MOBILITY CULTURES IN MEGACITIES: RESULTS FROM A GLOBAL STUDY

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Draft version, 09.11.2012

ABSTRACT

Megacities worldwide show an important diversity not only in structural properties and mobility behavior but also in cultural values and public policies. Many common challenges of sustainable development culminate in the global hubs of economic growth, social disparity and environmental risks, especially those concerning transport. Is the approach of “mobility cultures” an appropriate framework to develop successful local strategies? The objective of the research presented has been to understand the diversity of mobility patterns and the underlying conditions in selected megacities worldwide, in order to support the development of policies for sustainable urban mobility.

Six clusters of megacities worldwide have been identified as non-motorized cities, paratransit cities, transit cities, auto cities, traffic saturated cities, and hybrid cities. The selected researchers have developed individual analyses on Atlanta, Los Angeles, Ahmadabad, Johannesburg, Shanghai, Sao Paolo, London, and Berlin. The common findings and policy recommendations have been reflected in the workshops and are published in a book.

Every city is unique: this research shows the importance of specific local conditions to be taken in account for the development of sustainable policies of urban mobility. At the same time, every city seems to be “the same”: Comparable challenges worldwide and common systemic interdependencies between the local structure of transport supply and the built environment, public plans and programs, individual preferences and values as well as urban mobility behavior show that a mobility culture approach might be an appropriate framework for successful urban transport policies. Further cooperative research and networking is needed to exchange on experiences of good practice and to develop innovative solutions in a diverse world.

Keywords: Urban mobility, Megacity, Mobility Culture, Sustainable development

1. INTRODUCTION

Where people meet, life begins.

Beatriz and José meet at the same university in Sao Paolo and might even fall in love, and start a common family life in a near future. Their parents have not met personally in the past, even though they have been working at the same building. Beatriz' father was working as a department manager in an engineering design office, commuting by car on congested highways every day from the wealthy south-western sector of the city. José's father took an annoying public transport ride from the poor, extreme south fringe of the Sao Paolo metropolitan area to get to the same office building, being a valet parking attendant. Thanks to changing mobility cultures, Beatriz and José enjoy riding their bike today in the lively and safe streets of central Sao Paolo.

This perspective on mobility culture, based upon one of the city stories of the Post-Doc fellowship program "Mobility cultures in megacities worldwide" (Costa, 2013) gives a first insight into the research approach of mobility culture. Already within one single metropolis there can be distinct worlds of mobility patterns and related economic, social and environmental conditions. On a global scale, megacities could be considered to be facing the same challenges and showing comparable characteristics. However, megacities worldwide provide an important diversity not only in structural properties and mobility behavior but also in cultural values and public policies. Many common challenges of sustainable development culminate in the global hubs of economic growth, social disparity and environmental risks. But the local response, planning decisions and individual solutions are specific and varied.

The approach of "urban mobility culture" (see Götz, Deffner, 2009; Klinger et al., 2010) has been developed further and tested as an appropriate framework for developing successful local strategies.

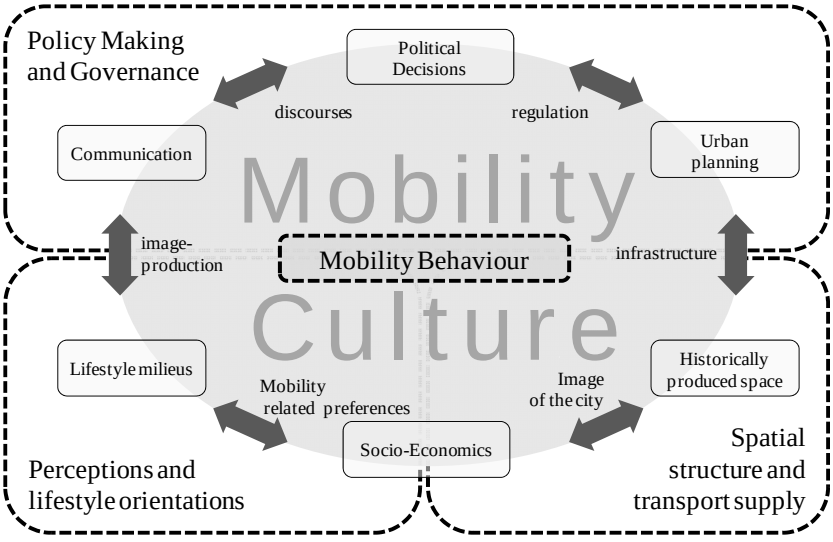

Fig. 1: Concept of urban mobility culture (Kuhnimhof, Wulfhorst, 2013)

Four key dimensions of mobility culture have been identified (see Kuhnimhof et al. 2013):

(1) Spatial structure and transport supply:

Key aspects of this dimension include the characteristics, opportunities and constraints provided by the fundamental geographical space and its topography, economic and demographic framing conditions, corresponding urban densities and the transport infrastructure. Transport networks and service qualities for pedestrians, cyclists, private vehicles and public transportation characterize the quality of transport supply.

(2) Policy-making and governance:

This second dimension of mobility culture covers the societal framework of official and unofficial plans and programs. This includes (a) the general political context; (b) the specific political discourse on the level of the urban policy arena; (c) the involvement of different stakeholders; (d) their quality of governance; (e) participation mechanisms; and (f) the decision-making processes. These aspects of mobility culture strongly influence the local transport system and city structure, and herewith the conditions for everyday mobility behavior. This influence is mostly exerted through the implementation of policy decisions through specific actions and measures, possibly conditioned by the availability of appropriate planning instruments and financial budgets.

(3) Perceptions and lifestyle orientations:

The third dimension of mobility culture directly relates to the user level. It covers the perceptions, values and preferences of the travelers. These are heavily influenced by the specific cultural background, ethnics, gender and race but also by the socio-economic situation, status, social norms and motivations. First, such context conditions are influential on individual travel options and on how individuals perceive these options. Second, these conditions can also be influential on the collective level because they shape local milieu conditions of different neighborhoods with distinct lifestyle orientations and mobility styles.

(4) Mobility behavior:

The fourth dimension of mobility culture finally encompasses the realized mobility behavior. This concerns the individual social practice regarding long-term as well as everyday mobility decisions. Long-term decisions include the choice of workplace and residential locations (influencing urban settlement patterns) and car ownership (influencing motorization trends). Every-day mobility decisions include choices about activity engagement, trip chaining, destinations and travel distances, mode of travel, departure time etc.

From 2010 to 2012 a comprehensive and interdisciplinary research program has been carried out on this background. The key objective of this program has been to understand the diversity of mobility patterns and the underlying conditions in selected megacities worldwide, in order to support the development of policies for sustainable urban mobility.

2. METHODOLOGICAL APPROACH

The research program supported from 2009 to 2012 by ifmo, Institute for Mobility Research, a research facility of the BMW Group, was run at the Institute of Transportation at TUM, Technische Universität München, together with partners from Goethe-University Frankfurt, namely Jeff Kenworthy as DFG Mercator professor from Curtin University of Technology.

The methodological approach has been set up on three different levels:

(a) Quantitative analysis of megacity clusters

First of all, in 2009 and 2010 a quantitative factor and cluster analysis has been carried out on a selection of 41 megacities, based upon the dataset of the UITP Millennium Cities Database for Sustainable Transport compiled by Jeffrey Kenworthy and Felix Laube (2001). Even if the data relates to a base year of 1995, highly interesting and relatively stable groups of cities have been identified. From the 230 standardized indicators included in the database, for the scope of this study the 59 most relevant descriptors of the land use transport system of cities have been selected as key indicators for further analysis. These indicators by means of a classical factor analysis have been simplified to 13 factors explaining xxx% of the variance of all indicators ranging from urban sprawl and automobile dependence, across different mode-related transport qualities (such as public transport supply, parking charges or restrictions/management) up to travel behavior (such as motorized private transport trip length, shared taxi traffic) and traffic impacts (e.g. congestion, energy consumption). As a result, 6 distinct megacity clusters regarding urban mobility (and one outlier) have been characterized in detail based upon this extremely rich quantitative analysis (see Priester et al. 2013 for more details).

(b) Post-Doc fellowship program

Eight highly qualified and motivated post-graduate junior researchers have been selected to take part in an interdisciplinary research network by a 6 to 8 month stay at TUM, Munich in 2010 and 2011. The Post-Docs have been chosen within an expert workshop, coming from a broad variety of megacities and with very different disciplinary perspectives. They have been invited to bring in personal experiences and qualitative, tacit knowledge from selected megacities, in addition to the quantitative data analysis. Each of the fellows therefore elaborated a detailed description of the four components of mobility culture mentioned above for at least one megacity. This finally has lead to a case-study specific “city story” for places like Sao Paolo, Johannesburg, Atlanta, San Francisco, Shanghai, Ahmadabad, Berlin and London (all published in a Springer book, to be presented at TRB 2013, ifmo, 2013).

c) Expert workshops and common discussion

Beyond that, the fellows have shared their individual research interests within the group by regular colloquia and in two major expert workshops with internal scientific supervisors and external international guests. In that way, the common global challenges at the one hand and

the city-specific strategies to cope with these have been made transparent. A deeper understanding of the underlying mechanisms within the framework of mobility culture as well as some general guidelines for bridging the gap between individual, bottom-up solutions and top-down system-based constraints have been developed (see Wulfhorst et al. 2013, Kuhnimhof et al, 2103).

3. PRESENTATION AND DISCUSSION OF SELECTED RESULTS

3.1 Megacity clusters

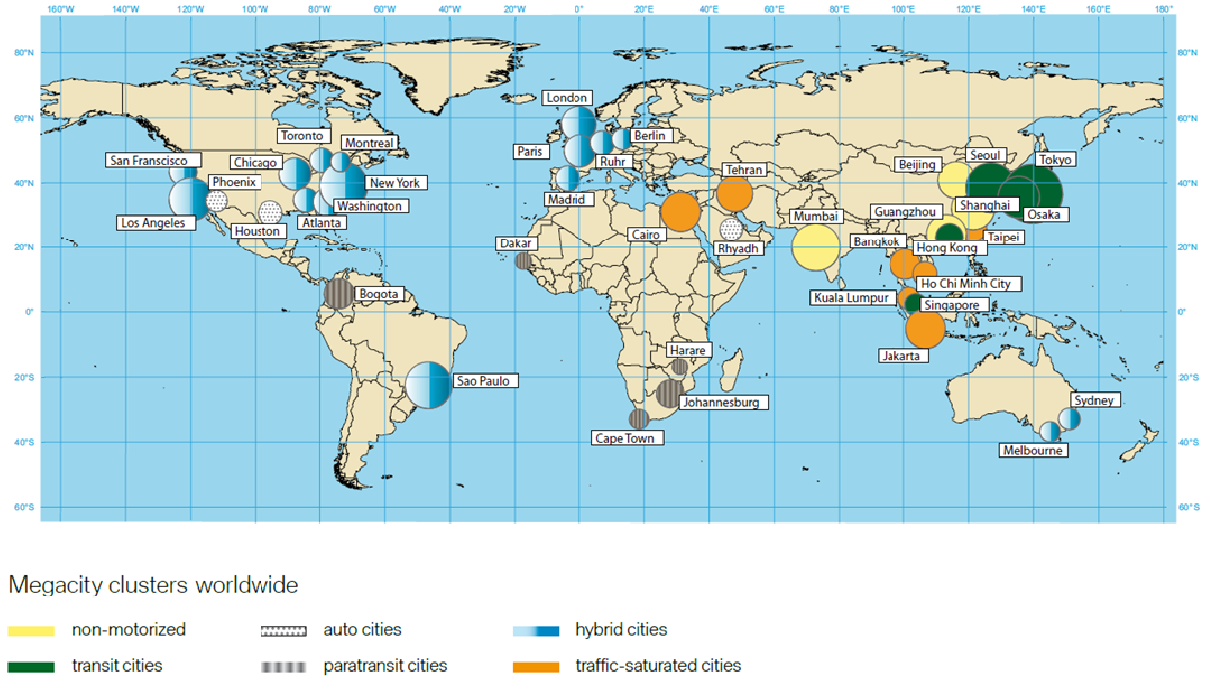

Fig. 2: The 41 megacities studied according to their respective cluster (Priester et al., 2013)

Six clusters of megacities worldwide have been identified.

Hybrid Cities

Cities in this cluster display a specific character, being best described as of a ‘hybrid’ nature. This means, on the one hand, that these cities have a consolidated, dense urban core, extending to the inner suburban areas, with good infrastructure and significant usage of public transport and non-motorized modes. On the other hand, it signifies that these urban centers are surrounded by a vast and sprawling suburban area, with much poorer public transport and opportunities for walking and cycling.

Auto Cities

Auto cities can be described as sprawling, relatively wealthy and completely car-dependent, with tiny roles for public transport and non-motorized modes. Their infrastructure is dominated by freeways and they have few quality public transport alternatives.

Transit Cities

The main characteristics of a Transit City lie in its strong public transport (or transit) profile, in conjunction with the minor role that private cars play in its mobility culture. While car ownership is low or moderate at the utmost, and the availability of public transport is high, their public transport modal share puts them near the top of the list. Thus, car kilometers per capita travelled, energy use and particularly emissions are all low or very low.

Non-motorized Cities

Non-motorized cities can be described as those where walking and bicycling (and other mechanized but non-motorized modes) dominate the modal split for all trips. These cities have high public transport use as well, with very low car use and their urban densities are amongst the highest in the world.

Paratransit Cities

In Paratransit Cities, relative poverty and a high level of informality in the practicalities of day-to-day life causes chaotic transport conditions and leads to a very high number of transport deaths. Much of the transport system of these cities consists of a semi-organized entrepreneurial response to the general ineffectiveness of government planning and transport infrastructure development (with some notable exceptions, such as Bogotá's Trans-Milenio bus rapid transit system). Car ownership and transit system development in such cities are generally rather low, due mainly to poverty.

Traffic saturated Cities

This group of cities is characterized by urban regions with intense – in some cases legendary – traffic congestion, Bangkok being an obvious example. These cities rank high in urban density but generally low in wealth. The cities also have a fundamental mismatch between the degree of development of their transport infrastructure – for both private and public transport – and the existing demand for transport. Motorization is relatively high.

3.2 Transport development trends

As previously mentioned, the quantitative cluster analysis is based upon data from the UITP Millennium Cities Database for Sustainable Transport. While this database relies on data from 1995, an update of the data for the year 2005 or later was absolutely preferable, but not

available yet. So in the meantime mobility culture may have changed greatly in some cities, especially in emerging economies like India and China, but also in some US cities where rail transit has been re-introduced.

Some of the salient trends in the new data for US, Canadian, Australian, European and the wealthier Asian giants of Singapore and Hong Kong can be summarized as follows:

- Car ownership on average continues to grow in all cities except those in Canada and the Asian cities, which remain stable. The dominant trend, especially in already very high car owning environments confounds the theory of a car saturation level.
- Car usage, not withstanding widespread car ownership growth, appears to have peaked in many developed cities or at least is leveling off. Many researchers are currently pursuing this idea of “peak car use” (see Newman and Kenworthy, (2011) for a recent summary).
- Urban densities of metropolitan areas are growing in many cases, or their decline is halting, following decades in the post-war period when the trend throughout the developed world was generally towards declining densities. Some of the factors behind this include growing population in the city centers and inner areas of cities, transit-oriented development increases in the suburbs around rail, smaller lot sizes in sprawling areas and socio-demographic changes that lead to the growing popularity of denser, more mixed land use and urban settings.
- Positive trends in public transport infrastructure, service provision and usage. A majority of wealthier cities are enhancing their public transport systems and they are being used more heavily and are experiencing sometimes quite dramatic growth. Modal analysis reveals this trend to be heavily oriented to urban rail systems and sometimes buses are even in decline, despite the overall growth.
- Urban freeways are still being built in many places but there appears to be a slowing down in the extent of this new provision in many cities.
- Parking in the centers of cities (CBD) per 1000 jobs is declining on average in all groups of cities as the number of jobs increase in these locations (despite a decline in the percentage of metropolitan jobs located there), required parking standards in new developments decline or CBD parking facilities are built out with other uses such as residential.
- On average, the use of non-motorized modes as a percentage of total daily trips seems to have risen (except in Australian cities where it has declined a tiny fraction).
- The number of transport fatalities measured per 100,000 people has declined consistently in every city and the changes in many cases have been quite significant.
- Singapore and Hong Kong remain as vastly different kinds of cities than their wealthy counterparts with dramatically lower car use, very much higher public transport use and better performance from a sustainability perspective on all the above factors.
- Early indications from metropolitan areas that have been expected to have dramatic increases in car use and declines in public transport (e.g. Prague, Sao Paulo and Taipei) are suggesting on the contrary that actual car use increases have been more modest than expected and public transport use has increased. It may be that such cities are reaching some physical limits based on crippling congestion and other factors, but this requires further research.

These and many of the above mentioned perspectives are pursued in Newman, Glazebrook and Kenworthy (2013).

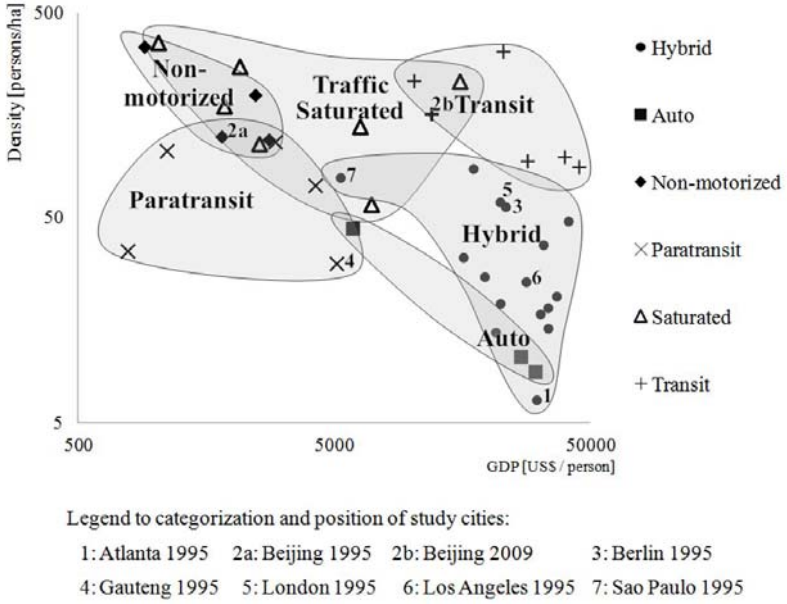

Fig. 3: Population Density and GDP as major drivers of megacity clusters (Kuhnimhof, Wulfhorst 2013)

If depicted as in Figure 3 the city clusters represent more than just a cross-sectional snapshot of the state of affairs of urban mobility from the mid 1990s: They allow for mapping the pathways that cities are moving on as they develop. Moreover, they can assist in identifying upcoming challenges for cities on the move. For example, car ownership tends to grow specifically strongly at levels of GDP per capita between roughly around 3.000 US$ and 10.000 US$. Hence, assuming economic growth, Figure 3 suggests that some cities are imminently facing rapid growth of car ownership. If this prospect coincides with high urban densities the path towards traffic saturation appears to be pre-assigned and many cities have taken this path already.

Take Beijing as an example: In the 1990s, Beijing was a non-motorized city characterized by high density, still low motorization and continued economic growth. Traffic saturation appeared to be inevitable. Hence, the city's recent development (first in roadway extensions, then in transit investment) was characterized by the struggle to avoid traffic saturation. The city's position in 2009 is also depicted in Figure 3. Beijing has seen a slight increase in urban density since the mid-1990s paired with rapid economic growth. This development has propelled Beijing from being a Non-Motorized City into a position where – according to GDP per capita and population density – the Traffic Saturated City cluster overlaps with the Transit City cluster. This raises the question how Beijing could manage this significant development without getting stuck in traffic. In his megacity story about Beijing's "Transition to a Transit City" Song addresses exactly this question (Song, 2013). However, Chinese cities will never be like American or European cities. Still today, more than half of all trips in Beijing are being made by walking and cycling, public transport accounts for roughly a quarter of all trips and only every fifth trip is made by private motorized transport.

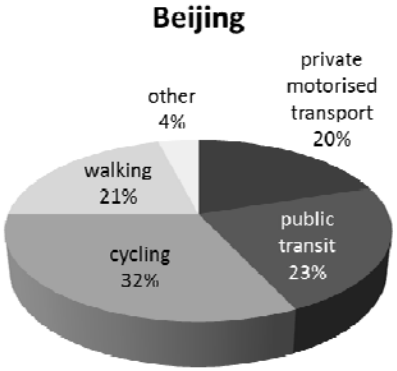

Fig. 4: Beijing mode share 2011. Source: LTA Academy 2011 (adapted)

3.3Diversity of mobility patterns and mobility cultures in megacities

Every city is unique: this research shows the importance of specific local conditions to be taken in account for the development of sustainable policies of urban mobility. The variation of indicator values across the different cities is astonishing (cf. Fig. 5 to 8).

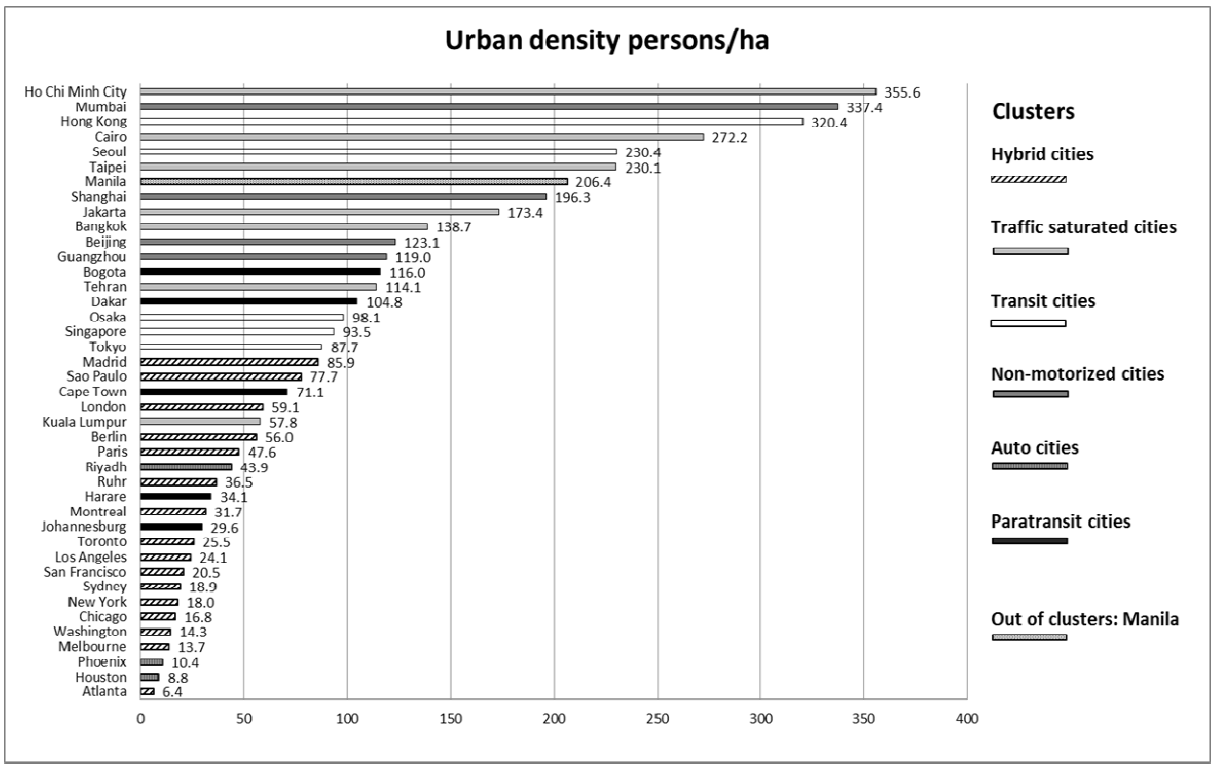

Fig. 5: Urban density across all 41 megacities studied

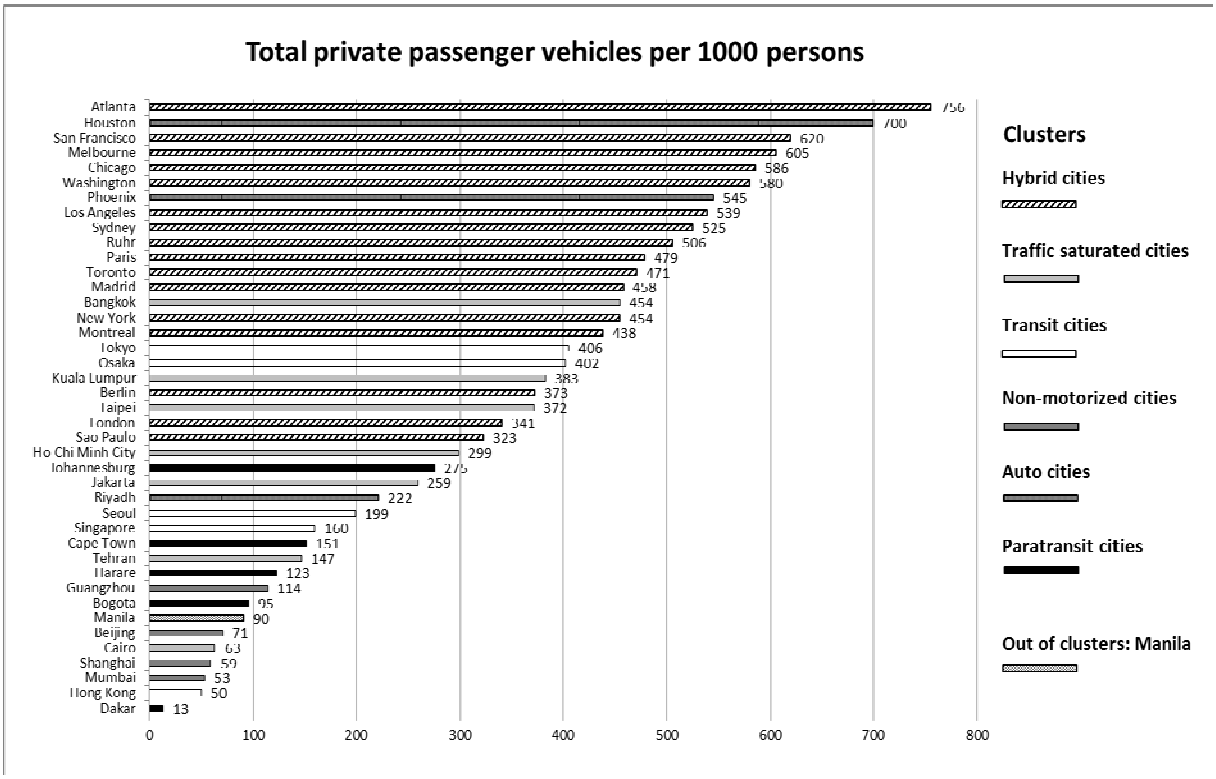

Fig. 6: Motorization rates across all 41 megacities studied

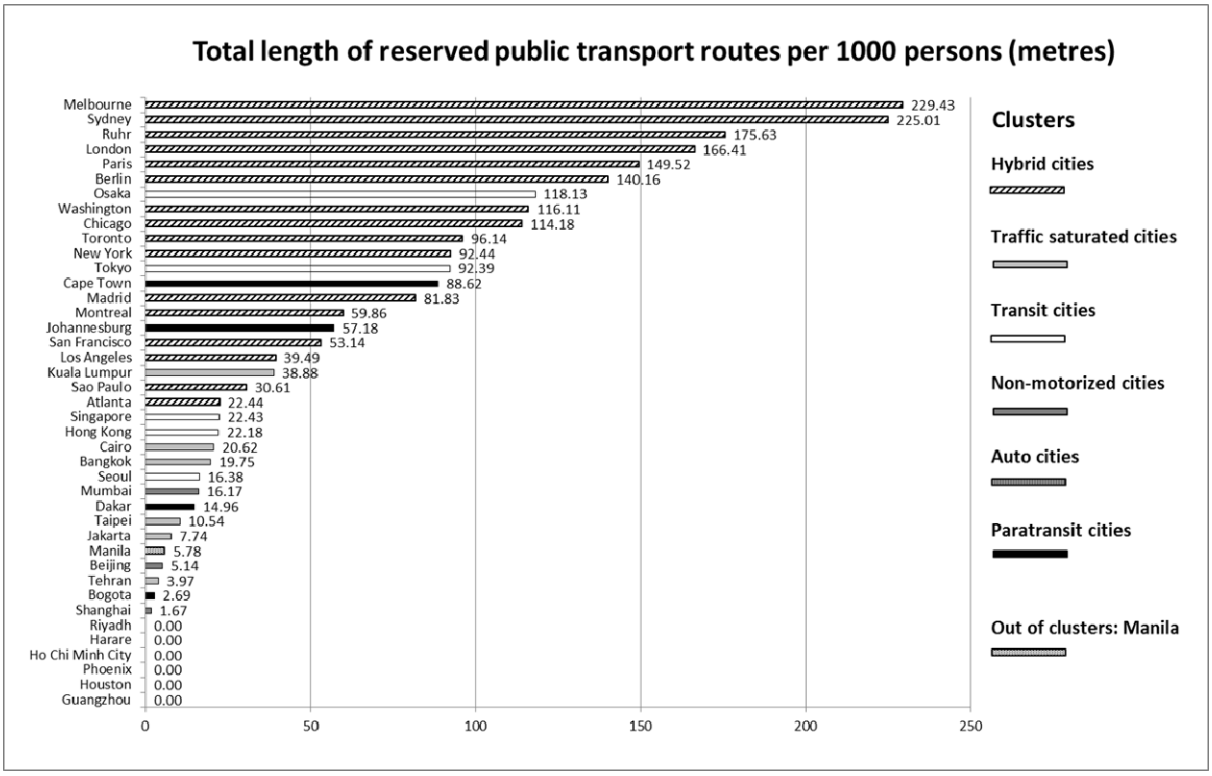

Fig. 7: Public transport infrastructure across all 41 megacities studied

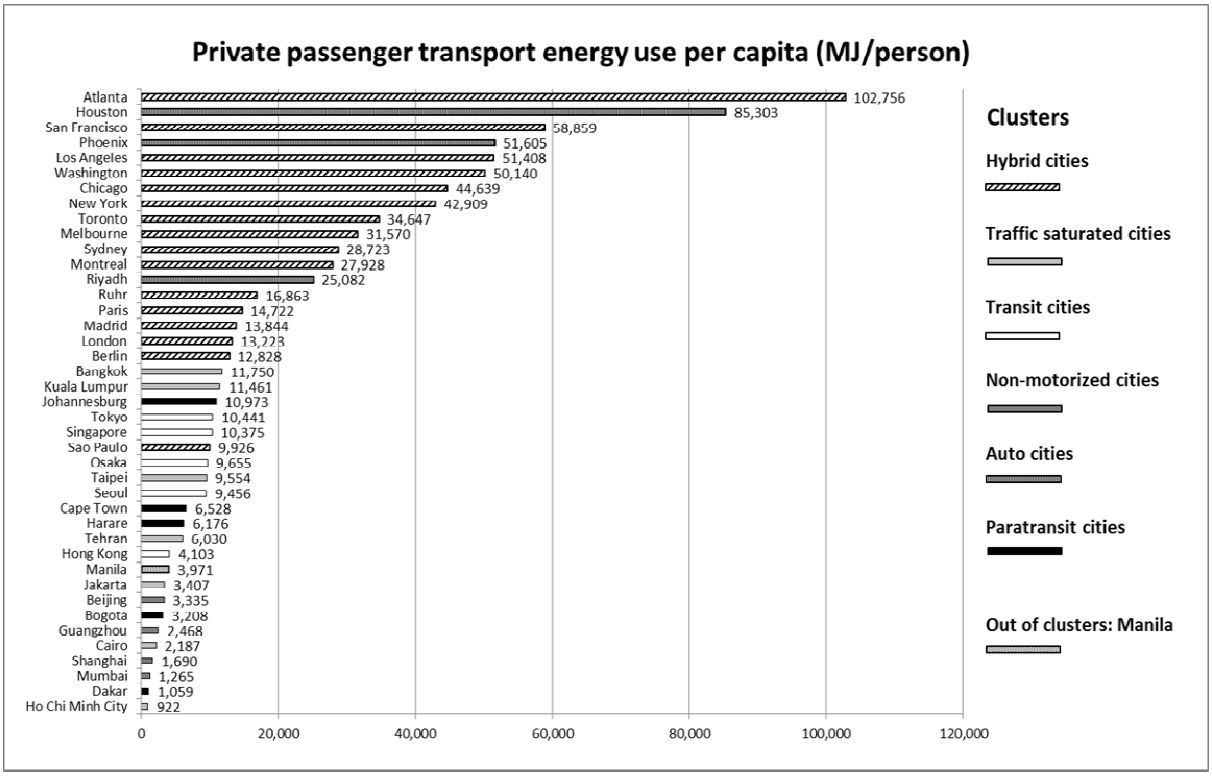

Fig. 8: Energy consumption related to travel behavior

Case-study specific analyses on all components of mobility culture, including the qualitative aspects, have been carried out by the Post-Doc fellows on selected places such as Atlanta, Los Angeles, Ahmadabad, Johannesburg, Shanghai, Sao Paolo, London, and Berlin.

3.4Comparable characteristics as temperaments of megacities

Every city seems to be “the same”: Even though the cities and their relating mobility culture differ a lot, we can search for and discover common denominators. Across the manifold local situations there seem to be red threads referring to generic mechanisms of interaction linking all domains and dimensions of mobility culture.

These mechanisms of interaction describe the underlying dynamics and driving forces that shape urban mobility systems. Of course, they are not equally pronounced and operate the same way in all cities. If and how these fundamental mechanisms are at work, is intrinsically determined by the values, conventions and social practices of the local actors in the field of urban transport and city policies. In order to take account of the fact that these mechanisms of interaction are hardly tangible and nevertheless fundamentally constitute the mobility cultural character of a city we label them “mobility culture temperaments of cities”.

These generic mechanisms represent the dynamics at work in every single city, constituting the constantly changing urban mobility culture. The mobility culture approach might be an appropriate framework for successful urban transport policies.

Further cooperative research and networking is needed to exchange on experiences of good practice and to develop (and implement!) innovative solutions in a diverse world.

3.5 Perspectives to be addressed

Comparable challenges worldwide and common systemic interdependencies between the local structure of transport supply and the built environment, public plans and programs, individual preferences and values as well as urban mobility behavior enable us to dress some common findings of the multiple pictures studied and discussed.

Megacities across the world do not only face global challenges that are common to all; their development also has to take into account local conditions that are unique. Cities contribute significantly to these global challenges and must be part of their solution. Mobility Culture, we have argued, is a suitable framework to develop appropriate strategies for sustainable urban mobility.

How can the megacities of today handle their responsibility to contribute to the development of tomorrow's world? The Brundtland Commission's declaration on sustainable development (UN, 1987), states that our individual needs should be fulfilled. However, this must not jeopardize our common resources or limit the options available to future generations, or other regions, for fulfilling their own needs. So, looking beyond our individual, local desires and actions, we have also to consider and respect our common constraints at the global level.

It seems that one of the key problems in sustainable development is that we can never be sure to end up with a system-wide optimum by combining individual behavior that is motivated by user-optimizing criteria. In that case, how can we strive for sustainable urban mobility, while our daily individual mobility choices may be heading in the opposite direction?

In this conflict between individual decisions and common targets, the system boundaries used are crucial. Top-down and bottom-up strategies have to meet. Efficient internal market mechanisms have to be framed by clear boundary conditions, set by the public. In consequence, we have to develop consistent and coordinated new policies that will assist in putting these well-intentioned approaches into practice.

Based upon the workshops and the exchange among the researchers, some policy recommendations have been reflected and summed up by the following headlines (see Wulfhorst et al. 2013):

(1) Be Visionary – and Pragmatic

The general objective is clear: We urgently need to develop a more sustainable mobility system. But this is not an easy, linear optimization problem. It is more complex than just modeling optimal prices. Besides, there might be no 'optimal solution', no equilibrium state for a dynamic, non-linear, complex system like this. The following questions need to be answered in problem-solving strategies: What, precisely, is the objective function? Which are the multiple targets and interests, and by whom are they addressed? What are the framing conditions? Which specific constraints apply?

We have to take up the challenge, which involves setting a common vision and clear targets, and developing shared strategies that enable realistic steps to be taken. Cities should never let mechanistic solutions lead the future through self-fulfilling prophecies. Cities need to have a vision of their future, and mark their steps in policy and strategy terms by yearly increments with a view to accomplishing those visions. Any successful visioning exercise requires both: bottom-up, community driven activities, and top-down government involvement.

In summary, we should be less illusionary in our thinking, but more visionary in our ambitions, and more pragmatic in the realization of our projects.

(2) Think Globally, Act Locally

The slogan "Think Globally, Act Locally", adopted by the Agenda 21 movement, has a strong application to mobility in megacities. The spirit of this idea, derived from the UN Conference on Environment and Development that took place in Rio de Janeiro in 1992, should be clearly maintained and even reinforced according to today's challenges of globalization. Every city is unique, so there cannot be one single answer, one simple solution to the challenges that present themselves. We need new, creative solutions for 'our city', which requires investment in an understanding of the local context. It is for this reason that we study how different cities try to tackle the global challenges at a local level. From these local, case-study-based observations, we can try to develop a general understanding of processes, and thereby generate knowledge and experiences that are transferable to more general situations.

Understanding the complexity of different scales, the local, regional, national and global levels, is needed. We need to consider the interactions between these multiple and overlapping scales. What kind of bottom-up strategies, or top-down mechanisms, can we apply? Can we develop joint strategies for urban solidarity and the governance of sustainable mobility? What kind of formal or informal instruments support the integration of local knowledge and interests into common societal solutions?

On the local scale, new cultures and instruments of participation need to be found that link citizens to policy decisions that take place at higher levels. This will avoid political frustration, and improve acceptance of policy. Decisions and solutions agreed upon at the level of a

metropolitan region must then be sufficiently reliable and resilient to be implemented and secured at a lower level.

(3) Consider All Modes of Transport

When looking at transport systems, the above cooperative approach would have to consider all modes of transport, weighing up their various potentials and challenges.

Walking and cycling will probably gain greater stature in sustainable urban mobility concepts. Historically, urban mobility has always been based upon non-motorized travel. In many urban places, more than 50% of all trips are still non-motorized. These modes are likely to become central to urban regeneration and city-friendly mobility. Non-motorized travel can satisfy individual needs locally while helping address societal challenges at a global scale. With the appropriate urban structure embracing density, diversity and design and attractive networks, walking and cycling could attain a high modal share (Schiller, Bruun and Kenworthy, 2010).

Public transport certainly has a vital role to play as a backbone for structuring large-scale urban agglomerations. It can support the development of a polycentric urban system through better access to and attractiveness of centers (Cervero, 1998). Its competitiveness against the private car will, however, have to be demonstrated, not only in travel times, travel costs and individual comfort, but also energy efficiency, local pollution and global greenhouse gas emissions.

Private motorized travel will no doubt continue to be a strong mobility option, and a driver of local development, but it remains an illusion to imagine building attractive and resilient cities that are based predominantly upon the car. Rapid motorization, regardless of the car technology, will always conflict with one of the most important urban resources: space.

(4) Make Space a Value

Urban space is a scarce and precious resource, especially in growing megacities. Conflicts over space should therefore be reflected upon carefully. To which user groups is public space being allocated? Engaging citizens as local experts would likely help.

Space allocation problems can be partly overcome through subway systems, elevated roads or tunnels. However, new challenges can emerge, such as financing investment and maintenance, integration of urban design, and arguments about aesthetics.

Congestion might be a serious problem for many car users in peak hours, but capacity constraints can also be considered as “limits to growth”, offering a form of system self-regulation. Rather than combating congestion by providing additional urban roadway, mobility policies can improve mobility options, allocating more dedicated space to non-motorized modes and public transport and helping to attract people from cars. Fair and equitable solutions to urban space allocation probably need to include altering long-term spatial travel patterns by changing urban structure, providing alternative modes and traffic management schemes which organize vehicle flow more efficiently.

Some very effective measures to overcome the mismatch of travel demand and road space supply rely on mobility pricing schemes including parking management. Certainly, charging for congestion is a rarely practiced, but potentially effective route to follow. The local and global effects of such pricing policies, synergies (for example, climate protection plans), and conflicts (involving, for example, social factors) must be studied within the local context.

Generally speaking, making the scarce resource of public urban space into a value certainly can assist in achieving decisions that treat all modes more equitably.

(5) Manage Transportation Demand

With many megacities having both growing populations and economies, motorization and vehicle mileage have increased accordingly. As soon as certain thresholds of disposable income and household budgets are surpassed, the demand for individual motorized transport in many cities rises to a point where infrastructure provision cannot keep pace. Coherent urban development, together with network design, will not of itself be able to satisfy the demand, although the provision of, for example, excellent public transport infrastructure integrated with dense, mixed-use development can help a great deal (Newman and Kenworthy, 2006). A lack of space, compounded by the absence of sound, integrated land-use/transport planning in many dense, fast growing cities, often leads to rapid suburbanization.

Mobility pricing schemes, therefore, are more and more frequently being considered as the only strategy for the relief of congestion. They also are a very much-welcomed resource for financing local transport. Transport for London, for example, is obliged to spend the revenues of the charging zone on multimodal transport policies. Stockholm, with its electronic urban toll system, not only reacts to peak hour congestion levels by adjusting time-dependent tariffs, but also allocates the money collected to implementing strong improvements to the supply of public transport. Because of this clear public benefit, the pricing scheme is widely accepted among the citizens.

The attractiveness and amount of driving in cities are also highly influenced by parking regulations. Cutting down the supply of on-street parking space will provide scope for re-organizing public space to create attractive urban qualities. Cheap and abundant parking, which extends even to the central business district (CBD) of a city, as it does in Los Angeles, Houston, Phoenix and other car-orientated cities worldwide, certainly won't contribute to urban attractiveness. On the other hand, a lack of parking space, especially for residents, might reinforce the suburbanization processes. New urban development does mostly need parking space, but the question is how much?

Not only does the overall amount of parking have to be considered, but, by use of balanced parking management schemes, the parking pricing and policies applying to different user groups (residents, commuters, visitors) should be regulated. This can motivate them to use alternatives to the car, thereby reducing the amount of traffic simply searching for parking. Strategies for tackling the problem of commuting to work, such as payment for a parking

space are particularly needed. When combined with the subscription to a monthly public transport ticket, or even 'cash-out' regulations, whereby employers are required by law to give employees who have a parking space the choice of using that free parking or being paid its equivalent cash value, could function as strong incentives to modify behaviors (Shoup, 2005).

(6) Stay Active in the Policy Process

Public bodies have to face up to their responsibility to ensure societal goals and respect environmental constraints, while at the same time supporting development of economic activity. Institutions have to be trustworthy in their areas of responsibility, and must be held accountable in their fields of competence. A clear policy should be formulated, based on a comprehensive participation mechanism, which increases awareness and acceptance of policy. Consequently, political strategies, once they have been decided at a higher level, are more likely to be respected and implemented at the local level.

Working on open systems such as the transport network and mobility patterns of a megacity represents a challenge to institutions whose areas of authority and competency are clearly restricted to limited spatial areas. Functional territories and organizational territories never can perfectly be in line with each other, so we have to look for cooperation and coordination amongst stakeholders.

These policy processes, of course, form part of a cultural setting and occur within a continuous history, not in an instant of time. They are influenced not only by the current 'power game' of stakeholders, but also by political systems, physical geography and local habits. Increasingly, we have to consider, in a pluralistic society, the manifold concerns and attitudes that exist, and both individual and common values, as these relate, for example, to consumption. There is no single public interest, but rather many 'public interests'.

(7) Develop Creative Solutions Together

For substantial innovation to take place in the mobility sector, creative solutions are needed. Competing partners (for example municipalities within an urban metropolitan area) normally can only be led to cooperate when the gain in terms of common benefits exceeds the individual investment. However, it becomes more and more clear that real success in sustainable urban mobility cannot be found alone, but only in a collaborative way.

The Mobility Culture Approach might help to de-code the hidden interwoven relationships. It will make clear that overall success has to be based upon bottom-up processes that attend to individual needs and interests, translated into top-down integrated policies that address not only those individual needs, but also the societal needs on a system level. It becomes obvious that new solutions which address multiple crises will have to be developed from such bottom-up / top-down interfaces.

4. CONCLUSIONS AND OUTLOOK

When people meet life begins.

Developing sustainable urban transport policies based upon the mobility cultures approach is addressing several fields of integration:

(1) Integration across all transport modes – towards a balanced transportation system.

(2) Integration across disciplines – beyond classical transportation planning, linking it up with urban planning, economy, environment, sociology, etc.

(3) Integration across spatial scales – on at least two main levels of action in order to live locally and be connected globally:
   a. The level of the urban neighborhood, with a strong focus on non-motorized transport, enabled by proximity, diversity, and design, leading to livability
   b. The level of the metropolitan region, the megacity region as a potential daily activity space, searching for global hubs / gateways as well as for social inclusion across different regional locations and population groups.
   c. Additionally a virtual space, the increasing importance of relational proximity via information and communication technologies on a world-wide-web.

(4) Integration across time and ages,
   Counting not only minutes and hours of daily dynamics (peak hour / off peak hour – at daylight at night) but accounting across years of planning and implementation (that last for decades or centuries) up to generations.

It is showing the need of innovating

- the schemes of planning, towards such approaches like action planning, according to a locally defined strategy and a shared vision of different stakeholders,
- the methodologies of impact estimation and assessment, by holistic system modeling approaches taking in account complex quantitative as well as qualitative feedbacks in a dynamic, non-linear way, rather than singular and linear forecasting methods,
- the policy-making processes themselves, as it will no longer be possible to define policies and political decisions off the public; consensus – common sense is needed between parties but also between politicians and citizens.

Finally, sustainable solutions have to be developed from an individual perspective of user needs towards the constraints and necessities of a common societal system. This process clearly is based on understanding, awareness und altruism. And this is, at the end, something that makes human life rich and satisfying: As Maslow concludes in introducing “transcendence” as an additional step on his pyramid of human needs – just before his death (cf. Maslow et al., 1971).

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