

# USING TAXIS TO BRIDGE THE GAP BETWEEN INDIVIDUAL AND COLLECTIVE TRANSPORT

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## 1. Introduction

During the last decades the discussion on urban mobility has been increasingly marked by the fight against congestion, a condition of the system that nobody wishes but results from a juxtaposition of individual decisions that are mostly rational from an individual point of view, if each of us takes all other variables of the system as fixed. But of course they are not fixed because many agents – on all sides of the system – are simultaneously thinking and acting towards improving their situation.

Car ownership has increased steadily, not only because more people can afford it but also because the car offers more independence of mobility. And growing car ownership has a positive feedback loop not only with suburban location of housing, shops, jobs, leisure and public facilities – fragmentation of transport demand in space – but also with a more varied set of activities and relations, allowing different lifestyles – fragmentation of transport demand in time.

Authorities have tried to respond to this pressure of congestion over public space using both push and pull measures in favour of a *shift of transport modes* used by citizens: On the “push” side, with diminishing spaces for circulation and increasing prices (mostly in parking) for cars in city centres, and on the “pull” side with strong investments on collective transport systems, especially light and heavy rail, depending on the level of wealth and of earlier endowment of each city with these means.

But at the same time in most cities very significant investments have been made on motorway networks to facilitate movement between the various nuclei of each large agglomeration. Of course, this further encourages urban sprawl and car ownership. And the nice and modern rail-bounded collective transport systems we are getting are capable of giving very good service to those who happen to have start and end points of their trip along one of the fixed lines of the system, but are doomed – because they serve fixed lines – to impose transfers and inconvenience to those who start on one line and end on another.

And of course, there are still many citizens who do not live or work close to one of those railway lines, thus necessarily having to go through one or two more transfers. All surveys show that people who have to undergo two or more transfers leave collective transport as soon as they can afford their own means (car or, in at least some countries, motorized two wheels).

This paper intends to show why we should include taxis – also a form of public transport – in the solution to the congestion problem and to present some ideas about how their contribution could be enacted at a much stronger level.

## **2 . Modal Shift versus Modal Alternation**

The appeal for a modal shift has had some positive response from those who have favourable locations with respect to the collective transport network, but success of these policies has been very limited because of urban sprawl and of what we could call activity sprawl, i.e. the fact that many people now want (and have) more from their daily life than work and home-based activities. They will engage in other activities – sport, culture, social – mostly after work, but also increasingly during “normal” working hours, which can be compensated by working after hours, reduced hours or other schemes.

What happens is that very often collective transport does not serve these displacements well, either because the activity finishes at a time when service has stopped or has a very low frequency, or because the place where that activity takes place imposes a very inconvenient path, with several transfers to get there. Since not wasting time in these processes is seen as a vital need, use of the private means of transport is seen in many cases as the only transport option enabling that activity.

The problem is that both collective transport authorities and operators are still thinking and acting only for their typical, commuting client, who uses collective transport in a symmetrical pattern, in and out of the centre, every working day of the week. Even if the network reaches many places, the tariff system reflects this perception of mobility: favourable prices apply only to monthly cards with a price computed on the basis of 22 days of a go – and – return pattern, and price levels of those cards are established by zones.

What this tariff system is saying is that if you want to have a more complex travel pattern one day per week, in which you need to go to a wider zone, or you simply need to use your car once a week because there is no good collective transport connection, you do not get a favourable deal. You would still use the system 4 days out of 5, but we no longer want you! What other sectors of business treat their clients this way? It is no wonder that many of these people (especially if this happens not one but two days per week) abandon collective transport and opt for using their car every day.

So, if collective transport wants to be attractive to more people it must understand the increasing variety and dispersion of lifestyles and adjust its offer. Just like people increasingly do not have the same agenda every day of the week, there is no reason that they should be pushed into an all-or-nothing relation with collective transport.

The key concept here is *modal alternation*, which simply means that we should be encouraged to use in each day the transport mode or combination of modes that best suits the agenda of that day. And, as agendas vary, so inevitably the choice of modes will vary if the conditions for that choice do not prevent that alternation. This possibility has to do with product, price and information about the available options, in general and at each moment, and is no easy thing to accomplish, but the potential reward in reduction of congestion is huge.

A very strong reduction of congestion could be achieved with only a reduction of traffic volumes by 15% or 20%. At the risk of some oversimplification, we can say that if every car user in the city would use collective transport (or another mode with higher efficiency in the use of road space) one day per week, the congestion problem would be largely solved. Of course, there are Fridays and peak periods, with more than average traffic loads, but this statement only intends to show the scale of the problem and not to present a complete solution.

It is well known that there is great difficulty in persuading current car drivers to make a modal shift into permanent use of collective transport, but there should be a much greater chance of success if the effort was geared towards explaining what modal alternation means and developing the conditions for that type of behaviour to be adopted.

### **3 – Bringing taxis into the picture**

In most discussions about road congestion in urban areas we tend to have this dichotomous view, considering only the private car and collective transport. Even when a wider picture is presented, it is normally to bring in the soft modes, walking and cycling, but rarely if ever mentioning the taxi as a contributor to solve the congestion problem.

The reason is simple: a taxi with one or two passengers contributes as much to congestion as a private car with one or two persons, at least as far as the circulation phase is concerned. There are obvious advantages of the taxi regarding the need for parking space, but these are mostly left aside in the discussion about congestion.

But the role of taxi may change very strongly if our effort is made towards modal alternation instead of modal shift. Provided that you can get one easily when and where you need it, the taxi is a transport solution that rarely is considered as inconvenient both by collective transport users and by car drivers: for the former it offers direct and faster connection, and for the latter it offers the same speed and flexibility, without the hassle of finding a parking space.

So, apart from the questions of availability and price, the taxi will be considered by virtually all citizens as a good alternative (thus eligible for the desired alternation). Of course, in the current conditions, price of this service implies that it will not be the most used option by the vast majority of people.

The taxi can thus provide a solution for those days when collective transport is not capable of providing a good quality solution to the mobility needs of the individual agenda, with the advantage that it can be adopted only when needed, instead of the private car, which, once owned, tends to become the permanent and rigid solution.

For collective transport, missing one passenger on a certain day because she has travelled by taxi is only a farewell, whereas missing her for use of her car is probably a rather definitive goodbye.

The fact is that this is not an option most collective transport clients adopt, partly because it is not brought into their minds, but mostly because it is considered too expensive. But if we adopt an integrated view of urban mobility problems, solutions and pricing schemes, things could be different, especially if we see the problems in a dynamic perspective, including in the analysis the issue of (collective transport) client retention vs. definitive loss.

This, of course, brings us onto the realm of loyalty programs, as now common in the relationship of many industries to their clients, but strangely absent in urban transport.

In this perspective, it would be interesting to explore the concept that regular, not necessarily daily, clients of collective transport would accumulate the equivalent of *air miles*, as adopted in the airline industry, which could be used for an upgrade, not by travelling in business class but by travelling in its urban proxy, a taxi.

One can of course say that in the airline, it is still the same company that is transporting the passenger, and here it would be another company. But also in the airline there is a considerable extra direct cost in providing the much more costly meal, and an opportunity cost of allocating that seat in an upgrade and then possibly not being able to sell it to a paying customer. The fact is, the company wants to retain that client, and that reward is seen as an instrument in the process.

In the urban area, this could even have the advantage of stimulating the adoption of smart-card based integrated fee collection technologies for collective transport and for taxis. With such systems in application, it would be rather simple to have taxis serving as the final leg of bus services into lower density areas, possibly with a small additional fee, but at a much lower cost of provision and much higher quality than what can be offered by the standard buses.

After all, collective transport has been able to engage (also financially) into park-and-ride systems, through which car drivers come from low density areas into a collective transport service on an axis with high density of demand. Why not engage in a ride-and-ride system, in which non driving individuals come by taxi from low density areas into an axis with intermediate density of demand, served by bus?

There are many other ways in which taxis and collective transport can be complementary forms of public transport, for instance by offering regular services at periods of low demand with taxis, or even by introducing mixed (partly regular and partly on demand) services using taxis.

All of these have the advantage of retaining clients for public transport, delaying acquisition of another car by the families because they allow provision of a service that satisfies the clients at a cost they can afford.

#### **4 – The case for collective taxis**

We face a different challenge when we consider the case of people who have been regular car drivers for at least some years, when they are faced with increasing difficulties or prices for parking their car near their place of work, or access charges to that area.

In many cases they will in fact be forced into modal shift, starting to use collective transport on a daily basis, trying in parallel to lose as little flexibility as possible with regard to their previous situation, based on the private car. In some cases, this may imply, soon after, a search for a new job or home location, because the connections are not direct or do not ensure the necessary time cover or frequency of service.

In some cases, companies will move to the suburbs under pressure from a significant part of their key workers, as these workers find that they are losing too much quality of life. And when they come together and speak, they may find out that their bargaining power with the company management is rather high. But when the company moves to the suburbs, mostly everybody has to commute by car, and high risks of social exclusion of those without a car are incurred. What this implies is that radical parking restrictions in the city centre may alleviate congestion on the short term, but reduce urban vitality and increase emissions and social exclusion if we consider the mid- and long- term effects. So, the dosage of this medicine has to be well calibrated.

Some cities in the developing world – namely in Brazil – have come up with interesting solutions of informal transport based on vans of between 8 and 20 passengers each, providing direct connections between one neighbourhood in the suburbs and one central area at pre-established times and with predefined clients filling most of the seats, although an occasional rider may hail the driver and hop aboard if there is place available.

This is a hybrid between private and public transport: The small scale of the vehicle allows for a very well tailored service, without the need for frequent intermediate stops, providing a connection almost as quick as with the car of each of the riders, but at a fraction of the cost and without the hassle and cost of parking. It is not exactly door-to-door service but walking distances from and to those doors are always rather short, typically less than two blocks.

On the other side, the provider has a guaranteed patronage that brings him a revenue enough (or almost) for breakeven, while retaining the upside for additional random clients. Of course, this could only come about in societies with greater propensity and tolerance for informal solutions,

but it shows that there was a latent demand and supply that could be combined and that interesting and stable forms of service could be developed.

This type of solution does not address the flexibility of daily agendas that is of such high value in contemporary society, but it shows that intermediate solutions may exist with great value for clients and for providers, if enough ingenuity is applied and regulatory barriers do not prevent it from bringing good ideas to the market.

Solutions based on collective taxis with support of currently available (and even more in the near-future) information and communication technologies may offer similar types of quality for clients and reward for suppliers, even for less regular and predictable displacements, as the “reservation” adopted in this example is replaced by the real-time capacity to match demand and supply.

On the basis of mobile phones, clients will inform where they want to go by specifying the address or pointing on a map. By triangulation or GPS, the system will know their location and those of taxis with available capacity. For the collective taxis already with clients aboard there will also be information about where they are heading to, so it will be possible to automatically match clients and taxis with the objective of minimizing waiting times of those still outside the taxis plus detour times of those already aboard.

Reservations should still be possible (as they are already for individual taxis), but they will be less necessary for launching the service, as the capacity to find clients in real time is now very strong. And the regular car driver may even prefer not to be “forced” into the schedule of a reserved service if he is confident that there will always be an available service within a few minutes of his calling for it. Or he may even reserve some days, and leave it open in other days.

If we consider the transport requirements of the regular car user in urban areas, we see that flexibility, i.e. availability at any time, and good speed (or perception of it) are paramount, the encapsulation in one’s own space being also important but probably the first requirement to drop against a high price of parking or access.

Small-scale collective taxis (for instance up to 4 or 5 passengers) may offer these attributes of flexibility and speed, especially if they are allowed in BUS lanes, as indeed regular taxis already are in many cities. In such cases, using the collective taxi would offer shorter travel times than the private car, even allowing for a small detour to pick up or drop another passenger.

These need not be large vehicles, and in fact several models currently in the private car market (monovolumes) would be quite well adapted, with higher sitting positions and easier entry and exit. Models with total capacity for 5 and for 7 people are available, with overall dimensions, purchase cost and fuel consumption levels in line with those of the regular taxis.

Although tariffs on a collective taxi system with sophisticated electronic support will probably be set also with some underlying sophistication, for instance considering the detour time imposed on the client, there is a very wide margin for reduction of prices in relation to individual taxis, thus a very strong potential for increasing demand: if a collective taxi of capacity 5 has an average occupation of 2.5, and a percentage of time running empty of 30% (instead of the usual 40% for regular taxis), it would be possible to increase the revenue of the taxi by 50% while still reducing the fare paid by each passenger by 48%. Even if the average occupation was only 2, a revenue increase of 45% would be possible in parallel with a fare reduction of 38%.

So, for a regular car driver, a collective taxi could represent a very affordable second-best solution, something that many could adopt on a recurrent basis. And it should be remembered that we are not seeking the traditional modal shift, but rather modal alternation.

Obviously, the prices and service of collect taxis will also make them more affordable and attractive to the regular clients of collective transport, thus reducing the pressure towards the definitive shift for the private car. Also for them, collective taxis may represent a very interesting second-best solution, for those days when the scheduled services of collective transport would not be adequate.

And there is a growing latent demand for mobility by elder people who used to drive their own cars but no longer can (or want to) do it for loss of physical ability. Collective taxis are an ideal means of transport for this growing segment of the population, as it offers similar patterns of motion to their habits, while providing another opportunity for socializing. This segment may even be a very interesting layer of demand for collective taxis in the off-peak hours, and time-differentiated tariffs (as they exist in collective transport in several cities) might do all the difference to stimulate it.

## **5 – The impact on collective transport**



It may seem at first that such advances by individual and especially collective taxis will be to the detriment of collective transport. In fact what should be expected is that the introduction of an intermediate form of transport will segment the market, bringing additional satisfaction to clients and thus expanding the overall mobility market.

It is intended, and it should be expected that there would be less private cars in use, the individual trips of several of them being replaced by a single collective taxi, and thus relieving congestion. And it should also be expected that there would be less passengers on public transport services of low speed or frequency, as the quality of service provided by collective taxis can be so much better at a not much higher price.

But this should not be seen as a problem, since it allows collective transport to perform its duty where it delivers good service and has good possibility of covering its costs through a good occupation level of its vehicles, leaving the fringes of the market it currently serves to other forms of transport better suited for them.

And on the mid and long term, it may even increase the volume of passengers transported, as the dissatisfaction with provided services is reduced and client retention increased. The key, again, is modal alternation, organizing the system in such a way that everybody has a good transport solution for their varying mobility requirements.

This will reduce congestion and increase the overall quality of mobility and in general the quality of life in the cities, while at the same time reducing carbon emissions and the need for subsidies, which always represents an element of vulnerability for the suppliers.

## **6 – Conclusions: How de we get there?**

We have seen that there is scope for a better urban mobility system by calling upon taxis – especially collective taxis – to play a much larger role than they currently do.

However, much remains to be done besides the evolution of technology. Further development of geographical skills in mobiles phones (to recognize location, indicate intended direction or destiny, signal surrounding opportunities, etc.) is still necessary but will be with us in ever more user-friendly ways within a very few years. The computation power to match clients and providers in real time should pose no problem by now.

What might be slower in coming are the regulatory openings as well as the recognition of these changes as opportunities rather than threats, by authorities, collective transport operators and even regular taxi operators in a tightly regulated market.

At this stage, it is high time to expand the argument that taxis are an integral part of the urban mobility system, and that their role should be expanded since they are in many cases the first or the second best option to get where we want.

This argument must be brought to regulators, organizing authorities, transport operators, and elected local politicians, and the discussion opened engaging all of them and citizens / clients in general, so that the opportunities for all of them arising from that stronger role may be perceived, the business models developed and the regulations opened, and innovative solutions may be brought forward and tested by the market.

It is of course important that a systemic view is maintained throughout, trying to ensure the consistency of public interventions, across the spectrum of infrastructure and technology, regulations and pricing changes.

Inevitably, given the high potential in presence, many variants will emerge, some will succeed and some will fail, but we will all learn and hopefully adopt some of the good ones for our own cities. But a general attitude of openness to change of the field of available transport solutions is necessary, in recognition of the underlying permanent changes in lifestyle and mobility requirements.