DECISION-MAKING TOOL (RUMOTOOL)

Deliverable D.T1.1.5 - Annex 2

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Content

1. Introduction

The main focus of the RegiaMobil project was to test smart mobility solutions in rural areas. By setting up pilot cases in WP T2, and by collaborating with Trenčín, Modena, and Liguria regions in WP T1 with the aim to prepare strategic documents, partners developed and tested several tools to improve mobility in rural areas. This decision-making tool – RUMOTOOL, was developed for a wider audience, which faces similar problems in rural mobility.

The future smart mobility solutions should consist of several complementary features adapted to local circumstances, all of them under the same coordination 'umbrella', involving different actors. There are many ideas for measures such as conventional public transport routes with stops and frequencies based on the needs of the local population, shared mobility solutions, demand-responsive transport services, car-pooling, mini-hub/interchange points, local people engaged on a voluntary basis as drivers or in other supporting roles, and many others, offered by some coordination unit managing the transport services of different rural municipalities. It is necessary to select the right ones respecting the basic conditions, limited possibilities for funding, and the services already provided in the rural regions. The aim of this decision-making tool was to develop an instrument - a practical tool to select the appropriate measure, based also on the needs and ideas of local residents. The tool is dedicated to regional authorities that have competencies in the field of transport so that they can use it to decide which measures can be implemented in some specific area within the planned time horizon.

RUMOTOOL respects the toolbox, presented in D.T2.6.2 - Tool-box documenting successfully demonstrated smart mobility approaches for rural regions supporting the development of smart mobility solutions in rural areas at all stages: from better understanding the current situation, through introducing new services and improving existing services, towards raising awareness and providing information.

2. How the RUMOTOOL works

RUMOTOOL serves as a tool for planning and evaluating mobility measures planned to be implemented in rural areas. It is based on the Multicriteria analysis (MCA). MCA represents a structured approach suitable to analyze overall possible alternatives and preferences and evaluate them under different criteria at the same time. In this methodology, preferable targets and goals are particularized and corresponding characteristics and indicators are recognized. One of the important characteristics of MCA is that the assessment of indicators generally depends on a quantitative analysis of various qualitative impact categories. Obviously, the assessment of indicators is not expressed in monetary terms. The MCA has been adopted by various transport authorities all around the world, and there are many derivations of MCA that had been already developed in various transportation projects (e.g. MAMCA methodology[1]). The potential measures are evaluated a priori, that means before the action takes place. By this method, we can select appropriate measure/action, and then assess this preselected measure in more detail by some kind of Cost-benefit analysis (CBA).

A very useful tool for cost-benefit analysis was developed by Tim Larsson, Lund University, for the CIVITAS DYN@MO project. The tool (an Excel spreadsheet) allows the user to input relatively little data about a sustainable urban transport measure and to obtain a cost-benefit ratio and net present value for the measure based on the monetized value of its costs and benefits. It takes into account many different benefits including time, operating cost and accident savings, and changes in air quality and noise. It uses monetized values of these benefits taken from Swedish and UK sources but adapted to take into account differences in purchasing power in different DYN@MO countries. However, if users have local values, they can include

[1] https://www.mobility4eu.eu/project/mamca-methodology/

these in the spreadsheet if they wish but this is only recommended for expert users who are very familiar with how CBA works. This tool is available for free.[2]

When speaking about travel time and its value, there was another interesting project The "Mobility and Time Value" (MoTiV) addressing emerging needs and perspectives on Value of Travel Time,[3] a relevant research area particularly valuable to decision-makers, transportation planners, engineers, and economists in the context of projects aiming at enhancing transportation infrastructure. There was the question addressed in the project, whether "Travel Time is not productive": "lost" time as an economic loss (justifying aim of travel time savings as cost savings, the rationale of transport projects) or "Travel time may be valuable": value "measured" in terms of quality of experience, not limited to productivity or economic indicators (time/cost savings).

In MCA developed in RegiaMobil, preferable targets are particularized and corresponding characteristics and categories are recognized. One of the important characteristics of MCA is that the assessment of categories generally depends on a quantitative analysis of various qualitative impact indicators. A set of criteria addresses three dimensions of sustainability, i.e., environment, economics, and social aspects. The sustainable mobility evaluation is based on an Index calculated through a weighted multi-criteria combination procedure.

2.1. Evaluation process and toolbox design

The evaluation tool was developed as an Excel spreadsheet including eight sheets. The process of the evaluation consists of the steps is shown in Fig. 1.

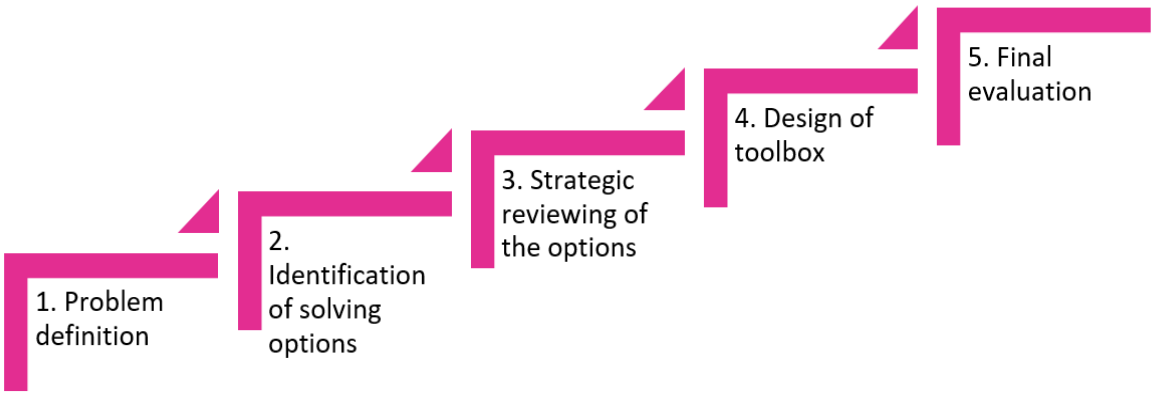

Fig. 1 - The steps of the evaluation process

Each mobility problem is a specific issue, difficulty, contradiction, or gap that you have to address in your region. You will look for practical solutions to problems aimed at contributing to change. You have to identify areas that need improvement (e.g. accessibility of rural areas). In this case, this is also the goal to be achieved (e.g. improving the public transport service to provide better access for the rural population). Defining the problem and setting a target can be done on the basis of feedback from the local population. At the same time problems have to be found in strategic documents and discussed among different key actors and stakeholders involved. Citizens can be reached in different ways (workshops, e-tools, etc.). They will deliver their ideas and define the mobility problems in their region.

[2] https://civitas.eu/tool-inventory/civitas-dynmo-cost-benefit-analysis-tool-for-cities-to-evaluate-measures

[3] https://motivproject.eu/

There are four categories of measures to tackle the defined problems:

- Transport infrastructure and vehicles
- Mobility services
- Communication and information
- Mobility management

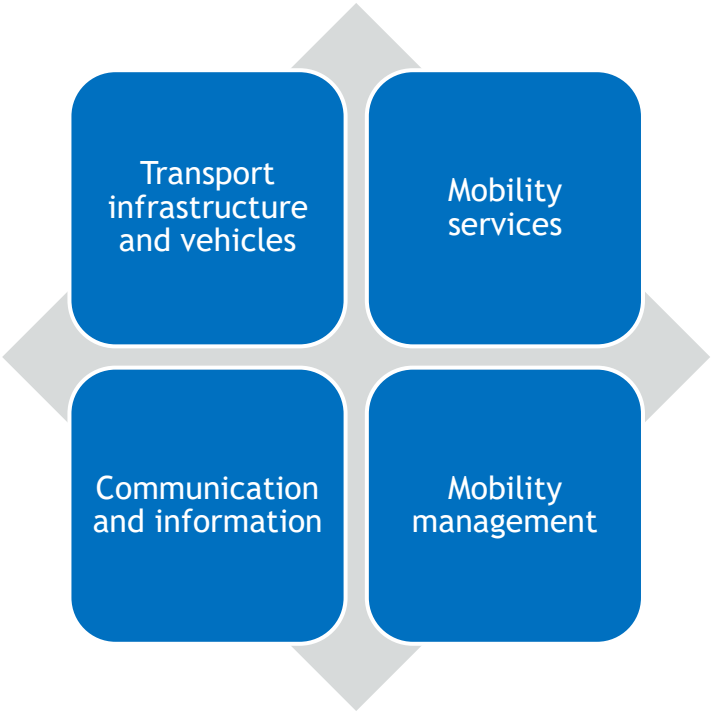

Fig. 2 - The categories of measures

The required improvement of the situation can be achieved in different ways, e.g. by investing in the new vehicles to reach carbon neutral objectives, or by building up or reconstructing the road or railway track. Such measures refer to so-called hard measures. But there are also measures to improve the level of PT service by improving existing or introducing new services which lead to the improvement of accessibility in the region. In addition, the role of the new technologies linked to the services together with the right communication and information provided could increase the usage of public transport. Last but not least there are important measures related to mobility management to ensure that all measures will be conducted in line with strategic planning.

To address the new challenges of mobility in rural areas in order to meet the different goals, various measures and options have been already identified. Some of them are listed in the tool or available in different knowledge bases. There is no single one-size-fits-all solution to address the specific problem of mobility in rural areas, and it is also not possible to implement many measures at the same time. Therefore there is a need to review the options based on the various criteria and find the set of options that could be implemented respecting the available budget and local conditions and frameworks.

There are often problems with the feasibility of measures or options that have to be in line with the legal and financial framework, and other conditions. Only a later, detailed analysis will show whether the chosen solution is feasible or not. Feasibility analysis (study) will help regions to determine the viability of an idea of how to improve mobility, such as ensuring the project is legally and technically feasible as well as economically justifiable. Generally, such studies precede technical development and project implementation.

Some services or measures are subject to contracts that have been completed under public procurement. In addition, the contracts are strictly defined and any changes (e.g. the new services) have a direct impact on the contract which needs to be updated, or the services need to be covered by the providers by themselves. So the degree of flexibility of the implementation of some services or measures is limited. This condition is thus intended to ensure that potential measures are evaluated in advance before they are rejected due to the impossibility of their implementation due to legislative constraints.

A governance responsibility framework defines the basic responsibility for regional and rural public transport. This framework defines the scale and the role of the responsible authority or authorities in the planning process or in the implementation of planned measures. Sometimes the planned measure can affect various levels of governance. The financial framework is represented by the budget that can be used for actions. It sets a limit that can be applied through the various means of financing (whether public or private) to the proposed measures. These frameworks are linked to each other with strong dependencies that are influencing the potential measures too.

3. Evaluation tool (an Excel spreadsheet)

The evaluation tool was developed as an Excel spreadsheet, Annex 3. There is an example of partial evaluation for Trenčín region provided in a spreadsheet.

3.1. Frame conditions

The MCA evaluation is based on two basic conditions. The first condition is related to the legal framework of potential measures. This is related to the fact that not all services or actions have the same legal and operational base in European countries. Most countries have the legal service of regular public transport, but the national framework is not unified in some specific services e.g. on the demand transport services or Mobility as a service. Therefore, it is important that the measure can be evaluated either as part of existing public transport services or, if this is not possible, it can be implemented as a test or pilot. This means that the important frame condition for the implementation of the measure is the governance model. Who is responsible for regional public transport? Is it the regional government or other authorities? Does the operator have to follow strictly the public contract or is there flexibility in providing services? Does the planned measure impact the contract or does not matter? Those are the relevant questions addressing the importance of planned measures in line with the legal framework.

There can be different governance models for transport services. Some characteristics may of course vary from case to case. Usually, those models in Tab. 1 are possible:

Tab 1 - Governance Models for transportation services, Source [4]

	Free market model	**Nationalised model**	**Quasi nationalised model**	**Transport community model**	**Franchising model**
Strategic planning	Private operators	Government	Government	Government	Government
Tactical planning	Private operators	Government	Government	Public planning agency	Private operators
Operational planning	Private operators	Government	Private operators	Public or private operators	Private operators

[4] https://www.ptua.org.au/campaigns/govern/models/

Government role	none	'Turnkey' Provider	Planner and contractee	Planner and contractee	Regulator
Operating contract type	none	In-house provision	Fee-for-service/'Gross cost'	Fee-for-service/'Gross cost'	Franchise/ 'Net cost'
Governing institution type	none	Government Department or Statutory Corporation	Government department	Statutory corporation	Government department
Oversight	Private share-holders	Commissioners or Department Head	Department head	Independent board	Department head/private share-holders

The second condition evaluates the financial situation. What budget is planned to be available for measures in each category per year? There are four categories in RUMOTOOL as follows:

- Transport infrastructure and vehicles
- Mobility services
- Communication and information
- Mobility management.

The first sheet (Fig. 3) includes information on the governance model, the number of inhabitants in the region/district, and the expected budget available for measures per year. It is necessary to complete the yellow cells of the table.

INPUT parameters

Please provide the basic input parameters (yellow cells)

Public transport governance model in region

Governance framework	Free market model	Nationalised model	Quasi nationalised model	Transport community model	Franchising model
Check box	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE
Strategic planning	Private operators	Government	Government	Government	Government
Check box	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE
Tactical planning	Private operators	Government	Government	Public planning agency	Private operators
Check box	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE
Operational planning	Private operators	Government	Private operators	Public or private operators	Private operators
Check box	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE
Goverment role	none	'Turnkey'	Planner and contractee	Planner and contractee	Regulator
Check box	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE	FALSE/TRUE

Number of Inhabitants in region/district	examples
Trencin region	585000
Myjava district	26800

Expected available budget	examples	exmaples
Planned budget per year	Planned investments (in Euro per year)	Planned maintenance (in Euro per year)
Transport infrastructure and vehicles	0	200 000
Mobility services	8 000 000	70 000
Communication and information	20 000	
Mobility management	30 000	

Categories	Dedicated excel sheets
Transport infrastructure and vehicles	InsfrastructureMatrix
Mobility services	ServiceMatrix
Communication and information	InformationMatrix
Mobility management	MobilityManagementMatrix

Fig 3 – the first sheet of MCA evaluation

3.2. Measures

The second sheet (Fig. 4) includes the list of measures. Some of them are already predefined in the table in four categories as examples. The user of the table can supplement his measures as needed. The 'current status' item indicates whether this measure has already been implemented in the region. Different kinds of respondents, key actors, or stakeholders can be involved in the evaluation process. In this way, their voices can be heard and they become a part of the evaluation and selection of a measure that meets their needs. They can be residents of rural municipalities, municipalities, employers, organizations, schools, etc. Measures – evaluation criteria are brainstormed appropriate to the current situation. After discussion, the list of measures is refined. Each respondent can rank criteria according to their importance using the scale from 0 = not important to 5 = extremely important. In this way, we can narrow the list for further evaluation, and identify any criteria that must be included and any that must not be included.

Please write the list of measures	Current status	Input value from inhabitants, stakeholders, etc.
Measures by categories (default list as an example)	Current status (0-no/1-present)	Scoring of the measures (range 0 - not important - 5 extremely important)
Transport infrastructure and vehicles		
new buses	0	5
new trains	0	3
other vehicles (e.g. e-vehicles)	0	5
new railway track	0	4
modernisation of railway track	0	4
new stations, stops	0	4
modernisation of stops, stations	0	5
Park and Ride facility	0	5
Bike and Ride facility	0	5
e-charging points	0	5
Please enter/delete the measure according to your need		
Mobility services		
regular bus service with 30 min. headway during peak times	0	4
regular bus service with at least 60 min. headway during peak-off	0	4
DRT service	0	3
tourist PT service during weekend	0	3
passenger specific service (e.g. pupils, elderly, handicapped etc.)	1	3
bus fare system	1	3
rail fare system	0	5

Fig 4 – The list of measures and their scoring

Subsequently, the MCA methodology will be used to evaluate the selected measures. In general, the MCA is much more suitable in comparison to CBA because it helps to identify better or more feasible options to solve potential problems and reach defined targets. MCA also helps to filter the more important options in comparison to less important ones. CBA is better for the evaluation of the single scenarios or variants before the project starts and it can be used also as a part of the MCA. The main advantage of the MCA is that it is a detailed preferably quantitative assessment using scores and ratings against multiple criteria linked to the objectives of the initiative. It is also scalable and flexible and can be applied in a wide range of potential investment options. MCA has also its own limitations mainly in the area of subjectivity because the evaluation is based on the own preferences of individuals, local stakeholders, or authorities.

3.3. Decision matrixes

A decision matrix for each selected measure - criterion evaluates and prioritizes a list of options (Fig. 5). The evaluation team first establishes a list of weighted criteria and then evaluates each option against those criteria, based on how important that criterion is to the situation.

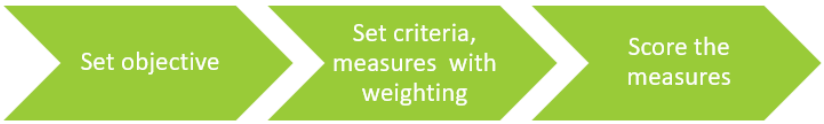

Fig 5 – The list of measures and their scoring

There are several ways how it can be done. First, if we consider that all criteria have the same impact, thus the weight can be applied equally to all criteria. This is possible to use if there is a wide consensus about the criteria. In the case, that some of the stakeholders consider different views on the various criteria or measures, the weight could be set up differently. That means some criteria have a higher importance in comparison to others.

E.g. it is possible to do that by distributing 10 points among the criteria, based on team discussion and consensus. By each member assigning weights, then the numbers for each criterion for a composite team weighting. There are four matrixes at disposal in excel for evaluation of each category. There is an example of such a matrix for the category 'Service' shown in Fig. 6, together with a graphical evaluation in Fig. 7.

			Option 1	Option 2	Option 3
Objective 1	**Criterion**	**Target**	**e-buses**	**hybrid buses**	**CNG buses**
Reduce air pollution from PT	New ecological vehicles	Reduce emission by 50 %	4	3	3
		Zero carbon emission by 2030	5	4	3
			Option 1	**Option 2**	**Option 3**
Weight	0,4	Reduce emission by 50 %	1,6	1,2	1,2
	0,6	Zero carbon emission by 2030	3,0	2,4	1,8
		Objective 1 score for options	4,6	3,6	3,0

Fig. 6 – Decision matrix and rating

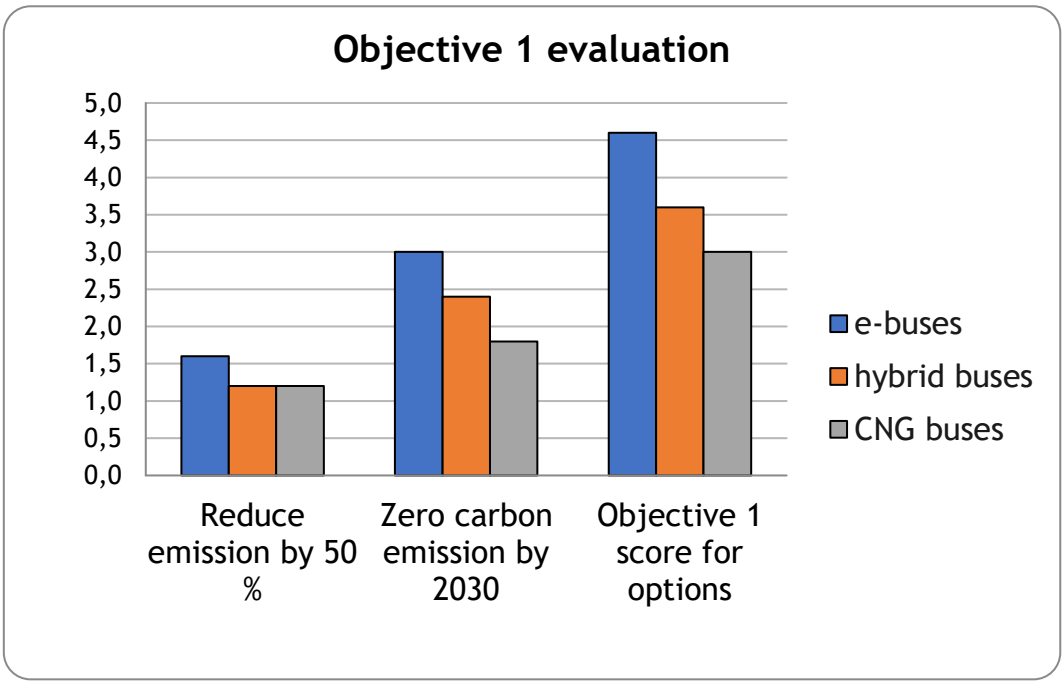

Fig. 7 – Graphical evaluation of rating

Fig. 6 shows a decision matrix to decide which option to solve the overall problem of "bad air quality" to be tackled first. This method can be used when we have several improvement opportunities to solve some problems and several solutions (often just one of them) must be selected to work on. It is important that the rating scales are consistent. Later in the evaluation for each criterion, all options are rank-ordered according to how well each meets the criterion. Each option is multiplied and rated by the weight. The option with the highest score (in the case of Fig. 5 e-buses) will not necessarily be the one to choose, but the relative scores can generate meaningful discussion and lead the team toward consensus. In this case, all options with a score higher than 3 are taken into consideration in the decision-making process.

3.4. Evaluation

As we mentioned before, the proposed tool is not a closed framework, but it is open and scalable according to users' needs. Moreover, it emphasizes the role of citizen participation and engagement. The proposed measures themselves are evaluated through public participation of the population in cooperation with the responsible regional or local authorities. A stakeholder committee should be set up for this purpose. This is important because the committee helps to state also the weight of the criteria.

The role of inhabitants consists of several steps of participation. For the first time, citizens are involved in assessing or defining the problems arising from insufficient mobility services in the region. Secondly, citizens are involved in setting the weights of individual criteria and measures. Finally, the citizens are scoring the proposed criteria and measures, see Fig.8.

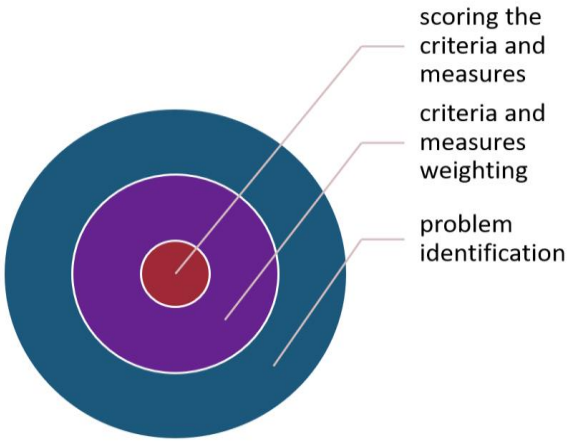

Fig. 8 – The role of citizens' participation

There are several ways how to involve residents, either in various forums, seminars, or workshops. It is also possible to use various digital tools, which residents can participate through e.g. smartphone applications, websites, etc.

From previous matrixes, we have the most important options for each objective (value 3 and more, green marked). It is shown in Fig 9. We should make sure that the persons who will deliver the system of scoring understand the scale and direction of scoring (e.g. higher air pollution means a low quality of life). It is recommended to use only the positive scale. Also, we have to ensure that all measures are possible to score. There is not recommended to use "not applicable" scoring. The system of scoring can be as follows:

- 5 Strong, positive impact
- 4 Moderate, positive impact
- 3 Neutral, no significant positive or negative impact
- 2 Moderate, negative impact

- 1 Strong, negative impact.

The most important options to reach objective (value > 3)			
Scoring (1-5)	option 1	option 2	option 3
Objective1	4,6	3,6	3,0
Objective2	5,0	4,00	2
Objective3	4,5	4,0	2,5
Objective4	4,7	2,8	4
Objective5	2,8	2,8	4

Fig. 9 – Scoring of measures and options

Let's consider that the single options were evaluated by stakeholders and authorities with statements of the final measures. As the final measures have been selected options achieving the value equal to 5. The stakeholders will score the most important options and they will choose the best one (value = 5, Fig 10).

The most important options selected as the best (value = 5)			
Scoring (1-5)	**option 1**	**option 2**	**option 3**
Objective1	**3**	**2**	**2**
Objective2	**5**	**5**	**3**
Objective3	**4**	**4**	**2**
Objective4	**4**	**2**	**4**
Objective5	**1**	**1**	**5**

Fig. 10 – The most important options

In the final step, we compare the base scenario or DO NOTHING scenario with the DO SOMETHING scenario (See Tab.2). In general, the evaluated measure is always compared with the real-world scenario which represents the base case for future comparison.

´Tab 2 – An example of proposed measures in DO NOTHING and DO SOMETHING SCENARIO

Measures	DO NOTHING (base case)	DO SOMETHING (plan)
Number of regular daily services		
Travel time (min.)		
Implemented measures		

To support the implementation of the measure, the CBA may be conducted separately. See the reference mentioned above.

In the evaluation sheet, there is also an example of a comparison of benefits and costs of car usage and public transport service usage for the implementation of bus connections in Myjava district.