Chapter 45

Transport and Development – What Next?

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1. Introduction

The relationships between transport and development have become a central part of transport thinking, particularly in the cities of the developed countries. These cities already have a high level of connectivity with dense street patterns, roads and public transport systems that can accommodate most traffic under normal conditions. The quality of that transport network has been seen to be central to the economic success of cities and in making them an attractive centre for investment. Increasingly, the transport benefits of new infrastructure investment have been enhanced by the wider economic benefits brought about through agglomeration economies, labour market benefits (better employment opportunities), and other multiplier effects. In the rapidly growing cities in the developing world, there is still the need for new infrastructure to accommodate the huge increases in demand arising from population growth and from increased wealth. Yet in time, even these 'new cities' will have to limit new investment as demand for travel always seems to exceed the means to provide for that demand. Questions are now being raised in all cities about what is a sufficient amount of infrastructure and whether issues of demand management and capacity management should become the central concerns of decision makers rather than continuing to follow the supply led future.

This book has addressed these fundamental concerns, about how much transport infrastructure is sufficient for cities. Development is seen as a much wider concept here that embraces social, environmental, and spatial issues, as well as the economic implications. The three main Parts of the book are structured around these important factors that place development within the concept of wellbeing rather than growth. Issues relating to consumption and economic growth are important elements for development, but in this book the concern is also over the equally important issues of resources, accessibility, location, community design, health, the spatial implications of development, linking public transport to local development, poverty and inequality, social policy, cultural aspects, open and green spaces, the impacts of technology, demographics, sustainable transport, climate change and politics. When discussing transport and development, all these factors are central to the realities of the debates, and the diversity of issues and interpretations that can be made for a rich and comprehensive understanding of the different pathways that have been followed.

This concluding chapter brings together many of these interesting and important issues by sketching out a vision of cities and change, through looking backwards and forwards, before setting out an agenda for the future. Development is seen as a multifaceted process that provides a fundamental rationale for cities and regions, and it is argued that transport plays a key role in facilitating the success brought about by development. Transport supports the development of new and existing cities, but it can also act as a barrier to

development, and additional demand for travel is often a consequence of development. Every city is different and the pathways followed both start and end at different points, but there are many underlying commonalities relating to economic success and stability, employment and trade, innovation, research and education, as well as social inclusions, clean air and health, governance, and a high quality of life. The problems facing cities also have common elements relating to the need for housing, affordability and accessibility, security and safety, climate change, and investment (including infrastructure). Although cities, regions and locations all have underlying commonalities and problems, each one is very different, and these differences have been brought out in the individual chapters of the book. The richness and diversity is something to be treasured and valued, and this in turn makes it difficult to come to any form of overall synthesis in this concluding chapter.

2. Cities and Change

Cities are undergoing a renaissance with a huge growth in urban population, and the emergence of the 'Megacity' (over 10 million population), the 'Metacity' (over 20 million population) and the 'Metacity' regions (with a total population over 80 million). Examples of Metacity regions can be seen in Japan (Tokyo to Nagoya and Osaka), in China (Pearl River Delta), and in Brazil (Sao Paulo to Rio de Janeiro). In 1900, about 13 per cent of the global population was urban, but by 2000 this figure was 47 per cent, and the 50 per cent threshold was reached in 2007 when 3.3 billion people were 'urban'. By 2030, the figure will exceed 60 per cent (4 billion), and by 2050 nearly 70 per cent (6 billion) of the global population (9 billion) will be living in urban areas. This enormous growth will be fuelled by natural growth, longer lives and migration into the city, and the dynamics of urbanisation will also change as the population will be young and active. Cities will provide the main sources of employment in manufacturing and service provision. But in addition, they will also provide the new growth in the knowledge economy and in the networked society. Cities will continue to drive the global economy, as well as being centres of innovation, creativity and wealth.

The traditional notions of work, as being construed by a 35 hour week and by 40 years of commitment to one employer, has already effectively been transformed. The new forms of work are much more flexible with people moving around between different jobs, with hours to suit their own needs, and with time taken out to learn new skills or to raise a family – at least for increasing parts of the working population. Gender barriers are being broken down and home working becomes much more common, as both work and leisure are becoming increasingly organised around the Internet in its many manifestations. The cities that adapt to this new knowledge and network based environment are the ones that will prosper, with tradition counting for less as labour becomes ever more mobile. In addition to being the centres of work, cities will retain their positions as centres of government, finance, education and culture, as this is where decisions will be made that affect the next stages in the increasingly globalised markets.

Multinational companies may still influence many aspects of life, but it is likely that governance may change, as decision making revolves increasingly around the power of the Internet, and coalitions that are formed to address particular challenges (e.g. climate

change or social equity issues). Because of the greater transparency brought about by web-based transactions, there is a much greater flexibility in decision making and a strong movement against big government. It is unclear how many of these potential conflicts of interest between governments, multinational companies and society in general will actually be resolved.

Within this ever evolving landscape of change, and as cities restructure themselves to this new set of challenges brought about by the latest technological revolution, it is clear that social and environmental issues will continue to need careful attention. Cities are dependent on all people being able to engage in the opportunities that are presented, but there is still likely to be homelessness, crime and poverty, so social priorities are central to the 'successful' planning of cities, as are the needs to address energy, pollution, water, waste management and climate change.

At present, cities account for 75 per cent of the global energy consumption and nearly 80 per cent of Greenhouse gas (GHG) emissions come from cities burning fossil fuels, and many of the World's great cities are located on the coast and on river estuaries making them vulnerable to floods and sea level rises. Of the 29 Mega cities[1] (2013), 20 are coastal or on major rivers (under 100 feet above sea level). In certain countries, a high proportion of the total population are at risk of flooding, including Bangladesh (46 per cent of the population), Egypt (38 per cent of the population) and Vietnam (55 per cent of the population). Cities are robust and durable, and in the past they have lasted longer than many countries, but this stability might change in the future, as extreme weather events become more frequent and of a much greater intensity. Much of the infrastructure in cities was designed and built over 100 years ago, and it needs reconstruction, and new fibre optic networks are required for high speed access to the Internet. It is here that transport has a key role to play in the city, both in terms of the need for people to get together for work, leisure, social, educational and cultural activities, but also to enable the city itself to work. This would include the movement of freight around the city, and the support necessary for the efficient operation of the energy, waste and delivery businesses. Physical movement and distribution are still central to the operation of the city, as not every activity or transaction can be undertaken electronically. As Colin Clark (1958: 237) stated over 50 years ago, "A system of transport is a necessity, which like the respiratory system of the body, we take entirely for granted as long as it is working well – our imagination just fails to tell us what would happen if it broke down."

Mega Cities have grown and will continue to grow at a much faster rate than the provision of new infrastructure and housing, and this situation is having a deleterious impact on the quality of life through sprawl, congestion and pollution, through poor quality housing and poverty, and through the need for more reliable energy supply, clean water and sanitation. The potential global risk is of increasing poverty and social

[1] Mega Cities (over 10 million population) in rank order (2013): Tokyo, Guangzhou, Shanghai, Jakarta, Seoul, Delhi, Mexico City, Karachi, Manila, New York City, Sao Paulo, Mumbai, Beijing, Los Angeles, Osaka, Dhaka, Cairo, Kolkata, London, Buenos Aires, Bangkok, Istanbul, Lagos, Tehran, Rio de Janeiro, Shenzhen, Moscow, Paris, Tianjin. The top 12 are meta cities (over 20 million population). The figures are not entirely comparable as truly comparative data is not available– Source: http://en.wikipedia.org/wiki/Megacity.

inequality, which may in turn lead to social unrest and higher rates of disease and crime. Although the role of good governance and urban planning may be reduced, it is important to see development as investment in the future of the city, and to maintain and enhance the quality of the built environment is key to which cities emerge as the new centres of innovation and affluence. Although it has been acknowledged that all cities are different, the narrative given in the next two Sections is generic and it traces some of the commonalities between cities from all parts of the World.

3. The Retrospective View

Cities of low mobility

Before 1960, many cities had low levels of car ownership, and movement was dependent on walking, cycling and public transport. These relatively slow forms of transport limited the growth of cities, but it must be realised that it was the introduction of public transport that permitted the initial expansion of cities – London provides a good example. In 1801, 87% London's population was located in the inner area (20% of the total area – 1500 km2), amounting to 0.957 million out of a total population of 1.1 million, and this was before the advent of public transport. By 1901, 70% of the population (4.5 million out of 6.5 million) was still located in the inner area, even though decentralisation had been facilitated by rail, tram and bus. In 2001, 45% of the population (7.2 million) were in the inner area, and now (2013) there are about 40% of the population in the inner area, and 60% in the outer area (80% of area). The car has only been influential in this process since the 1970s.

In his study of the London rail network development, Levinson (2008) found positive feedback between population density and network density over the period 1871-2001, where additional stations in the periphery on the underground and overground rail networks encouraged suburbanisation and relocation, as land was cheap. In the centre of London, more expensive land was increasingly being used for commercial development and the population moved out, and the concept of commuting was created. This pattern has been replicated globally, and it reflects the classic location theory that location is influenced by rent levels (declining from the city centre) and transport costs (rising from the city centre) (Alonso, 1964).

Cities for cars and high levels of mobility

Mobility levels increased with the mass production of the car and cheap energy, and more than any other consumer durable, it has come to represent prosperity and a modern notion of development. This period was marked by high levels of investment in the infrastructure, the expansion of cities, new towns, and the ethos of predict and provide dominated (Banister, 2002, p25). There was a divergence of thinking between the US and Europe. In the US, where land was cheap and available, with few constraints on development, suburbia grew with single family units, low densities and large land plots, and accessibility was provided by the car. In Europe, less land was available and there were stronger controls on development, and a desire for higher densities, at least among planners and other urban modernists, and this allowed for a stronger role for public transport to provide accessibility (Banister, 2012).

The reconstruction and extension of cities was not universally supported, and influential arguments raged about the nature of community and whether it could be created, or whether it could only be destroyed (Jacobs, 1961). Urban renewal could only come from mixed use developments and maintaining the vitality of existing neighbourhoods, designed around local movement and the small scale. These arguments centred on social capital. In terms of urban development, this meant that cities were constructed at medium densities with lively neighbourhoods that encouraged mixed communities (all ages, ethnicities and classes) leading to lower levels of crime, and fostering innovation, creativity and employment.

Cities for sustainable mobility

It was only in the early 1970s, following the release of the 'Limits of Growth', 'Energy and Equity', and other similar publications (Carson, 1962; Meadows et al., 1972; Illich, 1974) that environmental quality became a major political concern. Even then the concern was mainly over the local environmental quality, including some pollutants, air quality, noise and community severance, but not issues relating to carbon or the future of oil. The oil crisis of 1973 was quickly forgotten, and oil's low cost and abundance continued to dominate the debate at the expense of concerns over security of supply, resource depletion and carbon.

It has only been in the last twenty years, since the World Summit in Rio (1992) and the climate agreement in Kyoto (1997), that global warming has become a major concern of science and policy. It took over seven years for the Kyoto Protocol to be ratified (February 2005). Since that time there has been frenetic activity in examining how sustainability can be placed at the centre of transport in urban areas, so that the twin axes of development (economic and social) can be balanced against the third axis (environmental). These three 'pillars of sustainability' have been at the heart of the debates on future urban form and sustainable transport (Perrels et al., 2008).

Part II of this book draws on some of the academic debate that has been important to practice – with the protagonists arguing that urban structure plays an important role in generating particular travel patterns, with a range of built environment characteristics considered (such as density, mixed use, accessibility, etc.). There has been some limited critique, mainly from the perspective of individual choice, and also the ineffectiveness of governments to deliver neighbourhoods of 'appropriate' design. In the main, policy development (in the EU at least) has followed the 'compact city' approach that argues for medium (and high) built densities, enabling efficient public transport and thresholds to support concentrations of economic activity, services and facilities (CEC, 1992). Mixed-use environments and good public open spaces are important, with urban containment policies implemented through the demarcation of a growth boundary or urban edge. Compaction or higher building densities help cut the volume of traffic in urban areas, and this was seen by the EU as the main means to provide cities with environmental and quality of life benefits.

This rather 'simplistic' view of development failed to recognise the complexity of choices about travel, but it does not negate these arguments, as there may be strong accessibility reasons for co-location of services/facilities and homes (Breheny, 1992).

The current thinking in the EU is for 'smart, sustainable and inclusive growth' (EU, 2010), but the terminology rarely clearly defined, and compact city planning is still central to reducing the intensity of individual car use and for developing higher quality public transport connectivity between the city and its functional urban agglomeration. Policy implementation has often been weak, and urban development, particularly on the edge of the larger urban areas, or in the smaller urban centres, has (perhaps perversely) followed the dispersal route, with the compact city approach gaining little traction. Many of the complexities and nuances explored in the academic debate are not followed at the level of practice.

Cities for people

Other issues such as agglomeration and a concern over the appropriate forms of governance have become more important, whilst parallel movements such as 'New Urbanism' have examined similar principles at the local neighbourhood scale. Local neighbourhoods are seen as seen as being composed of "fine-grained, mixed-use, mixed housing types, compact form, an attractive public realm, pedestrian-friendly streetscapes, defined centres and edges, and varying transport options" (Grant, 2006, p.8). This means that a wide range of facilities are grouped together around key public transport facilities and intersections to maximize accessibility by efficient forms of transport (e.g. walk and cycle, as well as public transport), but there is a concern that these types of development are not diverse or dynamic as they are only attractive to certain types of people; and as there is not sufficient good quality housing in attractive urban neighbourhoods, the cost of living in these locations is often expensive.

Within the context of transport, the new urbanism is linked to transit oriented developments (TOD), where higher densities and better public transport access are traded off against the greater flexibility of the car. In some situations TODs can reduce car use per capita among its residents by half and save households around 20% of their income as they have lower levels of car ownership (Cervero, 2008) and the ecological footprint of cities can be reduced. People travel shorter distances when they move into neighbourhoods with higher accessibility (Krizek, 2003), with median distance increasing from 3.2km in the more accessible neighbourhoods to 8.1km in less accessible neighbourhoods. Street connectivity is also important here as it can reduce distances for slow modes, but cul de sacs are also popular with residents even though they tend to extend travel distances. Main Street programmes in the US (and more recently in the UK) are intended to revitalise town centres by restricting access at certain times and to create vibrant communities day and night (Handy, 2004). Other initiatives to encourage urban living include extensive pedestrianisation, the closure of residential streets, gated communities, and even the removal of freeways (e.g. the Embarcadero Freeway in San Francisco).

Transport has had a fundamental impact on urban development, and this pathway from public transport oriented cities through the car dominated city, and the more recent concerns over the social and environmental factors has been replicated in nearly all cities, but at different times and in different ways. Part III of this book examines the spatial impacts of transport investment, again drawing on the rich debate concerning the different types of modes and impacts that be seen. The impacts of public transport, of

varying forms, are perhaps most well explored. But again, there is little agreement as to the 'likely' impacts of investments, with effects largely determined by context, macro and micro economic trends, the associated planning strategy and other factors.

Two themes have emerged from this retrospective view on the arguments over the roles and relationships between transport, and development. One is that people are and should be at the centre of the debate, and not subject to arbitrary standards about levels of density and very physical interpretations of land use and planning. Related to this is the need to consider urbanity, where the function of urban living is to increase the means by which people can interact with each other and feel a sense of belonging through engagement with the full range of urban organisations and institutions. Secondly, the more recent debate on the importance of the environment has given a new impetus to the need for higher density forms of living, as the global population increases and as the proportion living in urban areas increase from 50% (2008) to 70% (2050). City living must provide the location in which most people live, as it makes the most efficient use of available land and it allows for the greatest economies of scale and scope, and it should also be less dependent on non-renewable resources.

There also seems to be a basic dilemma between the 'desirable city' that is a clear aspiration for many politicians and other visionaries, and the difficulty or impossibility of getting there. The consequence of viewing development only in a narrow economic sense means that many of the negative aspects are strengthened in the interests of growth and getting there faster. So the quality of the urban environment may deteriorate through congestion, social unrest, high housing costs, poor levels of air pollution, and resource scarcity, with transport contributing to some of these factors, and all these coming from pursuing development for its own sake. It is only when there is a realisation that quality does not need to be sacrificed, and that it is possible to move towards the 'desirable city' without having to pass through the deterioration in the quality of urban living that real progress will be made.

4. Reflections and Prospects

In the 2009 Report (UN Habitat 2009, p. 129), eight sustainability directions were identified so that cities can address sustainable urban development in an integrated way. The three energy themes cover the use of renewable energy, carbon neutral investments that improve energy efficiency, and distributed local electricity and water systems. Three other themes reflect the need for cities to move toward more local production (biofuels, food and fibres, and biodiversity), eco-efficient strategies for industry (to include waste and recycling), and the means to improve the housing stock. The two final themes are most relevant here, as they reflect the importance of place strategies and transport. The "sense of place" strategies promote the human dimension, as driving all the other strategies. This can be assisted by local economic development strategies, by place-based engagement approaches to all planning and development processes, and by the innovative use of 'sustainability credits', or complementary currencies, to implement local sustainability innovations as development bonuses. The sustainable transport strategies include quality fast transit along each main corridor, dense TODs built around each station, pedestrian and bicycle strategies for each centre and TOD (with cycle links across

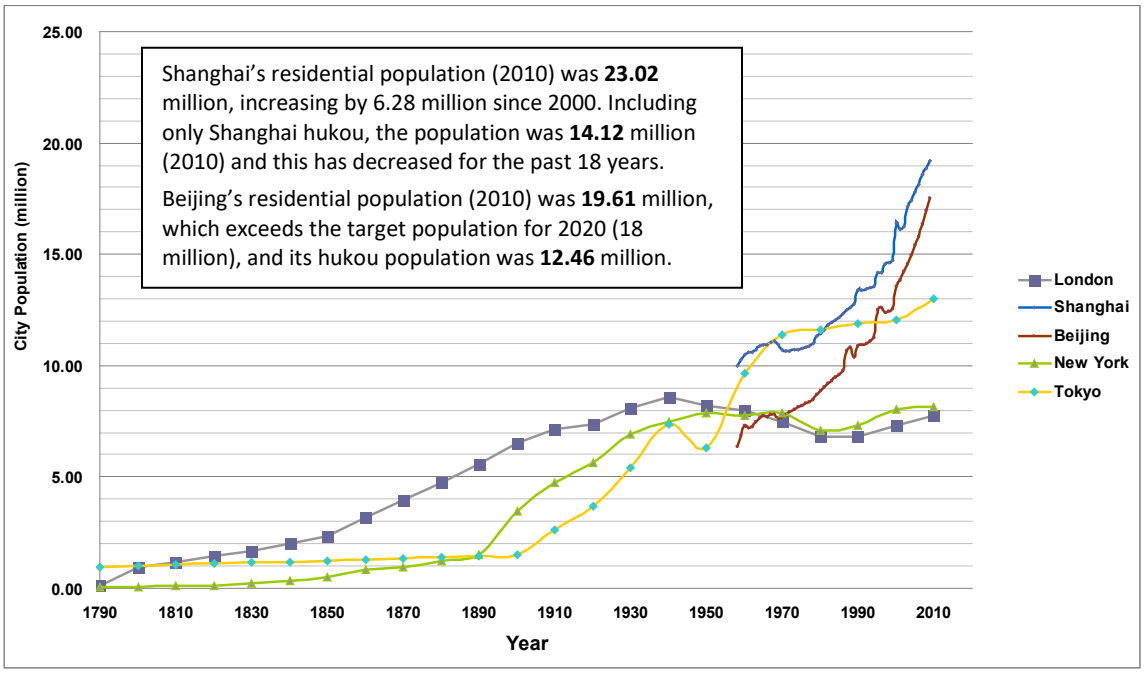
the city), the plug-in infrastructure for electric vehicles as they emerge, cycling and pedestrian infrastructure as an integrated part of all street planning, and a green wall growth boundary around the city preventing further urban encroachment.

This report (UN Habitat, 2009, p219) concludes that "there is some agreement that an equitable and sustainable city will have the following spatial features: higher densities but low rise; mixed uses; public transport based; spatial integration; a defined and protected open space system; and an urban edge to prevent sprawl". There is an awareness that this ideal may be far easier to achieve in developed countries, where there is much greater institutional capacity to bring about compliance with the supporting organisations, processes and enforcement necessary to carry out the intentions. But the Report is optimistic in that it still sees the achievement of these principles in different contexts as a worthwhile goal. The UN Habitat contribution is the realisation that there is more to development than economic growth, and that the equitable and sustainable city should be given as much importance in the priorities of decision makers, but that the institutional capacity may need to be strengthened.

In the rapidly growing cities of the developing world, both the speed and scale of change are unprecedented, and this requires strong institutional and governance structures as well as substantial infrastructure investment funds. For example, Figure 1 shows the growth in population of five World cities, illustrating the recent (since 1960) surge in the populations of Beijing and Shanghai, with each of their populations more than doubling from high base populations of 7.3 million and 10.5 million respectively. Even at that time, they were larger than London was in 2000 or New York was in 1990. Looking back over time, it can be seen that London has followed a steady path of population increase, reaching 1 million in 1805, 5 million in 1885 and peaked at 8.6 million in 1940. New York's population growth pattern is similar to that now being experienced in China, as it was also subject to mass inward migration. The population in New York reached 1 million in 1875, but from 1890 it rose from 1.5 million to 7.5 million in 1940, a five times increase over a 50 year period. Tokyo has also grown by more than 6 times, from 2 million in 1900 to 13 million by 2010, but over a longer period. The patterns of population growth and migration in the Chinese cities are not new, even though the speed and scale of change is substantially larger.

Such an argument is promoting an explicitly social dimension to the more central thinking behind the new economic geography (Krugman, 1991), where increasing returns to scale promote concentration of activity, and where transport costs are seen to be important in determining market structure, under conditions of imperfect competition. Central to the case is factor mobility, where knowledge, information, and labour are instrumental in determining the spatial patterns of development (Krugman, 2011). The desire for urban living and the opportunities that it offers are central to the attraction of the city, as well as the sound economic reasons for clustering and concentration. To some extent this reasoning also counters Storper's concerns over the need to include knowledge and information spillovers, and other intangibles to fully explain the complexity of the processes taking place (2011 – the dormitive properties of new economic geography).

Figure 1: Population growth in London, New York, Tokyo, Beijing and Shanghai



There is a strong economic rationale behind this urbanisation process, and it is consistent with resource availability and the export led manufacturing, it provides an extreme example of Krugman's core-periphery model (1991), with industrial clustering and localisation, together with specialisation and higher levels of productivity. In addition, the larger cities have attracted the best educated workers, more international investment, and there also seems to be network benefits arising from better communications and transport infrastructure. These agglomeration economies occur when the different agencies (firms and workers) benefit from being in close proximity to each other, and good quality transport can help strengthen these agglomeration economies as the connectivity in the spatial economy is improved, and this in turn may again lead to higher output productivity (Graham, 2007).

Climate change (as manifest by the increased frequency and intensity of extreme weather events) may imply the submersion, washing away and buckling of roads and other infrastructures (Meyer, 2010), whilst the rising price and constrained supply of oil-based fuels may make certain trips unaffordable or impossible. Parts of cities, for example along the coast or inland waterways, neighbourhoods that can only be reached by car or where the car is the basic way of getting around, may become virtually inaccessible, and these effects may be propagated throughout whole cities. These detrimental effects impact on the attractiveness and the viability of the city, with consequential reductions in output and competitiveness. In addition, insurance premiums will increase both in flooding-prone neighbourhoods and more generally. If significant numbers of people or firms decide to leave certain parts of an urban area, land values and prices may fall,

imposing significant financial risks to private individuals, corporate investors, public authorities (local and central), and others.

For urban areas to thrive in the future, resilience needs to be developed to address transport-related vulnerabilities at the city level and at the transport system level. Additionally, integral or 'expanded' assessments (Jaroszweski et al., 2010) of city-level risks and vulnerabilities are required, which consider both climate change and oil scarcity simultaneously as part of coupled human/ environment systems that are complex and multi-scalar (i.e. ranging from the globe to the individual). Vulnerability is here understood as the degree of susceptibility of a system (e.g. a city, transport network, the daily travel/activity pattern of an individual) and its lack of ability to cope with the adverse effects of events associated with climate change and oil scarcity. Vulnerability is a function of the exposure of a transport system to (and its sensitivity to) those events, and its adaptive capacities to respond to them (Koetse and Rietveld, 2009; Changa et al., 2011). Transport and urban planning research with regard to climate change is growing rapidly but it tends to focus on mitigation rather than vulnerability and adaptation (IPCC, 2014a and b).

Part IV of this book refers to the 'wider dimensions' that need to be addressed in the research field – the psychological and sociological determinants of travel; the value often perceived within travel; the existence of norms, habits and values; the role of ICT and its relation to physical travel; the heterogeneous nature of the population; and the appropriate forms of governance in defining and responding to societal goals. All of these areas influence the urban structure and travel and transport investment and spatial impact relationships – and often they are poorly understood.

In many ways the message of this chapter is optimistic, in that many cities in Europe are becoming more sustainable, at least in transport terms in their everyday activities as over 50% of trips are made by walk and cycle. Public transport plays an important role for travel over longer distances, and in many cases the role for the car is being questioned. But, if the trends are considered closely, then huge challenges still remain – in the travel that remains largely car dependent beyond the main urban centres, in the huge growth in international communication and physical travel – and much of this remains carbon intensive and highly socially inequitable in terms of access. Quality of life and urban living are seen as being the main driving forces in the greening of everyday travel, with high quality low carbon mobility options often possible. To some extent cities in the USA and Canada are following the same pathway, but it is more difficult here as distances are much greater, and the alternative low carbon infrastructure is not an attractive option to the car. More opportunities are being taken to concentrate development and to build at higher densities through mixed use and balanced approaches – but often there is much disagreement over the policy approach and the progress is agonisingly slow. Technology may also have a key role to play here through greater efficiency in car design, through new forms of ownership (leasing and car sharing), and through reducing the need to travel by adopting new working and social patterns of activity (Banister, 2013). Social and work based networking offer immense possibilities to again change the nature of physical movements and other forms of communication so that flexibility is maintained within the transport system.

The growth in the Mega cities present new possibilities and problems, with key questions being raised as to whether the solutions used elsewhere can be adapted and applied here. Part of the problem relates to the scale and rate of change, but part to the speed at which the land use planning system can adapt to the requirements that are now being placed on it. For example, much of the traditional thinking is to provide a built environment and transport system that will last at least 100 years, and investment decisions are made on that basis, examining all the costs and benefits and discounting them over 30 or 60 years. The new agenda requires a far quicker decision process and far greater flexibility to be included in any major decision, as land values, land uses and travel patterns are all changing over a much shorter period of time, as industrialisation moves into service based and knowledge based futures. The cloudy definition of sustainability has not helped in research or practice – with the term representing many things to many people. Perhaps a wider understanding of 'development' as a means to achieve well-being at the individual and societal levels will give further clarity in direction. We hope this book brings together much of the interesting debate from the past 30 years – and offers us a basis for moving our research and practice forward. Transport, as ever, has an important role to play in promoting the sustainable city, including greater well-being in life. The huge growth in the urban population at the urban scale, with much of it yet to be designed, offers us many opportunities – and we should seek to grasp them.

References

Alonso, W. (1964) Location and Land Use, Harvard University Press, Massachusetts.

Banister, D. (2002) Transport Planning, London: Routledge.

Banister, D. (2012) Assessing the reality: Transport and land use planning to achieve sustainability, The Journal of Transport and Land Use 5(3), pp1-14.

Banister, D. (2013) Scanning the transport horizon, Paper prepared for the Foresights Futures Programme, Government Office for Science, Revised Version July.

Breheny, M. (ed) (1992) The Compact City – Special Issue of Built Environment 18(4), 659-674.

Carson, R. (1962) Silent Spring, London, Hamish Hamilton (Penguin, 1999).

CEC (Commission of the European Communities) (1992) Sustainable Mobility: Impact of Transport on the Environment, COM 92(46), CEC, Brussels.

Cervero, R. (2008) Effects of TOD on Housing, Parking and Travel, Transit Cooperative Research Program Report 128, Federal Transit Administration, Washington, DC.

Changa, H., Lafrenza, M. and Junga, I.W. (2011) Potential impacts of climate change on flood-induced travel disruptions: A case study of Portland, Oregon, USA, Annals of the Association of American Geographers 100, pp938-52.

Clark, C. (1958) Transport – Maker and breaker of cities, Town Planning Review 28(4), 237-250.

EU (2010) A Strategy for Smart, Sustainable and Inclusive Growth, European Union, Brussels, Com (2010) 2020, March.

Graham, D.J. (2007) Agglomeration, productivity and transport investment, Journal of Transport Economics and Policy 41 (3), pp 317–343.

Grant, J. (2006) Planning the Good Community: New Urbanism in Theory and Practice, Routledge, London and New York.

Handy, S. (2004) 'Accessibility v Mobility-enhancing Strategies for Addressing Automobile Dependence in the US', Paper presented at the ECMT round table on Transport and spatial Policies: The Role of Regulatory and Fiscal Incentives, RT124, Paris, November 2002, pp49-85.

IPCC (Intergovernmental Panel on Climate Change) (2014a) Impacts, Adaptation and Vulnerability, Report of working Group II, Yokohama, Japan, March.

IPCC (Intergovernmental Panel on Climate Change) (2014b) Mitigation of Climate Change, Report of Working Group III, Berlin, Germany April.

Illich, I. (1974) Energy and Equity, London: Calder & Boyars.

Jacobs, J. (1961) The Death and Life of the Great American Cities, New York: Random House.

Jaroszweski, D., Chapman, L. and Petts, J. (2010) Assessing the potential impact of climate change on transportation: the need for an interdisciplinary approach, Journal of Transport Geography 18, pp 331-5.

Koetse, M.J. and Rietveld, P. (2009) The impact of climate change and weather on transport: an overview of empirical findings, Transportation Research D 14, pp 205-221.

Krizek, K.J. (2003) 'Residential relocation and changes in urban travel: does neighbourhood scale urban form matter', Journal of the American Planning Association, vol 69, no 3, pp265-281

Krugman, P. (1991) Increasing returns in economic geography, Journal of Political Economy 99, 483-499.

Krugman, P. (2011) The new economic geography, now middle aged, Regional Studies 45(1), 1-7.

Levinson, D. (2008) Density and dispersion: The co-development of land use and rail in London, Journal of Economic Geography 8(1), pp55-77.

Meadows, D.H., Meadows, D.L., Randers, J. and Behrens III, W.W. (1972) The Limits to Growth, New York: Universe Books.

Meyer M.D. (2010) Greenhouse gas and climate change assessment: framing the transportation research agenda, Journal of the American Planning Association 76, pp 402-12.

Perrels, A., Himanen, V. and Lee-Gosseling, M. (2008) (eds) Building Blocks for Sustainable Transport: Obstacles, Trends, Solutions, Bingley: Emerald.

Storper, M. (2011) From retro to avant-garde: A commentary on Paul Krugman's The new economic geography, now middle aged, Regional Studies 45(1), 9-15.

UN Habitat (2009) Planning Sustainable Cities, Global Report on Human Settlements, London: Earthscan.