

NON-MOTORIZED PUBLIC TRANSPORT: A GLOBAL REVIEW & ANALYSIS OF TRENDS AND ISSUES

Mamun Muntasir RAHMAN¹, Queensland University of Technology

Glen D'ESTE, Queensland University of Technology

Jonathan BUNKER, Queensland University of Technology

INTRODUCTION

Over recent decades there has been growing interest in the role of non-motorized modes in the overall transport system (especially walking and cycling for private purposes) and many government initiatives have been taken to encourage these active modes. However there has been relatively little research attention given to the paid form of non-motorized travel which can be called non-motorized public transport (NMPT). This involves cycle-powered vehicles which can carry several passengers (plus the driver) and a small amount of goods; and which provide flexible hail-and-ride services. Effectively they are non-motorized taxis.

The original version of the NMPT was hand-pulled rickshaws, which were first introduced in Japan in around 1870. The concept then spread to countries including China, India, Singapore, the French-Indo-China colonies, South Africa and for a brief time in America and Australia. The word 'rickshaw' comes from the Japanese *jīn rīkī sha*, which means literally 'man-powered vehicle'. The name was originally given to the hand-pulled rickshaws which thronged Asian cities in the 1920's and 1930's, but now it applies to the cycle-rickshaws of India and Bangladesh as well (Gallagher, 1992). These vehicles, also known as trishaw (China), pedicabs (UK, USA and Philippines), samlor (Thailand), cyclos (Cambodia and Vietnam), becak (Indonesia), saika (Myanmar), pinyin (Malaysia) and ecologico (Mexico) come in many different designs with two wheels either in front or back. They are capable of carrying a driver and 2 to 4 passengers or freight loads of up to 250 kg at speeds of 5 to 12 km/hr over distances of up to 40 km (Replogle, 1992). Figure 1 shows examples of cycle-rickshaws used for passenger and freight movement in developing and developed cities. Note that this paper supports the banning of rickshaws pulled by humans by walking and specifically excludes them from the category of NMPT.

¹ Contact: Mamun RAHMAN, School of Urban Development, Queensland University of Technology, Brisbane, QLD 4001, Australia. Email: mm.rahman@qut.edu.au



Figure 1: Examples of NMPT in Asia, Latin America, North America and Europe (picture caption in clock wise direction)

Source: <http://www.fotosearch.com>; Westall, 2007; Rickshawforum 2009

If this paper had been written 15-20 years ago, the outlook for NMPT would have been poor. NMPT played little or no role in cities in developed countries having never existed or having disappeared long ago; and in developing countries, NMPT was a “dying” mode, many cities having already banned rickshaws or taking active steps to discourage them. The reasons are many and varied, including NMPT being considered inhumane and inconsistent with the image of a modern city, and being accused of creating congestion, especially in rapidly motorizing cities of Asia. However the situation has changed. There is a growing recognition that NMPT can play an important role in the transport system, for instance for short distance local trips; as a feeder mode to public transport; for tourist transport; for transporting vulnerable social groups like women, children, elderly; and in areas where access for motorized transport is discouraged, restricted or unsuitable. Instead of “dying”, in many cities in both developing and developed countries NMPT is maintaining or increasing its significance and with potential for further growth. For example in Dhaka, the number of rickshaws and number of trips by rickshaw continues to grow. From less than 200 rickshaws in 1947 (Banglapedia 2006), the rickshaw fleet had grown to around 300,000 by 2000 and is currently more than 500,000 and still growing (STP 2005). More than 40% of non-walk trips and more than 22% of passenger kilometre of travel are estimated to be taken by rickshaws (DITS 1994; DUTP 1998; STP 2005). In New York, pedicabs emerged in early 1990s and from an initial handful of pedicabs has grown to a fleet size of around 1,000 and with

potential to expand further after regularization of pedicabs as part of the transport system under regulations introduced in 2009 (Epstein 2009; Grynbaum 2009a; 2009b)

This paper examines and analyzes global trends in NMPT incorporating both developing and developed country contexts and issues such as usage patterns; NMPT policy and management practices; technological development; and operational integration of NMPT into the overall transport system. It looks at how NMPT policies, practices and usage have changed over time and the differing trends in developing and developed countries. In particular, it will use Dhaka, Bangladesh as a case study in recognition of its standing as the most NMPT-intensive city in the world. The aim is to highlight NMPT issues and trends and their significance for shaping future policy towards NMPT in developing and developed countries.

THE CURRENT SITUATION

Before looking at NMPT trends and outlook, the first step is to understand the current situation and issues facing NMPT.

NMPT in Developing Countries

In developing countries, the situation and attitudes towards NMPT are mixed. To some extent, this reflects local culture, city size and ambition, and the level of development and motorization. In many of the largest and most rapidly developing and motorizing cities of Asia (such as Beijing, Bangkok, Kuala Lumpur), NMPT has been phased out, but in many other Asian cities NMPT continues to be a significant mode of urban transport system. Becaks in major Indonesian cities, pedicabs in many cities in Philippines, and cyclos in most Cambodian cities and some parts of Vietnam are examples of places in East Asia where NMPT continues to have a significant role in the urban transport system. Many parts of India (Calcutta in West Bengal, Matheran in Maharastra, Agra in Uttar Pradesh, Madras in Tamilnadu, states of Kerala, Karnataka and Andhra Pradesh) and Bangladesh also have a large population of cycle-rickshaws which serve as a major mode of travel. This is especially the case in Bangladesh, where all cities with a population of half a million or more (Dhaka, Chittagong, Rajshahi, Khulna, Comilla and Barisal) have rickshaw as the main mode of transport, apart from walking (STP 2005). Although comprehensive statistics are difficult to obtain, it is estimated that there are currently more than 10 million NMPT drivers in Asia.

In the Americas and Africa, the situation is different. NMPT is not as widespread or significant as in Asia, but in Latin America, NMPT has been operating for a least the last 40 years and has a small but growing role in the transport system for both day-to-day trips by residents and for tourist trips. Countries including Columbia, Mexico, Costa Rica and Cuba have persisted with their local version of the cycle rickshaw *bicitaxi*, and pedicabs operate in most parts of these countries including the capital cities of Bogota (Columbia), Mexico City (Mexico), San Jose (Costa Rica) and Havana (Cuba) (Urban Thinking, Urban Policy, &

Translating Policy into Law, 2009). In Africa, NMPT operated in the past but has been replaced by small motorized taxis and there is little evidence of a re-emergence.

The following case study examines in more detail the current situation in Dhaka, the capital city of Bangladesh and perhaps the most NMPT-intensive city in the world. The case study provides a snapshot of the role and significance of NMPT in the urban system, and of the issues facing NMPT in developing countries.

Case Study: Dhaka, Bangladesh

Rickshaws reached Bangladesh in the mid-1930's, and Dhaka by 1938 (Begum and Sen, 2005). The cycle rickshaws of Dhaka had their present look by around the 1950's. Since then, the design, technology and operation of rickshaws in Dhaka have showed little change.

In the last 30 years, the growth in rickshaw numbers in Dhaka has been explosive. The 'official' rickshaw population of Dhaka in 1983 was less than 30,000, and by 1987 it had tripled to almost 90,000 (Gallagher 1992). Since then, rickshaw numbers in Dhaka have continued to grow very rapidly. According to the Institute for Transportation and Development Policy (ITDP) (2005) and STP (2005), the total cycle rickshaw population is now estimated at around 500,000. With an estimated population of more than 12.5 million, this is equivalent to one rickshaw for every 25 residents in Dhaka. In addition, there are about 5,000 rickshaw vans that are used exclusively for freight carriage (STP 2005). But with only a limited number of legal licenses (80,000) (STP 2005), the same license plate numbers are duplicated many times over resulting in some 80% of the passenger rickshaw fleet operating illegally. Due to the absence of a comprehensive legal framework, the rickshaws industry has low barriers to entry and little regulatory control.

In terms of mode share, rickshaws currently carry around 40% of non-walk trips in Dhaka (Figure 2) and also have a major role as freight carriers for personal goods and small consignments.

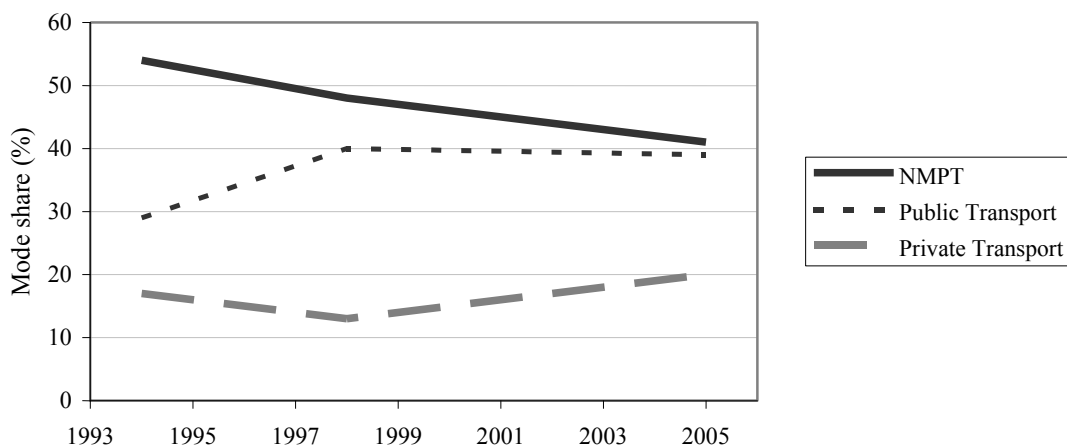


Figure 2: Trend in primary non-walk trip share for Dhaka

Source: Derived from DITS 1994, DUTP 1998, STP 2005

These statistics paint a picture of the current market for NMPT usage in Dhaka. Although rickshaw mode share has declined and car ownership is increasing, NMPT remains the most popular non-walk mode of transport in Dhaka, and with strong growth in population and demand for travel, the actual number of trips per day by rickshaw and the number of rickshaws in Dhaka is still growing. In terms of passenger kilometre of travel rickshaw is second to bus only, having approximately 22% of total trip length share (DUTP 1998; DTCB 2004).

The continued popularity of rickshaws in Dhaka and many similar Asian cities results from a mix of factors. From a user perspective, rickshaws provide affordable door-to-door service; are well-matched to demand in terms of specific trip lengths and types; and can access all parts of the network including very narrow and crowded streets unsuitable for other modes. Rickshaws are a low speed, low capacity mode, but for many trips these factors are not a drawback. In Dhaka, the majority of trips are short and local, with average trip lengths around 2.3 km (STP 2005); and the number of people travelling together is generally small. For short trips, NMPT is competitive in terms of overall travel time (when walking, waiting and transit time is taken into account) and is cheaper than travelling by other comparable modes (auto-rickshaw, taxi or car). In addition, NMPT has an important role as a business/personal freight carrier over short distances. Transit modes such as existing bus services and future mass transit cater for longer trips on defined routes and are not suited to many older parts of Dhaka with narrow crowded streets. As a result, there is a strong market differentiation with specific modes catering for different travel needs. For more detailed analysis of the operational attributes of NMPT in comparison to other available modes and the travel needs NMPT caters in Dhaka transport system, see (Rahman et al 2008; 2009a).

From a broader community perspective, rickshaws make a strong socio-economic contribution in terms of equity and employment; and have a key cultural and economic role in the overall urban system of Dhaka and many other cities. NMPT is important for all types of short-medium length trips, but plays a special role for vulnerable social groups. Rickshaws are the preferred travel mode by women, children and the elderly who make up 40% of loaded rickshaw trips due to their relative safety, security and comfort (STP 2005). In this respect, NMPT plays an important cultural role in providing equity and mobility for these groups. It provides an alternative to over-crowded and poor quality bus services; and an affordable alternative to higher cost taxis and auto-rickshaws. For instance, the fare for a short length rickshaw trip of 5 km in Dhaka is Taka 14, approximately one third of the taxi fare and half of the auto-rickshaw fare (STP 2005). Moreover in many other Asian cities, motorcycle is the favored mode of lower income groups, but in Bangladesh, motorcycles are not considered suitable for travel by women, children and the elderly who make up a major component of the NMPT market,

The rickshaw industry is also one of the most important sectors of the Bangladeshi economy. According to Gallagher (1992), rickshaws in Bangladesh contribute 34% of the value added from the transport sector to GDP and it is estimated that 6% of Bangladesh's GDP can be accounted for by rickshaw pulling (Wipperman and Sowula 2007). This level of activity means that NMPT is a substantial contributor to employment in Bangladesh. In Dhaka,

some 20% of the population relies on the NMPT industry directly or indirectly (pullers, their families, manufactures, garage owners, painters, repair men), which amounts to about 2.5 million people (Wiperman and Sowula 2007). This large workforce and its continued growth are attributable to two major factors; a) the unemployment problem in agro-based rural areas and subsequent large urban drift, and b) easy access to jobs in rickshaw industry (Wikipedia 2009). As a result, NMPT is woven deeply into Bangladesh society in terms of its employment, cultural and socio-economic contributions, especially amongst the poorest sections of society. In a city like Dhaka, the “hard” transport planning issues associated with NMPT cannot be fully separated from the “soft” socio-economic implications of NMPT policies.

NMPT also has a growing significance from a sustainability perspective. Although historically, environmental considerations have not underpinned the growth of NMPT in Asia, this is now emerging as a strong factor in its favor. Cars, buses and auto-rickshaws are the principal contributors to air quality pollutants in Dhaka (Hoque, Khondaker and Alam 2005). By contrast, NMPT is fuel-free and has an almost negligible impact on climate change and air quality.

Despite these advantages and critical issues, official attitudes towards NMPT in Dhaka have mostly been neutral to negative, with NMPT discouraged in favor of motorized transport. NMPT was considered inhumane, inconsistent with the image of a modern developing city, and a major source of congestion. However it appears that, while generally well-intentioned, Government policy initiatives to restrict or ban rickshaw access in Dhaka have failed because they have focused on expected benefits to private motorized vehicles and not on broader mobility needs. For some trips, for instance trips that cross major corridors on which rickshaws are banned, accessibility has declined and adequate alternatives and traffic management measures have not been put into place to manage new traffic movements and the interaction of motorized and non-motorized vehicles. In addition, these policies have not taken sufficient account of the severe social disruption caused by restricting NMPT

The World Bank originally supported plans to severely restrict rickshaw operations (Hummel 2008), but observing the severe negative socio-economic implications of such policy measures on the population and the marginal improvement in traffic conditions, the World Bank in early 2005 reversed its support for rickshaw restrictions on major roads in Dhaka. This policy reversal is also evident in the DUTP project performance assessment report (DUTP 2007), which admitted that such rickshaw restriction measures had been ineffective, stating that the banning of rickshaws from certain intersections and corridors had a negative impact on rickshaw drivers and some users. In addition, the DUTP project performance assessment report (DUTP 2007) concluded that banning rickshaws on some corridors in Dhaka had led to an increase in the number of mini-buses operating as a stop-and-go service that passengers could request to stop at any point along the corridor. This added considerably to air pollution and congestion, on top of the general emissions generated by the introduction of private vehicles, replacing fuel-free modes like rickshaw. For a more detailed analysis of shifts in policy towards NMPT in Dhaka and their impacts, see (Rahman et al 2009b).

Over the past 20 years, the government approach to NMPT in Dhaka has gone through the stages of a) a neutral stance in the hope that NMPT would disappear; b) a negative stance with policy initiatives implemented quickly and rickshaw bans imposed in an uncoordinated way to discourage NMPT; and c) after failure of these policies to resolve the issue, now looking for some new approach. Many other cities in Asia have gone through a similar cycle, with the result that most recently, the current situation has changed and attitudes to NMPT have become more positive. In Dhaka (Dhaka Urban Transport Network Development Study 2009 and Department of Environment 2009) and a growing number of other Asian cities such as Yogyakarta (Municipality of Yogyakarta 2008) and Delhi (Singh, 2008; Prakash, 2009, The Manila Times, 2008 and Roche, 2009) where NMPT has an existing major role in the transport system, Governments are now accepting the longer term role of NMPT and looking for ways to better integrate it into the overall transport system. However in some cases, the lack of regulatory and planning framework is hampering organized development of this industry to optimize its potential. In Dhaka, a draft Rickshaw Policy was published in the 'Urban Transport Policy' report (STP 2005), but has not been finalized or adopted.

In terms of technology, NMPT technology in Bangladesh has not changed since the 1950s, partly as a result of restrictive Government policies and import duties on import of bicycle parts. But in other countries in Asia (especially India and Indonesia), initiatives are underway to update the technology and produce "modern" rickshaws and becaks. For instance, ITDP programs including the Indian Cycle-Rickshaw Modernization project initiated in 2002 (Gadepalli 2008) and Yogyakarta Becak Improvement Project initiated in 2003 (PUSTRAL UGM 2002; Utz and Petersen 2003) have been very successful in producing rickshaws that are safer, more comfortable and easier and less physically demanding to operate.

Cities in Developed Countries

Active non-motorized modes like the bicycle are widely used in the developed world and increasingly incorporated as an integral part of overall transportation system. Especially in Western European countries such as Netherlands (Amsterdam, Delft), Germany (Berlin), France (Paris and Lyon) and Austria; North American cities such as Portland and Alberta; and Asian cities such as Tokyo, bicycles are widely used for work and non-work purposes. However until recently, there was little, if any, NMPT in cities in developed countries; NMPT having largely disappeared by around the start of the 20th Century or earlier.

Over the last 10-15 years, NMPT has re-emerged and gained popularity in the form of *pedicabs*. These are rickshaws with a modern makeover and operating technology including hydraulic brakes, suspension, complete lighting systems, seat belts, full weather canopies, steel frames and fibreglass bodies (Modianot-Fox, 2007). Companies like *Orient Express Rickshaw*, *Manhattan Rickshaws*, *Portland Cascadia Pedicabs* (US); *Velotaxi* (Germany); and *Bugbug* (England) have sprung up across Europe, the Middle East, Asia and the Americas, offering an environmentally friendly way to sightsee, go shopping, avoid traffic, deliver packages, and return home after a night on the town.



Figure 3: NMPT in Developed Countries (Left- New York; Right- Berlin)

Source: Modiaton-Fox, 2007; Westall, 2007

Exact and up-to-date figures for NMPT use are difficult to obtain, but in many cities there is a definite upward trend. Velo-taxis started operating in Berlin in 1997, and by 2007 the market had grown to a fleet size of around 200 vehicles and passenger carriage of some quarter million trips per year (Westall 2007). In London, pedicabs started operation in 1998 and by the end of 2005, the UK market had grown to an estimated 500 vehicles and more than a million journeys per year in London (UK Parliament 2005). Several sources (Epstein 2009; Grynbaum 2009a; 2009b) estimates that there are currently around 1,000 pedicabs cruising New York City. There are also significant numbers of pedicabs in major cities in European (Paris, Amsterdam, Barcelona, Budapest, Edinburgh, Frankfurt, Hamburg, Copenhagen, Milan, Rome and Dublin) and North America (Boston, Charleston, Chicago, Oklahoma City, Philadelphia, San Diego, Seattle, Vancouver, Washington DC, Massachusetts). A more recent growth area has been Japan, the originator of rickshaw (see Figure 4). According to Japan for Sustainability (2006), Velotaxi services have been adopted in 13 major cities in Japan, starting with Kyoto in 2002 and including Tokyo, Matsumoto, Osaka, Nara, Naha, Hiroshima, Kitakata, Sendai, Nagoya, Miyazaki, Kurashiki, and Kobe, as well as in the town of Ioujima in Nagasaki and Fukuoka city in 2006. There are also proposals to allow pedicabs to operate in areas which have restrictions or bans on motorized traffic during the Vancouver Winter Olympic Games 2010 (Vancouver Organizing Committee 2010) and London Olympics 2012 (Chandran 2009) .



Figure 4: New Pedicabs in Japan

Source: <http://www.rickshawforum.com>

In most of these developed cities, pedicabs are used predominantly as a mode for tourism and recreation where the pedicab trip is seen as an experience in itself. However this situation is gradually changing, especially in larger cities, such as London and New York, where pedicabs have a small but increasing role as public transport for residents undertaking normal day-to-day trips. In either case, NMPT is highly suitable for short distance trips and where it is catering for a trip that would have otherwise been made by a motorized mode (whether for visitor trip or resident), it is delivering sustainability benefits from reduced fuel use and pollution. This shift to a broader role is due to a number of factors including the eco-sustainable nature of NMPT; its operating flexibility (such as in areas where motorized vehicle access is restricted or discouraged through pricing); and the dynamics that it adds to the urban fabric. Whereas NMPT may have been seen as an obsolete mode, in many cities (such as New York, San Diego, San Francisco, London and Berlin), it is maintaining or increasing its significance and with potential for further growth.

The emerging challenge in developed cities is integrating NMPT into the overall transport system. In many cities in US and Europe, the introduction of pedicabs and their subsequent growth has taken place under the regulatory radar or through a regulatory loophole. For instance when introduced into London in 1998, pedicabs could legally ply for hire as stage carriages under the Metropolitan Public Carriage Act 1869 without the need for a street trading licence required by motorized modes providing a similar service (London Assembly 2005). This exemption was subsequently tested in court and upheld. At present, a number of initiatives are under process to regularize and incorporate pedicabs within a regulatory regime. For instance, voluntary registration scheme is in effect since 2009 by Westminster City Council in consultation with the pedicab industry. Under this scheme, pedicab operators sign up to a voluntary code of practice to which they and their riders must adhere. This covers driver background checks, cycle training (including the Highway Code), agreeing fares in advance and keeping rider records. In return, those within the scheme are given permit access to pedicab parking bays located across the City of Westminster. The London Local Authorities and Transport for London (No. 2) Bill, which is in process of approval would allow for more effective enforcement of moving traffic offences and parking contraventions against pedicabs by treating them as "motor vehicles" for the purposes of these contraventions. The Bill only deals with traffic enforcement issues and does not itself set up a licensing or registration scheme for pedicabs. This issue has been examined by Transport for London (TfL) and they suggested that neither a stage carriage nor a hackney carriage licensing regime is appropriate for the pedicab industry, especially when service public transport characteristics is considered for the former while compliance and enforcement costs are taken into account for the later. TfL suggested to Government that it should determine necessary safety and licensing standards for pedicabs as it does for other passenger carrying vehicles including formulation of primary legislation for pedicabs (Transport for London 2009).

The growth in pedicab activity in many other cities has also reached the point that it has come to the attention of planners and regulators, and competitors, such as motorized taxi drivers. Major cities in Germany (Berlin, Frankfurt, Hamburg for instance) has formal annual registration, licensing, safety inspection and operating standard for velo-taxi/cult-flitzer,

similar to that for any motorized vehicles since 2004 (Pommereau 2005; Velotaxi 2010).. Pedicab specific regulations have also been promulgated in USA cities such as San Francisco (1986 and amended in 2010), Austin (1992), Ashland (2003), Boston (2007), Phoenix (2008), New York (2009), San Diego (2010), and Washington D.C. (2010) (San Francisco Government 2010; City of Austin 1992; City of Ashland 2003; Boston Police Department 2007; City of Phoenix 2008; New York City Council 2007; 2009; City of San Diego 2010; Austin Pedicab Alliance 2010; Roth 2010; Neibauer 2010) and in Vancouver, Canada (in 2009) (City of Vancouver, 2009) All these regulatory systems typically require annual registration, renewal and safety inspection for vehicles, licensing of pedicab drivers, requirements for public liability insurance including provision for personal injury and property damage; detailed rider operating and vehicular safety rules; loading requirements; sanitary requirements; agreed upon and public display of fare schedules; provision of punitive measures, and in some cases limits on the number of pedicab licenses (San Francisco for instance). Other major USA cities such as Seattle and Portland are also considering/ processing measures to introduce regulatory regimes for pedicabs (Green and Rose 2008; Anderson 2009; Maus 2009; City of Portland 2010). These moves to regulate pedicabs can be seen as a milestone in the recognition of NMPT as a “serious” transport mode in developed countries.

COMPARATIVE ANALYSIS AND TRENDS

The snapshots of the current situation provide evidence for issues and trends that are likely to shape the short to medium term development of NMPT worldwide. These issues and trends are brought together and summarized in the following Tables and graphics from several different perspectives. Table 1 provides an historical perspective. It shows the trend in NMPT activity and policy in selected cities over the last 50 years. Figure 5 then shows the current situation in terms of NMPT market share and growth trend in selected cities. Finally, Table 2 shows the relative patterns of NMPT usage and how it is changing and expected to continue to evolve in selected cities worldwide. Taken together, this provides a picture of the current situation and worldwide outlook for NMPT. The picture shows no common trend, but instead, a divergence of trends with clusters of cities following different pathways according to local culture, city size and ambition, and the level of development, as follows

- in Bangladesh and many parts of India, rickshaw activity continues to grow and have a large share of day-to-day trips (40% of non-walk trips in Dhaka). This is despite uncertain and sometimes negative policy positions regarding rickshaws. In some other Asian cities, such as Yogyakarta, the market share is much lower but local policy environment is supportive and NMPT activity is growing. In this cluster of cities, NMPT is likely to continue to play a significant role in the transport system for at least the medium term. The main challenges in these cities is to bring the rickshaw industry under a more consistent and inclusive regulatory regime; introduce improved standards and technology; and plan for improved integration of NMPT into the overall transport system. Yogyakarta is a leader in meeting these challenges. It has programs underway to develop a non-motorized vehicle master plan; introduce

specific technical and operational legislation for NMPT (Municipality of Yogyakarta 2008); upgrade NMPT technology (PUSTRAL UGM 2002); and improve management of mixed traffic environments;

- in another group of cities in Asia (such as Surabaya, Chiang Mai, Kaohsiung, Hanoi), NMPT still operates, is officially accepted to certain extent and has a significant role, but its use as a day-to-day public transport mode is static or declining and NMPT is increasingly contracting to local roads, poorer areas, or as a tourist mode. In others (such as Jakarta, Manila, Ho Chi Minh City), NMPT bans have been imposed but NMPT persists unofficially in back streets and poorer areas. The immediate challenge for these cities is to decide the future role of NMPT in their city transport system (if any), clearly define that role, and be consistent in implementing the policy and managing the transition from the current situation;
- the downward trend in NMPT has advanced further in many of the largest and most rapidly developing and motorizing cities of Asia (such as Beijing, Bangkok, Kuala Lumpur). These cities banned NMPT early in their transition, with the result that NMPT had been eliminated by the end of the 1970s and is not show signs of a resurgence. These cities are in a similar situation to that facing developed cities (see below);
- in several cities in Latin America (Bogota, Havana, Mexico City), NMPT has grown steadily over the last 40 years and has both a tourist and resident role, with residents using NMPT for day-to-day trips as a significant market. In particular, in Bogota there has been supportive policies and initiatives to integrate NMPT into the overall transport system (Hidalgo 2002). The challenges are similar to those facing cities in Asia with an existing and significant NMPT market;
- in cities in developed countries, there was little if any NMPT up to the late 1990s, but it has re-emerged as pedicabs and there has been a subsequent struggle to develop NMPT policies and regulations and integrate NMPT into the overall transport system. In some of these cities, NMPT has a static and largely tourist role, but in others (such as New York and London) NMPT has grown rapidly over the last decade (albeit from a very small base) and there has been a switch to a small but increasing role as public transport for residents undertaking normal day-to-day trips. The main challenges in these cities are managing the operation of pedicabs in a highly motorized and congested road environment; managing the interaction between NMPT and other non-motorized modes (walking, cycling); and deciding on and implementing a clear policy, safety and regulatory environment for NMPT.

Table 1: Trend in NMPT Activity and Policy in Selected Cities

Berlin			Started in 1997	Growth Increase Positive Policy	
London			Started in 1998	Generally Supportive Moves to Regulate	
Amsterdam			Started in late 1990s	Generally Supportive	
New York			Started in 1996	Generally Supportive Moves to Regulate	
Kyoto				Started in 2002 Growth & Positive Policy	
Bogota	Rickshaw Growth started	Slow Growth. Not very supportive and not well integrated. Not much policy support.		Well Integrated in 2002 Growth increased	
Havana	Rickshaw Growth started	Slow Growth. Not very congenial and not well integrated. Not much policy planning			
Dhaka	Introduced 1938 Early growth Positive Policy	Cycle Rickshaw growth started and continued steadily Positive Policy	Rapid Growth Adverse Policy and Measures	Rickshaw Ban on Main roads in 2002 Growth Continues	
Delhi	Introduced 1947 Growth started Positive Policy	Steady growth continued	Rapid Growth Negative Policy and several phases of bans until 2008	Ban lifted in some areas. Growth Continue	
Calcutta	Introduced before 1947 Positive Policy	Steady growth Policy initiatives to restrict rickshaws from 1976	Growth Continues. Negative Policy.	Hand-pulled rickshaws banned in 2007 Cycle rickshaw continues. Growth continues.	
Jakarta	Introduced in 1940 Positive Policy	Steady growth continued	Negative Policy Banned in 1988	Ban lifted in 1998 but reversed immediately	
Manila	Rickshaws Banned		Some re-emergence before banning again		
Ho Chi Minh City	Rickshaws Present. Slow growth			Banned in 2008	
Beijing	Rickshaw Banned in 1949				
Karachi	Rickshaws Present	Rickshaw Banned in 1962			
Bangkok	Rickshaws Present	Rickshaw Banned in 1960			
Kuala Lumpur	Rickshaws Present. Steady growth	Banned in 1970			
Phnom Penh	Rickshaw present and slow growth Government Policy Positive but not very active				
1950 and earlier	1960	1970	1980	1990	2000

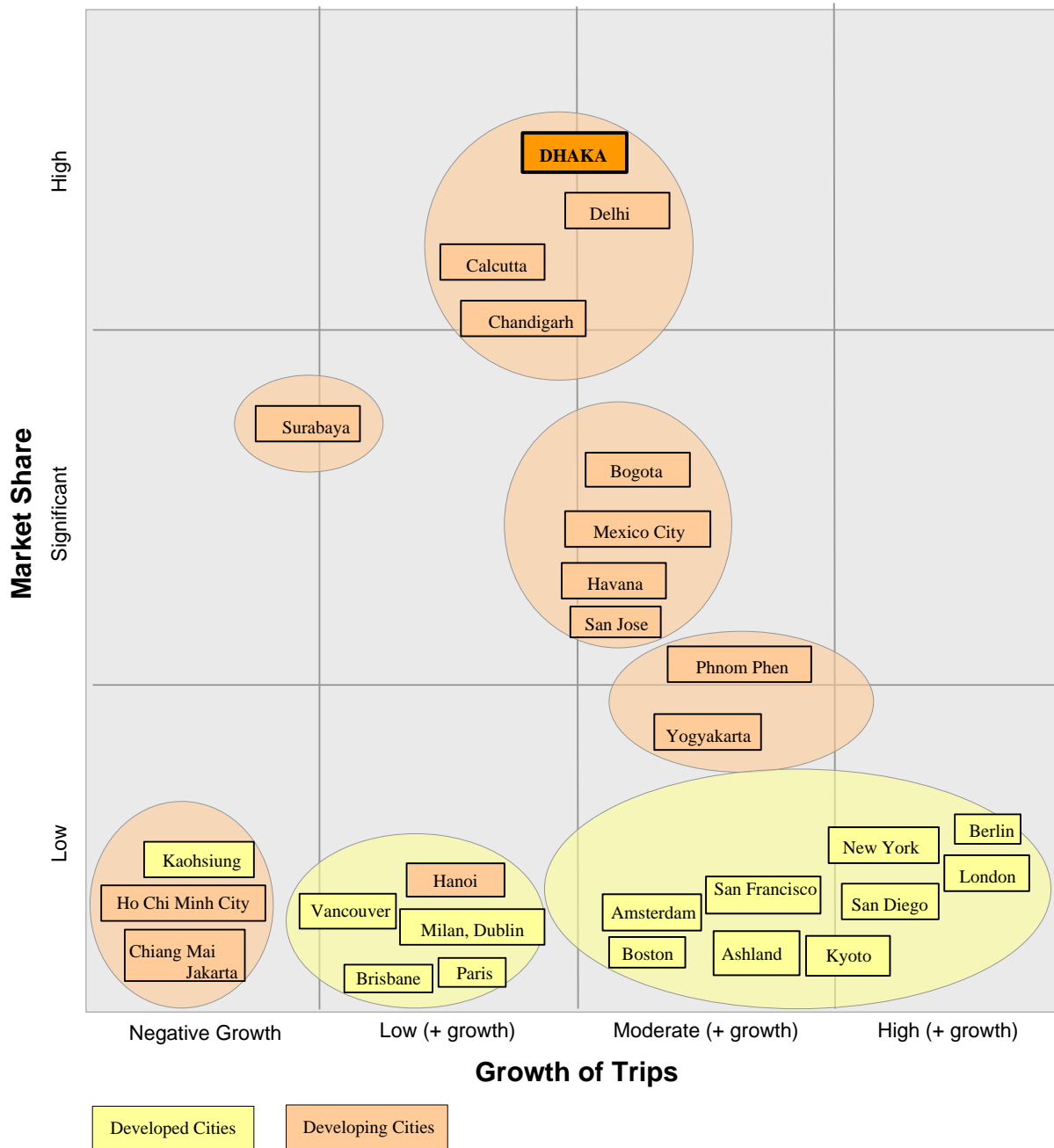


Figure 5: Market Share of Cycle Rickshaw Usage in Selected Cities Worldwide

Table 2: Degree of and Shift in NMPT Usage in Selected Cities Worldwide

Location		Degree of Usage		Shift in Usage		
Country	Major Cities	Tourist Transport	Public Transport	TT ⇌ PT	PT ⇌ TT	No Change
Australia	Sydney, Melbourne, Brisbane	○				-
Germany	Berlin, Frankfurt, Hamburg etc.	●	○	⊛		
England	London	●	○	⊛		
Netherlands	Amsterdam	⊙				-
Other Europe	Milan, Paris, Dublin etc	○				-
USA	New York, San Francisco, San Diego	●	○	⊛		
Canada	Vancouver	○				-
Japan	Kyoto, Nagoya, Osaka	○	○	⊛		
Mexico	Mexico City and other major cities	○	⊙			-
Cuba	Havana and other major cities	○	⊙			-
Costa Rica	San Jose and other major cities	○	⊙			-
Colombia	Bogota	○	⊙			-
Bangladesh	Dhaka and every other city	○	●			-
India	Delhi, Calcutta Chandigarh etc	○	●			-
Thailand	Chiang Mai	⊙			⊛	
China	Beijing	○			⊛	
Taiwan	Kaohsiung City	⊙			⊛	
Indonesia	Surabaya, Yogyakarta		⊙			-
	Jakarta	○				-
Malaysia	All Cities	○			⊛	
Vietnam	Hanoi	●	○		⊛	-
	Ho Chi Minh City	○			⊛	
Philippines	Manila		○		⊛	
Cambodia	Phnom Penh	○	●			-

Source: Developed by the Authors from Literature Review

Legend: Relative Level of Usage: ○ Low ⊙ Medium ● High

Usage Shift Indicator: ⊛

CONCLUSIONS

The outlook for NMPT has turned around in the last 10 years. From a mode that was seen as inhumane, inconsistent with the image of a modern city and creating congestion, there is now a growing recognition of the potential for NMPT to make a valuable contribution to the transport system and urban fabric. In many developing countries, NMPT has a long history and has retained its popularity despite sometimes negative Government policies. Although top speeds are lower than motorized modes, NMPT is competitive and cost-effective for short distance door-to-door trips that make up the bulk of travel in many developing cities. In addition, it is often the preferred mode for vulnerable groups such as females, children and elderly people; it makes a positive contribution to social equity, the economy and employment creation; is environmentally sustainable; has a valuable role in the urban freight system; and is suitable for narrow and crowded streets found in many cities in developing countries. As a result, NMPT bans and negative policies have been relaxed in several countries. NMPT is also gradually gaining in popularity and significance in many developed countries of Asia, Europe and parts of North America, where there is a small but emerging trend for NMPT usage pattern to broaden from tourism to public transport. This shift is due to a number of factors including the eco-sustainable nature of NMPT; its operating flexibility (such as in areas where motorized vehicle access is restricted or discouraged through pricing); and the dynamics that it adds to the urban fabric.

Many cities throughout the world are approaching a decision point about the future nature of their transport system and the future role of NMPT. In particular, those cities where NMPT already has a large and in some cases dominant role in the transport market are faced with the decision to (a) ignore NMPT, perhaps in the hope that it will eventually disappear; (b) actively discourage it through policy measures to ban or restrict NMPT; or (c) accept that NMPT is a valid and sustainable component of the system and work towards better integration of motorized and non-motorized modes. In developed countries, local conditions and the scale of the problem may be different, but the challenges for NMPT regulation and integration are similar. NMPT has established itself “under the radar” but is now coming to the attention of planners, policy makers and competitors.

In summary, NMPT has a strong and enduring role in the transport system of many developing countries and is re-emerging in many cities in developed countries. While NMPT has been a “Cinderella” mode that has received relatively little planning, regulatory or policy attention, there is a growing recognition of the valuable contribution that NMPT can make. This creates a number of policy and research priorities that need to be addressed to shape the future of NMPT:

1. **Better Integration** – this involves better integration of NMPT with other modes from an operational perspective, traffic management perspective, and an overall transport planning perspective. Traffic management measures aimed at improving traffic flow in a mixed traffic environment of NMPT and motorized modes have not always been

based on sound research and in developing countries have a mixed (mostly unsuccessful) track record. In addition, NMPT is ideally suited as a feeder mode to conventional public transport, but little research attention has been devoted to approaches towards coordinating NMPT with motorized PT modes by physical infrastructure and operational integration measures. Since NMPT and conventional transit are in most instances complementary not competing modes, this should be a subject of focus and priority. There are also emerging issues (especially in developed countries) such as whether or not to allow access by NMPT and under what conditions to facilities such as bicycle lanes, bus lanes, restricted parking areas, pedestrian precincts, area charging schemes, etc.

2. Better Technology – in many cities in developing countries, NMPT technology has not changed for decades. There is scope to introduce locally suitable technological innovations that make it easier for the driver and improve efficiency, safety and comfort. Some programs have been successful in introducing improved rickshaw design in India and Indonesia (Utz and Petersen 2003) and modern pedicabs are becoming more common in developed countries. These programs and further innovation (such hybrid human-power/electric operation) need to be continued and extended to other countries such as Bangladesh where there has been little or no recent innovation.
3. Improved Regulatory Environment – in Bangladesh most rickshaws are operating illegally; in London, pedicabs began operation through a legal loophole; and in the US, there are concerns about pedicab safety and insurance. This is creating pressure to regularize NMPT operation and bring it under a legal and regulatory regime similar to that applying to other transport modes and service providers. This includes effective powers for Police to fine or “move on” NMPT vehicles that are causing traffic or public nuisance. The challenge is to create, implement and enforce a regulatory environment that protects NMPT and users and the general public, but at the same time, does not discourage NMPT operations.
4. A Supportive Policy and Planning Environment – aspects of integration, technology and regulation come together in the policy and planning framework. As mentioned above, NMPT has been a “Cinderella” mode that has either received relatively little attention in the policy and planning process. The challenge is to regularize the inclusion of NMPT into the formal policy and planning process, with the aim of ensuring that decisions about NMPT are based on a solid foundation of local evidence and understanding of the NMPT market and how it can work together successfully with other modes.

NMPT is not the answer to the transport problems affecting cities, but for many cities it can play a valuable role and be part of the answer. In particular, NMPT has a potential role in cities with all or a combination of the following attributes: relatively flat topography; an existing NMPT industry that can be revitalized or no existing NMPT but a dynamic and receptive urban fabric; densely built up areas or an “old city” area with narrow streets unsuitable for motorized vehicles; high levels of tourism; pro-sustainable transport strategy;

and existing or planned restriction of car use in central areas or other precincts. However before that can happen, the significance of NMPT needs to be more fully acknowledged and it should be brought more closely within the formal transport policy, planning and regulatory environment. The priorities listed above provide a starting point for that process.

REFERENCES

- Anderson, J. (2009). City looks to develop rules for 'pedicabs'. Portland Tribune, 16 April 2009.
- Austin Pedicab Alliance (2010). Pedicab and rickshaw regulations and ordinances around the USA. <http://austinpedicab.org/2009/04/23/pedicab-regulations-and-ordinances-around-the-usa/> (accessed May 3 2010).
- Banglapedia (2006). http://banglapedia.search.com.bd/HT/R_0201.htm (accessed February 15 2008).
- Begum, S. and B. Sen (2005). Pulling rickshaws in the city of Dhaka: A way out of poverty?, Environment and Urbanization, Vol.17, No.2, 11-25 .
- Boston Police Department (2007). Interim regulation for Pedi-cabs. Police Commissioner's special order number SO-07-062. http://www.cityofboston.gov/Images_Documents/Interim%20Pedicab%20Rule.pdf (accessed May 10 2010).
- City of Ashland (2003). An ordinance amending Ashland municipal code section 6.28.035 by revising regulations applicable to pedicabs. Ordinance number 2898. Ashland municipal code. <http://austinpedicab.org/2009/04/23/pedicab-regulations-and-ordinances-around-the-usa/> (accessed May 7 2010).
- City of Austin (1992). Regulations for Austin's pedicabs. Austin city code. Chapter 13 section 2 subpart E. <http://austinpedicab.org/2009/04/23/pedicab-regulations-and-ordinances-around-the-usa/> (accessed May 7 2010).
- City of Phoenix (2008). Pedicabs regulation s . Phoenix municipal code. Article XI. <http://austinpedicab.org/2009/04/23/pedicab-regulations-and-ordinances-around-the-usa/> (accessed May 8 2010).
- City of Portland (2010). New schedule for vehicle permitting: regulations and permits. Private for hire transportation board of review. <http://www.portlandonline.com/omf/index.cfm?a=295539&c=38405> (accessed May 15 2010).
- City of San Diego (2010). Vehicle permit for pedicab program. Engineering and capital projects. San Diego city code. <http://www.sandiego.gov/engineeringcip/services/public/pedicab/vehiclepermit.shtml> (accessed May 12 2010).
- City of Vancouver (2010). Vehicles for hire by-law number 6066. The council of the City of Vancouver, British Columbia. <http://vancouver.ca/bylaws/6066c.PDF> (accessed May 15 2010).
- Chandran, C. (2009). The Cycle Rickshaw in London- It's a 'Pedicab' mate!. IANS. http://www.thaindian.com/newsportal/feature/the-cycle-rickshaw-in-london-its-a-pedicab-mate-feature-with-images_100247650.html (accessed January 27 2010).

- Department of Environment (2009). Pilot bus priority corridor pre-feasibility study: Final report, Clean Air and Sustainable Environment Preparation Project. Department of Environment, Government of Bangladesh.
- Dhaka Integrated Transport Study (1994). Greater Dhaka Metropolitan Area Integrated Transport Study Final Report Volume 1: Database and immediate actions. Report No. BGD/88/011, Government of Bangladesh Planning Commission, Dhaka, Bangladesh.
- Dhaka Transport Coordination Board (2004). Dhaka Urban Transport Project 1998-2004. Government of Bangladesh and World Bank.
http://www.dtcg.gov.bd/dutp_backgroundmain.htm (accessed August 22 2008).
- Dhaka Urban Transport Project (1998). Dhaka Urban Transport Project-Phase II. Volume 1: Technical proposal. Government of Bangladesh and World Bank, Dhaka, Bangladesh.
- Dhaka Urban Transport Project (2007). Project performance assessment report. Government of Bangladesh and World Bank, Dhaka, Bangladesh.
- Dhaka Urban Transport Network Development Study (2009). Dhaka Urban Transport Network Development Study: Interim Report. November 2009, Dhaka Transport Coordination Board and Japan International Cooperation Agency.
- Epstein, R.A. (2009). Pedicab Regulation: Does public safety take a back seat to government monopoly? <http://www.forbes.com/2009/06/22/pedicab-regulation-safety-opinions-columnists-epstein.html> (accessed January 19 2010).
- Fotosearch (2008). <http://www.fotosearch.com> (accessed December 6, 2009).
- Gadepalli, S. (2008). India Rickshaw Modernization: Strengthening Bicycle and Rickshaw Industries. Institute for Transportation and Development Policy.
http://www.itdp.org/index.php/projects/detail/india_rickshaw_modern (accessed January 6 2010).
- Gallagher, R. (1992). The Rickshaws of Bangladesh. University Press Ltd., Dhaka.
- Grynbaum, M.M. (2009a). Stalled plan to license pedicab advances. The New York Times.
<http://www.nytimes.com/2009/06/15/nyregion/15pedicab.html?ref=todayspaper> (accessed April 27 2010).
- Grynbaum, M.M. (2009b).Pedicabs will now be inspected and licensed. The New York Times. <http://www.nytimes.com/2009/11/21/nyregion/21pedicabs.html> (accessed April 30 2010).
- Hidalgo, D. (2002). Structural change in Bogota's transportation systems: Public and non-motorized transportation priority and private car restrictions. Proceedings of the 2nd International Conference on Urban Public Transportation Systems, ed. Kulyk, W., Virginia, April 2002.
- Ho, V.. and B. Wong (2008). Pedicabs come under scrutiny after tourist's death. http://www.seattlepi.com/local/374131_pedicab08.html (accessed May 1 2010).
- Hoque, M.M., B.Khondokar and M.J.B. Alam (2005). Urban transport issues and improvement options in Bangladesh. Proceedings of 2005 Canadian Transport Research Forum Conference, Hamilton, May 2005.
- Hummel, K. (2008). The Rickshaw as an endangered species. The Bengal Gaze.
<http://www.popmatters.com/pm/archive/contributor/122/> (accessed on July 30 2008).

- Institute for Transportation and Development Policy (2005). World Bank says Dhaka rickshaw ban should not go ahead. Sustainable Transport E-Update, No. 16. <http://www.itdp.org> (accessed January 20 2009).
- Japan for Sustainability (2006). <http://www.japanfs.org/en/pages/026295.html> (accessed December 24 2009).
- London Assembly (2005) London's Rickshaws – The Transport Committee's scrutiny into the future of London's pedicabs. <http://www.london.gov.uk/assembly/reports/transport.jsp> (accessed December 26 2009).
- Maus, J.(2009); Saltzman creates new pedicab committee to oversee policy changes. <http://bikeportland.org/2009/05/13/saltzman-creates-new-pedicab-committee-to-oversee-policy-changes/> (accessed May 11 2010).
- Modianot-Fox,D.(2007).The ancient transportation takes a modern turn. <http://www.smithsonianmag.com/people-places/10024086.html#> (accessed on January 1 2010).
- Municipality of Yogyakarta (2008). Technical and operational rules of the non-motorized vehicles in the City of Yogyakarta. Local regulation of the City of Yogyakarta on non-motorized vehicles, Municipality of Yogyakarta, Indonesia.
- Neibauer, M. (2010). D.C pedicabs to adhere to new rules. Washington Business Journal. <http://washington.bizjournals.com/washington/stories/2010/04/19/daily85.html> (accessed April 19 2010).
- New York City Council (2007).Local law number 19 Subchapter 9. Local laws of the City of New York. http://www.nycpedicabassociation.org/pdf/Law_Issues/Pedicab_local_law19_April07.pdf (accessed April 7 2010).
- New York City Council (2009). A local law to amend the administrative code of the city of New York, in relation to licensing of pedicabs. Local law number 53. <http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=452683&GUID=82826507-4706-4F0E-BBAE-D02BE21852BC&Search=&Options> (accessed May 1 2010).
- Pommereau, I. (2005). Pedal power thrives in Germany. The Christian Science Monitor. <http://www.csmonitor.com/2005/0503/p07s01-woeu.html> (accessed May 15 2010).
- Prakash,V. (2009). Leaving the solar rickshaws in India. <http://ecoworldly.com/2009/04/09/leveraging-the-solar-rickshaws-in-india/> (accessed April 9 2009).
- PUSTRAL UGM (2002). Becak improvement projects report. Gadjah Mada University, Indonesia: Centre for Transportation and Logistics Studies. <http://www.pustral-ugm.org/becak/report.htm> (accessed January 24 2010).
- Rahman, M.M, G.D'Este and J. Bunker (2008). Problems and prospects of non-motorized public transport integration in developing cities. Proceedings of the 30th Conference of the Australian Institute of Transport Research, Perth.
- Rahman, M.M, G.D'Este and J. Bunker (2009a). Non-motorized public transport development: present scenario and future approach in developing cities. Proceedings of the 3rd Smart Systems Postgraduate Student Conference, Brisbane.
- Rahman, M.M, G.D'Este and J. Bunker (2009b). Is There a Future for Non-Motorized Public Transport in Asia? Proceedings of the 8th Conference of the Eastern Asia Society for Transportation Studies, Surabaya.

- Replogle, M. (1992). Non-Motorized Vehicles in Asian Cities. World Bank Technical Paper 162. Washington DC, USA: Environmental Defence Fund and World Bank.
- Roche, E. (2009). The humble cycle rickshaw gets a solar-powered makeover. <http://www.livemint.com/articles/2008/10/14005055/The-humble-cycle-rickshaw-gets.html> (accessed May 2 2009).
- Roth (2010). New pedicab policy in San Francisco invites new routes and businesses. San Francisco street blogs. <http://sf.streetsblog.org/2010/02/04/new-pedicab-policy-in-san-francisco-invites-new-routes-and-businesses/> (accessed May 2 2010).
- San Francisco Government (2010). Pedicabs regulation. San Francisco municipal code. Article 39. <http://www.municode.com/content/4201/14140/HTML/ch039.html> (accessed May 16 2010).
- Singh, G. (2008). Solar powered cycle-rickshaws launched in Delhi's oldest and busiest market. <http://ecoworldly.com/2008/10/12/solar-powered-cycle-rickshaws-launched-in-delhis-oldest-and-busiest-market/> (accessed December 8 2009).
- Strategic Transport Plan (2005). Strategic Transport Plan for Dhaka- Draft Report, Government of Bangladesh, The Louis Berger Incorporation and Bangladesh Consultants Limited, Dhaka, Bangladesh.
- TfL(2009). Pedicabs update: Agenda 11. Surface transport panel. Transport for London. <http://www.pedicabforum.com/forums/blog.php> (accessed May 17 2010).
- The Manila Times (2008). In India, the rickshaw goes high-tech with solar power. <http://www.manilatimes.net/national/2008/oct/17/yehey/fasttime/20081017fast8.html> (accessed January 28 2010).
- UK Parliament (2005). Proceedings of the Select Committee on Committee on the London Local Authorities and Transport for London Bill, Minutes of Evidence Sections 80-99. <http://www.publications.parliament.uk/pa/cm200506/cmselect/cmllatfl/51101/5110106.htm> (accessed December 30 2009)
- Urban Thinking, Urban Policy, & Translating Policy into Law. (2009). <http://urbanplacesandspaces.blogspot.com/> (accessed June 22 2009).
- Utz, V. and Petersen, L. (2003). Good practice: A cycle rickshaw for the future. *Appropriate Technology*, Vol 30, No 3, 46-48.
- Vancouver Organizing Committee (2010). <http://www.vancouver2010.com/more-2010-information/local-business--organization-and-resident-information/transportation-plan-and-maps/getting-around-metro-vancouver/> (accessed March 12 2010).
- Velotaxi (2010). <http://www.velotaxi.de/> (accessed May 16 2010).
- Warren, J.F. (2003). *Rickshaw Coolie: A People's History of Singapore 1880-1940*, National University of Singapore Press, Singapore.
- Westall, S. (2007). Rickshaws pick up speed in Europe's top cities. <http://www.reuters.com/article/idUSL0343085520071003> (accessed December 15 2009).
- Wikipedia (2009). Rickshaw. <http://en.wikipedia.org/wiki/Rickshaw> (accessed January 18 2009).
- Wipperman, T. and T. Sowula (2007). The rationalization of non-motorized public transport in Bangladesh. *The Progressive Bangladesh*. http://www.drishtipat.org/blog/wpcontent/uploads/2007/08/rickshaw_development-proposal.pdf (accessed January 9 2009).