it can be concluded that both a high level of required interdisciplinary knowledge, but also a large number of people interested in projects implementation (whose requests should be recognized and satisfied as much as possible taking into account objective constraints) contribute to the complexity of decision-making. For all

aforementioned reasons planning can be concluded that it is a demanding task which implies a systematic and interdisciplinary approach. Consequently, the planning support concept based on multicriteria analysis emerged as an appropriate approach. This approach will ensure systematic decision-making within planning processes. The purpose of the concept is to support setting of implementation priorities for subprojects (construction of new and/or improvement of existing parking) within a sustainable parking development project (SPDP). The result of the presented concept is the implementation plan for sustainable parking development projects in ancient Mediterranean cities whose specific features stem from their original development from historic centers of ancient cities which are jointly with their contact area often under the protection of international institutions for the protection of cultural heritage, such as UNESCO. This implies the existence of spatial and dynamic constraints to the realization of such projects. In fact, there is a deficit of available spaces around the traffic attraction points for construction of parking places or garages, and there are also great variations in the number of city residents during and after the tourist season. Both greatly influence the dynamics of project implementation. By reviewing previous works it can be concluded that the number of authors have researched decision support to the management of urban infrastructure systems, among which the paper of Bielli [1] should be emphasized. Bielli presented a decision support system for traffic management as a new approach by which maximum effectiveness and efficiency of the city transport system (through the introduction of new ways of traffic regulation, billing services and service delivery) could be attained. Decision support concepts within design of cost-benefit analysis for infrastructure projects can also be found in the literature, and one of those is paper written by Guisseppe, A. Forgionne, G.A. [5]. By reviewing these works, as well as others in the literature, it is easy to conclude that a lot of authors have dealt with a very wide range of problems related to urban road infrastructure, but also with the problems related to other infrastructure systems whose findings are applicable to this research area. A common characteristic of all these works is that they all deal with design of different approaches to the decision-making process within strategic planning. Furthermore, all of them try to find a way how to cope with the problem of a lack of systematization within decision-making processes and how to employ this knowledge to enhance the quality of project management. Rouse, P., Chiu, T. [12]   describe optimal life-cycle management in a road maintenance setting in New Zealand. Their paper aims to assess how local authorities have maintained their respective local road networks from a life-cycle perspective. Finally, they provide a best practice indication of the optimal

maintenance activity that must be undertaken. Development of a life cycle assessment tool for construction and maintenance of asphalt pavements was the focus of Yue Huang, Roger Bird and Oliver Heidrich, [7] research. During the decision-making process it is important never to forget environmental assessments of maintenance activity impacts. A comparative study of the emissions by road maintenance works and the disrupted traffic using life cycle assessment and micro-simulation was elaborated in paper of Yue Huang, Roger Bird and Margaret Bell [6] Leclerc, G. et al., [10] provided an intelligent decision support system (IDSS) for an urban infrastructure complaint management module. The spatial decision support system for planning urban infrastructure MCPUIS [4] is based on the integration of GIS technology and the SAW method, where authors pointed out that the presented procedure can be used for planning other types of infrastructure including transport infrastructure. Quintero et al. [11] and Jajac et al. [8, 9] dealt with the aforementioned issues of urban road infrastructure (such as stationary traffic, planning, decision-making, etc.)

However, all these papers are focused on supporting decision-making when developing strategic plans for the development of transport systems and related infrastructure of cities, while the focus of this paper is on design of the concept for decision support when planning the implementation of projects related to development of stationary traffic infrastructure (parking places and/or garages). Therefore, in this paper, we deal with support to decision-making in a much later stage of the project lifecycle, its implementation phase, and that is what differs this paper from the aforementioned.

2. Determination of the concept

Figure 1 below shows the architecture of a generic planning support concept to implementation of sustainable parking development projects in ancient Mediterranean cities. Execution of the concept starts with analysis of both the future state (designed project) and the current state of stationary traffic in the city. Analysis of the designed project results in its breaking down into subprojects and identification of relations between defined subprojects. Analysis of the current state of stationary traffic results in determination of supply and demand for parking spaces (capacity of parking places and/or garages). Furthermore, it provides techno-economic data about the state of infrastructure elements used for stationary traffic realization. Other conditions that derive from characteristics of ancient Mediterranean cities and that affect the development and operation of stationary traffic must also be analyzed. In parallel, relevant stakeholders must be gathered and gathering must be provided

according to the representative principle (meaning representatives of stakeholders are divided into several relevant groups). Each of these groups consists of several members. For the purpose of this research division into three relevant groups was provided. The first group consists of the experts in the fields of stationary traffic and engineering, project management and ancient Mediterranean culture. Representatives of city government constitute the second group of stakeholders and the representatives of citizens/users constitute the third group. All three groups are involved in design of the goal hierarchy structure in form of the goal tree. The goal tree is established in a manner of group decision-making after brainstorming on the following subject – sustainable development of stationary traffic in ancient Mediterranean cities. Establishing of the goal tree starts with a definition of the main goal. Sustainable development of stationary traffic in the city is the main goal that should be used. The second step in establishing the goal tree is defining its objectives (division of the main goal into several supporting objectives/first level objectives). Then subobjectives of first level objectives must be provided. The process of generating subobjectives must be repeated until the generated objectives do not need to be or cannot be divided anymore. Objectives/subobjectives must be defined in a manner that enables measuring of their achievement. When the process of dividing objectives into subobjectives is finished, the goal tree is established. It provides an overview of mutual relationships between objectives within hierarchy but it do not provide any information about relative importance of objectives at the same level. It is particularly important to determine relative importance of objectives from the last hierarchical level. Specifically, these objectives are to be used as criteria for evaluating identified subprojects during the process of their ranking according to the priority for implementation. They will be used as criteria because relevant characteristics of subprojects can be described and measured by them. Preliminary importance (weights) of criteria are defined using the Analytic Hierarchy Processing (AHP) method by three groups of stakeholders. In this way, three sets of criteria weights are defined. The final values of criteria importance (final criteria weights) can be gained then by usage of the Simple Additive Weighting (SAW) method combined with weighted mean.

According to results of conducted analysis and determined criteria, alternative solutions are determined, meaning that the project is divided into several logical units – subprojects. These subprojects are then evaluated by each criterion. Taking into account both the final criteria weights and the selected preference functions, a comparison of subprojects is conducted by using the PROMETHEE II method (presented in the paper of Brans, Mareschal, and

Vincke [3]). The result of this method is a priority ranking list of subprojects. Furthermore, several different kinds of constraints must be introduced. These constraints are used for introduction of dynamic character of stationary traffic and for introduction of resources availability (particularly financial means). The dynamic nature of stationary traffic during design of the implementation plan should be taken into account. It is reflected in changes in priorities resulting from the impact of the construction or improvement of individual subprojects at the particular location to other neighboring or functionally related subprojects. Through introduction of these constraints a subset of projects to be implemented in the first phase of project implementation (during the first investment cycle) can be determined. This is carried out by combining the results of the analysis of multicriteria problems with (0-1) linear programming taking into account the limitations of segmentation on a set of alternative solutions. This combination is called the PROMETHEE V method, and it was presented by its authors Brans and Mareschal in their paper from 1990 [2].
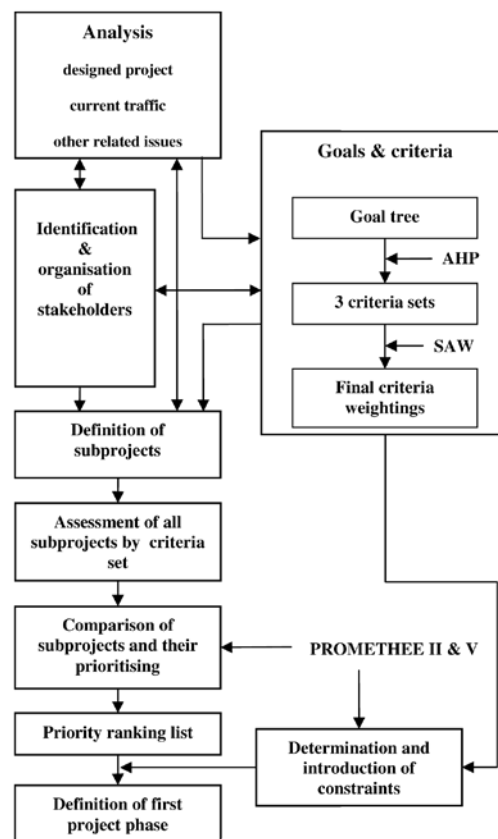

Figure 1: *Architecture of planning support concept to implementation of sustainable parking development projects in ancient Mediterranean cities*

The foregoing considerations and Figure 1 therefore explain the general model for supporting processes related to implementation planning of sustainable development projects. In addition, Figure 1 illustrates the modus of stakeholders' participation in the improvement planning process. Their participation ensures better transparency of planning (of the implementation project) and prepares stakeholders to accept future activities related to project realization easier. Each next implementation phase (a short-term implementation plan for the next investment cycle that consists of several subprojects) can be determined by repeating the procedure presented before. Each repetition of the presented procedure is conducted only for the remaining subprojects (remained after all previous investment cycles) of the overall project. All short-term implementation plan, provided by the presented concept together form the overall project implementation plan. This approach ensures the actuality of each implementation phase of the project and the project as a whole. This approach is necessary because we deal with long-term projects which take place in highly urbanized areas with extremely variable dynamics and intensity of traffic. This approach allows city governments to adapt to continuous social and economic changes and on demands placed upon them.

3. Concept validation – Trogir case study

With respect to the stationary traffic problem, Trogir doesn't differ from most of the old ancient cities in the Mediterranean but it differs from both young and inland cities. It is characterized by the way of spreading its urbanity, i.e., development of the city around the old town (which is in this case situated on the island). From this core, the city expanded on the nearby mainland and on the neighboring island of Ciovo. The rapid development of Trogir in the 20th century was not followed by the proper development of infrastructure systems. The road infrastructure and its part related to stationary traffic was not an exception. Needed information and data were collected by analyzing the current state of stationary traffic and related infrastructure, and by using preliminary results provided in an unfinished study of parking places in Trogir (by Mladineo and Ivačić, University of Split, Faculty of Civil Engineering, Architecture and Geodesy).

Trogir, a city rapidly developed in the past 50 years, faces the problem of inadequate road infrastructure and especially the problem of "disorder" in the field of stationary traffic. The increased traffic during summer months leads to daily traffic jams. Cars and trucks parked on the streets and sidewalks represent a huge problem. The reason for that, apart from the lack of parking spaces in the city center, are unfurnished parking lots located within walking distance

from the city center but not in full operational state due to inadequate pedestrian areas and walking trails. In addition to traffic congestion that occurs on the city's main roads, problems occur in smaller streets due to their widths that do not meet the conditions for normal and smooth functioning of two-way traffic or pedestrian flows. By analyzing parking issues in the city the following can be concluded: lack of harmonization between spatial needs and possibilities to realize parking in existing neighborhoods, inability of streets expansion and expansion of sidewalk parking in already overurban neighborhoods, lack of sidewalks and areas for pedestrians (the existing are usurped by cars), lack of parking spaces for motorcycles, etc. Given these circumstances to provide quality solutions for traffic in general and in particular for stationary traffic, the following actions must be undertaken: carriageways and sidewalks must be free of parking vehicles to ensure smooth traffic flows, proper location for stationary traffic that are formatted properly, proper regulation of both traffic within parking/garages and pricing. The conducted analysis provided a collection of information and data on the location, type, capacity, usage, organization and other characteristics related to existing and future/planed parking areas.

By defining the main goal (sustainable development of stationary traffic in the town of Trogir) the process of establishing the goal tree was initiated. Supporting objectives at both hierarchy levels were defined by group decision-making during brainstorming. The provided goal tree with two hierarchy levels is shown in Figure 2. Each of objectives within the goal tree is determined by taking into account a high level of standards for the protection of environment and cultural heritage because a wider center of Trogir and its contact area are under protection of the United Nations Educational, Scientific and Cultural Organization (UNESCO).
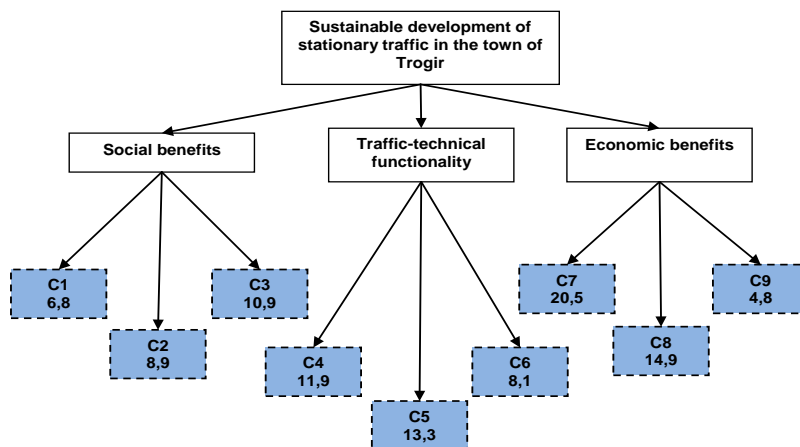

Figure 2: *Goal tree for the Trogir case study*

Stakeholders were divided into three groups that represented the attitudes of representatives of experts (experts in the fields of stationary traffic and civil engineering, project management and ancient Mediterranean culture), representatives of city government and representatives of citizens/users, respectively. The last hierarchy level of the presented goal tree (Figure 2) that consists of undividable and measurable objectives is recognized and adopted as a criteria set for the evaluation of alternative solutions (subprojects). At the last hierarchy level, Figure 2 shows some numbers which are ponders of the chosen criteria. How these ponders are obtained is explained in the text below and within Table 1 and Table 2. Using the AHP method, preliminary importance of each criterion in a defined criteria set is determined based on each stakeholder group opinion. In that way three sets (according to traffic experts, local government, and citizen representatives) of preliminary criteria weights are defined. Final values of criteria importance (criteria weights) are then gained by using the SAW method combined with weighted mean. Because different stakeholder groups have a different influence on final criteria weighting (according to their financial, social and/or political responsibility relating to project decisions) SAW is used to determine a degree of that influence on each group. The influence of each stakeholder group was assessed by all stakeholders but with one restriction – nobody was allowed to assess its own group. Assessment was done in group decision-making manner by using the following grading scale: 0 – no responsibility, 1 – medium responsibility, 2 – a high degree of responsibility. All stakeholders also agreed about ponders given to three aspects of responsibility (criteria) as shown in Table 1 below.

Stakeholder group	Criteria & ponders			Determined influence of each stakeholder group
	Financial responsibility	Social responsibility	Political responsibility	
	1.5	2	1	
Experts	1	1	0	**3.5**
City government	2	2	2	**9**
Citizens/Users	1	1	0	**3.5**

Table 1: *Influence of stakeholder groups on setting up final criteria weighting*

Table 1 shows that the city government group has the highest influence on final criteria weighting. SAW results are then used as ponders for each of three criteria sets. Table 2 shows pondered values of three preliminary criteria weight sets within the 2nd, the 3rd and the 4th row. The final value of single criterion importance (compromised weight of the criterion) is gained as a weighted mean of three pondered values of the same criterion from three different criteria sets and it is shown within the last row of Table 2 for all criteria.

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Experts	0.343	0.357	0.35	0.735	0.49	0.525	0.385	0.175	0.14
City government	0.36	0.54	0.9	0.99	1.26	0.45	2.16	1.89	0.45
Citizens/Users	0.385	0.525	0.49	0.175	0.385	0.315	0.735	0.315	0.175
Compromised weights	**0.068**	**0.089**	**0.109**	**0.119**	**0.133**	**0.081**	**0.205**	**0.149**	**0.048**

Table 2: *Final values of criteria weights - compromised weights*

Criterion label	Criterion name	Brief description of criterion and its assessment technique	Preference function min/max	
C1	Population density	The population per m² of the zone	max	Vshape
C2	Density of commercial space	Number of commercial space per m² of the zone	max	Vshape
C3	Concentration of public institutions	Number of public institutions in the zone	max	Vshape
C4	Feasibility	Assessing the possibility of building, i.e., conditions for the construction of the proposed solutions/subproject; assessment as follows: - Easily feasible parking - 5 - Medium easy / difficult feasible parking - 3 - Hardly feasible parking - 1	max	Vshape
C5	Fitting into spatial/urban plans	Determining whether the parking is entered into spatial/master plan (e.g., GUP) or not meaning that the procedure of its introduction into spatial plan must be carried out; grading as follows: - Parking is entered in the master plan - 1 - Parking is not entered in the master plan - 0	max	Usual
C6	Distance to major roads	Higher quality of parking located along major roads due to higher exchange capacity; the main city road is considered as a major road and the distance is to large if it exceeds 50m; assessment under this criterion is given as follows: - Parking is close to major roads -1 - Parking is not close to major road - 0	max	Usual
C7	The amount of investment	Amounts expressed in euro, which includes construction costs on a "turnkey" and land acquisition, if required	min	Vshape
C8	The possibility of land acquisition	Favourable is parking for which the required land can be purchased or the land is owned by the City of Trogir, ratings are given as follows: - The land is owned by the City of Trogir - 5 - Only one owner - the concessionaire - 4 - Combined ownership (public-private) - 3 - Only one owner - private ownership/not concessionaire -2 - More private co-owners -1	max	Vshape
C9	Tourist attraction	Attractiveness of parking during the summer season in terms of its distance from cultural attractions and within walking distance of the old town, assessments as follows: - Tourist attractive parking -1 - Travel unattractive parking - 0	max	Usual

Table 3: *Labels, names and description of criteria*

A compromising weight of each criterion is stated as a percentage share of the total weight of all criteria (which is 100%). Adopted weights are shown in Figure 2 in dashed rectangles within the last hierarchical level by which criteria are presented.

Because of the perceptibility in the previous Figure 2, only labels and final criteria weights are presented. The following Table 3 provides full names of the criteria and their description (including the description of the technique for assessment of subprojects according to each criterion separately). The zones from the descriptions of the criteria (the third column in Table 3) stand for the gravity area of each parking/garage and generally coincide with the city quarters.

The total supply of parking spaces within the analyzed area is 2,030 parking places (PP) with a possible extension up to 2,780 PP. The biggest problem is the poor organization of the existing parking and billing system. Table 4 below shows the current and possible supply of PP in Trogir at 25 locations representing 25 subprojects.

No	Location/ Subprojects	Current supply	Possible supply	No	Location/ Subprojects	Current supply	Possible supply
1.	Balancane	90	180	14.	Brigi	200	350
2.	Motel	50	80	15.	Lokvice	120	120
3.	Dom zdravlja	60	60	16.	Kino	30	30
4.	Stara INA	100	100	17.	Barbika	80	80
5.	Travarica	150	150	18.	Naselje	70	150
6.	Soline	150	150	19.	Skver-ACI	250	250
7.	Pasike	0	60	20.	Skver	150	200
8.	Miratov	80	80	21.	Balan	60	60
9.	Posta	20	40	22.	Madiracin mul	30	40
10.	Mosor	80	80	23.	PŠU-Banj	30	50
11.	Dvorana	40	60	24.	Mali mul	50	130
12.	Ribola	50	50	25.	Vojarna	40	80
13.	Groblje	50	150	**Total**		**2,030**	**2,780**

Table 4: *Current and possible supply of parking in Trogir*

Subprojects mainly deal with or are related to the increase, remodeling and expansion of the existing parking with a goal to increase its capacity. Only one new parking/subproject at location Pasike is proposed.

Once the criteria and the subprojects are defined, it is necessary to perform evaluation of each subproject by each criterion. All evaluation values together make a decision matrix which needs to be inserted in the appropriate software. Using the Visual PROMETHEE software evaluation matrix is processed by the multicriteria PROMETHEE II method. Thus a ranking of all alternatives/subprojects was established according to their priority for implementation. The PROMETHEE II method provides a complete ranking by

mutual comparison of subprojects according to all criteria taking into account established opinions of stakeholders which are introduced into the comparison process by criteria weights and preference functions. Preference functions are defined for each criterion and they represent how a decision maker forms his/her preferences among two subprojects according to that criterion. PROMETHEE II results in a complete ranking of subprojects according to their implementation priority as shown in Flow Table (Table 5). Subproject Travarica is ranked best. Subprojects ranked from the 2nd up to the 19th place form the first large group of subprojects, while the second smaller group consistes of subprojects ranked from the 20th up to the 24th place. The worst subproject is Motel.

Rank	Location/Subprojects	Phi	Rank	Location/Subprojects	Phi
1	Travarica	0.2877	14	Kino	0.0219
2	Miratov	0.1478	15	Soline	-0.0122
3	Brigi	0.1453	16	Ribola	-0.0191
4	Stara INA	0.1127	17	Dvorana	-0.0234
5	Lokvice	0.1048	18	Mosor	-0.0472
6	Posta	0.0895	19	Skver-ACI	-0.0547
7	Pasike	0.0867	20	Skver	-0.1160
8	Madiracin mul	0.0639	21	Balan	-0.1383
9	Balancane	0.0604	22	Mali mul	-0.1733
10	Dom zdravlja	0.0433	23	Vojarna	-0.1922
11	Barbika	0.0428	24	Groblje	-0.2147
12	PŠU-Banj	0.0422	25	Motel	-0.2942
13	Naselje	0.0364	**RANKING - FLOW TABLE**		

Table 5: *Complete ranking of subprojects by application of the PROMETHEE II method − Flow table*

According to results presented in Table 5, it is easy to conclude that there is a need to include additional constraints in the planning process due to creation of smaller groups of subprojects suitable for one single investment period. Stakeholders defined the aforementioned constraints used for determination of a subset of subprojects for realization during the first implementation phase of the project. These constraints are derived from the limited availability of all required resources (especially of financial and spatial resources) and from dynamic nature of stationary traffic as described earlier in this paper (in Chapter 2). Several linear equations and inequalities are defined to describe constraints related to spatial&functional influences (no more than one parking lot can be implemented in one zone but in the center of the town at least one parking lot must be provided), and only one inequality was created for introduction of financial constraints (budget year limit – 160,000 Euro). The PROMETHEE V method is used for introduction of defined constraints (results are presented in Table 6).

All subprojects presented in Table 6 should be realized within the first investment cycle. It is interesting that subprojects Miratov and Lokvice which were ranked 2nd and 5th did not get into the first implementation phase. It is a consequence of constraints that were set up and explained earlier.

Location / Subproject	Type of activity
Travarica	Functionality improvement
Miratov	Functionality improvement
Brigi	Functionality improvement
Stara Ina	Functionality improvement
Posta	Functionality improvement
Pasike	Construction of a new parking

Table 6: *Subprojects proposed for the implementation within the first implementation phase*

4. Conclusion

The planning support concept (PSC) to implementation of sustainable parking development projects (SPDP) in ancient Mediterranean cities presented in this paper is conceptualized by the logic of decision support systems and the multicriteria analysis approach. The purpose of the paper is to present of concept functioning and its validation in resolving such planning problems. The concept is verified to be useful to support setting of implementation priorities for subprojects (construction of new and/or improvement of existing parking) within a SPDP in the city of Trogir. Its application starts with analyzing the existing and the planned state of parking within the city and proceeds with establishment of a goal tree. Subprojects are defined accordingly. Objectives from the last hierarchy level within the goal tree are used as criteria for assessment of defined subprojects. Representatives of stakeholders provided criteria weights by application of AHP and SAW methods. PROMETHEE II was used for priority ranking and PROMETHEE V ensured a definition of project's implementation phases. The result of the presented concept is the implementation plan for such projects.

By application of this concept it is possible to overcome the majority of problems characteristic of poorly structured problems such as project implementation planning. In approach based on multicriteria methods and on the logic of decision support systems has shown a lot of methodological and socio-politic advantages when it comes to dealing with the problem of this complexity level. The advantage is primarily reflected in the improvement of the quality of the technical and functional aspects of management of stationary traffic in the ancient Mediterranean cities but also in an increase of the quality

and quantity of meeting the socio-economic demands of the community. The application of multicriteria analysis, if it is implemented correctly, requests the cooperation of all concerned in a practical decision-making process and involves all stakeholders. This approach in turn facilitates the implementation of established priorities and removes doubts about a subjective approach of city government to the project implementation. It is necessary to emphasize that this approach provided involvement of all stakeholders in the process of determining the influence of each group of stakeholders to decision-making and that was performed in a very transparent manner. By introducing such instrument, the ability of autocracy of the city government can be restricted and thereby planning processes can be improved for the benefit of all citizens.

Future research related to this issue should be directed toward researching possibilities of automation in data collection (data about maintenance status). The intention is to explore the possibility of collecting data by using Semantic Web.

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