

FROM MULTIMODALITY TO SEAMLESS INTERMODALITY IN URBAN TRANSPORT: A DIFFICULT TRANSITION

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1 – THE IMPORTANCE AND DIMENSIONS OF INTEGRATION

The existence of several transport modes in an urban agglomeration is a trivial fact and a natural consequence expansion of the agglomeration. This process implies growing distances to be covered and different levels of concentration of travel demand in different directions, to which the various modes respond with different speeds and capacities. These modes can range from walking and cycling, to motorbikes, private cars and buses, to various forms of rail and guided systems in general.

Such a multimodal system can serve the city and region rather well while it is a rather monocentric city and most of their inhabitants carry on rather simple mobility patterns, typically based on symmetric pairs of home based trips. But when one of these conditions fails, many people will need to move from one area to another, located too far away to walk or cycle, and between which there is no simple and easy public transport connection. Failure to respond to this problem for an extended time is one of the major reasons for quick growth of individual motorization, as observed in many cities throughout the world.

The key concept for properly addressing this problem is *integration*. But integration may mean different things for different people, and it useful that we mention at least two levels of integration which are relevant for transport systems:

- integration internally to the transport system, that is among its multiple components;
- integration of transport policies with policies in other sectors, as defined in (Potter and Skinner, 2000). Those include *land-use* policy and planning, *social* policies (Viegas and Macário, 2003), as well as *environmental and economic* policies, by which a holistic view of all the relevant policies is pursued, as shown in (European Commission, 1995).

In this paper we will mainly cover the internal integration level. For that, the first step is to define what is meant by a well integrated transport system. In very general terms it is quite easy to answer this question: a transport system is well integrated when all (or the large majority of) its users consider that it does not impose unjustified *transition costs* on them, i.e. that when their transport need implies service by two or more links, the process of changing from one link to the next does not constitute a significant cost by itself, in terms of time, price paid, physical energy, loss of comfort, etc.

This is something that the road system has been capable of providing very effectively in all countries, for a little more than one century: all types of roads (national, regional, local) are usable by most types of vehicles, driving licenses are valid across all of them, and they are even all represented in the same maps. This need not be like this, and in fact it is likely that in some years some roads with high levels of incorporation of electronic guidance systems will only allow properly equipped vehicles on them.

But nothing similar occurs in the other transport modes, railways being the less integrated one: even within the same country there are frequent cases of different gauges, power systems,

signaling and control systems, and machinists' accreditation levels. Urban public transport also frequently has very low levels of integration, with multiple companies operating separate networks, with independent ticket systems, transfer points and timetables that show little concern for the ease of transfer of passengers between one system and another. Of course, their network maps will be printed separately in many of those cases.

Seen from the user's side, this is normally described in three dimensions of integration (ISOTOPE, 1997):

- *Physical integration*, meaning that the transfer process from one link to the next must be such that the user does not have to spend much time or effort in it. This normally requires well designed interchange stations and properly coordinated timetables. When luggage is involved, adequate facilities and operations must be in place;
- *Tariff integration*, meaning that the traveler who would have wished to be served by a direct link but could not, should be able to buy the transport title(s) at a single location and time, and not have to bear a tariff penalty on top of the physical penalty that anyway is already inflicted upon him or her by the need to transfer. In a well integrated system, inasmuch as transport prices are a function of distances traveled, prices of composite services (two or more links used in connection) should reflect what would have been the price of a direct service, not the sum of the prices of the various components.
- *Logical integration*, meaning that the user should be able to perceive the service as whole unit, with available information about the whole chain of services as if it was a single through service, and special emphasis on all that allows to reduce the uncertainties and risks associated with any transfer process.

To achieve these attributes in the eyes of the users of transport systems, significant efforts must be done on the supply side. Physical integration is the most obvious dimension where financial investment is necessary, for the construction of adequate interchanges, but tariff and logical integration are frequently slower to build because they involve relationships which go beyond good neighborhood and require lasting commitments and joint work.

Transport interchanges are of fundamental importance, not least because of their symbolic nature, becoming the icons of the integration process that are visible to everybody, even to those who are not using the public transport system. Moreover, they should be transformed from a necessary evil in the journey of all travelers who do not enjoy a direct connection to an element of added value to the region where they are located, thanks to the opportunities deriving from the artificial concentration of demand.

In this perspective, an interchange should not only provide smooth transport connections for the transit passengers, but allow them positive experiences of leisure and consumption. But in parallel, the large numbers of transit passengers can make a greater variety of (shopping, entertainment and leisure) supplies viable, which could in turn be made accessible to a wider public in the area, not necessarily connected to the transport system that justified the interchange in the first place.

If transport integration certainly has added social value, as it avoids much higher costs for those clients located outside the main poles or axes of demand, where most direct services are starting or ending, and the resulting skewed distribution of mobility by public transport. This is not only inequitable, but may be harmful to the overall mobility in the agglomeration, as those who feel badly served will tend (as soon as they may afford a car) to solve their problems by recurring to individual transport, thus aggravating congestion problems.

2 – COSTS AND DIFFICULTIES OF INTEGRATION

Integration is a complex technical task, but the major barrier to successful integration is not in this technical dimension: integration creates additional costs for the agents involved in public transport production, vulnerabilities in quality of service and constraints on commercial initiative to the operators, which constitute or generate multiple forms of inefficiency on the production side.

Integration has significant costs of the following natures:

- Network planning, so that transition costs from one system component to the next are as low as possible (for the client and for the company), and supply patterns can be regularly adjusted to make full use of the additional demand potential;
- Preparation of contractual agreements between the companies involved in the integrated system (and possibly also with some public authorities driving it);
- Information systems, that allow each supplier in the system to know early enough about the timing and flow quantity it will receive from each upstream component, keep track of all flows and incidents in actual operations, and bill other integration partners accordingly;
- Contingency planning, so that clients are adequately treated in case of disruption of the planned flow of events.
- Operations staff that are especially dedicated to transfer clients (both in normal and in disturbed circumstances).

When there is State intervention in promotion of integration, a good part of the extra missions and costs of integration listed above will be undertaken directly by that authority, and cross-subsidization between users is easily factored in the system.

But also when there is no State push towards integration, private companies may find it in their interest to adhere to integration, normally in association with acquisition or preservation of strong market positions, and rarely on a totally open scheme: integration will be available only for some combinations of services, with either low marginal production costs or with high potential for client capture (a stronger form of loyalty).

The much greater efficiency of public transport over the private car in the use of urban space, and the very high cost of that space, fully justify the involvement of authorities in promotion of transport integration. Social cohesion arguments can also be added, in defense of residents in less dense areas or with lower purchasing power, who could be severely discriminated in the absence of adequate levels of integration.

It is interesting to note that in planned networks with State intervention a conflict of interests may rise between planning agents in the public sector: very often, the best deal for a political circumscription which is part of a region will be different from the ideal contribution of that area to the larger set, i.e. the region to which it belongs.

So, even before the issue of alignment of public and private interests for integration of transport systems is raised, there is a need for compromise between different public agencies at the very heart of the conception and development of integrated transport systems.

But the fact that there is a strong State intervention in promotion of an integrated public transport system and covering most of the integration costs, does not mean that there will be no problems among operators when more than one are involved, namely in the contracts between the authority and those operators: Since decisions to keep using the system or not are based on a global (integrated) perception of quality of that service by its users, commercial success of one operator

becomes partly dependent on the performance of other operators. This can be addressed by removing the commercial success element from the rewarding formulas in contracts, but this escape is certainly less than optimal.

Even in systems so strongly driven by the State, the presence of private players may be advantageous, mainly for three reasons:

- They are more subject to the risks of poor economic performance, which makes them more determined and capable in the pursuit of economic efficiency;
- They can mobilize funds in private capital markets evading formal constraints on public borrowing and spending, thus allowing faster completion of investment programs and earlier entry of new transport components into service;
- They tend to be in frequent search for improving their position in the market, one of the ways for doing it being through innovation in the services supplied or on the ways to produce them.

There are also costs and difficulties related to the introduction and presence of private suppliers in these markets with direct State supervision:

- there are significant transaction costs, related to the tendering and negotiation processes, in which an attempt at quasi-definitive allocation of risks between the public and the private side is always made;
- capital costs are higher, in direct relation with the remuneration of private capital, the commercial risk of the project and the (lack of) guarantees given by the State for the payback;
- there will naturally be different objectives on the public and on the private sides, which implies the need to design a balanced and effective set of contractual incentives so that those objectives can come closer. This is especially delicate in integrated transport systems, where the performance of the agent responsible for each component may have implications on the performance of other agents.

3 – STABILITY VS. INNOVATION

In the provision of public transport, stability is a very important requirement as citizens must be able to easily identify at least the small set of services that are instrumental for their dominant mobility wishes. Integrated transport systems may include some forms of competition among operators, but only in such ways that it does not cause instability (Viegas, 2003).

But this stability poses risks for the longer term: the system functions as a sequence of time-limited sets of spatial monopolies, where gains of market share are always very difficult, and operators can only improve their situation by gains of productive efficiency, but not by redesigning their supply. This is a strong disadvantage, both directly by prohibiting innovation, and indirectly because it incorporates this prohibition into a mindset, transforming those operators into simple vehicle pushers and cost-cutters.

So, good design of an integrated transport system must include some opening for innovation by the initiative of (private) operators, not by specification of the authority.

Just like the integration of transport services in a cohesive network is not easy to design or maintain, so the integration of public and private partners in the specification and delivery of such a network requires good design and management efforts. In the end, for the visible integration of transport services to function properly, there has to be an invisible integration of public and private agents supporting it.

4 – MAIN INSTRUMENTS FOR INTEGRATION

The essential requirement for a good start of the integration process is *clarity of purpose* on the public side, where the driving power resides: Public authorities must specify what level of integration of transport services they require, what instruments and at what cost can be mobilized for that, and what roles private agents are expected to play in the delivery of such a system.

The next step is to develop a *good institutional design* for the implementation and management of the process, recognizing that, even on the public side, there may be diverging interests, for instance related to different territorial levels of administration, or simply to different circumscriptions of the same level.

These two steps are the structural ones, corresponding to the mission and organization driving the integrated transport system. Once they are cleared, a set of agreements and contracts must be prepared, involving public-public as well as public-private relationships. In most modern democracies, such contracts between public agencies and private companies are normally awarded through public tenders.

Preparation and management of such contracts has several special difficulties in the case of integrated transport systems. One first difficulty is related to the level of competence required on the public side:

- Contracts should be designed so that they constitute effective pressure on the (private) service suppliers towards high quality services. It should be expected that private companies who are competent on the production of those services will also be competent at negotiating the corresponding contracts, which requires that also on the public side there will be competent (highly skilled and motivated) public agents, which is not always easily available;
- Proper management of these contracts over their lifetime requires technical, legal and managerial skills on the public side in line with those available on the private side;
- The public sector must keep its ability to procure efficiently: The experience of some cities who went from provision of public transport exclusively in the public sector to exclusively in the private sector shows that such a full transfer may raise a delicate problem, namely that after a few years the public sector may lose its ability to procure services effectively and efficiently, by being left with no one who knows how to produce those services. This can be solved by leaving parts of each of the services to be done by a small public agency, or by regular hiring from the private sector to renew the skills in the public agency, but the first option is only viable in large systems, and this coexistence of two rationales may be difficult to manage over time;

An important question around the engagement of private companies in transport systems is the type of contract. The usual choice when there is significant investment supported by the private side – like in motorways, suburban railways lines or light rail systems - is for a concession contract with net costs, in which the operator collects and retains the tariffs paid by the users of the system. Besides this revenue there may be an additional (*net cost*) paid by the authority.

Besides the pressure on the concessionaire for overall economic efficiency, this type of contracts has the big advantage of avoiding consideration of the investment supported by the private company as public debt, but requires great care in the specification, design and performance of the elements of the transport system surrounding the sub-system that is put into concession, so that they do not constitute bottlenecks preventing adequate feeding of that sub-system or, in the other side, excessively competitive alternatives that reduce the market potential for the sub-system under concession. For this reason, they are more frequently found in easily separable components of the transport system.

So net cost contracts should be avoided in urban public transport when the volumes of private investment involved are not so significant. In all such cases the generally preferable alternative for engagement of private companies in integrated transport systems – which require periodic tuning and changing of traffic rules and relative prices - is to use *gross cost* contracts. In these contracts, the tariffs collected from the users belong to the authority, and the operators are remunerated by their production according to a network and timetable defined by the authority, with a (positive or negative) correction through incentives related to the quality with which their service is produced and perceived by the clients.

In the case of gross cost contracts for operations in integrated transport networks, there is an additional difficulty related to these incentives, because in an integrated network, users perceive quality in an integrated way thus making operators' performances inter-dependent.

Another problem that is common with gross cost contracts, but especially so in integrated systems, is how to break the apparent dilemma between integration and innovation in the design of services. Not only it is the rule that in these contracts the authority specifies and the operators provides as specified, but the requirements of integration leave less room for experimenting new patterns of service. Should innovation be left only to the initiative of the authorities, who would specify new types of services at the moment of launching a new tender? This seems a poor choice, as not only authorities tend to be less inventive, but they are further away from the field and the clients, and thus less aware of emergent mobility wishes that could be better satisfied with new types of services.

A preferable alternative seems to be to let operators suggest new types of services, without special attention to integration – but not pre-empting it or biting on territory served by other operators – and, subject to a positive preliminary evaluation of their potential by the authorities specifically aimed at avoiding predatory practices over other operators, allow their introduction for a trial period of between six months and one year, with commercial risk on the side of the operator.

This attitude in favor of innovation by private companies may have a secondary effect of great importance, which is to make the contracts an instrument for joining efforts towards better service for the public, and not a basis for permanent adversarial positions, like in a zero-sum game. Both sides should remember that the integrated transport system is justified because there is a public need for it, and success in serving that public well will be a success both for the authority and for the operators. So, also at the institutional level, integration is preferable to antagonism.

5 – CONCLUSIONS

We have seen the importance and multidimensionality of integration, highlighting its main dimensions and its social added-value. But the costs and difficulties of bringing about proper integration must not be ignored, as in most cases that are significant costs and barriers to its deployment.

These costs and barriers are partly technical but in part they also derive from diverging interests of the intervening agents, irrespective of their being in the public or private sector.

If stability is very important on the short-run, it may be detrimental on the long-run as it serves as an alibi to promote innovation. In the discussion of the main instruments to promote integration, these two competing objectives are highlighted in the assessment of the various types of instrument.

6 – REFERENCES

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