THE RELEVANCE OF STRATEGIC ASSESSMENT OF URBAN MOBILITY NETWORKS

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ABSTRACT

The good performance of the urban mobility systems (UMS) is one of the necessary conditions to a competitive city. Besides quality of life and business, cities require a UMS that fulfills all its displacement needs, ranging from people to goods. In this sense is clear that the UMS has to embody a multimodal structured and integrated mobility network whose configuration should be according to the needs of the city. However, this is a theoretical vision of the urban mobility network (UMN) planning. In practice, the interventions made in the network are performed in order to meet specific needs of the city, without considering its main vocation. In this way, this paper discusses the relevance of strategic assessment of urban mobility network as a mean of guarantee the conciliation of both visions of the UMN planning. This discussion is preceded by the identification of the urban network planning problem, followed by a discussion about the strategic planning of the urban mobility system planning, to finally argue the relevance of the strategic assessment of urban mobility network.

Keywords: Sustainability, Planning, Mobility Network, Strategic Assessment.

INTRODUCTION

Transport plays an important role in urban areas, not only for their residents, visitors and investors but also for the distribution of goods and services, and mobility is intrinsically embedded in the perception of quality of life of the city and therefore in their potential for competitiveness. In this sense, the urban mobility system (UMS) has a vital character, for it allows access to all activities in the city and delivers fluidity in all urban displacements of people and goods.

According to Macário (2000) and European Commission (2005), the UMS should be seen as an enabler of the urban system, from which it is a subsystem with great autonomy of organisation that has a strong symbiotic relationship with other subsystems, acting as a key component of the attractiveness of cities and playing a major role in decisions on where to work and invest, that is in the competitiveness of a city or urban area.

Therefore the planning of the UMS should be done in order to adequately meet the needs of the city it serves. This means the UMS should provide an efficient level of mobility for the performance of all functions taking place within the city, meeting the needs of its different users – whether they are individual users like residents, tourists, businessmen and students, or institutional, like companies or public institutions (Garcia et al, 2008). Depending on the purpose of each displacement, the needs of the travellers will also differ, and these needs give rise to multi attribute requirements to be fulfilled by the UMS.

In order to attend to all these needs, it becomes clear that the UMS has to embody a structured multimodal and integrated mobility network, as all the different requirements cannot be met neither by a single mode nor by the simple systems of several modes. The mobility network considered in this study includes not only the physical network (roads, railways, metro, etc) and transfers, but also the service networks and the information networks on how to use the system. The physical network is the one that supports the services offered by the UMS, the second type refers to the set of organised service offer by bus, metro, tram and train lines, and the third refers to the set of articulated information that make the interface between the travellers and the other networks.

This network must be configured according to the city's needs, and consequently of its inhabitants. It is necessary to think the best configuration of the urban mobility network that should serve the city and thus make it competitive against other cities with the same function. However, this is an ideal vision of the urban mobility network configuration. In practice the interventions made in the network are performed in order to meet specific needs of the city, without considering its main vocation, reflecting an incremental development process for the network often loosing the notion of the whole system (Macário, 2007).

Based on this vision, this paper discusses the relevance of strategic assessment of urban mobility network as a mean of guarantee the conciliation of both visions of the UMN planning. This discussion is preceded by the identification of the urban network planning problem, followed by a discussion about the strategic planning of the urban mobility system planning, to finally argue the relevance of the strategic assessment of urban mobility network.

RECONCILING THE USER AND SERVICE PROVIDER PERSPECTIVES

One of the major conflicts that UMS planners have to deal with is the divergence between the vision of the user and service providers about the system. The inhabitants of cities, UMS

users, consume the services offered by the system in a chain, making the choices about their travel based on the global offer provided by the system, considering all available modes, the need for transfer and the desired route. However, managers and operators look at UMS in a compartmentalized and often ring fenced attitude, focusing their efforts only in the modes they manage/operate, which contributes to the provision of less efficient services and therefore less adequate performance of the network.

During the UMS planning process the conciliation of the users and service provider's interests can only be completely achieved at strategic level, where political priorities, financial resources and objectives are defined. It is at this level that the network configuration must be defined, i.e., the combination of modes, its prioritization and the levels of integration, accessibility and coverage of the network. Thus it is during this planning level that it is possible to define the general configuration of the network that better meets the city needs considering the political priorities established and means and resources available.

However, the conciliation of these two divergent visions is also achieved in a restricted way at the tactical level of the UMS planning process. At this level the mobility system must be conceived and the design of its detailed network done in order to attend the needs of displacements of the users. Though, in practice, the decisions made at this level are more based on the operational problems than oriented by the guidelines set at the strategic level and, consequently concentrated in the improvement of part of the network or in a single type of mode.

Moreover despite the objectives of each planning level being clear in theory, in practice what takes the lead is the tactical planning of the network often thought as a strategic one. Very often, planners are confronted with the task of designing a network for a new mode in the city, based in political decisions that were not thoroughly discussed or assessed, which also reveals that the strategic planning of networks is not being performed properly. This happens due to a very unclear definition of what is strategy in UMS and how much this should be linked with the strategy of the city itself.

In this sense the problem of the urban mobility network (UMN) planning can be identified as the divergence between the theoretical and practical approach of the UMN planning since is clear that in practice there is a significant distortion in how the network is planned and how it should be planned. This divergence is also reflected in the way the network is assessed, since in theory the network assessment should be guided by the holistic vision of the system and hence by the user's view, while in practice the approach is much in line with the upcoming of operational problems (Figure 1).

Theoretically, the assessment process of the network should be a top-down approach starting with the verification whether the strategic objectives for the network are according to the strategic goals of the city (strategic assessment), to then assess if the design of the network meets the needs of displacement of the city (tactical assessment) as consequence of the strategic options taken for the development of the city, and finally verify if the services

offered are the most adequate to fill strategic and tactical objectives (operational assessment).

However, in practice what happens is a bottom-up approach with the analysts interfering in the network to solve only minor problems encountered in day-to-day operations without assessing the impacts of the local changes on the overall network performance. Normally they make only the assessment of specific parameters of parts of mobility chains, such as waiting time, travel time, number of transfers, etc. Besides, with the exception of main intervention (like new metro systems, etc.) the assessment is mainly unimodal, while the citizen expectations in the UMS have a multimodal perspective.

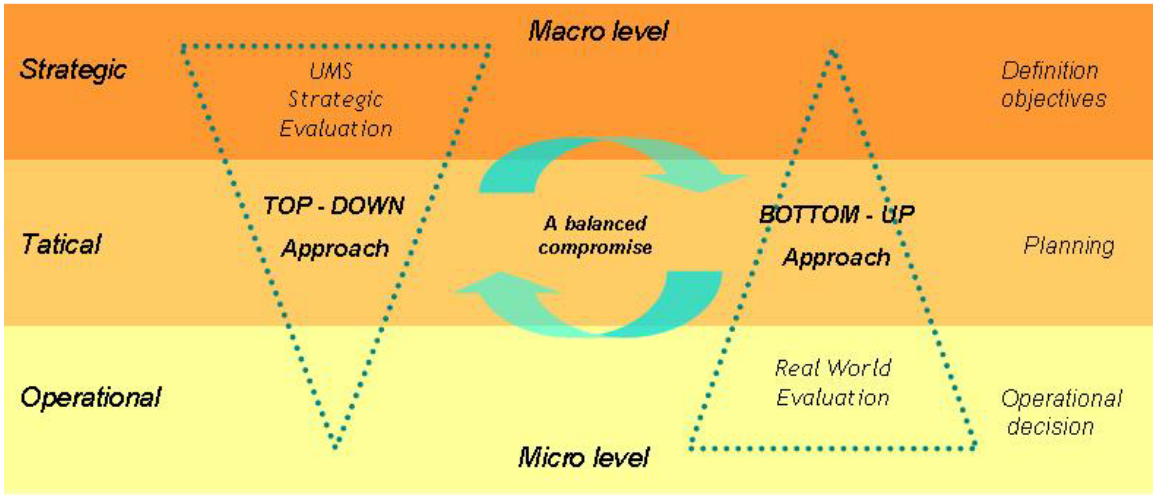

Figure 1: The theoretical and practical UMN planning/assessment approaches

This divergence between the top-down and the bottom-up network perspectives point to the need for a compromise between these two approaches, because it is not enough to intervene only microscopically in the network, it is also fundamental to look at it as a whole and conciliate both perspectives. For this the strategic assessment of the network seems to be a fundamental action in the sense that helps to consider a holistic view over the system and therefore ensure the conciliation between users' and provider's perspective. In fact it is not obvious at this stage whether the problem lies fully in strategic or tactical level. Instead it may well be shared by both due to undergoing casual relationship, but the departure hypothesis of this research points toward deficient strategic formulations.

To help understand the importance of the strategic assessment, the next section will deepen the discussion first on the strategic planning process of the urban mobility system presenting the main issues that are currently defended in the literature, to then examine the practice of strategic assessment in the planning sector and identifying the main arguments, methods and restrictions in its application that can be projected to the specific case of the network assessment.

THE STRATEGIC PLANNING OF URBAN MOBILITY SYSTEMS

According to da Silva et al. (2008) until the end of the 1970s the concept of mobility was predominantly seen as a matter of transportation services provision, but in the last decades the way cities and their mobility systems are planned started to change. That change resulted not only in new planning strategies, but also in the development of a new urban mobility concept, which is based on the assumption that the mobility problems are not only a consequence of a limited physical access to the transportation modes, but also involve complex environmental, economic, social and behavioural issues.

This new concept expresses the principle of sustainability which according to Macário (2007) in the context of urban mobility can be translated as the balance that assures citizens access to the economic and social services and activities for their lives, while minimising negative environmental, economic and health impacts of mobility. This means offer a combination of modes including public and private motorized modes as well as non-motorised modes, which together provide the best mobility solution for the city, in order to meet its citizen's needs without compromising the ability of future generations to do the same.

Many authors have been defending the principle of sustainability and consequently of its economic, environmental and social dimensions as the base to guide the UMS planning process (Meyer and Miller, 2001; Goulias, 2003; Jeon, 2007; Litman, 2007). The consideration of this principle provides a more comprehensive approach to the planning process and consequently allows the assessment of the different impacts caused by the UMS. Moreover, Jeon (2007) argue that integrating sustainability considerations in the planning process can help decision makers prioritise strategic objectives, since different dimensions of sustainability may become more significant as the transport needs, the patterns of land use, the quality of environment and economy of the city evolve.

For Goulias (2003) each sustainability dimension serves a specific objective to support effective policies and need to be considered together in order to avoid solutions for one problem that exacerbates other problems and undervalues strategies that provide multiple but modest benefits. In relation to UMS each sustainability dimensions can be understood as:

- Economic dimension is related with the efficiency of the UMS. As an enabler of the urban system the UMS need to operate efficiently, offering choice of transport mode and levels of accessibility that support the urban activities and consequently the economic development of the city. According to Crozet (2009) the accessibility provided by the UMS is the major leverage of the urban economic development and the mobility policies that aim to promote the sustainability should be focusing on its provision instead of limiting their goals on objectives such as improvement of speed.

- Social dimension is related with the concept of equity that implies providing all the population with the same mobility opportunities. For Litman (2007) there are two types of equities to be considered in an UMS. One is related to the distribution of impact between individuals considered equals in their mobility needs and requirements

(horizontal equity) and the other is concerned with the distribution of impacts between individuals and groups that differ according to their social classes and income or to their mobility needs (vertical equity). The consideration of this concept implies that the mobility policies should favour the economic and social disadvantage groups and people with disabilities or other types of special needs.

- Environmental dimension is related to aspects such as the consumption of non-renewable resources, the abusive use of land and the visual impacts caused by the UMS. For Schafer (1998) most of these problems are generated by the massive use of cars that are fossil fuel powered and demand more space for the construction of infrastructures which contributes for the urban sprawl. These problems lead to the need of policies that limits the emissions, promote the use of renewable resources, minimizes the use of land and encourage the use of public transport, soft modes and walking.

Another important premise in the strategic planning process is the consideration of the multimodality of the UMS. As the system is supported by a set of different modal networks, the recognition that there is not a single solution to attend the displacement needs of the citizens should be one of the first steps in the development of the UMS strategies. Besides, the multimodal view over the system allows expanding the planning focus beyond private vehicles and considers other modes which not only enhance the overall performance of the system, but also promote its sustainability.

Although the consideration of the sustainability principle and the multimodal quality are key issues for the UMS planning, the land use-transport interactions are also a primary question that needs to be addressed as its integration is considered a precondition of sustainable development. It is clear the mutual relationship between transport and land use as not only the travels are derived from the land use, but also the accessibility provided by the UMS influences the land development and the location choice. In fact, according to Meyer and Miller (2001) these interactions should represent the start point for the analysis of many transport policies, but unfortunately in practice the planning and analysis of both systems are developed inefficiently or even independently.

To address the land use-transport interaction into the planning process, integrated land use and transport models (ILUTM) have being developed with the objectives to better understand the connections and feedbacks between these systems. Miller (2003) defended that ILUTM provide not only a more detailed simulation of person and household demographic and socioeconomic attributes, which can be powerful explanatory variables of travel demand, but also provide policy analysis capabilities for a much wider range of land use, transportation, and other policy measures that might influence travel behavior.

However, in general, these models are still limited in considering the sustainability performance of land use and transport policy. According to Hatzopoulou and Miller (2008) there are few examples of where the LUTM framework has been extended with capabilities to consider this issue. Good examples are the European project PROPOLIS and the

Canadian ILUTE project. In both projects a set of environmental, economic and social indicators are proposed to evaluate policy options in terms of their impact on urban sustainability which allows a change in the transport evaluation to a broader approach much more sustainable.

Another interesting approach that combines the principle of sustainability and the land use-transport interactions into the UMS planning process was proposed by Doust (2008) *apud* Doust and Black (2009). In his work a sustainability framework (Figure 2) was designed to bring the three sustainability dimensions together with a holistic consideration of the urban system, the urban dynamics and the resulting sustainability performance. The main objective of this approach is ensuring the visibility and the measurability of the systems elements and interactions that drive the sustainability performance of the city, through the application of the integrated urban models and development of indicators as a base for a quantitative methodology for assessing the sustainability of the cities.

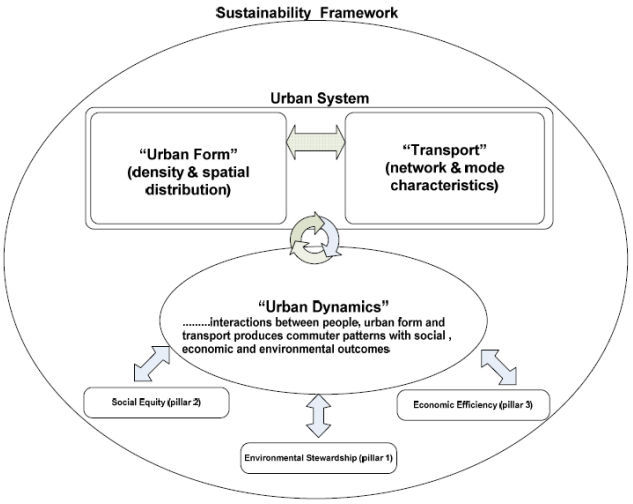

Figure 2: The Urban Sustainability Framework (Doust and Black, 2009)

Notwithstanding the existence of such frameworks, the incorporation of the principle of sustainability in the UMS planning process is still restricted due to the fact that in many urban areas the concept of sustainable mobility is not yet perceived and in others, despite the evidence of understanding the concept, has not been assumed in an integrated organizational and management structure covering all the decision levels (Macário, 2007). This contributes for an absence of strategy for the systems which can be noted in the unclear division between strategic, tactical and operational levels, with very often considerable overlap between these decision levels.

In this context the strategic planning process assumes significance since it helps to define a strategy for the UMS, by defining the strategic objectives for the system and the guidelines for the development of tactical and operational actions to attain them. After the identification of the needs and problems of the city (or the citizen), the definition of the objectives is the first step in this process and should reflect the main goals of the city and the sustainability

principle. Specifically in relation to the mobility network, the sustainable strategic objectives of the UMS should be consistency amongst them and comprise concerns such as:

- Provision of good levels of accessibility and redundancy in order to support all the activities in the city (economic sustainability);
- Promotion of equal access to meet the individuals needs of displacement (social sustainability);
- Prioritisation of collectives and non-motorised modes through a hierarchical and more compacted network in order to promote the reduction of the auto-dependence and the abusive land use (environmental sustainability).

Besides the consideration of such sustainable concerns, Macário (2007) also defends that for the definition of strategic objectives in the UMS is important to define the relevance and consequently the hierarchy of these objectives. This can be achieved by the decision-makers' interpretation of the importance of the citizen's needs and of the problems to be solved. This process is necessary since cities differ substantially in its vocation and hence in its needs, and even when the problems are similar, the perceptions on which are the main problems and which are the best solutions to mitigate them will differ for each city accordingly to their past experience.

Moreover, to guarantee the achievability of the objectives another important action is the assessment of the probability of success of each of the actions and policies envisaged as potential solutions for the needs and problems identified previously as well as to the superior objectives of sustainable development of the urban environment. In this sense the assessment action has a significant role in the formulation of strategy, since it allows not only the verification of the matching between the strategic objectives of the system and the principles considered in its formulation as well as the strategic objectives of the city, but also enables the verification of the concordance among tactical and operational actions in relation to the achievement of the strategic objectives, thus contributing for the vertical consistency of the UMS as stated by Macário (2005).

HOW RELEVANT IS THE STRATEGIC NETWORK ASSESSMENT?

The importance of strategic assessment in the planning process has been emphasised by the exercise of carrying out Strategic Environmental Assessment (SEA) and more recently by its broader version Sustainability Assessment (SA). In both cases the main purpose is to address in the early stage of the planning process the main implications of policies and proposals in relation to environment aspect in the case of SEA, and also social and economic aspects in the case SA.

According to Fischer (2002), the strategic assessment can be seen as an instrument for reconciling not only different decision levels but also different sector areas due to its tiering characteristic. According to him its application helps reconciling differing goals and objectives

of different planning (strategic, tactical and operational), administrative (national, regional and municipal) and geographical (global, regional and local) levels (vertical tiering) and also links sector areas such as transport and land use planning and different government bodies at the same administrative level (horizontal tiering).

Different initiatives of SA under various forms and titles are spreading around the world, but two broad forms can be distinguished in relation to its approach. One that follows a EIA-project model though looking at different levels of decision, such as the assessment of major infrastructure projects performed in Canada and Australia (Gibson, 2000 and Pope et al., 2005). And other that follows a SEA model with a planning focus addressing strategic impacts in a sustainability context, such as the Sustainability Appraisal applied by the UK government in its regional planning (ODPM, 2005).

The SEA approach of SA does not present a standard process to be followed. Instead it considers a framework of key functions and activities that in general should comprise activities such as understanding the context, identifying critical factors, setting the reference framework, analysing trends and opportunities, assessing options, defining planning, management and monitoring guidelines (Partidário, 2007). In fact, a SA should consider the specificities of each case and design a process that better fits the decision-making process. This process is very often adjusted and should be carried out in parallel with the planning process, influencing the formulation of the plan and the decision-making process.

In the same way that there is not standard process defined for SA, Partidário (2000) says that there are no real specific methods or techniques to implement it. The common practice is the use of a combination of two or more mechanisms to carry out the different stages of SA. This methods and techniques come from diverse sources ranging from project assessment (checklists, matrices and modeling) to policy analysis and planning (scenario analysis, input-output techniques, multi-criteria analysis, sensitivity analysis, etc). The choice of techniques will be strongly influenced by the nature of the initiative that needs to be assessed.

In relation to mobility context it is possible to argue that the integration of strategic assessment into the UMS planning has a great potential to embody the environmental and sustainable concerns in the decision-making processes. Actually, the SA does not need to be seen as a new way of planning. Instead, it should be embedded in the main planning process in a tiered way in different decision level allowing the verification of the achievement of its objectives and the assessment of the social, economic and environmental sustainability impact of each strategy proposed. This in fact pointed for a paradigm shift, in which the flexibility of the transport planning is reactivated and planners are reminded that they can perform a better planning as pointed by Lien (2006).

In this sense, since the network is the structural element of the UMS, its strategic assessment has significant relevance as it can help defining the configuration that are more adequate to attend the needs of the city and overcome its problems and consequently contribute for the formulation of better strategies for the system. In other words, the strategic

assessment of the network allows bringing to the initial phase of the planning process issues such as prioritisation of modes, level of accessibility and network coverage, that were subjects of only tactical decisions before, but need to be addressed in an early stage in order to guarantee the achievement of the sustainable goals of the system.

Thus the idea behind the SA concept presents a great potential to help structure a framework to strategically assess the mobility network. Likewise happen in the SA approach, the methods to be used to assess the strategic issues related with the network can vary, but in general the process should comprise the following activities:

- Identification of the city objectives and, consequently, of the UMS objectives;
- Confrontation of the UMS objectives with the reality of the network (level of accessibility, redundancy and coverage);
- Identification of gaps (divergence between what is expected and what is offered in the UMS);
- Building of strategies to fill the gaps (to help achieve the strategic objectives);
- Evaluation and choice of the best strategies; and
- Continuous monitoring of the results achieved in order to adjust the strategies.

FINAL CONSIDERATIONS

The departure point of this paper is the assumption that the divergence between the user and service provider visions is the major conflict of the UMS planning. Such divergence is clearly reflected in the way the urban mobility network is planned with the evident existence of two distinct approaches, the theoretical and practical, that needs to be reconciled. The disagreement between these approaches can be seen as a result of a deficient or even lack of strategic formulation for the system that is noted in the unclear division between strategic, tactical and operational decisions levels.

The discussion presented along this work indicates that to overcome this deficiency in the UMS planning process and consequently promote the conciliation of the different visions, the strategic assessment of the network seems to be a fundamental instrument. It contributes to the formulation of better system strategies, bringing to the initial phase of the planning process issues related with the network that are not normally addressed properly, such as the interactions between the network and land use and its sustainable impacts.

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