CHAPTER 2

THE STATE OF URBAN PASSENGER TRANSPORT

In a world that is predominantly urban, the ability of people to move within cities to access jobs, services and amenities is a critical driver of sustainability. Indeed, access to affordable, safe and environmentally friendly means of transport is a prerequisite for the wellbeing of urban dwellers as well as for the balanced functioning and prosperity of cities. While progress has been made in this respect, considerable challenges remain in widening the accessibility of sustainable transport in cities across the world. While developing countries are disproportionately shouldering an overwhelming share of the urban transport challenges, developed countries also face their own array of difficulties, compounded currently by undercurrents of global financial uncertainty.

This chapter provides an overview of the state of urban passenger transport globally, focusing on four key modes of transport namely non-motorized transport (NMT), formal public transport, informal (motorized) transport and private motorized transport (Box 2.1). Goods movement in urban areas is covered in Chapter 4, given its unique and crucial yet often overlooked role. The four modes of passenger transport are reviewed here in the context of developed and developing countries, illustrating extensive variation in trends and conditions, and thus accessibility (as elaborated in Chapter 1). The impacts of these trends and conditions are highlighted briefly as a precursor to a more detailed review of the same in Chapters 6, 7 and 8.

This review illustrates the central role of NMT in developing countries and a growing interest in these modes in developed countries. Formal public transport has varying levels of importance within, and/or between, cities of both developing and developed countries. Informal transport, although playing a limited role in developed countries, is found to be the principal transport mode in developing countries, to the extent that in some it is being co-opted as part of formal public transport provision. Thereafter, the enormous growth in private motorized transport in many developing countries is reviewed, as are the patterns of dependence on this mode in developed countries. Importantly, also, the chapter considers the critical role of integration across different modes of transport in cities, and highlights experiences of cities that have invested in intermodality.

The trends and conditions of urban transport described in this chapter have been directly

In a world that is predominantly urban, the ability of people to move within cities to access jobs, services and amenities is a critical driver of sustainability

Box 2.1 Modes of urban transport

Non-motorized transport refers to the transportation of passengers via human or animal powered means including bicycles, rickshaws, pedicabs, animal-drawn carts and walking. With animal power being largely a rural feature, the focus in this report is on human-powered modes (bicycles, cycle rickshaws) and walking.

Formal public transport services are those available to the public for payment, run on specified routes to timetables with set fares, and within the context of this report, in an urban area. They may be operated by public or private organizations and cover a wide range of modes, namely bus, light rail (tramways and street cars), metros, suburban rail, as well as waterborne transport (ferries, boats).

Informal (motorized) transport (also referred to as 'paratransit') relies on privately owned vehicles whose operators often lack necessary permits or do not meet requirements for vehicle size, insurance coverage or driver standards. Even if some operators are fully licensed, they may deviate from routes or charge unauthorized higher fares, as a result of which they are considered informal.

Private motorized transport involves vehicles that are powered by an engine and are used by individuals or private companies to transport passengers. Light-duty vehicles (cars, SUVs, light trucks and mini-vans) and two- or three-wheelers remain the key modes of private motorized transport in urban areas.

influenced by land-use and urban planning decisions taken at neighbourhood, local and regional levels (Chapter 5), resulting in particular urban forms and functionality that hinder or facilitate accessibility. In turn, transport investments and policies have influenced the development of urban form and functionality in particular ways, thereby impacting on access to mobility. The interaction between the development of urban spatial patterns and transport is thus a key factor shaping accessibility in cities both in physical and socioeconomic terms.

NON-MOTORIZED TRANSPORT

This section highlights the trends and conditions of NMT around the world, including the provision of appropriate infrastructure, as well as the related benefits and challenges. Globally, walking and bicycling are the dominant modes of NMT. Yet, the needs of NMT users are often ignored, while pedestrians and cyclists together form a significant fraction of traffic accident victims. Most cities do not have dedicated infrastructure, and even if some European cities have been remodelled to become pedestrian and bicycle friendly, NMT users typically negotiate hostile urban environments. In London, UK, for instance, many cyclists are killed annually by turning trucks, despite the presence of bicycle lanes.

Walking is the principal means of transportation in cities of developing countries . . . not by choice, but rather driven by the lack of affordable and accessible alternatives

Developing countries

NMT is the principal mode of transportation in most cities of developing countries, particularly Africa and Asia (Figure 2.1). In Dakar (Senegal), for instance, walking and cycling accounts for 71 per cent of trips while in Douala (Cameroon) it accounts for 60 per cent. In Asia, the combined average share of cycling and walking in Chinese cities, for instance, is 65 per cent.[1] Beijing, for instance, has a combined modal share of walking and cycling of 53 per cent. In Indian cities (such as Ahmedabad, Bangalore, Delhi and Mumbai) walking and cycling account for about a third of all trips. In Latin America, walking and cycling constitute more than one-third of the trips in cities such as Santiago, Chile (37 per cent), Rio de Janeiro, Brazil (37 per cent) and Guadalajara, Mexico (39 per cent), but are less significant in others such as Buenos Aires, Argentina (9 per cent), La Paz, Bolivia (10 per cent) and Caracas, Venezuela (18 per cent).[2]

In recent years, there has been a decline in cycling in some Asian cities [due] to rising incomes and concomitant motorization, as well as changing social perceptions

Walking is the principal means of transportation in cities of developing countries. This is largely not by choice, but rather driven by the lack of affordable and accessible alternatives, with most pedestrians belonging to lower income groups.[3] Among low-income groups in Santiago (Chile), NMT provides a modal share of over 50 per cent, compared to only 10 per cent among high-income groups.[4] In Kenya, the majority of Nairobi's slum inhabitants walk as they cannot afford motorized transport.[5] On average, walking accounts for a significant proportion of trips in African cities, and is particularly common among women and children.[6]

Cycling caters for the mobility needs of considerable numbers of urban dwellers in developing-country cities, especially in Asia. In mainland China, bicycle ownership is much higher than in other Asian countries, with an estimated 600 million bicycles.[7] In India, household bicycle ownership rates are high in cities such as Delhi (38 per cent), Ahmedabad (54 per cent) and Chandigarh (63 per cent).[8] This is reflected in the relatively higher modal share of cycling in these cities – Delhi (12 per cent) and Ahmedabad (14 per cent). In some Asian countries with relatively higher incomes, however, the modal share of cycling is much lower, such as in Singapore (1.6 per cent of work trips),[9] the Republic of Korea (1.2 per cent)[10] and Hong Kong SAR (0.5 per cent).[11]

In recent years, there has been a decline in cycling in some Asian cities. This has been attributed to rising incomes and concomitant motorization, as well as changing social perceptions, which tends to see cycling as a means of transport for the poor. India is a case in point where bicycle modal shares declined from 30 per cent in 1994 to 11 per cent in 2008.[12] Numbers also decreased in China, particularly in big cities.[13]

In African cities, cycling plays a comparatively limited role, accounting for less than 3 per cent of total trips in capital cities such as Bamako (Mali), Dakar (Senegal), Harare (Zimbabwe), Nairobi (Kenya) and Niamey (Niger). Cycling appears to be more popular in smaller and secondary cities such as Morogoro (Tanzania) and Eldoret (Kenya) where it constitutes 23 per cent and 12 per cent of total trips, respectively.[14] In Latin America, cycling makes up only a small share of total transport trips, with bicycle use being more in intermediate sized cities than in larger ones. For example, while in Curico (Chile) the modal share is 9 per cent, the average share across Chile is under 2 per cent.[15]

The three-wheeled rickshaw is a popular type of urban transport in Asia, especially in Cambodia, Indonesia, Myanmar, Thailand, the Philippines and Viet Nam. Known as pedicabs (*padyak*) in Metro Manila (the Philippines), they are able to operate in narrow alleys, walkways and other areas which are impenetrable by other modes such as *jeepneys* (converted jeep taxis) and buses. In Bandung (Indonesia), pedicabs known as *becaks* make up 33 per cent of all trips.[16] In contrast, cycle rickshaws are uncommon in Africa, although they did exist in the 1990s in Kigali (Rwanda) and Bujumbura (Burundi).[17] The use of tricycles however has been met with mixed

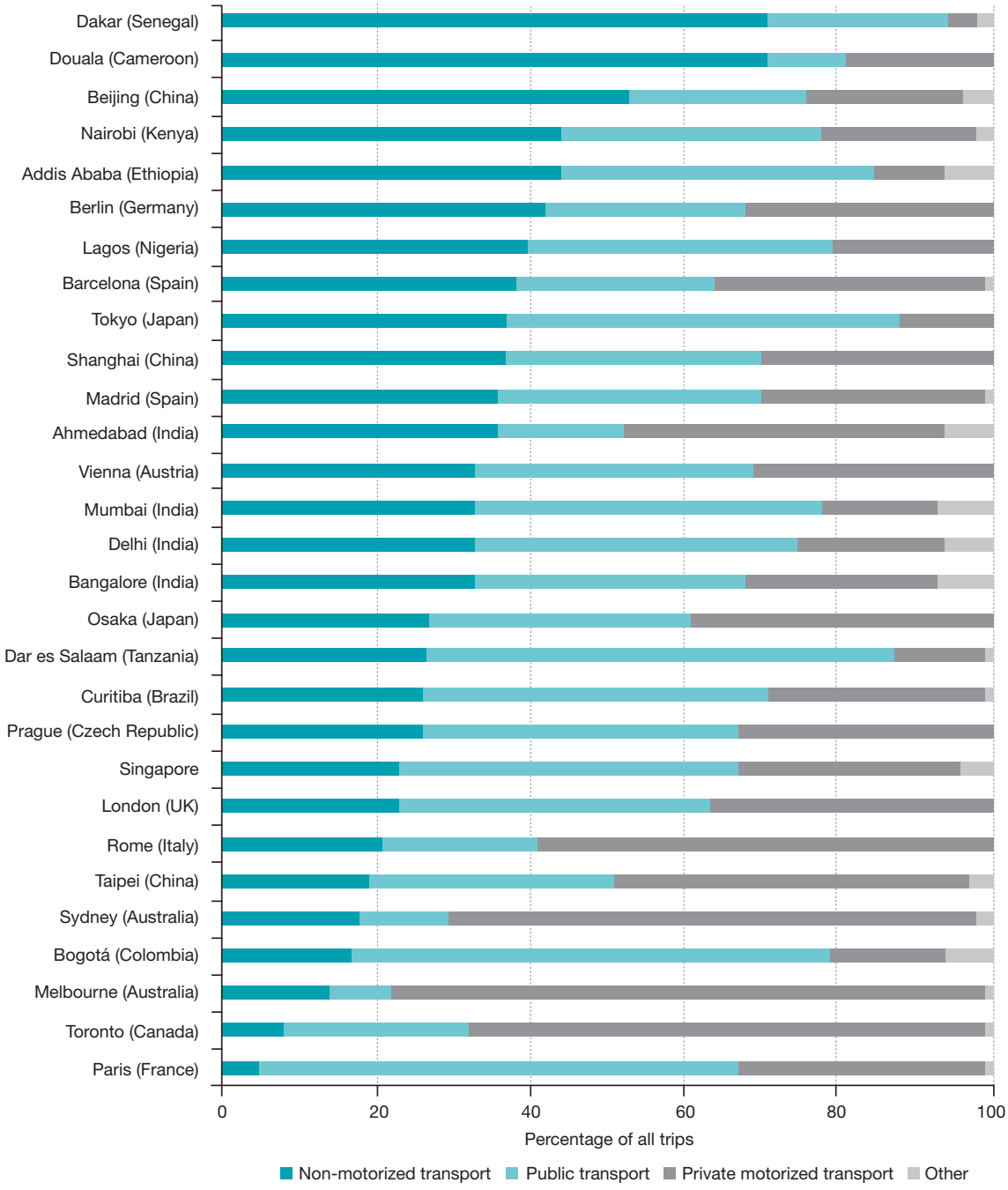

Figure 2.1

Urban travel modal shares in selected cities

Sources: LTA Academy, 2011; UITP and UATP, 2010.

reactions by city authorities in several Asian countries. Jakarta (Indonesia) banned *becaks* in the 1970s considering them obsolete, unsafe and hindering traffic flow, while Viet Nam banned tricycles in 2008.[18] In Mandalay (Myanmar), use in the central business district is limited to daytime.[19] The city of Udon Thani (Thailand), by contrast, is actively promoting cycle rickshaws as an alternative to cars.[20]

Developed countries

The proportion of non-motorized trips varies greatly in developed countries, with walking and cycling making up less than an eighth of daily trips in car-dependent countries such as Australia, Canada and the US, and over 20 per cent in most European countries. The share of journeys on foot is higher in European countries, but less than in Australia, Canada and the US (Figure 2.2).

Bicycle ownership is high in Western Europe, especially in the Netherlands, Germany and Denmark (Figure 2.3). This has been attributed to the transport and land-use policies introduced since the mid-1970s in these countries in favour of NMT and public transport facilities rather than motorized transport. The ratio of bicycles to inhabitants is lower in other European countries such as Hungary and France, as well as in the US and Canada. Cycling

Figure 2.2

Cycling and walking share of daily trips in Europe, North America and Australia (1999–2009)

Source: Buehler and Pucher, 2012a.

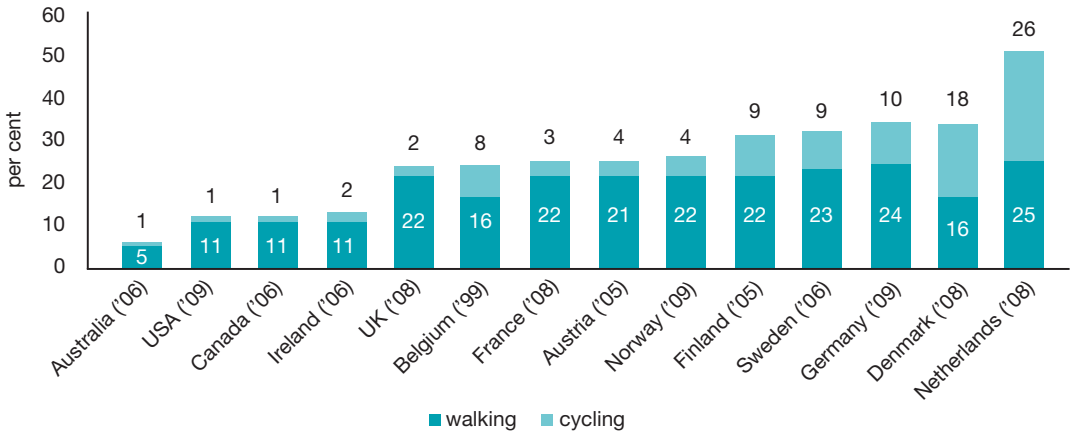

Figure 2.3

Number of inhabitants per bicycle, developed countries

Source: BOVAG-RAI Mobility Foundation, 2009.

in the US is mostly for recreational and fitness purposes, whereas in Europe it is a key means of movement for utilitarian purposes.[21]

A recent trend with respect to NMT in developed-country cities has been the increasing popularity of three-wheeled pedicabs. For instance, annual trips by such pedicabs have been estimated at 1 million in London (UK) and 250,000 in Berlin (Germany).[22] Nevertheless, this mode of transport is still insignificant in the cities of developed countries.

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Infrastructure for non-motorized transport

Generally, developing-country cities have poor quality infrastructure for NMT. Dedicated corridors are largely absent and, where they exist, they are often at the risk of being encroached upon for commercial purposes or used for the perennial widening of motorized carriageways.[23] Poor lighting, absence of footpaths and overcrowding make walking unsafe in these countries.[24] Furthermore, limited speed enforcement does little to deter high traffic speeds. In the absence of segregated NMT infrastructure, the dangers poised by speeding vehicles result in low cycling rates.[25] The general lack of provision and maintenance of NMT facilities in cities of developing countries is primarily a problem of financing. Such facilities are not considered to be 'revenue-generating' and private investors and international lending agencies are thus not keen to finance such expenditures. Furthermore, the costs of such NMT facilities are often considered to be beyond city capabilities.[26] However, as discussed later in this report, the result of this is that public expenditures tend to focus on provision of infrastructure for the small minority that can afford to own a private car, in effect subsidizing the wealthiest road users.

Poor lighting, absence of footpaths and over crowding make walking unsafe in [developing] countries

Across Africa, provision for segregated infrastructure for NMT is limited. In Nairobi (Kenya), 95 per cent of roads have high pedestrian flows but only 20 per cent have pedestrian footpaths,[27] while in Kampala (Uganda) more than 60 per cent of road networks have no footpath segregated from motorized traffic. In Lagos (Nigeria), NMT space is inadequately protected.[28] There are some exceptions, however, such as Ouagadougou (Burkina Faso), where dedicated lanes were built in the 1980s. Unfortunately, these lanes have become unsafe due to the encroachment by high-speed motorcycles.[29]

NMT infrastructure conditions in most Asian cities are similarly inadequate. Out of the transport-related projects approved under India's Jawaharlal Nehru National Urban Renewal Mission, only 2.2 per

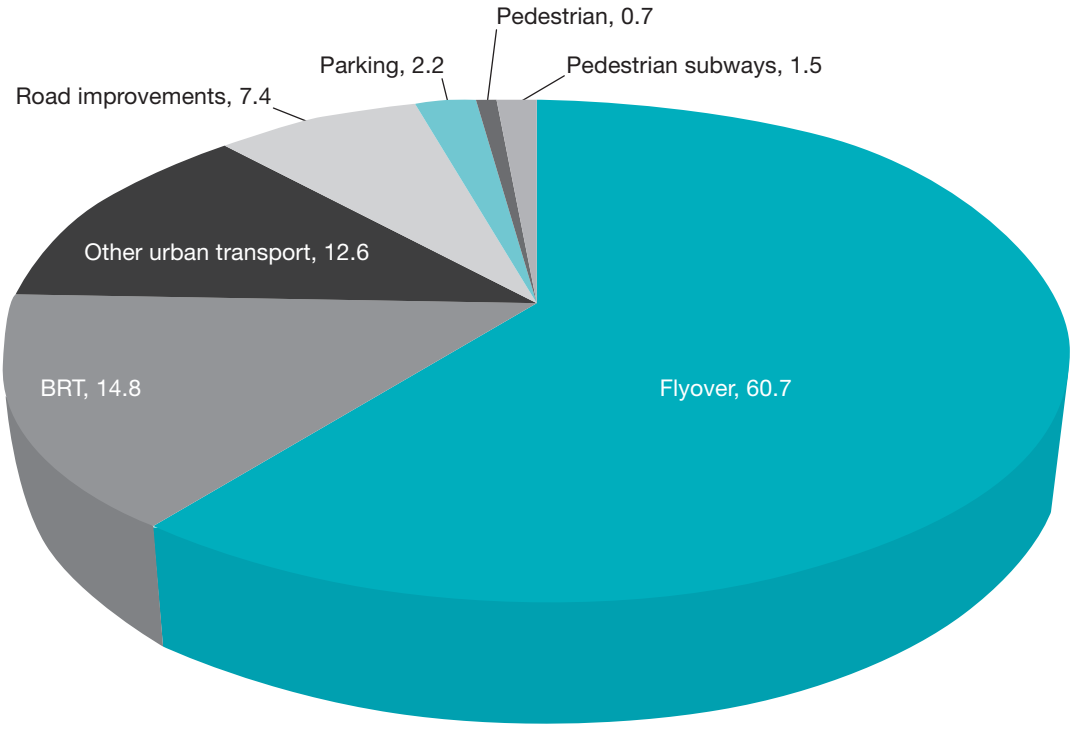

Figure 2.4

Transport investments in Indian cities under the Jawaharlal Nehru National Urban Renewal Mission (by December 2011) (percentages)

Source: Manchala and Vagvala, 2012.

cent focused on pedestrian infrastructure (Figure 2.4). The majority of the roads in Delhi (India) do not have pavements and those that exist are often unusable.[30] Some Chinese cities, by contrast, have excellent bicycle infrastructure. In the recent past, however, these have been invaded by electric bikes.[31] The elimination or narrowing of sidewalks to accommodate more car lanes in Chinese cities has also been reported.[32]

Infrastructure for NMT in some Latin American cities is also in poor repair. For instance, in Cali, Colombia, sidewalks are barely sufficient for one person, poorly maintained, blocked by construction waste, parked vehicles or informal vendors, and have open sewerages. Car access ramps often discriminate against the disabled, persons with high-heeled shoes and baby carriages (mostly women), while a lack of lighting encourages the pedestrian use of car lanes, and contributes to increased fear of muggings. Furthermore, a significant proportion of roads (30 per cent) are unpaved; pedestrians and cyclists are exposed to dust, mud and air pollution.[33]

However, encouraging measures to enhance NMT infrastructure have been observed in some developing countries. In Colombia, for example, Bogotá's *CicloRuta* – a 340-kilometre bicycle path that is connected to BRT routes, parks and community centres – has registered considerable achievements and resulted in a doubling of the proportion of the population that used bikes between 2000 and 2007.[34] The Republic of Korea's Bicycle Master Plan intends to build 30,000 kilometres of bike-ways (primarily for recreational purposes) and increase the modal share of cycling to 10 per cent by the end of 2019.[35] In China, policies to promote NMT include planned bicycle networks and parking at public transport stations in Beijing to increase ridership.[36] Some have also adopted bicycle sharing systems where bicycles are made available for shared use to individuals on a very short-term basis. The Chinese cities of Wuhan and Hangzhou have the largest bike sharing systems in the world, with some 90,000 and 40,000 bikes, respectively.[37]

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In developed countries, pedestrian infrastructure has rapidly improved in recent decades with a number of Western European cities investing heavily in pedestrian areas and dedicated lanes. In Germany and the Netherlands, there have been extensive efforts to improve infrastructure for both walking and cycling, with bike paths and lanes more than doubling in the Netherlands and tripling in Germany between the late 1970s and mid-1990s (Box 2.2). In contrast, investments to improve infrastructure for walking and cycling in the US have been comparatively limited.[38]

An increasingly important approach in Western Europe has been the integration of NMT and motorized travel through urban design to enhance the safety and quality of street space for pedestrians and cyclists. Neighbourhood streets have been redesigned in numerous cities in the UK, Denmark, Sweden, German and the Netherlands to create 'home zones' accessible to cars, bicyclists and pedestrians on equal terms, resulting in a significant

Box 2.2 An exercise in cycle-friendly design

In Houten – a new town in the Netherlands designed in the early 1970s – cycle routes, with adjoining walkways, form the backbone of the town plan. The town consists of a number of neighbourhoods, each connected to the railway station and the adjoining town centre by tree-like systems of direct cycle routes. Cars can enter each neighbourhood by way of an access road from a ring road that encircles the town. Access roads are split up as soon as they enter the neighbourhood, keeping the car traffic volume within the neighbourhood low and therefore compatible with the needs of ordinary, human-powered road users of all ages. Streets are designed to keep speeds low (30 kilometres per hour or less) while cars going from one neighbourhood to another, or from a residential area to the town centre, have to return to the ring road on the edge of town. This makes the cycle route shorter than the motorized route for virtually every trip, and as a result, cycling and walking account for a larger share of the modal split within the town.

Source: Foletta and Field, 2011.

increase in NMT use, enhancing urban landscape aesthetics and boosting the social function of public spaces.[39]

In the absence of strong policy support for NMT, the requisite infrastructure is not created

In general, with competition for space, speed and infrastructure, cyclists and pedestrians are disadvantaged in most cities globally. Although NMT sustains and complements public transport as a key feeder service, it is seldom integrated with it and receives rare media coverage.[40] In the absence of strong policy support for NMT, the requisite infrastructure is not created, resulting in a more hostile environment with higher rates of fatal accidents and an overall decline in cycling. This downward trend is enhanced by the fact that most NMT users, at least in developing countries, use NMT due to the lack of affordable alternatives; they are captive low-income users. There is thus a social stigma against using NMT as it is seen as the travel mode of the poor.

Impacts of non-motorized transport

The use of NMT in cities generates numerous social, economic and environmental benefits

The use of NMT in cities generates numerous social, economic and environmental benefits (Table 2.1).[41] Indeed, the existing evidence has consistently shown that the benefits of expanding NMT use outweigh the related costs by large margins. For instance, in Amsterdam (the Netherlands) the overall benefit–cost ratio of improving bicycle infrastructure was estimated to be 1.5:1 while similar calculations for Delhi (India) and Bogotá (Colombia) estimated the ratio to be 20:1 and 7:1, respectively.[42]

A major advantage of NMT is that it reduces energy consumption, greenhouse gas emissions and pollution (air, water and noise) substantially, as it does not rely on fossil fuels unlike other modes of transport in cities (see Chapter 7). Furthermore, as NMT requires significantly less road space and parking, it enables the preservation of natural habitats and open spaces. Cycling and walking can also directly provide the daily physical activity required for a healthy lifestyle. Negative health impacts have been observed where the share of NMT in urban areas is encroached by motorization.

Importantly also, the movement of passengers through NMT supports urban livelihoods in developing-country cities. For instance, 20 per cent of the population in Dhaka, Bangladesh, rely on rickshaw pulling for their livelihood,[43] while figures of 5–10 per cent have been reported in the Indian cities of Kolkata, Chennai, Delhi and Hyderabad. This source of livelihood is particularly important in smaller cities with limited public transport services and narrow streets.

Yet, despite generating enormous benefits in cities, NMT is constrained in a number of ways. Perhaps most critical is the risk of injury, with pedestrians and cyclists constituting more than 27 per cent of those killed in road traffic accidents globally, rising to a third in low- and middle-income countries.[44] Globally, 400,000 pedestrians are killed annually and vulnerability is accentuated in specific regions such as Africa where 38 per cent of those killed in traffic accidents are pedestrians.[45]

NMT faces the added challenge of being marginalized in urban planning and investments, partly due to an absence of adequate information and data. External loan financing in many developing countries tends to favour large projects, metro systems and BRT systems. Data on NMT are also often under-presented in transport data, resulting in low

Table 2.1
Non-motorized transport benefits

User benefits:	Increased user convenience, comfort, safety, accessibility and enjoyment as well as savings from reduced vehicle ownership and use.
Equity objectives:	Benefits economically, socially or physically disadvantaged people.
Congestion reduction:	Reduced traffic congestion from private cars on congested roadways.
Roadway and parking cost savings:	Reduced roadway and parking construction, maintenance and operating costs.
Energy conservation:	Economic and environmental benefits from reduced energy consumption.
Pollution reduction:	Economic and environmental benefits from reduced air, noise and water pollution.
Land-use impacts:	Encourages more accessible, compact, mixed, infill development (smart growth).
Improved productivity:	Increased economic productivity by improving accessibility and reducing costs.

Source: Adapted from Litman, 2013.

planning priority given the reliance of policy-making on mobility data.[46] Pedestrians and cyclists may thus be easily overlooked in planning at the expense of motorized transport.

Related to the above, the negative public image of NMT, especially in developing countries, is an additional factor in its neglect in planning.[47] Among users themselves the stigma of poverty leads many to shift to motorized transport when their incomes rise. For authorities, development and modernity is associated with technology and motorized transport. Promotion of NMT may thus not be considered commensurate with development.

Data on NMT are also under-presented in transport data, resulting in low planning priority given the reliance of policy-making on mobility data

FORMAL PUBLIC TRANSPORT

This section reviews the trends and conditions of public transport globally. The discussion focuses on services which can be considered as formal according to the way they are organized or operated to maintain a level of service, quality, routes, timetables and fare structures. High-capacity public transport services by bus or rail – which has significant potential to enhance urban accessibility in developed and developing countries alike – are examined in greater detail in Chapter 3, while informal transport is reviewed separately later in this chapter.

Overall, the growth of public transport in some cities of developed countries and stagnation and decline in cities of developing countries is highlighted, noting the consequences of restricted financial investments. The environmental, social and economic benefits of public transport are outlined, while the desirability of attracting choice riders to public transport is discussed together with experiences and challenges of achieving this.

Developing countries

The modal share of public transport has decreased or stagnated in most developing-country cities, and few efficient formal public transport systems remain. Public transport is typically operated by a growing number of entrepreneurial individuals or small/medium-sized companies, but with low investment and minimal public support. Public transport in these cites has been characterized by weak regulation, scarcity in supply, poor quality and the predominance of informal sector operators. Subsequent formalization occasionally occurs through aid-financing arrangements, for instance through trust funds guaranteeing credit lines for vehicle purchase, as in Dakar (Senegal), Johannesburg (South Africa) and Lagos (Nigeria).[48]

Some encouraging trends have, however, been observed. In Africa, BRT systems have been introduced in Lagos (Nigeria) and Johannesburg (South Africa), generating substantial benefits for residents.[49] BRT lines are under construction or planned in other African cities such as Dar es Salaam (Tanzania), Accra (Ghana) and Kampala (Uganda). The supply of public transport services is also increasing in North Africa, with light rail and tram systems available in Cairo, Casablanca, Rabat, Algiers and Tunis. Metro systems are now servicing the population in Cairo (Egypt) and Dubai (United Arab Emirates).[50] Perhaps most notable are China's growing investments in metro and BRT systems, servicing millions of passengers in urban areas.

Latin America has relatively good formalized public transport with stronger institutions in planning and management, while the private sector plays an increasingly important role in cities such as Montevideo (Uruguay), Bogotá (Colombia) and Rio de Janeiro (Brazil). A growing number of urban BRT systems in Brazil, Chile, Ecuador, Peru and Venezuela have expanded public transport services significantly.

The modal share of public transport has decreased or stagnated in most developing-country cities, and few efficient formal public transport systems remain

Beyond mainstream formal public transport services, a number of other modes exist in developing-country cities, depending on the context-specific nature of transport challenges and opportunities. Waterborne transport also serves a number of cities in developing countries. In Mombasa (Kenya), the Likoni ferry crossing serves over 200,000 passengers and 3500 vehicles daily.[51] The Chao Phraya express-boat company in Bangkok (Thailand) transports 11 million passengers annually.[52] In Colombia, Medellin's aerial cable car (Metrocables) moves up to 3000 passengers per hour and has been hailed as an innovative and high-impact solution that has dramatically transformed access to public transport for inhabitants of informal settlements built on steeply sloping terrain and hillsides.[53]

Developed countries

Most cities in developed countries are maintaining or increasing the market share of formal public transport. In North America and Western Europe, the annual number of public transport passengers has been increasing since the 1960s and 1970s, despite rising car ownership and suburban sprawl.[54] Yet, this overall increase masks differences between and within cities (or countries), as well as the low growth of public transport relative to other modes of transport.

Latin America has relatively good formalized public transport with stronger institutions in planning and management, while the private sector plays an increasingly important role

Levels of public transport use per capita range from highs of 237 trips per person annually in Switzerland to only 24 trips per capita annually in the US.[55] Although North America's public transport ridership is slowly growing – especially light rail and quality bus services in cities that have invested in public transport (Toronto, Edmonton and Vancouver in Canada and Portland in the US)[56] – the modal share of public transport remains marginal in comparison

Figure 2.5

Percentage of daily trips by public transport, selected cities in Europe, US and Australia (2001 data)

Source: UITP, 2006.

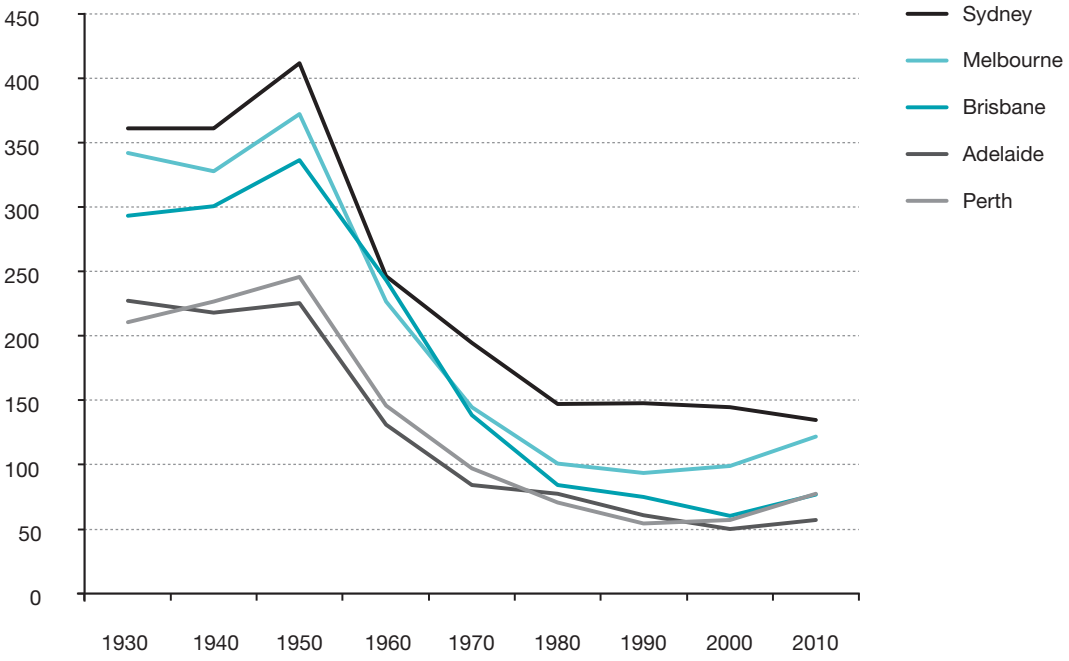
to European countries. A significant proportion of the daily trips in European cities like Vienna (Austria) and Helsinki (Finland) are by public transport, but far less so in Melbourne (Australia) and Chicago (US) (Figure 2.5). The dramatic overall decline in the importance of public transport in Australia since the first half of the last decade has been attributed to increased motorization (Figure 2.6).

Good service provision and quality infrastructure in many European cities allow public transport to be a lifestyle choice, enjoying increased patronage, especially for short inner-city trips, although constraints for women, children and the elderly have been noted. In Vienna, Austria, for instance, 96 per cent of residents live within walking distance of a public transport stop, formal public transport use is high, and the city is consistently rated highly for quality of life.[57] In Europe, there are 45 metro systems transporting 9.9 billion passengers annually while 189 light rail and tramways transport 10.4

Figure 2.6

Annual public transport passenger trips per capita, Australia (1930–2010)

Source: Cosgrove, 2011.



billion passengers annually.[58] Tramway use is seeing a revival in developed-country cities, especially in France, Spain, Portugal and the UK, but also in North America and Australia. Globally, the number of cities with trams had risen to 400 in 2011(compared to 300 in 1980), and another 100 systems were under construction or being planned.[59] In Eastern European countries the use of public transport remains much higher than in the rest of Europe, despite the debilitating effects of the end of communism on public transport services and use. Nevertheless, the dense urban rail and trolleybus systems created by the centralized socialist economies have been largely neglected and dilapidated amid rapid motorization and urban sprawl.[60]

In terms of the regulatory aspects of public transport provision, there has been a notable global shift from publicly owned provision to a privately owned market-driven approach since the 1980s (Table 2.2). A separation of organizer, operator and infrastructure functions has occurred such that public authorities now oversee, rather than organize or deliver, public transport. In the European Union (EU) for instance, there has been a strong drive for the deregulation of transport provision. One of the earliest experiences, which would later influence the rest of Europe, was the deregulation of the public transport market in the UK,[61] with private operators now providing more than 80 per cent of bus services outside London, leading to both improvements and setbacks.[62]

Despite some notable achievements in the expansion of public transport services, the wider picture is fragmented, with disparity in provision between regions and countries, and between capitals and non-capital cities. There are limited statistics on public transport operations in cities of developing countries, making comparison difficult.

In terms of the regulatory aspects of public transport provision, there has been a notable global shift from publicly owned provision to a privately owned market-driven approach since the 1980s

Table 2.2
Global overview of structure of formal public transport

Region	Trends	Regime	Comment
Western Europe *Average market share:* 15–20% *High share cities, e.g.:* Zurich, Switzerland 44% Vienna, Austria, 37%	Stagnation or slight growth in market share. Growth in trip numbers. Decrease in suburban areas.	Liberalization. Increasing competition. Cities often regulated or run by multi-modal public monopolies. Consolidation of major players.	Improved fare box recovery, reduced subsidies. Tension between authorities and operators may detract from social objectives.
Transitional European countries *Average market share:* 50% *High share cities, e.g.:* Warsaw, Poland, 69% but declining	Strong reduction in market share.	Deep reform, introduction of competition, separation of organization and operations. Private sector interest emerging.	Great financial stress, low quality, poor image.
North America *Average market share:* Low	Stagnation or slight growth in market share. Growth in trip numbers.	Publicly operated, federal support for infrastructure, local tax co-funding. Some recent private sector involvement.	Slow service delivery improvements in some places. Deficient fare box recovery. Serious financial stress.
High-income Asian countries (Japan, Singapore, Hong Kong) *Average market share:* 70–90%	Continued investment, expansion and more transport demand measures being put into place.	Mainly private operations. Competitive market. Local private players.	Some operators becoming global players. Some major private sector international groups moving in.
Emerging Asian countries (e.g. India, China, Republic of Korea)	Strong investment in public transport.	Reform to public sector. Introduction of new regimes.	Reform, increased financial incentives, improvement hampered by political interests.
Low-income Asian countries (e.g. Philippines, Indonesia, Malaysia) *Average market share:* Very low (data difficult to obtain)	Loss of market share. Losing ground to informal sector.	Weak and floundering public sector. Few private operators outside informal sector.	Renewed political interest but progress slow.
Middle East and North Africa *Average market share:* Almost zero.	Strong political support. Slow change in perception from low class to lifestyle choice.	Mainly private operations with regulation from newly created bodies.	Ambitious integrated networks being rapidly implemented.
Sub-Saharan Africa *Average market share:* <5%	Almost complete absence of formal public transport.	Informal and ad hoc. Often lacking minimum quality and infrastructure. Quality can be associated with switch to formal.	Public transport dominated by informal sector. New emerging systems include inclusion of the informal sector.
Latin America *Average market share:* 70% but declining.	Losing market share with growing car affordability. Significant interest.	Mainly private companies. Strong private owner associations.	Interesting new models and examples emerging that are appropriate for South/South transfer.

Source: Heather Allen, International Association of Public Transport, September 2011.

Infrastructure for public transport

In most developing countries, urban public transport infrastructure is far from adequate and in poor condition

The provision of public transport infrastructure is comparatively better in cities in some key emerging markets, such as South Africa and Brazil

Globally, there has been a lack of adequate investment in public transport.[63] In most developing countries, urban public transport infrastructure is far from adequate and in poor condition.[64] The existing infrastructure is often derelict and poorly maintained, which in turn compromises not only the quality of service, but also the health and safety of passengers. Previously subsidized public transport services have also been scaled back or discontinued amid policies of liberalization and economic reform in some developing countries. In Africa, publicly owned and managed public transport entities were disbanded in the 1990s owing largely to structural adjustment policies, leading to years of neglect since then and the dominance of informal transport operations.[65]

Investments required for urban public transport services can be prohibitively high for developing countries, as in the case of rail-based transport that costs millions of dollars per kilometre.[66] Furthermore, the spending on roads for private motorized transport remains far higher than on dedicated public transport infrastructure in developing countries (see for example the case of Africa in Figure 2.7). Much of the overseas development assistance received by developing countries has focused on road building, although this approach is now slowly changing in favour of investments in more socially sustainable modes.

The provision of public transport infrastructure is comparatively better in cities in some key emerging markets, such as South Africa and Brazil (Figure 2.8). The increased availability of bus transport services in most metropolitan areas of India – as a result of measures taken under the Jawaharlal Nehru National Urban Renewal Mission – has been noted, but the services remain unreliable, time-consuming and overcrowded.[67] The hosting of international events has also driven major public transport investments in cities such as Johannesburg (World Cup, 2010), Beijing (Olympics, 2008), Shanghai (World Expo, 2010), Delhi (Commonwealth Games, 2010) and Rio de Janeiro (World Cup, 2014).[68]

In contrast, many cities of developed countries have seen investment and improving services,[69] increasingly through public–private partnerships. During the 1990s average investment remained at 0.45–0.5 per cent of urban area GDP, with the higher levels in Madrid (Spain), Lisbon (Portugal), London (UK), Berlin (Germany), Vienna (Austria), Oslo (Norway), Prague (Czech Republic) and Lille (France).[70] Investment was also sustained in high-income Asian countries, particularly in Singapore, Tokyo (Japan) and Hong Kong (China).[71]

Impacts of formal public transport

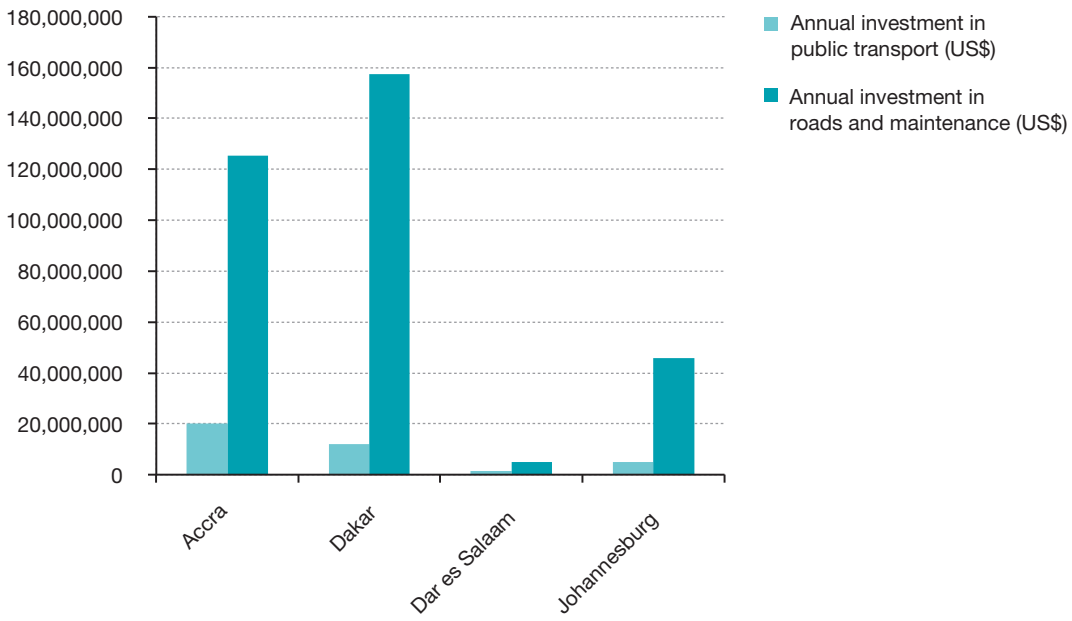
Public transport systems significantly influence the economic, environmental and social fabric of urban life in positive ways, and form a key prerequisite for the sustainable city of the twenty-first century. This mode of transport moves more people with fewer vehicles, less energy and smaller space consumption. Notable among positive environmental impacts are lower emissions of airborne pollutants and greenhouse gases (see Chapter 7).

The economic benefits of public transport investment include both direct job creation and indirect support of manufacturing, construction and other economic activities. An investment of US$1 billion in public transportation supports 36,000 local jobs in the US.[72] People living near public transport services work more days annually than those without such access, while public transport com-

Figure 2.7

Transport investments in Africa (2008)

Source: UITP and UATP, 2010.



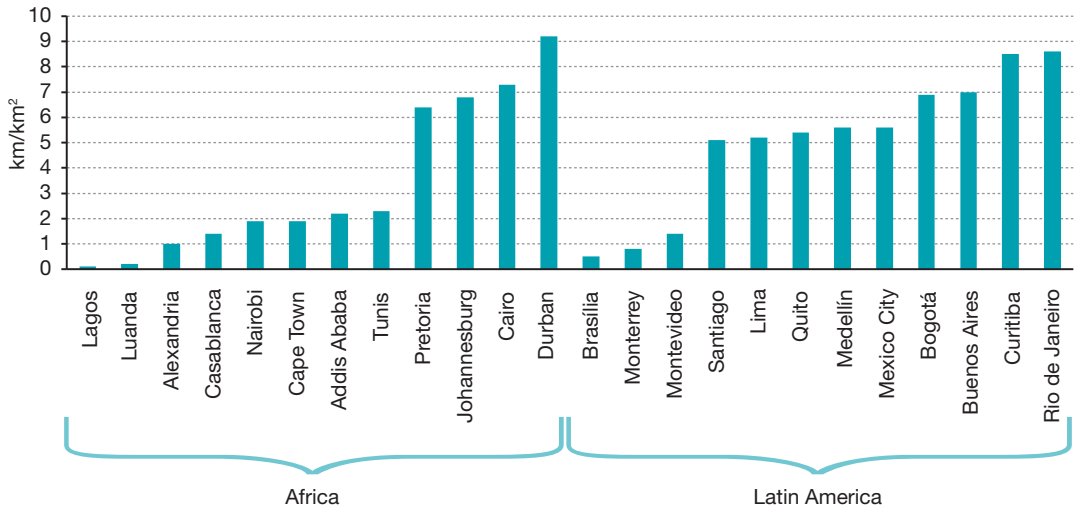


Figure 2.8

Length of public transport networks, selected cities in Africa and Latin America

Note: Includes dedicated public and private bus routes, in kilometres per square kilometres of city area.

Sources: EIU and Siemens AG, 2010 and 2011.

muters often report that they would not continue in current jobs, or would earn less, without public transport services.[73] A UK Government study showed that 13 per cent of respondents had not applied for a particular job in the previous 12 months due to transport problems.[74] Furthermore, the economic benefit of a modal shift to public transport can be substantial. In the US, it has been estimated that the annual economic savings to consumers would exceed the cost of strategies to encourage such a shift by approximately US$112 billion.[75]

Public transport investments via subsidies can have a broad effect. Subsidized student and schoolchild use (e.g. low-priced student tickets in Western Europe) can provide guaranteed revenues on uneconomic routes, as in the case of Germany.[76] In the US, many universities provide reduced-fare tickets. Salt Lake City's TRAX light rail system in this way serves the University of Utah with 45,000 travellers a week, or 33 per cent of total travel to the campus.[77]

In social terms, access to jobs, education, health services and other facilities is increased by public transport provision; these are central to social inclusion for the disadvantaged. Furthermore, public transportation also supports community cohesion by increasing the quantity and quality of interactions between people.[78] For the youth, public transport offers a means of travelling independently, and in some cases this can delay the desire (or need) to drive private motorized vehicles.

Public transport tends to increase physical activity as most trips include walking or cycling links.[79] Users average about three times as much walking as people who rely on private cars, nearly achieving the 22 daily minutes of moderate physical activity considered necessary for health reasons.[80] Public transport passengers also have about one-tenth the fatality rate of car occupants and, in terms of risks to other road users, public transport causes less than half the number of deaths per passenger-kilometre compared to private cars.[81]

The limited availability of financial resources for the provision of public transport services is a key constraint. Often, only a fraction of the necessary improvements can be implemented from the public purse. This has ramifications for both service levels and quality. Under such circumstances, retaining existing public transport customers, while gaining new ones, becomes particularly difficult. Projections on future population growth and motorized travel amid a lack of road capacity, suggest that if public transport does not double its modal share, many cities may well grind to a halt.

The economic benefit of a modal shift to public transport can be substantial

The challenge is to convert congestion into public transport riders, and overcome dependency on private cars. Yet, an important precursor to increasing such ridership is the provision of high-quality services, as clients value aspects such as connectivity and coordination of services, while flexibility and trip-chaining is also important, particularly for women.[82] Qualitative factors such as convenience, comfort, security and prestige are valued more highly than is assumed by a conventional focus on quantitative factors such as speed and price.[83] Focusing investments on improving quality of services may thus be even more effective than eliminating public transport fares (Box 2.3).

Projections on future population growth and motorized travel amid a lack of road capacity, suggest that if public transport does not double its modal share, many cities may well grind to a halt

Security and safety concerns are a barrier for public transport use by children, women and the elderly (see Chapter 6). overcrowding can expose travellers to undesirable behaviour in fellow passengers, and some cities do offer segregation of services such as in Mexico City (Mexico), Tehran (Iran) and Dubai (United Arab Emirates), where there are designated women's areas on public transport. Also, although children and youth are high user groups, keeping these as choice riders as they get older is not easy if public transport is low quality and perceived as old fashioned.[84]

Box 2.3 Zero-fare public transport?

Would zero-fare public transport systems 'even the playing field' and encourage travellers to shift from cars to public transport? Would free public transport be good for society, particularly lower-income or disadvantaged people?

Concession fares are an example of addressing these social objectives through partial subsidy. In a zero-fare public transport system the entire cost of the system is subsidized. The passenger does not directly pay for the trip, the most obvious result being that people are more likely to use public transport, as has been the case in Hasselt, a small city in Belgium. A similar system associated with tourism is in place in Melbourne, Australia. In Tallinn, Estonia, zero-fare public transport for all its 420,000 inhabitants on all public transport services run by the city from 1 January 2013 is expected to significantly increase ridership.

However, meeting dramatically increased demand in large systems would require considerable capital investment. If funds were instead used to increase service levels, perhaps new passengers may be attracted while maintaining income from existing passengers. The income from new passengers may then at least partially offset the costs of the improved service.

Sources: Brown et al, 2001; van Goeverden et al, 2006; Royal Institute of Technology, 2012.

The value of expanding public transport services to enhance accessible mobility in cities is unquestionable. Urban planning and land-use policies – together with transport demand and fiscal measures – can encourage a shift in transport behaviour towards public transport. Authorities in many cities may, however, lack the resources and institutional capacity necessary to coordinate land-use and transport planning so that they generate such a modal transition.

Urban planning and land-use policies – together with transport demand and fiscal measures – can encourage a shift in transport behaviour towards public transport

INFORMAL TRANSPORT

The informal sector – a term describing small-scale economic activity and unregulated employment – supplies small-vehicle, low-performance services that fill the niche between formal taxis and conventional 50-passenger capacity buses.[85] This section examines the conditions of informal transport globally, illustrating the dominance of this mode in developing countries. Informal transport is often the only accessible means available in many of the world's poorest cities. Although it provides important benefits to the urban poor, informal transport contributes significantly to congestion, air and noise pollution and traffic accidents. The role of informal transport in complementing formal transport and in generating broader social benefit is considered together with the costs entailed.

Informal transport is firmly entrenched in developing-country cities, often accounting for over half of all motorized trips

Developing countries

Informal transport is firmly entrenched in developing-country cities, often accounting for over half of all motorized trips. In Africa, private carriers dominate, mainly minibuses and shared taxis with schedules and fares varying with demand, routes being semi-fixed and stopping points unregulated. The City of Nairobi (Kenya) has the world's highest per capita use of informal transport with *matatu* minibuses providing 662 trips per inhabitant per year, three-quarters of public transport trips and 36 per cent of traffic volumes. In Harare, Zimbabwe, minibuses serve around 90 per cent of the market.[86] In Algiers (Algeria) the modal share for taxis and minibuses is 56 per cent of motorized trips,[87] while in Greater Cairo, Egypt, informal shared taxis increased their modal share (of motorized trips) from 6 per cent in 1987 to 37 per cent in 2001, and this has since risen even higher.[88]

In Lagos (Nigeria) the public-sector bus company failed under the weight of low fares and unsustainable subsidies, its mobility role taken over by *danfos*, midi-buses providing frequent and affordable services, but characterized by overcrowding and aggressive driving.[89] A fast growing informal mode is motorcycle taxis, with 60,000 of them in Cotonou (Benin) accounting for one-quarter of all trips.[90] In Kampala, Uganda, residents resort to *boda boda* motorcycle taxis, despite fares being four to six times higher than regular taxis.[91] The lower investments required from operators of informal transport services are a key incentive for entry into this sector.

Formal public transport is often absent in many Asian cities. In Istanbul, Turkey, an estimated 5000 illegal taxis were in operation by the year 2000.[92] In Sana'a, Yemen, public transport is almost entirely reliant on informally operated vehicles, often old and poorly maintained, posing safety, health and congestion challenges for the city.[93] Minibuses and microbuses serve 5–10 per cent of all trips in Thailand and Indonesia. Informal vehicles, dominated by the colourful *jeepneys* (converted US army jeeps) provide as many as half of all trips in the Philippines.[94] While NMT serves short-distance trips in Jakarta, Indonesia, motorcycle taxis (*ojeks*) cover longer distances. Hybrid, three-wheeled motor-taxis, *bajas*, provide comfort more akin to a private car, while larger three-wheeled *bemos* carry up to eight passengers, and *mikrolets* and minibuses carry 10 to 25 passengers.[95] The rapid expansion in auto-rickshaws has been observed in numerous Asian and African cities in recent years (Box 2.4).

Informal transport is a predominant mode in most of Latin America, with the proliferation of vans and minibuses fuelled by a lowering of import tariffs and the inability of public transport to meet transport demand. A flood of 10 to 15 passenger vans in the 1990s displaced *pirate* buses in Rio de Janeiro, while today an estimated 15,000 unlicensed vans operate in São Paulo.[96] The use of unlicensed vans in Brazil is also tied to perceived arduous and overreaching registration procedures. In Santiago, Chile,

Box 2.4 Auto-rickshaws: Taxis for the poor and middle class

An auto-rickshaw or three-wheeler (variously known as *tuk-tuk*, *trishaw*, *autorick*, *chakda*, *vikram*, *tempo*, *bajaj*, *tricycle*, *baby taxi*, etc.) is a popular way to get around in many developing countries. These motorized versions of the traditional rickshaw flourish in Bangladesh, Cambodia, Egypt, Ethiopia, Guatemala, India, Laos, Pakistan, the Philippines, Sri Lanka, Sudan and Thailand. In many Indian and Pakistani cities, motorcycle rickshaws – usually called *phat-phati*, *chand gari* (moon car) or *qingqi* (after the Chinese company) – also populate city streets. In Afghanistan, auto-rickshaw use is growing at 10 to 20 per cent per year in many cities. Auto-rickshaws are also an important source of employment, providing as much as 15 per cent of total urban jobs in some Asian cities.

Because two-stroke engines that power most auto-rickshaws are noisy and emit high levels of air emissions, local governments in India and Pakistan have in recent years required that older models be replaced by cleaner and quieter three-wheelers, powered by compressed natural gas.

Sources: Cervero, 2000; Jain, 2011.

some 30,000 pirate taxis ply the streets. In Kingston, Jamaica, private station-wagons (called *robots*) poach customers from public operators by running ahead of buses.[97] In Mexico City, around half of the mini-bus operators are not legitimately licensed or insured. Smaller door-to-door carriers concentrate on out-lying markets, such as in Bogotá, Colombia, where *tricimobiles* in peripheral informal settlements serve short trips of 1–2 kilometres at low costs (less than US$0.50 per trip).[98] Because of rapid motorization, however, informal carriers are increasingly viewed as major contributors to worsening traffic congestion.

Informal transport operators in developing countries serve not only low-income markets but also middle-income choice consumers looking for convenience (e.g. door-to-door, taxi-like services).[99] Low-income users also seek service quality, as in the case of Uzbekistan, the Kyrgyz Republic and Brazilian cities where surveys show that the poor are willing to pay more for better services.[100] Furthermore, there are notable gender and age differences in the use of informal transport in cities, with minibuses catering to larger volume, longer distance trips, generally serving male customers. Motorcycle taxis often cater to a younger crowd. Nearly two-thirds of the motorcycle-taxi passengers in Bangkok, Thailand, are aged 16–25 years.[101]

Generally, the role of informal transport appears to decline as cities in developing countries become wealthier. For instance, the market share of informal transport in nine cities in Sub-Saharan Africa shows a negative correlation with local GDP per capita levels (Figure 2.9). This inverse relationship between wealth and informal transport can at times prompt public authorities to ban them in the hope of conveying a modern image.

Informal transport operators in developing countries serve not only low-income markets but also middle-income choice consumers looking for convenience (e.g. door-to-door, taxi-like services)

Informal transport services are nowhere near as vertically organized as formal services. Often, individual owner-operators provide the service, and the sector is normally held together in a loose horizontal fashion, dependent upon inter-personal and inter-operator linkages and fellowship among stakeholders (Box 2.5).

Some developing countries attempt to regulate market entry, vehicle and driver fitness and service practices with respect to informal transport. For example, in Nairobi, Kenya, the Ministry of Transport enforced that all seats be fitted with seatbelts in minibuses, while standing is no longer permitted on larger buses.[102] Red plates distinguish the 55,000 legitimate shared-ride taxis of Beirut, Lebanon, although around 40 per cent of the plates are forged.[103] However, circumvention of such regulations is widespread and enforcement is often hampered. Thus, in many poorer countries, governments acquiesce to self-regulation and self-policing of informal transport. Indeed, many informal operators often form route associations to minimize collectively damaging behaviour and to increase ridership and profits.

Generally, the role of informal transport appears to decline as cities in developing countries become wealthier

Box 2.5 Minibus operators in Kampala (Uganda) and Nairobi (Kenya)

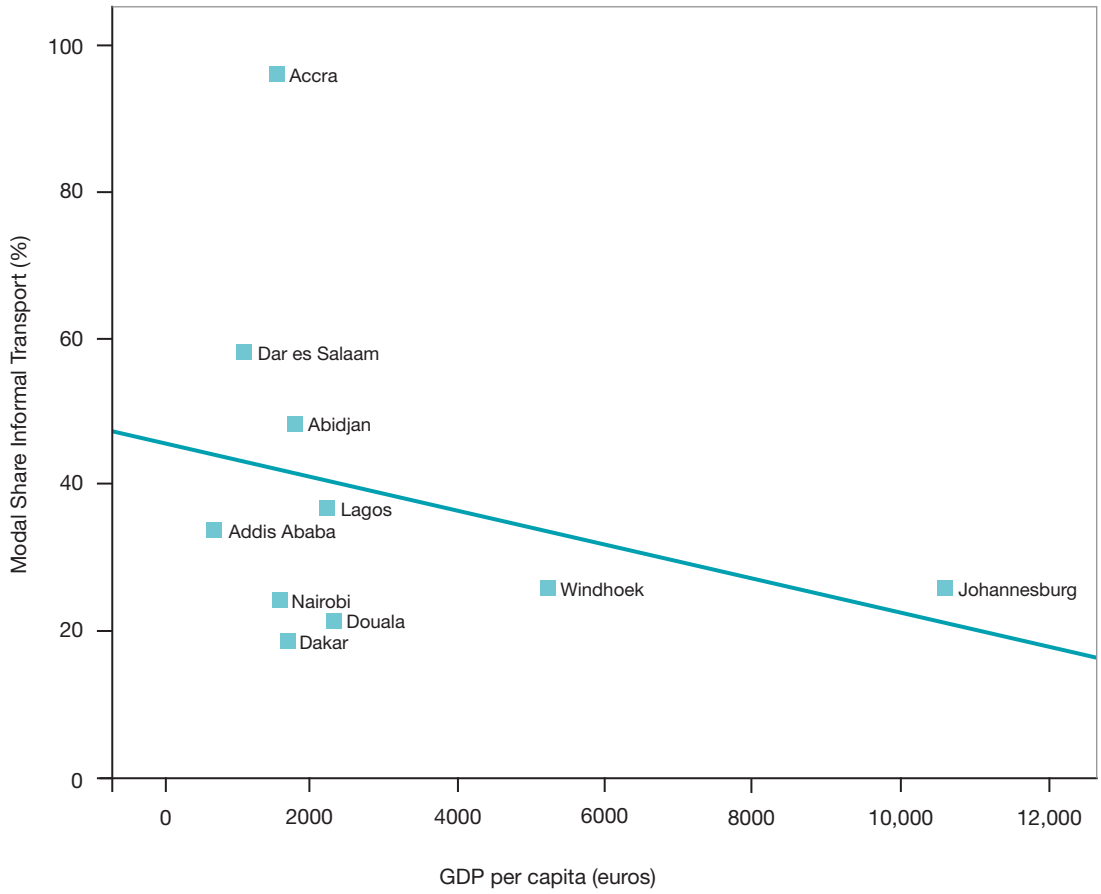
In Kampala and Nairobi, it is normal for minibus owners to be investors rather than owner-drivers. Most owners have less than four vehicles. They usually hire out their minibuses for a daily fee to a principal driver, who may in turn employ a second driver and one or more conductors. The driver keeps the revenue collected but is responsible for paying the costs of fuel, use of the minibus terminals, the wages of any second driver and conductors, as well as any fines extorted from him by the police or the route associations. Drivers work very long hours, with shifts averaging more than 12 hours a day, usually for six or seven days a week, although actual driving hours are normally seven to eight hours. So as to maximize the revenue from each trip, the minibus driver will not normally leave the terminal until the vehicle is full. This means that at off-peak times vehicles wait very long times at the terminal.

Sources: Gleave et al, 2005; Pirie, 2011.

Figure 2.9

Informal transport market share and GDP per capita in ten selected cities in Africa

Source: UITP, 2010.



Deliberate re-regulation of public transport has . . . been observed in some developing countries

Deliberate re-regulation of public transport has also been observed in some developing countries. Responding to faltering public bus services, the local government of Kingston, Jamaica, opened the marketplace to private service providers in the 1990s, only to experience a deluge of illegal minibus operators who flagrantly violated traffic rules. A single government-controlled bus company was consequently reintroduced, although illegal minibuses still persist. In Dakar, Senegal, re-regulation similarly followed the declining quality of private paratransit services. With the help of overseas development assistance, an organizing authority was created and resourced to upgrade the minibus fleet and grant tightly controlled concessions to private companies. In Nairobi, Kenya, *matatu* minibuses are being phased out in the central business district in favour of larger vehicles (25 seats and more), operated by larger, more closely regulated owner-driver 'societies'.

Developed countries

Many cities of developed countries also have informal transport services, often as niche markets for immigrants from countries with a legacy of informal transport. Some car-owning lower income families also supplement their income by operating 'under the radar'.[104] Unlicensed illegal limousine services may poach unsuspecting visitors leaving airports. In Miami and New York (US), informal services thrive as trusted and familiar alternatives to city services, particularly in areas with dense neighbourhoods of people with similar cultural backgrounds, high levels of immigrants and non-native speakers. Over 5000 illegal vans and private cars are estimated to roam the streets of Manhattan and Brooklyn.[105] Other examples include the 'black cabs' of Belfast (UK) and the 'little Cuba cabs' of Miami (US) operating in low-income neighbourhoods ignored and sometimes redlined by authorized operators.

In Eastern Europe, informal transport began to play an increasingly important role in the 1990s, following the disbanding and weakening of state-run public transport enterprises. For instance, in Tirana, Albania, ten-seat minivans called *furgons* emerged as a key form of transport in 1999, even surpassing the service of formal buses on some inner-city routes. Despite being banned from the inner city, such transport continues to play a major role in the metropolitan region of Tirana, accounting for 14 per cent of all trips.[106]

Paratransit offers distinct service advantages, and in most developing countries – where formal public transport is limited or non-existent – it is often the only dependable service available

Impacts of informal transport

Paratransit offers distinct service advantages, and in most developing countries – where formal public

transport is limited or non-existent – it is often the only dependable service available. With fewer passengers per vehicle, paratransit is more frequent, thereby reducing waiting times and is also more flexible and adaptive by providing door-to-door service. Small vehicles are suited to lower density settings, serving polycentric trip patterns, functioning as complements to large-vehicle, trunk-line services. They also penetrate the narrow streets of low-cost neighbourhoods and better negotiate congested traffic, and are thus faster, often offering a smoother ride and a guaranteed seat. Vehicles used for informal transport can also be more energy efficient, owing to higher load factors. In Abidjan, Côte d'Ivoire, minibuses use an average of 12 per cent less fuel per passenger trip compared to conventional buses.[107]

The greatest appeal of paratransit is that it is financially remunerative. Driven by profit, operators respond quickly to market trends and economize on costs. By organizing into route associations and cooperatives they can lower per-seat costs to the point of being competitive with larger companies.[108] Data from minibus operations in Abidjan (Côte d'Ivoire), Dakar (Senegal) and Douala (Cameroon) reveal sizeable profit margins, fare-box revenues exceeding operating costs by 17–96 per cent.[109] In Johannesburg (South Africa), the operating cost per passenger of formal public transport is estimated to be 13 times higher than informal transport.[110]

Importantly also, the informal sector is a significant gateway employment for many recent immigrants, making up an estimated 15 per cent of total employment in poor countries. In Dhaka, Bangladesh, the figure is close to 30 per cent.[111] In Cotonou, Benin (with just under 1 million inhabitants), motorcycle taxis alone provide 60,000 jobs, mostly for young men.[112] Indirect employment is also significant, as touts, changers (who provide small change) and a cadre of individuals who clean, maintain, repair and rebuild informal carriers.[113] Most motorcycle taxi operators in Bangkok (Thailand), Jakarta (Indonesia) and Yola (Nigeria) are rural migrants with no previous urban employment.[114]

While playing a critical role for the mobility of many urban residents, the informal transport sector faces a number of constraints.[115] A key challenge faced by operators relates to accessing commercial lines of credit. In the Caribbean and Sub-Saharan Africa, banks are reluctant to lend to informal operators. If they do, interest rates are often high (40 per cent or more per month) and payback periods short (three years or less). Unable to obtain credit through formal channels, some operators turn to street lenders, paying most of their daily earnings to creditors and rarely getting out of debt. Operators that lease vehicles pay to vehicle owners, often half or more of their daily in-take, meaning few are able to break out of poverty.[116]

Safety is an additional challenge, with accidents occurring because of poor (or lack of) driver training, inappropriate vehicles and poor maintenance. In Abidjan, Côte d'Ivoire, minibuses (*ghakas*) are involved in around 10 per cent of accidents and shared taxis in 25 per cent. In Yopougon, Côte d'Ivoire, shared taxis account for an estimated 90 per cent of traffic accidents and nearly all associated deaths in these accidents.[117] In South Africa, more than 2000 drivers, attendants and passengers died in paratransit-related violence during the 1990s, according to official statistics.[118] Informal operators rarely insure vehicles (or passengers), thus further aggravating accident impacts.

The informal sector is a significant gateway employment for many recent immigrants, making up an estimated 15 per cent of total employment in poor countries

In environmental terms, paratransit vehicles are significant atmospheric polluters due to two-stroke engines, excessive oil mixtures, low-grade fuels and poorly maintained engines.[119] In Cambodia and Laos, *tuk-tuk* three-wheelers still rely on two-stroke engines. In Thailand, most two-stroke engines have been converted to less noisy and polluting four-stroke engines, some cities experimenting with solar panel propulsion.[120] In much of Sub-Saharan Africa, motorcycle taxis emit from both two-stroke engines and excessive use of oil lubricant in fuels.

Without formal oversight, discrimination and harassment can be experienced by informal transport users. In Malawi and South Africa, women report fear of rape and high levels of verbal abuse.[121] Expectations that women sit side-saddle on motorcycle taxis can pose serious safety risks (Box 2.6). In the Middle East, cultural restrictions on haggling with male drivers means women often pay higher fares. Minibus routes focusing on work connections rather than domestic journeys – along with paying at each mode change – mean that Middle Eastern women pay more than men.[122] Young patrons are also vulnerable. In Dar es Salaam (Tanzania), some *dala dala* minibuses do not allow children to board during rush hours because government concessionary fares are seen as unprofitable.[123]

Corruption is frequently rife within the informal transport sector. Since most service providers are not fully licensed they must often pay bribes. In Dakar, Senegal, bribes to police officers by minibus drivers comprise 5 per cent of total operating costs.[124] In Thailand, Bangkok's *win* motorcycle taxi operators complain of protection payments to police officials and military officers.

Corruption is frequently rife within the informal transport sector

Another consequence of weak regulatory control is abuse of the labour market, seen through a disregard for minimum salaries, age limits, work-hour restrictions and insufficient or absent insurance, etc. Informal workers have few other employment options and are often in debt to vehicle owners who set high rents or provide high-interest loans.

Box 2.6 Gender differences in Nigerian motorcycle taxis

The worldwide economic recession and market liberalization policies from the 1990s have weakened an already struggling public transport sector across Nigerian cities. Buses routinely broke down, roads remained rutted and in very poor condition and formal services never reached the rapidly growing informal settlements on the urban fringes. Informal motorcycle and tricycle auto-rickshaw operators stepped in to fill the gap.

While viewed as just temporary fixes in the minds of public authorities, slowly but surely they have become firmly established as the backbone of Nigeria's urban public transport system. Flexible and market-responsive yet still too expensive for the poor, they predominantly serve more educated, somewhat better-off residents. A recent study of four intermediate-sized Nigerian cities showed that 85 per cent of such motorcycle passengers used the services four or more times a week, with slightly more women than men relying on such transport on a daily basis.

Over 95 per cent of the women surveyed stated that they adjusted their dress accordingly, compared to only 22 per cent of the men. Moreover, 83 per cent of the men were single passengers compared to only 8 per cent of the women, who frequently travelled with their infants and toddlers. Motorcycle fatalities have sharply risen across all cities in West Africa, including Nigeria. Records show that a higher number of females than male passengers were involved in three or more accidents per year. Dress and social norms have played a role in this; as women are expected to sit with two legs placed to the left of the motorcycle, which exposes them directly to traffic and a risk of being thrown off at bends or roundabouts. Children are equally vulnerable where they travel with women under such circumstances.

Sources: Oyesiku and Odufuwa, 2002, p.17; Peters, 2011.

PRIVATE MOTORIZED TRANSPORT

In 2010, there were 825 million passenger cars globally; . . . close to 70 per cent [of these] were in developed . . . countries

The growth of private motorized transport during the twentieth century had major impacts on the growth and development of cities all over the world. Pathways once charted in developed countries are now being followed in the rapidly growing cities of developing countries. This section reviews the global conditions and trends in the use of private motorized vehicles, and in the provision of infrastructure for the same. The externalities associated with private motor vehicles are considered while examining the advantages of private motorization.

In 2010, there were 825 million passenger cars globally. Of these, close to 70 per cent were in developed (including transitional) countries while only 30 per cent were in developing countries, mainly in Asia (Table 2.3). The number of light-duty motor vehicles – cars, SUVs, light trucks and minivans – is projected to increase to nearly 1.6 billion by 2035[125] and more than 2.1 billion by 2050 (Figure 2.10). Africa had the lowest ownership rates, accounting for only 3 per cent of all passenger cars globally. Nevertheless, motorization growth rates are higher in developing countries, as discussed below.

Globally, the number of new cars sold annually increased from 39 million in the 1990s to nearly 63 million in 2012.[126] Asia has seen a steady rise in new-car sales figures, from around 7 million in the 1990s to around 25 million in 2012, thereby becoming the leader in new-car sales, accounting for 40

Table 2.3
Global stock of motor vehicles and passenger cars (2010)

	Motor vehicles			Passenger cars			Passenger cars as % of all motor vehicles
	Total number	Per 1000 population (millions)	% of total	Total number	Per 1000 population (millions)	% of total	
TOTAL	**1047**	**159**	**100**	**825**	**125**	**100**	**79**
Developed countries	604	656	58	492	535	60	81
Transitional countries	98	303	9	83	259	10	85
Developing countries	345	64	33	249	47	30	72
Africa	35	40	3	26	29	3	74
Asia and Pacific	213	54	20	150	38	18	70
Latin America and the Caribbean	96	180	9	73	137	9	76

Note: The table is based on data from 164 countries from which data are available for both all motor vehicles (cars, buses and freight vehicles, but not two-wheelers) and passenger cars (motor vehicles, other than two-wheelers, intended for the carriage of passengers and designed to seat no more than nine people, including the driver). These countries account for about 96 per cent of the total global population. Data are the latest available during the period 2005–2010.

Source: Based on data from http://data.worldbank.org/indicator, last accessed 23 January 2013.

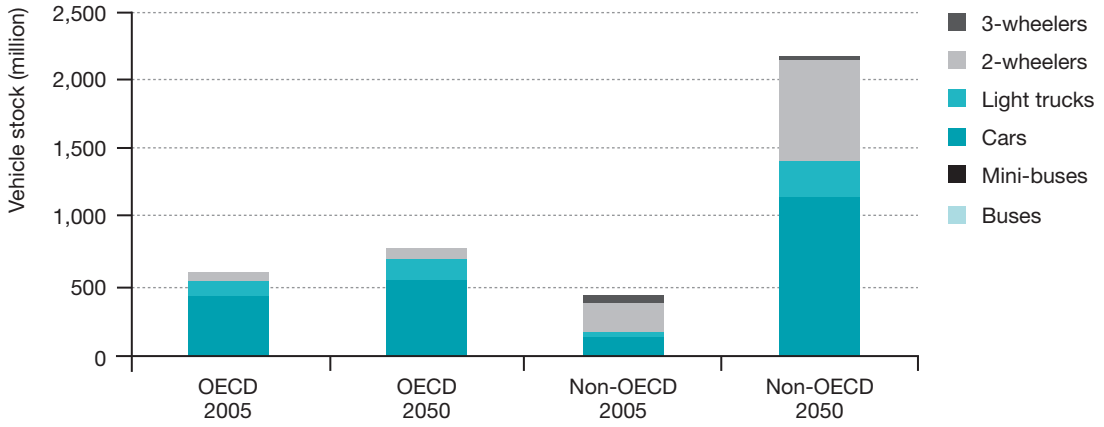


Figure 2.10

Total stock of motor vehicles, OECD and non-OECD countries (2005 and 2050)

Note: OECD = Organisation for Economic Co-operation and Development

Source: IEA, 2009.

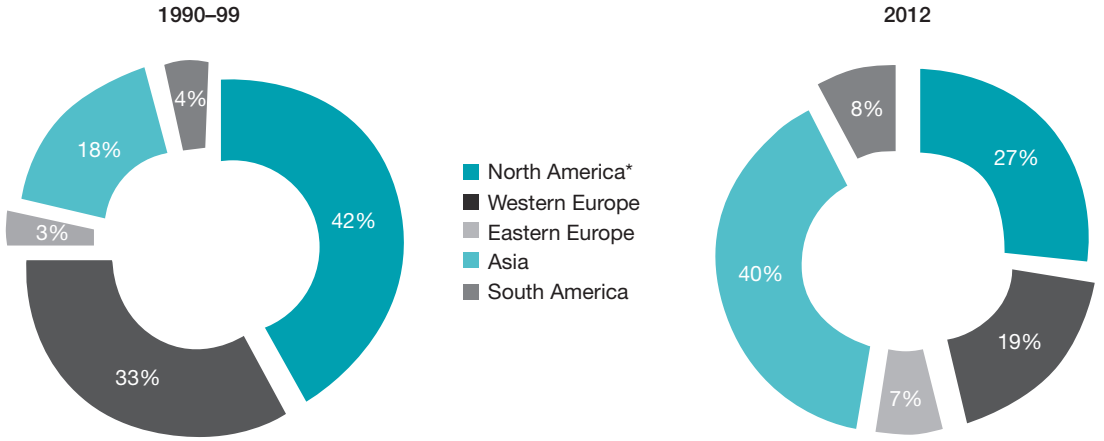


Figure 2.11

Global sales of new cars (1990–1999 and 2012)

*Note: * includes light trucks*

Source: Based on Scotiabank, 2013.

per cent of global sales in 2012 (Figure 2.11). The rapidly growing economies of Asia and South America are expected to continue driving massive future growth in new-car sales. It should here be noted that in many developing countries the bulk of newly registered cars are not new, but rather second-hand imports from developed countries.[127] Statistics on new-car sales are thus an unreliable basis for discussions on motorization levels in these countries.

Developed countries

Car ownership began to emerge as a phenomenon in the early twentieth century in the US, becoming widely available to the middle classes after 1920, and by the 1950s car ownership levels had reached an average of one car per household.[128] This was to have a significant influence on the spatial form of cities, allowing urban sprawl and facilitating the expansion of low-density suburban settlements in much of North America.[129] Within the framework of a government drive to provide affordable housing, land-use dispersal became a prominent feature of urbanization in the US, accompanied by growing car dependence.[130] Increased motorization occurred in other developed countries much later, but given higher population densities in Europe and Japan, public transport continued to play an important role. Indeed, both distances travelled and the number of trips by private car per capita are substantially lower in European countries compared to the US.[131]

Since 1990, vehicle ownership growth rates have been declining in a number of European countries such as Germany, France, Italy and also in Japan.[132] A non-linear relationship has been found between the growth of vehicle ownership and per capita income such that vehicle ownership grows slowly at lower levels of per capita income, then faster at middle and higher income levels reaching saturation at the highest levels of income.[133] In countries with high car ownership there is evidence that travel distances may have peaked, so that further increases in GDP are unlikely to lead to increased travel distances (Figure 2.12).[134] Factors such as higher fuel prices, an ageing population, improved travel options and health and environmental concerns contribute to a growing demand for alternative modes of travel in developed countries.[135]

In countries with economies in transition – following the move away from socialism and related market liberalization – car ownership rates doubled in just a decade (1990–2000). At the same time, these countries have experienced declining use of public transport, particularly due to the removal

In many developing countries the bulk of newly registered cars are not new, but rather second-hand imports from developed countries

In countries with economies in transition . . . car ownership rates doubled in just a decade (1990–2000)

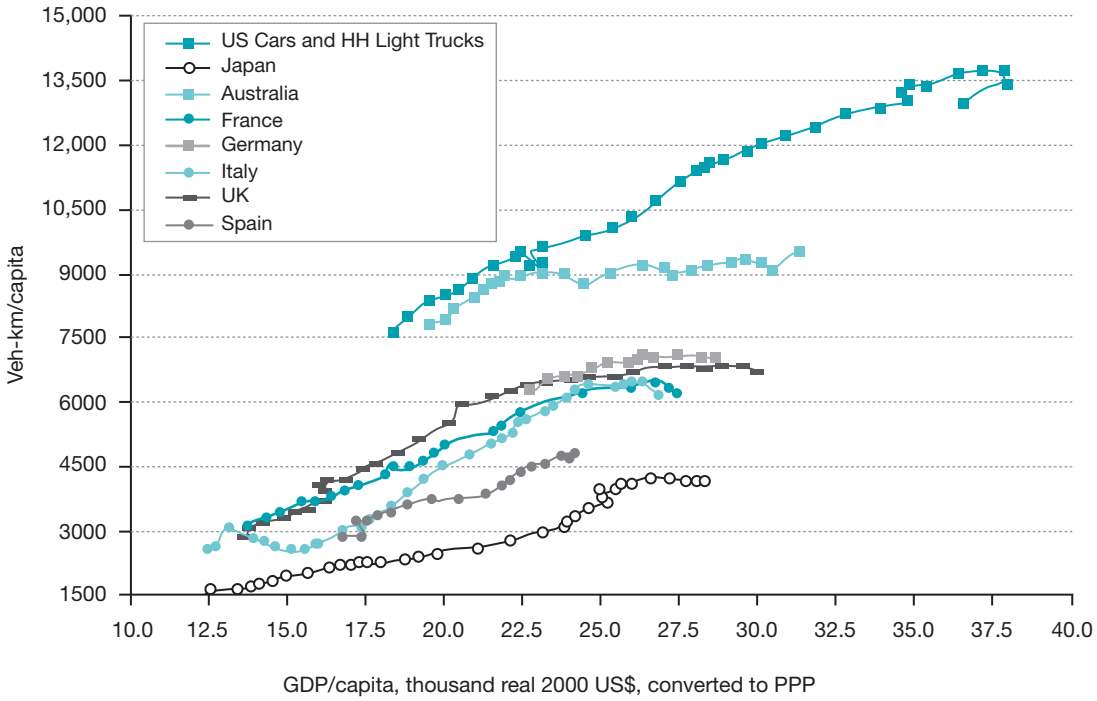


Figure 2.12

Vehicle kilometres travelled per capita for cars versus GDP per capita (1970–2008)

Notes: Data for some countries include SUVs and light trucks. PPP = purchasing power parity.

Sources: Millard-Ball and Schipper, 2011; Goodwin, 2012.

of state subsidies and disbanding of state-owned operators. Not surprisingly also, suburban sprawl patterns have emerged as prominent features in former socialist countries, representing a departure from the formerly densely built-up urban centres dependent on public transport.[136]

Variations in distances travelled by motorized vehicles in the US illustrate how specific urban forms shape travel behaviour. In 2007, residents of low-density sprawling cities travelled longer distances, as in the cases of Atlanta (48 vehicle kilometres per capita per day), Houston (61 kilometres) and Jacksonville (54 kilometres); while those living in more compact cities travel shorter distances, such as in New York (27 kilometres) and New Orleans (24 kilometres).[137] The relationship between urban form, land use patterns and private motorized travel is elaborated in greater detail in Chapter 5 of this report.

Motorized two-wheelers constitute a sizeable proportion of motor vehicles in developing countries, particularly in Asia

Developing countries

The rate of motor vehicle ownership in developing countries remains significantly lower than in developed countries (Table 2.3). However, ownership levels are not indicative of the high rates of growth in motor vehicle ownership in developing countries. The average annual motor vehicle ownership growth rate in emerging economies is higher than that of most developed countries. The levels of motorization in rapidly emerging cities of developing countries are already higher than expected, given their lower GDPs and their generally dense urban form.[138] With most of the current and future growth in population and urbanization taking place in developing countries, the potential for further motorization is substantial.[139]

Motorized two-wheelers constitute a sizeable proportion of motor vehicles in developing countries, particularly in Asia where 75 per cent of the world's two-wheelers are located, out of which China and India account for 50 per cent and 20 per cent, respectively.[140] It has been estimated that there were some 350 million two- and three-wheelers in use worldwide in 2005 (Figure 2.10). However, in many countries, this is the fastest increasing segment of personal transport. A recent report projects that total sales of motorcycles in 2013 alone may reach 114 million units, up from 39 million in 2003 and 79 million in 2008. The bulk of these, some 80 per cent are sold in Asian countries (55 per cent in China alone), yet the fastest rates of increase in sales are reported from Africa and the Middle East.[141] Thus, by 2050, the global stock of motorized two- and three-wheelers is projected to reach about 850 million (Figure 2.10). Therefore, while the rate of car ownership in many developing countries in Asia may be low (Table 2.3), the rate of motorization may be much higher. In cities such as Ho Chi Minh City (Viet Nam), Jakarta (Indonesia), Chennai and Mumbai (India) and Guangzhou and Shanghai (China) the number of motorcycles per capita exceeds that of cars (Figure 2.13). The inclusion of two- and three-wheelers dramatically alters motorization levels in Asian countries, raising them to levels comparable to developed countries.[142]

The rapid and often unmanageable growth in the number of two- and three-wheelers has resulted in the introduction of a number of government measures to restrict their growth and operation in Asian cities (Table 2.4). Even so – given their affordability,

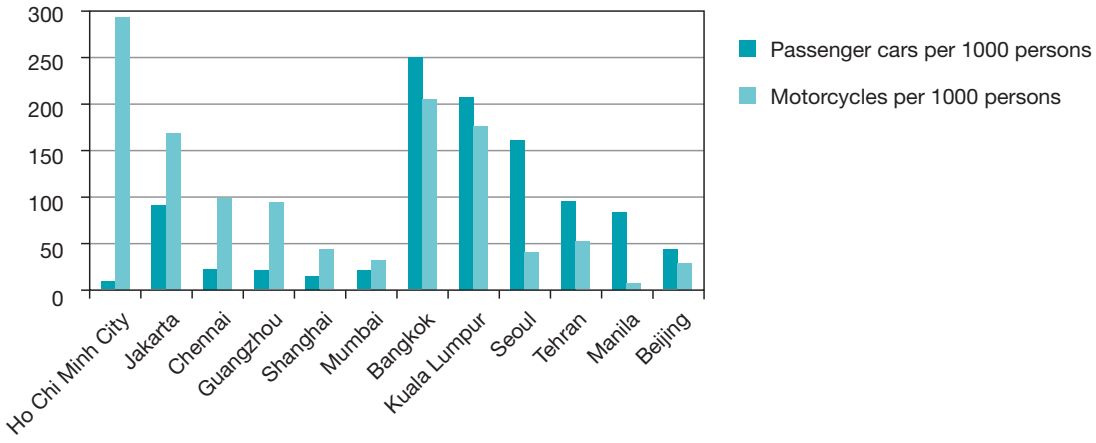


Figure 2.13
Car and motorcycle ownership rates, selected Asian cities
Source: Kenworthy, 2011.

fuel economy and manoeuvrability relative to private cars, and amid restricted access to public transport – two- and three-wheelers are likely to remain a popular option for lower and middle-income residents of Asian cities. In contrast, in Latin America and Africa, the number of motorcycles relative to cars remains low. Although ownership rates for two- and three-wheelers, are currently quite low in African cities, their role is expected to increase in the future.[143]

Infrastructure for private motorized transport

Globally, the provision of road space and parking for vehicles varies considerably, partly reflecting different strategies adopted by cities towards private motorized travel (Table 2.5). In most cities of Africa and Asia, there is less than 1 metre of road per person. Latin American cities, such as Curitiba, Bogotá and São Paulo have slightly more road length per person. Even so, road lengths per person in developing-country cities remain far lower than the average of the US (6.5 metres per person) and Australia (8.1 metres per person). A key objective of urban transport investments in many developing countries has thus been to increase road space for motorized transport. Yet, new road infrastructure tends to generate additional traffic. There is a need to move away from simply predicting growth in motorization in order to provide additional infrastructure, and move towards demand management within the framework of an overall strategy for sustainability.

In most cities of Africa and Asia, there is less than 1 metre of road per person

With respect to parking space, cities such as Bogotá (Colombia), Chennai (India) and Shanghai (China) have less than ten parking spots for every 1000 jobs in their central business district areas. In contrast, other cities such as Kuala Lumpur (Malaysia), Bangkok (Thailand) and Harare (Zimbabwe) have central business district parking spots in relation to jobs comparable to those of richer cities in Canada and Western Europe. The extremes are China at the low end and Riyadh (Saudi Arabia) at the top end with more parking places than jobs (Table 2.5).

The availability of parking is critical for destination accessibility and thus an important determinant of modal choice in urban areas. Control over available spaces, the length of availability and the costs of parking can thus prove effective in restricting private motor vehicle use if incorporated in the overall city-wide transport strategy.[144] Complementary traffic enforcement policies may be needed to ensure informal parking does not take place.[145]

The availability of parking is critical for destination accessibility and thus an important determinant of modal choice in urban areas

In developed countries too the provision of road space is differentiated (Table 2.5). The highest levels of road space per capita can be found in cities

Table 2.4
Two-/three-wheeler use restrictions, selected Asian countries

Location	Vehicle type	Programme details
Dhaka, Bangladesh	Two-stroke engines	Progressive ban from city: pre-1994 models phased out by January 2002, all remaining phased out by January 2003.
Guangzhou, China	All motorcycles and electric bicycles	Ban from entire city and suburban areas since January 2007.
Jakarta, Indonesia	Two-wheelers	Restricted lane use proposed to be extended to peak hour ban.
Kathmandu, Nepal	Diesel three-wheelers	Ban from city since 1999.
Lahore, Pakistan	Two-stroke three-wheelers	Ban from major roads to be progressively extended to entire city by December 2007.
San Fernando, the Philippines	Two-stroke three-wheelers	1970s models ban since 2003; 1980s models ban since 2004.
Taipei, China	Motorcycles above 550cc	Ban from urban districts.

Source: Posada et al, 2011.

Table 2.5
Road transport infrastructure in selected cities

City/region	Country	Length of road (in metres) per person	Length of freeway (in metres) per person	Parking spaces per 1000 CBD jobs
Chennai	India	0.3	0.011	5
Harare	Zimbabwe	1.8	0.000	370
Mumbai	India	0.3	0.000	77
Ho Chi Minh City	Viet Nam	0.3	0.000	105
Dakar	Senegal	0.5	0.003	120
Beijing	China	0.3	0.005	24
Jakarta	Indonesia	0.7	0.007	175
Cairo	Egypt	0.1	0.001	115
Tunis	Tunisia	2.0	0.018	170
Manila	The Philippines	0.5	0.004	29
Shanghai	China	0.3	0.003	2
Tehran	Iran	0.4	0.031	22
Guangzhou	China	0.5	0.000	24
Bogotá	Colombia	1.8	0.000	3
Cracow	Poland	1.5	0.023	31
Cape Town	South Africa	2.3	0.051	298
Johannesburg	South Africa	3.4	0.018	221
São Paulo	Brazil	1.0	0.009	183
Budapest	Hungary	2.2	0.013	147
Riyadh	Saudi Arabia	2.1	0.142	1883
Bangkok	Thailand	0.6	0.013	304
Curitiba	Brazil	3.2	0.000	84
Kuala Lumpur	Malaysia	1.5	0.068	298
Prague	Czech Republic	2.3	0.059	48
Seoul	Republic of Korea	0.9	0.017	25
Athens	Greece	4.5	0.039	225
Eastern Europe		**2.0**	**0.031**	**75**
Middle East		**1.4**	**0.053**	**532**
Latin America		**2.0**	**0.003**	**90**
Africa		**2.0**	**0.018**	**252**
High-income Asia		**2.2**	**0.020**	**105**
Low-income Asia		**0.6**	**0.015**	**127**
China		**0.4**	**0.003**	**17**
US		**6.5**	**0.156**	**555**
Australia and New Zealand		**8.1**	**0.129**	**505**
Canada		**5.3**	**0.122**	**390**
Western Europe		**3.0**	**0.082**	**261**

Note: CBD = central business district

Source: Kenworthy, 2011.

in Australia, New Zealand, the US and Canada, all of which have more than 5 metres of road per person. Western Europe has an average of 3 metres of roads per person, while Eastern European countries have even less. The availability of parking spots is also much lower in Eastern Europe compared to other developed countries. The length of freeways per person in Western Europe is almost triple that of Eastern Europe. On the whole, provision of infrastructure for private motorized transport is lower in Europe when compared to North America and Australia, both in terms of road length, freeway length and availability of parking spaces.

Impacts of private motorized transport

The major element behind the growth of private motorized transport around the world has been the individual freedom it offers, at a cost that is becoming affordable for a growing number of people. The perceived advantages of convenience, privacy and status continue to make the private car an attractive means of transport in cities. Moreover, the private motorized transport industry generates numerous economic benefits, including direct employment in manufacturing, indirect employment in infrastructure and services (fuel stations, maintenance, second-hand markets, policing, emergency services) and major investments in urban areas (road construction).

Overall, the automotive industry supports around 5 per cent of the total global workforce.[146] However, a considerable range of externalities arise from increased motorization in cities. Taken together, these dwarf the benefits of this means of transport. Being heavily dependent on oil, one of the most significant impacts of private motorized transport is on the environment. Increased use of private motorized transport also has impacts on health and safety in cities.[147]

A further externality of private motorized transport is traffic congestion that imposes significant costs on economic efficiency as time lost due to congestion reduces productivity. Congestion costs in Canada are as high as US$4.5 billion[148] nationally of which 80 per cent is accounted for by the country's three largest urban regions: Greater Toronto (43 per cent), Montreal (21 per cent) and Vancouver (17 per cent).[149] In the US, congestion has led urban Americans to travel 5.5 billion hours more and to purchase an extra 11 billion litres of fuel for congestion-related costs of US$121 billion in 2011.[150] In 2005, the cost of congestion in Australia's eight capital cities was US$7.1 billion,[151] comprised of private time costs (37 per cent), business time costs (38 per cent), extra vehicle operating costs (13 per cent) and extra air population (12 per cent).[152] The immense economic impact of traffic congestion is further illustrated by the case of Cairo, which costs Egypt as much as 4 per cent of its GDP.[153] In São Paulo, Brazil, some of the wealthiest residents have resorted to the regular use of helicopters to beat traffic jams.[154]

Access to motorized transport has not been universal in cities, with gender, age, disability and income having an impact. Also, in developing countries, travel by private motorized transport is reserved for a small group of high-income (often male) earners, and so its importance for women is comparatively minor.[155] However, this is changing, particularly in emerging economies such as China, India and Brazil, where middle-class women are increasingly owning and driving cars. The number of female drivers in Russia, where car ownership functions as an important status symbol, has increased by 50 per cent from 2000 to 2006.[156] Similar trends have been observed in Mumbai, India, where (with women earning higher incomes) traditional male-dominated gender roles in car purchase decisions are changing.[157] Gender differences in access to motorized transport in turn translate into differentiated access to opportunities.

INTERMODALITY IN URBAN TRANSPORT

The four modes of urban transport discussed in this chapter are highly complementary in that urban trips are often multi-modal, involving a combination of more than one mode. Modal integration – or the coordination of transport infrastructure, services, facilities and spatial configuration to enable seamless links between at least two different modes, thereby facilitating trip-chaining – is an essential prerequisite for enabling multi-modal trips, and by implication also urban accessibility. Strategies that facilitate this include spatial, network, fare, information and institutional integration to allow smooth transfers between different modes of urban transport.[158] It is particularly important to facilitate easy transfers between other modes and public transport if its modal share is to increase.

The critical importance of intermodality to enable accessibility in cities is recognized, though interventions designed to enhance integration vary across countries. Cities in Western Europe have taken the lead in facilitating modal integration, especially between public and non-motorized transport. Cycling significantly increases the catchment area of public transport stops beyond walking range, while access to public transport makes longer trips possible for bicyclists.[159] In Germany, 70 bike stations located at train stations enable bicyclists and public transport users to smoothly transition from one mode to the other. In the city of Berlin alone 24,000 bike parking spaces are available at public transport stations.[160] All metro and express interurban train stations on the peripheries of the city now have bike parking facilities. Guarded facilities for storing bikes together with complementary services (maintenance and repair) are available at all main train stations in the Netherlands, where 35 per cent of train users use a bike to get to and from train stations.[161] In the UK, train travellers are able to buy a discount bus ticket (PLUSBUS) that enables seamless transfer to buses.[162]

North American cities have, to some degree, also witnessed an increase in facilities designed to integrate cycling and public transport services, with bike parking spaces increasing by 67 per cent in Canada and 26 per cent in the US between 2006 and 2008. Noteworthy examples include the San Francisco Bay Area – where the Bay Area Rapid Transit (BART) system has bike parking in almost all 43 stations – and Vancouver – where integration between public transport and bicycles is facilitated by *TransLink*. *TransLink*, Vancouver's multi-modal transportation authority, has spent more than US$12 million on such integration between 1999 and 2009.[163]

Modal integration has been given minimal deliberate consideration in developing-country cities. Yet, although not by design, informal and non-motorized modes do serve as an important gap filler by feeding other modes of transport. Mexico City's *peseros* vans, shared-ride taxis, and collective minibuses connect the metro with outlying stations

Overall, the automotive industry supports around 5 per cent of the total global workforce

Gender differences in access to motorized transport in turn translate into differentiated access to opportunities

Cities in Western Europe have taken the lead in facilitating modal integration, especially between public and non-motorized transport

Modal integration has been given minimal deliberate consideration in developing-country cities. Yet . . . informal and non-motorized modes do serve as an important gap filler by feeding other modes of transport

substituting, without subsidies, the failing public bus system.

Some notable achievements in modal integration are emerging in Asian and Latin American cities. In China, Guangzhou's BRT system – which serves 800,000 passengers daily – is integrated with the city's bike lanes and bike share system, greatly enhancing physical access to public transport services.[164] The cities of São Paulo, Curitiba (both in Brazil), Bogotá (Colombia) and Santiago (Chile) have all taken action to advance integration between public and non-motorized transport.[165]

Cities remain inaccessible for large numbers of urban residents in spatial/physical or socioeconomic terms

Many of the attempts to facilitate intermodality between non-motorized and public transport in cities to date have focused on integrating cycling. Yet, the contribution of walking as a feeder to public transport systems has also been emphasized.[166] This also applies to developing countries, where most public transport trips involve walking at both ends of the trip. An analysis of access trips for Delhi Metro (India), for instance, found that often between 40 and 60 per cent of the passengers walk to the stations.[167]

CONCLUDING REMARKS AND LESSONS FOR POLICY

'Accessibility' may be the 'holy grail' for the twenty-first century city. Yet, the transport trends and conditions outlined in this chapter indicate that cities remain inaccessible for large numbers of urban residents in spatial/physical or socioeconomic terms. In turn, such limitations restrict access to opportunities for urban dwellers, with implications for their overall wellbeing and progress.

In the absence of accessible public transport services, informal transport remains predominant in developing countries

Public transport offers the greatest potential to enhance accessibility in cities, but is non-existent or declining in most developing countries, and increases in developed countries are not commensurate with the scale required to meet sustainability targets. A new business model for funding public transport needs to be forged. Public transport must always remain affordable but a new commercial paradigm is needed that allows the social dimension of providing a public service to be combined with efficiencies and commercial acumen to improve cost recovery. Moving from captive riders (passengers) to clients and choice riders, making public transport a lifestyle choice, requires a strong customer focus.

Despite the multiple benefits it generates for both users and society as a whole, NMT is often marginalized and receives minimal priority in urban mobility planning and investments, both in developed and developing countries. It constitutes the principal and often only accessible means of transport for the majority of residents in developing-country cities with most who opt for this mode doing so out of a lack of choice. Yet, in most cities, NMT conditions are extremely hostile. Investing in NMT to enhance the safety and security of walking and cycling constitutes a key pillar of planning and design for accessible mobility in cities. Innovative experiences from both developed and developing-country cities that have elevated NMT as a foundation for urban sustainability offer valuable insights to inform planning and investments elsewhere.

Perhaps one of the most alarming trends – which gravely threatens urban accessibility – is the steady increase in the share of private motorized transport. Almost 60 years after the private car became firmly fixed as the icon of the twentieth century, developing countries are experiencing extremely high motorization rates further supported by policies, actions and investments that favour private motorized over non-motorized and public transport modes. While motorization rates have generally reached saturation levels in developed countries, many of their cities continue to bear the consequences of urban and transport planning and land-use policies that facilitated car dependency and urban sprawl. While it does perform a necessary function within the overall arena of urban transport, where it dominates, the externalities of private motorized transport compromise the fundamental sustainability imperatives in cities. Addressing the broader welfare concerns around equal access to mobility thus necessitates action to enable shifts to more sustainable modes through deliberate and targeted policies and investments.

In the absence of accessible public transport services, informal transport remains predominant in developing countries and constitutes the main means of motorized trips for most urban dwellers. Although it provides essential benefits to the urban poor in terms of mobility and livelihoods, informal transport generates a number of environmental and economic externalities. A significant challenge is to balance the efficiency and social equity aspects of informal transport, i.e. to achieve the social benefits of free-market services without exceeding social costs. The sector would benefit immensely from best-practice examples of successful regulation of service quality and safety while at the same time allowing the inherent advantages of private competition and entrepreneurship to flourish.

Given the current state of urban transport globally, improved urban accessibility requires focusing on a number of vital pillars. Increasing the modal share of ***public transport*** is a universally applicable strategy that has significant potential to address mobility challenges of both developed and developing countries. The role of high-capacity public transport systems in this respect is underscored in Chapter 3 of this report and the social, environmental and economic sustainability benefits of public transport are featured in Chapters 6, 7 and 8. Efforts to

enhance urban accessibility are best not limited to mode-specific interventions and investments. There is abounding evidence indicating that ***intermodality***, or the integration of infrastructure and services across modes, to facilitate trip-chaining and multi-modal trips, is a vital precondition for accessibility. Urban planning and design principles that offer potential for this are elaborated in greater detail in Chapter 5. Effective ***institutional, regulatory and policy frameworks*** are also indispensable to facilitate urban, land-use and transport planning in an integrated manner that encourages shifts towards more sustainable modes of transport, as is discussed in Chapter 9. Finally, accessible mobility in cities cannot be considered in isolation from the ***movement of goods*** in urban areas that consumes significant space and interacts with passenger transport at times in adverse ways, as accentuated in Chapter 4.

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