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Non-motorised public transport: the past, the present, the future

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Abstract

Non-motorised public transport (NMPT) involves cycle-powered vehicles that carry several passengers and a small amount of goods; and provide flexible hail-and-ride services. Effectively they are non-motorised taxis. NMPT is widespread in developing countries, where it caters for a wide range of mobility needs. Common forms include cycle-rickshaw, becak, cyclo and bicitaxi. Over the last 10-15 years there has also been a re-emergence of NMPT in the form of pedicabs in many developed countries because of the operating flexibility of NMPT, its eco-sustainability, and its ability to operate where use of motorised vehicles is restricted. In particular, in cities such as Berlin, London, New York and Vancouver, pedicabs are making the transition from 'novelty' to 'serious' transport mode. This is creating new transport policy/planning questions about pedicab operation and integration. This paper examines the phenomenon of NMPT and where it is heading. It uses case studies from Asia/Latin America and Europe/North America to examine emerging NMPT issues and possible responses, and how this may affect NMPT in Australia and New Zealand where it is still somewhat a 'novelty' but has potential as both an opportunity and a challenge. In particular, this paper argues that there is an opportunity in Australia and NZ to address the legal, regulatory and operational issues associated with NMPT in a more pro-active manner rather than playing catch-up as is happening elsewhere in the world.

1. Introduction

Non-motorised transport (NMT) is a key component of urban transport system worldwide, but in developed countries, we generally think of NMT in terms of private transport: walking and cycling. However, there is another form of NMT that has an important role in the transport system in many developing countries, and is also growing in importance in some developed countries. This additional form can be termed non-motorised public transport (NMPT). NMPT involves cycle-powered vehicles that carry several passengers and a small amount of goods; and provide flexible hail-and-ride services for which the passenger pays a fare. Effectively they are non-motorised taxis. 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. It is widespread in developing countries, where NMPT caters for a wide range of mobility needs. Common forms include cycle-rickshaw (Bangladesh, India), becak (Indonesia), cyclos (Vietnam, Cambodia), samlor (Thailand), saika (Myanmar), bicitaxi (Columbia, Cuba) and ecologico (Mexico). The popularity and significance of NMPT is also

gradually increasing in several developed countries of Europe and parts of North America over the last 10-15 years. This re-emergence of NMPT in the form of pedicabs is primarily attributable to their flexibility and contribution to the urban dynamic; their eco-sustainability, and their ability to operate where use of motorised vehicles is restricted. In particular, in cities such as Berlin, London, New York and Vancouver, pedicabs are making the transition from 'novelty' to 'serious' transport mode.

This growing recognition around the globe that NMPT can play an important role in the transport system is also creating new transport policy/planning issues and questions and requirements centred around their legal framework, operation and integration in general. This paper examines the phenomenon of NMPT and where it is heading. The study findings are based on extensive worldwide literature review and discussion with NMPT operators in several cities. In particular, this paper explores issues relevant to NMPT's contribution to transport system; the need for and type of regulatory and enforcement measures; planning and management strategies; operational safety; suitable areas of coverage; whether of not numbers should be capped; and official attitudes towards the mode and its development. Case studies of cities in Asia/Latin America and Europe/North America are used to exemplify the current condition; critical issues that have emerged in managing NMPT; and responses that have been tried. Based on this analysis, the paper identifies and discusses possible future issues and concerns regarding NMPT in the Australia/New Zealand context where NMPT is still somewhat a 'novelty' but has potential as both an opportunity and a challenge.

2. NMPT in Asia & Latin America

2.1. The current situation

NMPT is a major mode of urban transport system in many developing cities of Asia and South America. Rickshaws were first introduced in Japan in 1870 and then onwards used as a public transport mode, in countries like Bangladesh, India, China, Indonesia, Vietnam and since 1960s in Havana and Bogota (Replogle 1991; Urban Thinking, Urban Policy, and Translating Policy into Law 2009). At present Dhaka, the capital city of Bangladesh is the single most NMPT populated city in the world with a fleet size of more than 500,000 rickshaws (Strategic Transport Plan 2005). It is estimated that currently there may be more than 10 million cycle rickshaw operators in Asia and Latin America (Rahman et al. 2010). See Figure 1 for examples of rickshaws in Asia and Latin America.

Figure 1: Examples of NMPT in Asia and Latin America (left- rickshaw in Dhaka; right- bicitxi in Bogota)

Source: Flickr 2010; In Bogotá 2010

However official attitudes towards NMPT in this region have been mixed. They were generally supportive in the early days but became adverse since the 1950's especially in large and rapidly motorising cities in the Asian region where Manila banned NMPT in 1950s, Bangkok in 1960s, Karachi in 1962, Delhi in 1980s and Jakarta in 1988. Most recent restrictive measures have been Surabaya in mid 2000 and Ho-Chin-Minh City in 2008 (Rahman et al. 2008 2009b). But where bans have been imposed, the results have not always been positive. In many cities, they were replaced by higher pollution generating vehicles like motorcycles, motorised three wheelers and cars; and there was a reduction in mobility and travel options for short trips (2-5 km) and vulnerable social groups (women, children and elderly) (Strategic Transport Plan 2005; Bari and Efroymson 2007; Rahman et al. 2009b). On the other hand, other cities in Asia, such as Yogykarta, Chandigarh and Phnom Phen have taken a positive (or at least neutral) stance towards rickshaws. In Latin America (except Mexico), official attitudes to NMPT are relatively supportive/neutral policy, but in part, this reflects the small NMPT population and role contribution compared to Asia, thereby making the problems and challenges less evident.

2.2. Case studies

The current situation regarding the treatment of NMPT as a transport mode, critical issues that have emerged in managing NMPT, the responses tried and the resulting outcomes can be further explored through two case studies contrasting in scale and character – Dhaka, Bangladesh and Yogyakarta, Indonesia.

Dhaka has had rickshaws since 1930's and at present there are around 500,000 rickshaws active in Dhaka. They provide a substantial proportion of travel demand – 41% of primary non-walk trips and 22% of passenger-km of travel (Dhaka Urban Transport Project 1998; Dhaka Transport Coordination Board 2004). The official attitude towards NMPT has however been mostly neutral to negative, especially in the last 20 years or so, with NMPT discouraged in favour of motorised transport. Policies have included increased price of spare parts and duty on imports, licensing limitation to 80,000, ad-hoc restriction of NMPT on major roads, and absence of appropriate plying and modal interfacing facilities. The primary concerns of policy makers were: rickshaws being inconsistent with a modern city image, their assumed congestion impact on transport system, and the health impact on rickshaw drivers. There was little appreciation of the important role that rickshaws play in Dhaka as a feeder mode, as a principal mode for vulnerable social groups, and as the most suitable mode for narrow crowded street in the old part of Dhaka. The addressing of design improvements to attain better ergonomics has also remained largely unattended. For detailed analysis on operational, policy and health issues see (Rahman et al. 2008; 2009a).

Since these measures were undertaken with no comprehensive user demand analysis or attention to providing modal or employment alternatives, their main impact has not been to reduce rickshaw activity but instead the growth of the rickshaw industry in an illegal, unplanned and unregulated manner. The best demonstration of such inappropriate and failed policy is the capping on fleet size, which is officially capped at 80,000 but in reality is over 500,000 (Strategic Transport Plan 2005). These illegal fleets coupled with no dedicated rickshaw policy; disjointed provision of rickshaw vehicle registration, irregular inspections, poor driver licensing and no insurance requirements; and insufficient infrastructure (rickshaw pathway, passenger loading/unloading and parking facilities) are resulting in poor operating standard, lack of passenger and driver safety and frequent violation of traffic rules. But enforcing authorities are facing difficulty in undertaking punitive measures as there is no legal regulatory framework for a non-motorised vehicle in the present ordinance 'The Motor Vehicle Ordinance 1983' (Strategic Transport Plan 2005; Bangladesh Road Transport Authority 2010).

Yogyakarta has a much smaller NMPT (becak) population (around 12,000), but their role is similar to that in Dhaka (City of Yogyakarta 2009). Realising the significance of NMPT in city transport, the Yogyakarta city council has implemented a comprehensive legal/regulatory

framework for becak, covering requirement of vehicle and driving permits at regular intervals, annual inspections, operating safety requirements, traffic enforcement measures, design improvements to upgrade driver ergonomics and planned facilities for its routing, parking and safe operation. The city government has future plans to restrict becak numbers based on market demand analysis and development of an integrated transport planning framework for becak and bicycle operation. This integrated regulatory umbrella and management efficiency has reinforced NMPT as an iconic element of the city, serving the local travel demands and complementing long haul public transport services. These two contrasting scenario demonstrate the critical significance of acting appropriately to optimise the role contribution of NMPT, where applicable rather treating it as nuisance.

In Latin America, the issues of defined regulatory framework and operational safety standards, good management practices, and improved technology have largely remained unaddressed, resulting in similar safety and operational problems as encountered in Asian cities. Bogota is an exception with planned integration of bicitaxi as a feeder service to the Bus Rapid Transit, TransMilenio (Hidalgo 2002; Hook 2003; Bari and Efroymson 2004), but it still lacks a comprehensive regulatory and safety framework. This generates problems for enforcement and user safety.

2.3. Overview

The above analysis brings forward a few critical elements that have emerged while decision makers in these regions have tackled issues in the NMPT sector. These include an inadequate understanding on part of the officials of the full extent of the NMPT role and contribution to the transport sector and subsequent reactive, disaggregated and inconsistent decision making; lack of an effective legal/regulatory framework making enforcement ineffective and creating a large “illegal” industry; failure to provide sustainable transport alternatives, with the mobility gap being mostly taken up by motorcycles, motorised three wheelers and cars; and ad-hoc and unplanned management initiatives for accommodating the mode without an integrated framework.

3. NMPT in Europe & America

3.1. The current situation

Over the last 10-15 years, NMPT has also emerged in many countries of Europe and North America in the form of pedicabs (also known as *bugbug/velo-taxi/trixi*). In particular, their popularity and significance has been gradually increasing, and the usage pattern is broadening from tourism to public transport, especially in London, Berlin, Frankfurt, Vancouver, New York, San Diego and Austin. The following statistics give a sense of the scale of NMPT in cities in Europe and North America: Berlin has a current fleet size of 200 and passenger carriage of more than quarter million in 2007 as reported by Westall (2007) and Velotaxi (2010); London with a present fleet size of about 900 and annual trips of more than one million (Transport for London 2009); New York has around 1,000 pedicabs and San Diego more than 430 as reported by Grynbaum (2009) and Gao (2009) respectively. See Figure 2 for example of pedicabs in Europe and North America.

Whereas up until the last 20 years, NMPT may have been seen as an obsolete mode with no future in the developed world, at present in many cities it is increasing its significance and with potential for further growth. Such re-emergence and increased popularity of pedicabs is attributable to a number of factors including it’s operating flexibility (such as in areas where motorised vehicle access is restricted or discouraged through pricing); sight-seeing convenience for tourists; suitability for small scale delivery packages; the eco-sustainable nature of the mode; and the dynamics that it adds to the urban fabric. The outlook and

attitude towards pedicabs are therefore becoming positive, both at user level and more significantly at the policy level.

Figure 2: Examples of NMPT in Europe and North America (left- velotaxi in Berlin; right- pedicab in San Diego)

Source: Keseling 2008 ; Derby 2009

3.2. Issues and concerns

The emerging popularity of pedicabs in these regions are posing new transport policy/planning questions about their regulation, operation, integration and management. The legal recognition of pedicabs into the main city transport system of some of the major cities – Berlin and Frankfurt by 2005 (Pommereau 2005), Vancouver in 2009 (City of Vancouver 2009), Boston in 2007 (Boston Police Department 2007), New York in 2009 (New York City Council 2009) and most recently San Francisco in 2010 (San Francisco Government 2010) – are positive signs of a relatively early response to the growing demand and realisation of the need to regularise the industry. The range, degree and extent of the concerned issues is examined through case studies of two of the most pedicab dominant cities in these regions, namely London, England and New York, United States of America. These cities demonstrate relatively contrasting approaches to the pedicab industry.

New York has had pedicabs since the 1990s, mostly used for tourist travel, but it was not until the early parts of this decade that they emerged on to the regulatory radar due to their growing market demand, shift of use as a regular passenger transport and for small scale goods delivery. These together with emerging operational issues, requirement of passenger and driver safety and subsequent enforcements due to accident occurrence led to the formulation of pedicab regulation in 2007, later amended and improved in 2009 (Rahman et al. 2010). The regulation (Section 20-259, local law no. 19) (New York City Council 2007) has clearly defined pedicab as vehicle similar to that of bicycle (therefore require abiding all bicycle laws) with restrictive coverage area due to service character; outlining operating and safety requirements including vehicle permit, driver skill requirement and liability insurance requirements. There are also punitive measures for violations. These regulations have made pedicab operation much safer in New York City. However, there are a number of issues that still demand more close examination. For example, pedicab capping is fixed to 325 at any give time according to Section 20-251, local law no. 19 (New York City Council 2007), which is inconsistent with the current market demand and existing fleet size of around 1000. This is causing illegal operations; conflicts between the operators and city authority; loss of council revenue; and pressure on the regulators to increase the cap limit. The local law no. 19 (Section 20-259) also allows for officials to restrict pedicabs in ‘unusually heavy pedestrian or vehicular traffic’. This means that pedicabs, which are vehicles under the law, are subject to removal while other vehicular traffic is permitted to remain, creating unequal plying facilities. Epstein (2009) further argued that the effect of such measures together with high end safety and insurance regulations might be to drive the economic competitors to cabs,

buses and livery services off the street, pedicabs in particular. The issues of parking, fare, planned movement and interfacing with other vehicles are also not addressed well in the regulations. This is leading to traffic chaos in their plying with fast moving vehicles; illegal occupancy and conflict for parking area with private vehicles and taxi services; obstruction of on-street vehicular traffic movements due to undesignated loading/unloading of passengers. The allegation of charging unfairly in some instances is also prevalent due to unclear regulatory directives on fare structure.

The situation, issues and concerns are more complicated in **London,** where pedicabs/bugbug started later to New York, around 1998. However the regulatory responses have been incomplete, indecisive and piecemeal compared to New York and San-Francisco. A pedicab-related module had been incorporated into the National Cycling Standard Level 3 in 2005 for operational regulation (Selection Committee on Committee on the London Local Authorities and Transport for London Bill Minutes of Evidence, Section 80-99 2005) (United Kingdom Parliament 2005), but there continue to be a number of issues unaddressed and regulatory loopholes in relation to the London pedicab industry. This is causing operational and management problems. On safety grounds, there are no passenger limitations, obligation of seat belts, or third party insurance to cover accident injuries, posing threat to passengers and drivers. The issue of what vehicular classification pedicab should fall under has been a long lasting debate and is creating conflict with regard to licensing, regulation and enforcement. For instance when introduced into London in 1998, pedicabs exploited a legal loophole which meant that they could legally ply for hire as stage carriages under the Metropolitan Public Carriage Act 1869 without the need for a street trading license required by motorised modes providing a similar service (London Assembly 2005). This exemption was subsequently tested in court and upheld. 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. But 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). Some voluntary registration initiatives are in place meanwhile to regulate the pedicab drivers initiated by the Westminster City Council (Rahman et al. 2010). But this still leaves large part of the pedicab industry unregulated and subject to illegal operations as they would be without any registration/ licensing, creating enforcement problems for Police. In addition, the number and coverage area for pedicab operation still remains an unsolved issue, creating confusion and chaos on traffic management.

3.3. Overview

In Europe and North America, a number of legal and management initiatives are underway or already in place to incorporate pedicabs within a regulatory regime. But mostly they are incomplete, there remain significant legal, planning and enforcement issues that require addressing such as need for and type of regulatory and enforcement measures, suitable coverage areas for the mode, whether pedicabs numbers to be capped or leave to be self regulated by market force etc, Pressure to fully address these issues is becoming more acute to resolve the existing conflicts and facilitate safe and efficient future operation of NMPT. One positive aspect of the pedicab industry of these regions is their technological innovation in terms of modern and attractive design with better ergonomics and improved vehicular safety measures compared to those in Asia/Latin America.

The issues and challenges observed in relation to NMPT in Europe/North America (and the experience of Asia/Latin America), plus the approaches undertaken and their received outcomes, can provide valuable lessons for other countries, such as Australia and New Zealand, where the pedicab industry is taking hold and similar issues are likely to emerge or already emerging in small scale.

4. NMPT in Australia & New Zealand

4.1. The current situation

NMPT is established in Australia and New Zealand but is still at an early stage of development compared with Asia, or even Europe and North America. In Australia, pedicabs are operating in the State capital cities of Sydney, Melbourne, Brisbane, Adelaide and Perth and in some smaller cities, including Gold Coast, Townsville and Cairns. They are generally classic in their appearance with the operator in the front similar to Asian cycle-rickshaws, though improved in technology and design like North American pedicabs.

Queensland has been a pioneer with pedicabs introduced as long as 30 years ago. Marlin Coast Pedicab Company in Cairns started operating pedicabs in 1987, and they were introduced to Brisbane back in 1988 during the World Expo and lasted for a couple of years before re-emerging in 2008. Presently, there are 2 main operators in Brisbane; Green Cabs which commenced operation in 2008 with a current fleet size of 8-10 and Pedal Cabs which started operation in 2010 with a fleet size of 10-12, imported from New York and London (Green Cabs 2010; Pedal Cabs 2010). They operate morning-evening all through the week with extended service period during weekends. Pedicabs have also started operating in Townsville and Gold Coast in the last few years with operators such as TropiCabs and Nick Booths. The usage pattern in these cities is primarily as tourist transport, although in Townsville and in particular Brisbane, there is a small but emerging role as regular public transport within inner city areas where speed limits and traffic speeds are low.

Sydney, Melbourne and Perth also have a few pedicabs primarily used as tourist and alternative transport. They have been operating in Sydney since around 2005 and in Melbourne since around 1995. These are primarily used as tourist rides, advertising, marketing campaign and small freight transport purpose. The key operators include Peda Pods Company and Sydney Pedicab in Sydney and Tri-Sleds in Melbourne. Tri-Sleds has also introduced a ‘utility trike’ to increase load carrying ability with a unique aluminum back tray and a wider load platform to ensure stability (Peda pods 2010; Sydney Pedicabs 2010; Tri-Sleds 2010). In Perth, there are also a few pedicabs in use for tourist and fun rides. Fares in Australia are generally around $5 per person for 10-15 minutes ride or 2-3 blocks distance.

The pedicabs in all these major cities are modern in makeover with innovative design, substantial safety measures and better ergonomics. Figure 3 shows some examples of pedicabs in Australia.

Figure 3: Examples of NMPT in Australia (left: Brisbane Greencabs; right: Brisbane Pedalcabs; next page: left: Sydney Pedapods; middle: Melbourne Trisleds; right: Perth pedicabs)

Source: Green Cabs 2010; Pedal Cabs 2010; Rahman 2008; Peda pods 2010; Tri-Sleds 2010

In Australia, the pedicab industry has grown more in recent years, with the response from the community being generally positive and that of the authorities to a certain extent encouraging. From a legal perspective, pedicabs are generally regulated through the prevailing bicycle regulations. For instance, pedicabs are categorised as AB vehicles by Australian Department of Infrastructure, Transport, Regional Development and Local Government (DOTARS) and as a bicycle by Road and Traffic Authority (RTA), New South Wales (Pedapod 2009). In Brisbane, Gold Coast, Townville and Cairns, they are categorised as bicycles and regulated accordingly through Part 15 of the Queensland Transport Operations (Road Use Management-Road Rules) Regulation 1999 (Office of the Queensland Parliamentary Council 2008). Queensland Police has provided their acceptance regarding Queensland Transport's adjudication of laws on pedicabs. In addition, Gold Coast has Local Law No. 11 *(Roads and Malls*) 2008 Subordinate Local Law No. 11.1 (*Interference with a Road*) 2008 to define the movement of pedicabs (Gold Coast City Council 2009). The regulations primarily covered include licensing, operating behaviour, parking, safety requirements and enforcement for non-compliance, though are generally based on existing bicycle regulation and are limited in spectrum.

Limited infrastructure facilities are in place for pedicabs. In Brisbane, four designated parking spaces and some passenger drop-off/ pick-up points have been defined for pedicabs by Brisbane City Council (BCC), but generally, pedicabs operate from the kerbside. The debate on its potential, utility and suitability as an alternative sustainable Central Business District transport for short distance trips is also growing in Brisbane due to operating flexibility, acceptable fare, eco-friendly nature and possibility to reduce demand for automobile dependency in inner city areas during peak periods as reported by Widdowson (2010), Straker (2010) and Dennehy (2010).

In New Zealand, pedicabs are operating in the streets of major cities such as Auckland, Wellington and Christchurch, and some smaller provincial cities (such as Nelson). They have

been operating in Auckland since the 1990s and at present, the major operators include Jafacabs (Pedicab Forum 2007; Coys 2010). In Wellington they are known as biketaxi and are operated by BAXI Company (Wellington NZ 2010). Seasonal operations of pedicabs are also observed in Christchurch and some smaller tourist centres. The pattern of usage is similar to that in Australia, they are generally used for fun, as an alternative form of short haul transportation in inner city and surrounding areas. Figure 4 shows some examples of pedicabs in New Zealand.

The vehicles in operation at Auckland and Christchurch are imported from Main Street Pedicabs Inc. New York and Cycle Maximus, London. They are modern in technology and design. Christchurch is using basic models from China Vehicles, while Wellington produces pedicabs locally but incorporating the modern operational features, safety and ergonomic issues. At the time of writing, formal regulation or legal frameworks was yet to be enacted for NMPT in New Zealand.

Figure 4: Examples of NMPT in New Zealand (left- Wellington baxi; middle- Auckland pedicab; right- Nelson pedicab)

Source: ; Wellington NZ 2008; Photobucket 2008; Radio weblogs 2007

4.2. Emerging challenges and opportunities

NMPT is growing in Australia and New Zealand and many cities have conditions conducive to further growth with relatively flat topography (in at least part of the city); receptive community; densely built up inner city areas; high levels of tourism; pro-sustainable transport strategy; and the possibility of future restrictions on car use in central areas. However the review of the current situation and international case studies have highlighted a range of general issues likely to be associated with expansion of NMPT activity:

- The most important of these is the **necessity to look ahead and decide early about defining the future major role of NMPT in the city transport system**, whether as regular or tourist mode of transport and bringing the industry under a more consistent and inclusive regulatory regime in accordance. In many cities (such as London and New York), NMPT has emerged as a significant mode under the regulatory radar and officials have been playing catch-up in developing a suitable policy, planning and regulatory framework.

- This leads to the second major issues which is **a comprehensive legal framework** to ensure that NMPT operates within the law and consistent with community expectations. NMPT uses streets and carries passengers which suggests consideration of guidelines on vehicular classification for pedicabs; and the corresponding set up of registration and, licensing requirement; vehicular and operational safety standards; rider skill requirement,

insurance level and extent; acceptable fare structure; and enforcement provision in case of non-compliance. The debate as to whether the NMPT industry should be allowed to be self-regulated or not as arose in Chicago or New York should also demand scrutiny before regulatory decisions are finalised.

- The issues of **consistency in implementing the policy and managing the transition** from the current situation are also crucial to address with provision of suitable infrastructure supply including but not limited to dedicated lane provisions; designate routing; appropriate signage and signals; parking and waiting facilities, backed up by integrated planning and road network hierarchy if required. An interesting issue is the extent to which NMPT should be allowed to operate in pedestrian precincts and use bicycle paths, transit lanes and other mode specific infrastructure.

- Focus should also be provided on **continuous improvement in design standards and technological upgrade** to facilitate safety, operational ease and sustainable ergonomics.

Some of the issues mentioned above are already at some stage of maturity in cities in Australia and New Zealand but the emerging challenge is to fill in the details and avoid some of the problems already encountered in Europe/North America and Asia/Latin America. In particular, some specific issues include:

- regulations covering non-motorised vehicles. Regulations already exist in most of the Australian cities but in most cases, they are local adapted bicycle regulations that are primarily formulated for private vehicle activity and not comprehensive enough to be fully suitable to public transport. Otherwise a number of critical issues may arise with future growth, such as enforcement problems on licensing and registration due to vehicular class confusion as in London; allegation of plying inequality in comparison to other public transport like taxi and buses as happened in New York and Chicago; debate on fleet size capping and rationale as is the case of New York; and level of safety measures-insurance. A few of such issues are already arising in cities, like Brisbane, with growing numbers of pedicabs. In Brisbane, pedicab operators are complaining about unequal plying facilities because pedicabs are categorised as a bicycle which is a private vehicle, thereby requiring that they follow all rules and regulations applicable to bicycle but are not allowed on all places where bicycles can ply such as on pedestrian paths with high traffic volume.

- the coverage area and limit of movement. Currently pedicabs operation is ad-hoc, within the inner city area in Brisbane and Townsville while all over the city in Cairns, Melbourne or Sydney. It may be preferable to develop some specific guideline on the operating areas of pedicabs based on common parameters such as network speed limits, road category, land usage and the role policy makers want pedicabs to perform in the transport system, that is, a planning framework for interfacing pedicab with other transport modes.

- infrastructure facilities. As specified in above, specific infrastructure is mostly absent in local cities except a few parking provision such as in Brisbane. It may be necessary to have dedicated infrastructure, depending on market demand, official policy and size of the respective cities.

- fare structure. At present fares are unregulated but mostly uniform, As the market size for pedicab increases and it becomes a competitor to other public transport forms, fares

policies may need to be put in place to reach an operator-rider-user acceptability. Otherwise discrepancies and conflict might arise as is happening in San Diego, and London.

5. Concluding remarks

In Australia and New Zealand, pedicab is still somewhat of a "novelty" mode but if NMPT follows a similar trajectory to what is happening in major developed cities in Europe and North America, then there is potential for substantial growth and expansion of its role. This has the potential to create opportunities, but at the same time, accentuate existing problems and raise many new issues associated with expanded operation of NMPT. Therefore this is the right time to have a serious look into this mode, its suitability and future role, and its possible integration into the overall transport system, as well as the issues that have already arisen in other countries and are likely to arise in Australia and New Zealand. There are lessons from Europe/North America and from Asia/Latin America that can help transport policy and planning professionals in Australia and New Zealand to anticipate and respond to these issues, rather than play catch-up as has been the case in most other markets.

This paper has described the current situation and outlook for NMPT in its global perspective and locally in Australia and New Zealand. It has highlighted the positive attributes of NMPT in terms of its operational flexibility in meeting short-distance trip demand; its potential to add to the vibrancy of the urban environment; its zero emission capability; and its potential for operation in areas where operation of motorised vehicles are restricted. But at the same time, the experience of many cities is that expanded NMPT operation also comes with market entry, competition, safety, regulatory, enforcement, pricing and operational issues, both in terms of the NMPT industry itself and its interaction with existing modes (such as taxi, bus, car, bicycle). Many of these issues have so far received limited attention in Australia and New Zealand despite a growing presence of NMPT in our cities. This paper provides a summary of international experience with NMPT as a step towards developing a more comprehensive policy and planning position towards the future of NMPT in this region.

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