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THE MOBILITY DNA OF CITIES

By Fabio Casiroli

In a new methodology of urban modelling, ***Fabio Casiroli*** *identifies how to develop sustainable transport options for complex urban systems.*

The connection between transport and social exclusion is at the heart of the policy debate on the future of cities. Yet, while reducing energy and carbon emissions through more sustainable transport are understood and are being implemented in different urban regions of the world, the connections between urban form, transport infrastructure and social well-being require further analysis. Understanding mobility in cities relies heavily on deterministic, engineering-based models. They tend to rely on a rather rigid, synchronous and static view of cities in which movement patterns are assumed to be the same for all consumers. Instead urban mobility can be approached as a 'pliable' science, one that allows the multiple scales and time zones to be understood through a set of simple modelling tools – which are in effect time-based accessibility maps – that do not require expensive and time-consuming techniques.

The experience of the modern city changes according to the hour of the day and depending on the mode of transport to access the city's primary urban provisions – jobs, shops, leisure and other essential social and community uses. Time, as opposed to distance, is perhaps a more appropriate variable to assess urban functionality. We need to first agree on an average quantum of time that is acceptable to most urban commuters. Research suggests that 45 minutes in each direction, or a total of 1.5 hours per day, is a reasonable time frame for most people to gain access to a range of primary urban functions from their point of departure. While the selection of any such figure may be challenged as controversial, it sets a benchmark against which to evaluate the amount of time spent on commuting by urban dwellers.

To better understand the relationship between urban form and mobility patterns travel times for different modes of transport (public transport and private cars) were tracked in twelve global megacities – including São Paulo, Los Angeles, London and Tokyo – to identify how long it takes to get to work, to go out in the evening, to go shopping, to attend a sports event and to go to university. The results show strikingly different results for different modes of travel in relation to the time of day and the activity they pursue.

The diagrams below indicate accessibility maps for the 'leisure city', illustrating journeys from a selected point of departure in the evening to the main area in each city where theatres, cinemas and other facilities are located. The maps on the top show how far one can get within 45 minutes (in green) or 90 minutes (in yellow) by car, while the ones at the bottom indicates how far one can get using public transport.

What stands out is the real strength of cities like London and Tokyo, which have extensive and integrated transport networks that are fully operational even outside traditional working hours. In these cities the accessibility maps roughly cover the same area for both cars and public transport users. A large percentage of the population can reach the city's leisure districts within 45 minutes regardless of whether they use the car or a combination of bus, rail and metro. Bogotá shows a similarly integrated pattern following the implementation of the TransMilenio bus rapid transit system, which carries 25 per cent of all commuters daily, and has seen travel times cut by 30 per cent, carbon emissions by 40 per cent and road accidents by 90 per cent. At the opposite extreme are Los Angeles and São Paulo where a much smaller area is accessible by public transport

compared to the car. In Los Angeles the amount of people living less than 45 minutes by car from Rodeo Drive is 27 times larger than the amount of people that could get there in 45 minutes by public transport (2.7 million versus 100,000).

The conclusions that can be drawn from these studies confirm that a road- and rail-based public transport system that extends across the surface of large urban areas is critical to providing access to jobs, leisure, shopping and any other primary functions of the city for the majority of its citizens. In Los Angeles, for example, less than 20 per cent of the population of the metropolitan area use public transport to get to work – a clear case of social exclusion – while in Tokyo – still the biggest metropolitan region in the world with 35 million inhabitants – 78 per cent of the population use public transport as part of their daily commute. Many of the most deprived areas of Johannesburg have hardly any public transport system to speak of, and thus access to jobs becomes extremely difficult for those who need it most – a pattern that is evident in many South American cities where commuting times can exceed three hours a day.

Ultimately, the results suggest that existing public transport networks should be used more intensively, taking into account the requirements of different user groups at different times of the day. For example, while London has an extensive and established bus, rail and metro system, its efficiency suffers from the fact that the entire rail-based system closes down at midnight, forcing many people to use cars to gain access to evening entertainment. But while these studies point to the need for policymakers to take time-based transport planning into account, growing metropolitan regions like São Paulo, Buenos Aires, Lima and Rio de Janeiro need to invest in an integrated cocktail of measures that include improvements in regional connectivity, the implementation of bus rapid transport technology, reserved lanes for public transport and cycle networks, and the introduction of traffic management policies such as an alternating number plate system and congestion charging. Only by approaching transport in a holistic way can urban policymakers begin to offer their citizens sustainable solutions.

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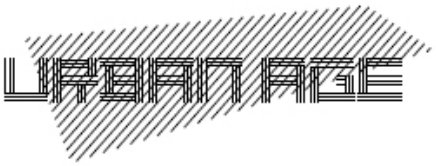

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