

QUALITY MANAGEMENT AUDIT SCHEMES IN SUSTAINABLE URBAN MOBILITY - LEARNING FROM EU EXPERIENCE

UDC:

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Abstract: This paper reviews the approaches of major European Union (EU) initiatives on Quality management (QM) and sustainable urban mobility. The focus is on QM audit schemes used for sustainable urban mobility planning. Based on the gathered body of knowledge major signposts for urban mobility planners and practitioners are summarized. The paper also demonstrates how the EU experience served as a baseline for benchmarking the Serbian road traffic safety system from the perspective of work of the most relevant institutions.

Key Words: *QM, audit, self-assessment, sustainable urban mobility, European Union.*

1. INTRODUCTION

Growing transport related problems in European urban areas have brought the question of sustainable urban mobility planning to the forefront. In the core is the new urban mobility concept that assumes that the mobility problems are not only a consequence of a limited physical access to the transportation modes, but involve complex environmental, economic, social and behavioural concerns [1]. From this raised the need to develop a new planning approach that will steer sustainable urban transport development. Sustainable urban mobility plan (SUMP) is the central concept of *EU urban mobility package* [2]. SUMP is defined as “a strategic plan designed to satisfy the needs of people and business in cities and their surroundings for a better quality of life; It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles” (definition given by ELTIS - The urban mobility observatory of EU).

Many initiatives were invoked in order to support SUMP deployment across the Union. The important research stream is considered with exploiting quality management (QM) audit schemes. Many projects and initiatives were launched to come up with proper QM audit schemes that will support decision makers and practitioners in EU in sustainable urban mobility planning.

This paper reviews accomplishments in devising QM audit schemes in the field of sustainable urban mobility in EU and demonstrates how the EU experience can serve as a baseline for similar efforts in Serbia.

The paper is organized as follows. Section two is about QM and sustainable urban mobility with the focus on experience in devising audit schemes, while section three offers a comparison of these schemes. In the section four it is shown how the ADVANCE audit

scheme served as a framework for benchmarking transport safety in Serbia.

2. QM audit schemes and sustainable urban mobility in EU

Schemes, based on quality management (QM) principles help cities in systematically developing and deploying Mobility Management (MM) plans and MM measures and therefore successfully support sustainability of their transportation system [2].

Quality Management schemes (also labelled as QM-schemes) shield and evaluate the quality of processes and outputs and give direction on how to advance the quality. On the other hand, according to the ISO 19011 (2002) audit is defined as “a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled”.

It is important to stress that audit is not an indispensable part of QM schemes i.e. QM-schemes are a wider concept that may or may not include some kind of audit. On the other hand most audits are not themselves QM-schemes [3].

When it comes to sustainable urban mobility there are many different QM schemes, but only some of them include audit or self-assessment.

2.1 The relevance

The first question we address in this paper is why and how QM is of relevance for sustainable urban mobility i.e. what invoked researchers to engage in developing QM schemes for urban mobility. The strongest impetus to this idea was given by EU transport policy documents.

Transport White Paper from 2011 [4] adopted by European Commission in 2011 denotes that independently validated *Urban Mobility Performance and Sustainability Audit Certificate* should be

considered in allocation of regional development and cohesion funds for cities and regions.

Furthermore, EU Urban mobility package in its annex on SUMP [6] states that local authorities should have a mechanism to assure quality and compliance of SUMP with adopted policy principles.

QM schemes are seen as a tool that will help local authorities to evaluate their urban mobility planning. The basic idea is to rely on QM audit schemes to accelerate the take up of SUMP.

2.2 A review of selected QM audit schemes

EU initiatives for QM audit schemes in sustainable urban mobility are aimed at implementing and/or evaluating SUMP or some specific aspects of sustainable urban mobility - accessibility, safety, modal shift, etc. They address at least the following objectives [4]:

- Ensure the accessibility offered by the transport system to all;
- Improve safety and security;
- Reduce air and noise pollution, greenhouse gas emissions and energy consumption;
- Improve the efficiency and cost-effectiveness of the transportation of persons and goods;
- Contribute to the enhancement of the attractiveness and quality of the urban environment and urban design

According to latest reports reviewing the state-of-the-art of QM and urban mobility, there is over 50 initiatives that are, at least to some extent, aimed at solving urban mobility problems using QM resources. There are several sources that offer comprehensive review of these initiatives can [4, 7-9]. Here we will in details analyse those which offer QM audit schemes.

BYPAD - Bicycle Policy Audit was a big initiative that lasted nearly ten years (1998-2008) and included 100 cities and 18 regions in 21 countries. BYPAD developed an audit scheme for cycling policies based on the Total Quality Management (TQM) methods. The BYPAD audit is in fact a self-assessment tool.

MaxQ (2006-2009) resulted with Quality Management System for Mobility Management (QMSMM) and audit procedure to support the implementation of the QMSMM in medium and small size cities. The QMSMM scheme is a process, which can be adopted by any organisation for managing their overall MM policy as well as particular MM measures. Depending on resources and budget the audit procedure can be carried more or less ambitiously in terms of engaged stakeholders and existence of external auditors[10]. It goes from using short questionnaires for MM quick scan without external involvement (self-assessment tool), over internal and/or external audits to external audit that ends up with benchmarking and certification.

EcoMobility SHIFT - EcoMobility Scheme to Incentivise Energy-Efficient Transport (2011-) developed labelling scheme ("EcoMobility Label")

based on QMS to help cities work towards EcoMobility i.e. environmentally friendly transport options. "EcoMobility Label" was the first TQM scheme for urban mobility and includes assessment and external audit [9]. The audit is performed by an external transport professional who is also a certified auditor for the SHIFT scheme. A stakeholder group evaluates the effects of a city's sustainable transport policies and actions in terms of environment, accessibility, safety and equity. For each indicator, the group evaluates performance level and weighs. The novelty is that EcoMobility Label includes both enablers (policy), actions/measures and effects of these on the transport system. Through externally assisted/ audited assessment EcoMobile status relative to other cities is evaluated and city is awarded with a relevant label (Gold, Silver and Bronze, valid for a defined period of time).

ISEMOA - Improving Seamless energy efficient mobility chains for all (2010-2013) developed so called ISEMOA QMS (two versions-one for cities and the other for regions). It included a moderated audit process to help cities' authorities to make public spaces and public transport more accessible, especially for people with reduced mobility (PRM). The audit process is performed by external auditor and ISEMOA auditor and involves a great number of stakeholders.

The **MEDIATE** project (Methodology for Describing the Accessibility of Transport in Europe, 2008-2010) was aimed at evaluating equality of access to public transport. It involved different stakeholders and end-user groups. The self-assessment tool was developed to identify weak elements in planning & implementation of accessible public transport and to discover new strategies.

The **QUEST** project (Quality Management Tool for Urban Energy-efficient Sustainable Transport, 2011-13) was aimed at developing TQM based auditing and certification scheme for medium sized EU cities (population 50,000 to 300,000 people). It contributed to produce tailored action plans and issued QUEST certificates for prominent cities. The Quest process includes following subsequent steps: an audit, self-assessment, report&action plan and certification

The **ADVANCE** (Auditing and certification scheme to increase the quality of sustainable urban mobility plans in cities, 2011-2014) developed an audit scheme to assess the quality of the cities' mobility plans. The scheme evaluates mission (five fields) and actions (eight fields) related to SUMP. Local authorities together with an external auditor critically review their mobility plans, judge its strength and weaknesses, and develop urban mobility measures. The audit is performed in three steps. City representatives form the ADVANCE working group consisting of city representatives and external stakeholders. They also choose among advance auditors who then facilitate and mentor their assessment. Each working group member fills the self-assessment questionnaires, while the auditor

moderates all working group meetings, helps to reach a consensus and to prioritize actions. Depending on the progress in the action/mission field the city is labelled as starting, advancing or advanced. It can be applied to all size cities. The process ends with the adoption of an action plan.

2.3. Lessons learned

Table 1 contains the summary of characteristics of EU QM audit schemes in the field of urban mobility. Developed QMS (e.g. for ISEMOA, BYPAD, MaxQ and MEDIATE) are based on ISO 9000 family of standards as well as on the EFQM Excellence and Common Assessment Framework -CAF models. EU QM schemes are developed to address outputs or work

process or both (like ADVANCE). They also include similar components and elements (Table 2). All of them, entail audit or self-assessment or both. For example BYPAD and Mediate clearly focus on self-assessment. The unique example is MaxQ which offers several different types of audits including self-assessment. The most elaborated issue in this sense is the way the assessment is organized and communicated to the stakeholders i.e. about the involvement of an external auditor [7,11]. Preliminary research in QUEST (interviews with experts) indicated that external auditor's role in the process influences the willingness of stakeholders to participate in the process and support actions.

Table 1. Review of QM audit schemes in sustainable urban mobility in EU

Project	Duration	Field	QM/ TQM scheme	Audit/ SA	Bench- marking	Certification	Source
MaxQ	2006-2009	Mobility management	√	√	√	√	www.epomm.eu
BYPAD	1999-2008	Cycling policy	√	√		√	www.bypad.org
EcoMobility SHIFT	2011-	Eco-friendly transport options	√	√	√	√	https://ecomobility.org/ecomobility-shift/
ISEMOA	2010-2013	Accessibility of public transport.	√	√		√	http://www.isemoa.eu/
QUEST	2011-2013	Energy-efficient transport	√	√		√	http://www.quest-project.eu
MEDIATE	2008-2010	Inclusive urban transport systems	√	√			http://cordis.europa.eu/project/rcn/88862_en.html http://www.aptie.eu/ http://www.mediate-project.eu/
ADVANCE	2011-2014	SUMP	√	√		√	http://www.eu-advance.eu

On the other hand EcoMobility SHIFT suggest using an auditor who was not involved in the assessment phase and who does not work for the city in order to maintain impartiality in the results.

All presented QM schemes include the certification (Table 1) in order to make the cities' progress towards sustainable mobility visible especially in the process of funds allocations.

Table 2. Components and elements of QM schemes in the transport sector [7]

BYPAD		MaxQ		MEDIATE	
Components	Elements	Components	Elements	Components	Elements
Planning	User needs	Policy	User needs	Planning	User needs
	Leadership & Coordination		Policy on paper		Leadership
	Policy on paper		Leadership		Guidelines & Policy on paper
	Means & Personnel	Strategy	MM programme		Resources & Personnel
Action	Infrastructure & Safety		HR management	Implementation	Vehicles & Built Environment
	Information & Education		Partnerships		Information & Ticketing
	Promotion & Partnership		Budget		Training & Education
	Complementary actions	Implementations	MM measures		Seamless Travel
Monitoring	Evaluation & Effects		Supportive measures	Evaluation	Results
	Monitoring & Evaluation	User & Society results	Evaluation & Effects		
		Stakeholder feedback			
		Management review			

They also all include more or less similar ladder of development (Table 3). The ladder of development enable to track and evaluate the development stage in a understandable way. The levels may be differently depicted (linguistic or with various symbols) as long as they clearly indicate the quality of development.

Table 3. Ladder of development in MaxQ, BYPAD, MEDIANE and ADVANCE

Level	MaxQ	BYPAD	MEDIATE	ADVANCE
5	Total quality MM-approach	/	/	/
4	Chain-oriented MM-approach	Integrated approach	Integrated approach	Integrated approach
3	System-oriented MM-approach	System-oriented approach	System-oriented approach	System oriented approach
2	Process-oriented MM-approach	Isolated approach	Isolated approach	Process oriented approach
1	Activity-oriented MM-approach	Ad hoc-oriented approach	Ad hoc-oriented approach	Activity oriented approach
0	No evidence of MM-approach at all	/	/	/

3. EU URBAN MOBILITY QM AUDIT SCHEMES AS A FRAMEWORK - the case of road traffic safety system in Serbia

Transport safety is an important domain of mobility planning. In the 2016 Serbian Road Traffic Safety Agency launched an initiative to develop a framework to benchmark road traffic safety system in Serbia with the focus on the work of the relevant institutions [12]. The aim was to determine to what extent relevant institutions contribute to national road traffic safety goals (so called five pillars of Road Traffic Safety Strategy [13]), and to detect the fields for improvement. It is a specific task since it does not fall into the common "comparative benchmarking" but rather refers to a collaborative benchmarking where the aim is to establish "learning atmosphere". The benchmarking is not initiated by a benchmarking partner who wants to gain superiority over others but from a third party (here a governmental agency) that wants to and assess achievements against the predefined standards of excellence-benchmarks and promote sharing experiences [14]. The assessment was carried out in respect to five pillars of road traffic safety strategy and eight fields of assessment, going from legal and strategic framework to safety system approach. For each of these fields best practice exemplars (benchmarks) needed to be defined. Three types of benchmarks were considered: 1) policy benchmarks defined in strategies and policy papers; 2)

theoretical-ideal benchmarks and 3) performance of road safety institutions recognized as best practice exemplars.

To come up with the framework to assess the performance against the benchmarks, different approaches were considered: road traffic safety performance evaluation approaches, ISO 39001, urban mobility QM audit schemes, studies on benchmarking roads safety institutions (e.g. study of Transport Research Board [15], OECD/ITF [16], etc).

Several conclusions were made. Road safety performance evaluation tools are heavily dependent on indices capturing mostly performance and rarely institutional aspects. ISO 39001 although with exhaustive indicator list was not applicable to all institutions under study. Namely all institutions do not contribute to all road safety pillars.

When it comes to existing benchmarking studies in the field of road traffic safety [15,16] they are specifically designed and oriented mostly to benchmarking same institutions from different countries what was not the case here.

The important signpost for further investigation on proper evaluation scheme was the conclusion offered by Al-Haji [17, 18] who worked on the development of *Road Safety Development Index (RSDI)*. Al-Haji [17, p.35] points out that TQM and business excellence models (including quality awards MBNQA¹ and EQA²) should be considered in order to assess the work of road safety organization and institutions and their performance against benchmarks.

Following the foregoing, methodologies for auditing in the field of road safety such as *Swedish Road Safety Audit* and *Road safety audit "on the way to school"* were further analysed. *Swedish Road Safety Audit* is focused on road design projects and creating a traffic safety plan. The analysis is conducted for seven themes and for both traffic safety standards and traffic safety culture. The maximum overall score for each main alignment (standard and culture) is described by 5 stars. Its advantage is that it deals both with the working process and the actual situation and has long been successfully applied [11]. The other safety related audit offers methodology for auditing the road safety levels in school itineraries in order to protect students in their daily way to school. It includes two checklists used to evaluate the proper design of the school areas and intersections [19]. Both audits although contributable to road safety auditing do not consider the work of road safety institutions.

Therefore in order to offer proper methodological framework for evaluating work of road safety institutions in Serbia, it was necessary to look beyond the existing safety audits. There are several advantages that qualified QM audit scheme in sustainable urban mobility planning (especially ADVANCE) to be a framework for evaluating road

¹ Malcolm Baldrige National Quality Award

² European Quality Award

traffic safety system of Serbia and the work of relevant institutions.

First, these audit/self-assessment schemes evaluate the efforts and the results of joint work of different stakeholders) in achieving shared goals. This is in line with the need to evaluate the work of safety institutions on achieving the objectives covered by the pillars of road traffic safety strategy.

Furthermore, the ladder of the development used in ADVANCE, MEDIATE and BYPAD with small alterations is easy applicable to safety indicators addressing the work of institutions.

The natural question is how ADVANCE can be used for benchmarking when it is clearly highlighted in the relevant reports that advance is not a benchmarking tool. QUEST also disregards benchmarking. All the mentioned QM audit schemes in SUMP are aimed at various cities across EU, different in their characteristics and therefore are not so easy to be coordinated. All this imposes serious concerns on comparability and eventual transfer of good practices. As highlighted in QUEST report [7, p.70] benchmarking is too time consuming and the capacity can be used better in order to support the uptake in the city itself i.e. his progress towards the benchmarks.

Regarding ADVANCE, although originally not a benchmarking tool it has enough elements to be of help in case of collaborative benchmarking. For each of the aspects in mission and actions fields the benchmarks in terms the ones to look up to are offered and the performance is evaluated against them. This is in line with the three types of benchmarks considered for each aspect of the work of road traffic safety institutions. This was used to obtain the gap between the actual performance and desired (benchmark) performance for each aspect and each pillar. The performance on the pillar level was labelled as starting, advancing or advanced (as in ADVANCE) with the modification that weighting factors were included for aspect within the pillars (agreed by experts as in EcoMobility SHIFT). Besides detecting the fields for improvement (based on the gaps) the responsibilities of roads safety institutions are also "mapped". In this way each institution is provided with the areas in which it can move forward and the best practice to follow in this improvement path. On the country level the overall road traffic safety system is accessed and institutions responsible mapped.

The used questionnaire is easy to use and follow and can be used continuously to track progress toward road safety national goals.

4. CONCLUSION

This paper offers a review of major EU QM audit schemes in the field of sustainable urban mobility. Some conclusions that can be in help for future designs of these schemes are:

- combining self-assessment and external audit;

- careful consideration of the role of external auditor;
- including ladder of development;
- including certification to ensure the visibility of the made progress;
- considering both working processes and outputs as much as possible.

All EU QM audit schemes are developed carefully and represent comprehensive frameworks that can be of much help for urban mobility planning and related issues.

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