

The Management of Intermodality in Urban Transportation

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ABSTRACT: The central idea of this paper is to promote the management of intermodality in urban transportation. The continuous management of intermodality, starting at strategic level with intermodality policy management and then, at all the decision making levels until final users, could become invisible the transshipment from a transport mode to the other. The politicians, infrastructure managers, operators and the final users including the passengers, are both the decision-makers and the target of the intermodality management. The management of intermodality must become a tool for optimal control of the large dynamic system of urban transportation according to a multicriterial objective.

RESUMÉ: L'idée centrale de ce papier est de promouvoir le management de l'intermodalité dans la transportation urbaine. Le management continu de l'intermodalité, à partir du niveau stratégique avec le management de la politique d'intermodalité, et puis à tous les niveaux des prendre-decisions jusqu'aux utilisateurs finals, pourrait devenir invisible le transbordement d'un mode de transport à l'autre. Les politiciens, les managers de l'infrastructure, les opérateurs et les utilisateurs finals y inclus les passagers sont aussi les cibles que la charge du management de l'intermodalité. Le management de l'intermodalité doit devenir un outil pour le contrôle optimal du système dynamique large de la transportation urbaine, conformément à l'objectif multi-critériel.

Introduction

There are many definitions of the intermodality, most of them being controversial. An important definition of the intermodality could consider the ability of many transport modes to operate together as a system.

The intermodality is a dynamic issue that is influenced complying with the policy and strategy being in force. Intermodality management system measures the intermodality, issues corrective decisions, follows objectives, plans strategically.

There are different methods acting on intermodality: - fleets development; - creating facilities; - infrastructure development; -creating and developing some logistics companies to provide intermodal services etc. Let's consider some of them.

- Freight separation from the vehicle generates the intermodal transport units (ITU): containers, swap-bodies, pallets etc. ITU facilitates the freight to pass through the transport modes and other logistics nodes: custom office, warehouses, intermodal transshipment nodes etc.

- Product's manufacturing, having in view the estimated logistics chains: at the end of production line, the product is already integrated in the logistics flow that begins.
- Stimulating the producers, the shippers and forwarders to present the goods for transport in an intermodal approach, is a very efficient management action to promote the intermodality.
- Periodic survey (census) of the intermodality (traffic, trends, mentalities) provides to the decision maker a general view on the real state of the intermodality of transport.
- SME's developing for intermodal logistics services can be a driving force to multiply the connections of logistics actors, facilitating the intermodal cooperation and integration.
- PPP for infrastructure has a private component to be attracted in the management. This is different from the state ownership, which is not at all interested in what is going on and in the efficiency of the transport activities.

- Continuous improvement of the intermodal policy.
- Urban networking of the intermodal users, lines and chains, the networking of all the human activities and related to life in the urban space and region.
- Urban supply chains build on the intermodality of the transport systems..
- Facilitating the concepts of cooperation and integration of transport actors and users: demand management, quality management in the frame of Urban Mobility System (UMS), corridor management, individual customer satisfaction.

Production and consumption of urban mobility service is a simultaneous process in the urban space by the actors who interact, but without any possibility as one of the actor should control. The public service concept of UMS must be accommodated to intermodality concept of the UMS. A customer can buy a service without having in mind the problems of different transport modes, but the result he expects to get it.

There are always gaps between decisions and reality. The problem to be solved is the management of these gaps.

There are at least two levels of public services that must be provided:

- The basic level consists in basic public mobility needs that must be provided by basic intermodality of transport modernization. This level is the field of strategic management, of long term planning and basic regulatory measures provided first of all by the public authorities.
- The sophisticated, high quality and market oriented services will differentiate the service providers being in competition. This field belongs to service providers and public authorities must only look on rules for safety, fair competition etc. Short term planning and day to day management of intermodality of transport modes will help for smooth passing of flows from a transport mode to the other without disturbances of uncomfortable interruption and waiting time. At this level of intermodality management, it is important the customers willingness to pay for supplementary intermodal services especially in the intermodal nodes.

At the strategic level, the management of the intermodality could be realized through the demand for mobility generated by land-use strategy, leisure areas etc.

It is not possible to cover all places in an urban area with infrastructures for all transport modes. So, the cooperation and integration of modes could achieve the customer needs for mobility.

Input signals for corrective decision in the management of intermodality could be provided by the congestion degree in different areas, the capacity scarcity of transport infrastructure, the level of services quality, the accessibility indicator values, customer needs, census results,

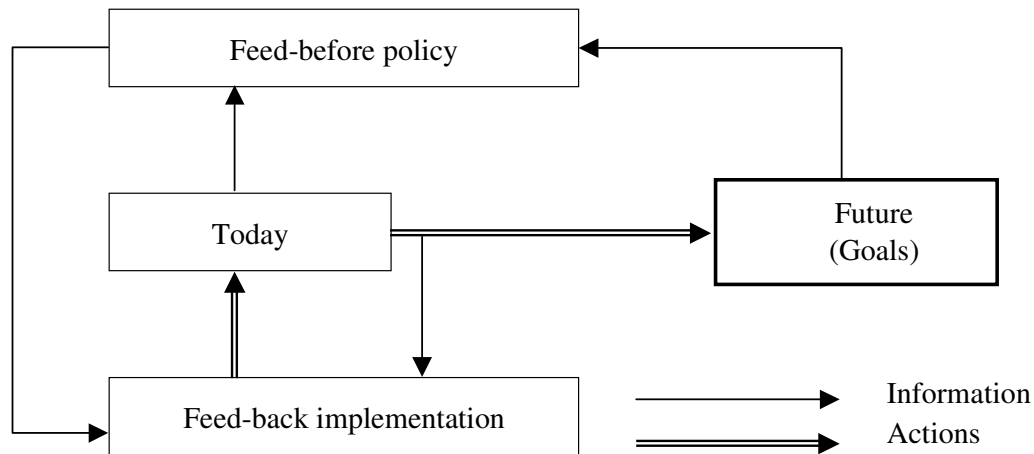
Lessons from the past

A critical procedure, disastrous for the transport operators and also for the other companies where the state is shareholder, is the access of the public servants and officials to the management board of the company and to the general assembly of the shareholders. A public servant is an incompetent manager or administrator, not having a vision orientated to the market, that creates great troubles to the respective companies. The public authority can influence the system of urban mobility by subtle methods keeping of transport policy and not by managing the transport operators by their incompetent employees.

A big mistake of transport authorities is the confusion of transport policy with projects. A project is not policy, but only a tool to translate the policy into practice. UMS consist in many policy systems, which must have an interaction mechanism generating management decisions according to common accepted criteria (system approach).

The intermodality management in the frame of the mobility policy

In an open economy the urban transport is influenced by a lot of general and local connections. The connections belong to the technical, economic, financial, commercial, operational, organizing domains. They have as main objectives the mobility carrying out in safety and comfort conditions. The complexity of transport interconnections with the social-economic environment, the vertical and horizontal integration of transports, the new regulations, liberalization and the free access of operators to the market make necessary the improvement of the mechanisms for issuing and implementing the transport policy in an intermodal view.



The mobility policy as a dynamic system

The complexity of transport modes and their interdependence with other systems in the mobility system make necessary the institutionalization of management within some policies that have been continuously upgraded depending on the phenomena and processes achieved and predicted. In this context, the transport intermodality is the basic request to make possible the functioning of the urban mobility system. The institutionalized model for issuing and continuously implementing an intelligent policy of the intermodal mobility has to fulfill the following needs:

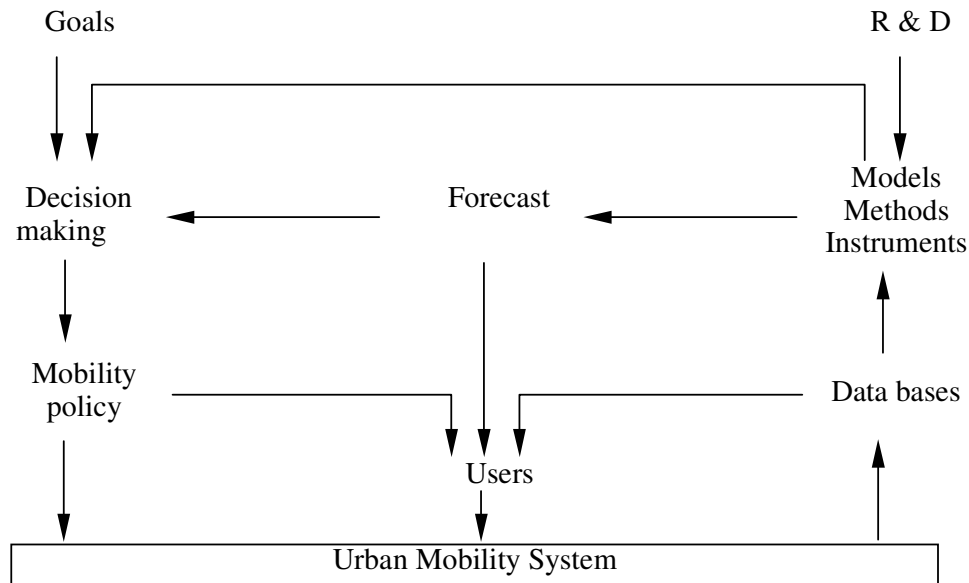
- To be adaptive so that to be able to reorganize itself structurally even after shocks and crisis, although an adaptive system tends to a discontinuity state in case of small perturbations as well.
- To be able to be trained not only for recognizing the transports situations and of the environment they are acting in, but also from the viewpoint of procedures and models for analyzing and issuing the strategic management decisions. Namely, to learn from experience.
- To identify and process the simultaneous events on different organizing levels: local, regional, national, international, on board of a vehicle or in a company, at macroeconomic level etc.
- To be reliable and tolerant to damages. If in a certain place of the transport system some subsystems are damaged, the system can function in acceptable parameters.

- Not to lose information, indifferent from the place and time of its achieving.
- To identify the relevant information, indifferent from the process speed or people perception threshold.
- To self-organize by learning without being programmed. By programming, the methods and models, inadequate to the new conjectural situations, would be conserved.
- To distribute the information in the transports structures.
- To be flexible.

A simplified model localized, for example, at a public institution, can achieve the institutionalization for continuous upgrading of urban intermodal mobility policy. Some component of that model represented in the figure below have already existed but they are far from being successfully usable. It is to be noticed that a part of the features of an intelligent system can be chosen in the proposed model. These are to be met in the component elements (database, models etc.) and in the system loops. For instance, the adaptability (database – models – information – decision drawing up), the training coming from the outside of the system (research – consultancy), the control (information – goals) etc. are elements that can be developed in a future distributed institution of neuronal type. And do not forget that the entire system is populated with human beings, the most intelligent components of it.

As regards the training procedures, the most important are the institutions for research-development, design and consultancy, as well as those specialized for implementing these procedures.

Continuous improving of the mobility policy



Intermodality in the scenarios for urban mobility

Using the scenario method means a top-down approach for drawing up the system management strategy on medium and long term. The scenario means, in fact, a lot of hypotheses concerning the environment and premises for the development of the system as well as of its elements. For this purpose, it is required a static and dynamic identification of the system and of its inside and outside connections in the external and internal environment.

In case of urban transport, it is necessary to know the social-economic and spatial-temporal environment, the local and general political context, as well as the behavior reactions of the transport systems in relation with the changes of social-economic, political and technological environment.

The external scenarios that are related to connecting the transport systems with the social-economic, political and geographic environments, shall be used for analyzing the traffic correlated with the intermodal transport infrastructures as well as for estimating their impacts.

The internal scenarios, aiming at the internal structure of intermodal transport systems (market, equipment, networks, vehicles etc.), are used for analyzing the conformity and adaptability of the measures and developing projects for transport in

relation to the specific political objectives to be carried out.

The aim is to absorb the external environment into the internal one of the urban transport system. As a result it will be generated the urban mobility system. The theory is based on the concept of the assimilating of the external environment by the internal one, issued by the Romanian philosopher C. Noica.

The urban transport carries out in a certain political context, meaning that its general political objectives are to be taken into account. From these objectives, let's consider those referring to sustainable economic growth and social-economic cohesion.

The action mode in these political domains is directed through specific political objectives that are introduced in the urban transport. Finally, measures and projects achieve the political objectives specific to urban transport.

The internal connections of urban mobility are reflected in the enclosed tree diagram showing how to reach, by a bottom-up approach, from the measures and projects applied in the urban transport to the pre-established political objectives. If we also consider the horizontal connections, as well as the bilateral connections, it results immediately that the continuous management of the urban mobility system must be performed.

Urban Mobility

General political objectives

Growth

Cohesion

Sustainability

Politics areas

Development

Integration

Env.prot.

Safety

Market economy

Pricing policy

Social

Mobility

Specific political objectives

Quality public services

Covering internal costs

Internalization of external costs

Intermodality

Accessibility

Land use

Local and regional development

Market liberalization

De-reglementation (withdrawal of the state)

Inter-operability

Measurements, projects

Databases Benchmarking

Ticketing

Continuous evaluation

Infrastructure networks

Transshipment nodes

Access persons with disabilities

Parking

Mobility management

Rules Standards

Contracts

Cooperation Coordination

It can be noticed that urban transport intermodality is a strong concentrator of downstream patterns, but it is also a major factor of influence to the diagram upstream trend of the inter-dependents in urban mobility system. The intermodality has a hub and spoke effect on mobility, meaning that the intermodality collects and distribute the concepts and patterns floating inside and around the urban mobility area. By its optimal control the efficiency of urban mobility can be influenced. The transport policy appears in two main directions that influence the general political objectives:

- market;
- transport.

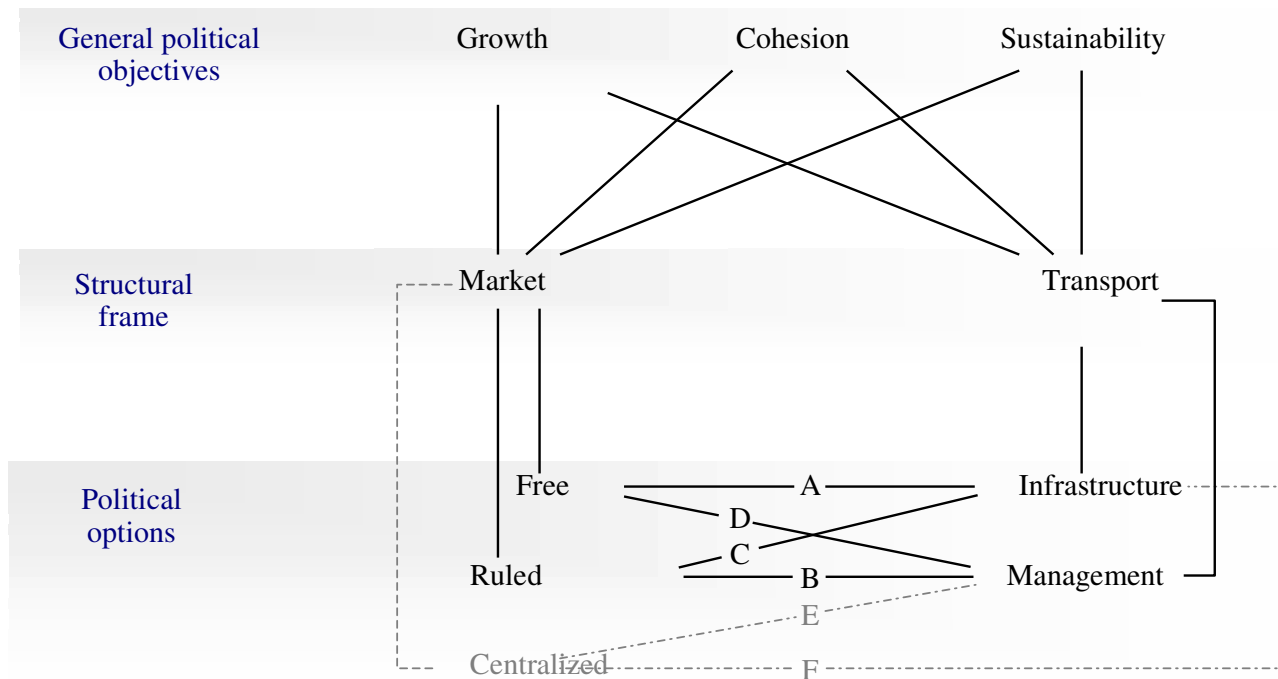
The transport market can be classified in the following three types:

- free
- free and ruled
- centralized,

of which the first and the last can be considered as extreme.

For example, in scenario B a maximum importance is given to the intermodality (weight=4), while the problem of territory arrangement is practically neglected (weight=0). The comparative study of the specific political objectives, measures and projects of intermodal integration/development of the urban transport in different internal scenarios leads to useful conclusions for the decision makers. The urban transport system can be dominated by the decision factors concern, first of all for the infrastructure development or, emphasizing, on the organization, management and transport modes cooperation and integration.

By combining the two types of political options concerning the structural frame of the public transport, it results 6 possible internal scenarios, of which, in this study we consider only 4 scenarios (A, B, C, D) according the enclosed graph.



Internal scenarios of urban transport

They can be characterized by the weight given to the political objectives specific to the urban transport. These weights describe, in fact, a certain scenario as a vector in the multidimensional space of the specific political objectives.

As a rule, the decision-makers are of public nature and exercise their right to choose a strategic decision by selecting a certain scenario, evidently after they have established the specific political objectives that must be reached to. In this context,

it follows an iterative process through which it is to be established the projects and measures to be applied, with a view to achieving the development policy of urban intermodal transport. For the objectives and projects chosen for exemplifying, let's comment upon the test of conformity, results depending on the established scenarios. The conclusions are valid for the established hypotheses.

- The classification of the scenarios after the score, gained from the projects conformity with the specific political objectives, show that the market with ruled competition in both alternatives, with transport systems based on developing the modal and intermodal infrastructure (scenario C) with transport systems based on organization and intermodal management (scenario B), are the most efficient. The other two scenarios based on the market with completely free competition, mean

operators in free competition who try to be efficient by itself (scenario C) or by dissipating in infrastructure the existent resources (scenario A).

Scenario	Rate	Rank
A	395	4
B	690	2
C	735	1
D	465	3

	Specific political objectives	Internal scenarios							
		Market economy				Centralized economy			
		A	B	C	D	E	F		
1	Services of good quality	1	3	2	2	1	0		
2	Covering internal costs	3	2	2	3	0	0		
3	Internalization of external costs	0	3	3	0	0	0		
4	Intermodality	2	3	3	2	1	1		
5	Accessibility	1	2	3	2	1	1		
6	Land-Use	2	0	3	0	0	3		
7	Local and regional development	2	3	3	1	1	3		
8	Free market access	3	1	2	3	0	0		
9	Dereglementation	3	2	1	3	0	0		
10	Inter-operability	1	2	3	2	2	2		
	Total 1...10	17	21	24	18	6	10		
11	Transport		Infrastructure	3	1	3	1	0	3
12	Systems		Management	1	3	1	3	3	0

- The projects aiming at cooperation and intermodal coordination of the transport systems and actors occupy the first place in what concerns their effect to achieve the specific political objectives. Otherwise it can be noticed, that, generally, the projects aiming at an intensive utilization of systems (cooperation, coordination, intermodal management of mobility, adjustments and standards achievement, ticketing etc.), meaning those classified on the 1st, 2nd and 3rd etc. places have the most powerful impact on the political objectives.
- The extensive modal projects (infrastructure networks, junctions, parking etc.) meaning great investments too have a more reduced effect on the established political objectives, occupying the last places in the classification. Still it is not to be forgotten their role on long term, that means conformity with other political objectives of strategic nature.
- A special case is the project aiming to facilitate the access of disabled people that however has a preponderant social character, which can be optimally obtained only in the intermodal vision.
- Analyzing the classification of the specific political objectives depending on the mode they gather or draw the effects of the proposed projects, it can be noticed from far away that quality of services is the gaining objective.
- There are political objectives (services quality, intermodality and accessibility) classified in top but which occupy the same place not only in the general classification, but also in each analyzed scenario. It results that these have stability at political changes, namely they do not depend on the decision factors, that meaning a good news.
- In all scenarios, covering the internal costs represents an objective politically hardly to be attained by the measures and projects proposed. It results that new measures and projects might be added that contribute to solve this objective which, otherwise always and everywhere, is difficult to be satisfied.