Table 5: Traffic Operational Characteristics of Rickshaw in Comparison to Remaining Modes

Travel Mode	Operational Characteristics							
	Route Flexibility	Schedule Rigidity	Ease of Access	Capacity	Service Freq	Speed	User Cost	Dominant Trip Length
Transit								
Metro Train (expected)	○	●	○	●	⊙	●	○	●
Bus	○	●	○	●	⊙	●	○	●
Micro bus	○	●	○	⊙	⊙	●	○	⊙ ●
Para transit								
Auto rickshaw	⊙	○	⊙	○	○	⊙	⊙	⊙ ●
Rickshaw	●	○	●	○	●	○	⊙	⊙ ○
Taxi	⊙	○	⊙	⊙	○	●	●	●
Private								
Car	●	○	●	⊙	●	●	●	○ ⊙ ●
Motorbike	●	○	●	○	●	●	⊙	○ ⊙ ●
Bicycle	●	○	●	○	●	○	○	○

Source: Derived from STP (2005) and Critical Analysis

◉ No ○ Low ⊙ Medium ● High

5. FUTURE DIRECTIONS

5.1 Initiatives towards Integration between Motorized Transport and Non- Motorized Transport

The discussion so far has demonstrated that private NMVs (like bicycles) and NMPT (like cycle-rickshaws and rickshaw vans) are not a substitute for motorized public transport. Instead, they are complementary and partially overlapping modes of transport. Each has unique strengths and weaknesses. In combination, they offer strong potential competition to private motorized transport for variable trip dimensions in developing cities of the world. Therefore, instead of enforcing policies to eliminate non-motorized modes, more attention should be paid to the integration of motorized and non-motorized modes, such as encouraging bicycle and cycle-rickshaw as access modes to express transit services for longer distance trips. For Dhaka, it should also be noted that rickshaw as NMPT are not the major cause of congestion, and that replacement of rickshaws with motorized transport may have a detrimental impact, especially from road space occupancy

and environmental perspectives. The prime example of such failed transport policy initiatives are Bangkok, Manila and Jakarta (GTZ 2003). These factors also indicate the necessity that management and integration of rickshaw transport in Dhaka and other Bangladeshi cities are required to achieve a successful and sustainable city system.

In Western Europe and Japan, the bicycle has recently become the fastest growing and predominant access mode to suburban railways (Replogle 1992). In India, bicycles play a major role in access to commuter railways (Replogle, cited in Tiwari 2002). The Bogotá transport model is considered by many researchers like Hidalgo (2002), Bari (2003) and Joewono & Kubota (2005) as highly successful, sustainable urban development models in recent years promoting NMT and public transport while restricting cars. Bari (2003) stated that this model is under active consideration for implementation in a number of African developing cities like Cape Town Dakar and Accra. He went on highlighting that the Bogotá approach demonstrated how NMVs, pedestrian mobility and public transport facilities could be integrated for the development of sustainable transport system and is worthy of exploring to cities like Dhaka. The integration lessons from Delft, Netherlands incorporating motorised modes, NMV (bicycle), pedestrians, mass public transit and water transport within an integrated transport network is also worth mentioning while we analyse the MT-NMT integration possibility for Dhaka. The plan for Tama New Town in Tokyo, which provides for pedestrian and bicycle access to town centres and railway stations completely segregated from vehicular road traffic, is also worth mentioning (World Bank 2002).

However, all these are examples of integration between motorized public transport and private NMVs. The scenario is somewhat different for Dhaka where integration demands are between motorized transport and NMVs including NMPTs (rickshaws). Therefore, while taking lessons from the successful integration instances elsewhere, it is necessary for Dhaka to devise a functional and indigenous integration mechanism that is contextual to the traffic characteristics and travel demand while facilitating the majority of the transport users.

5.2 Present Focus and Future Approach

This research paper has focused on and critically analysed the questions relevant to 'what role does rickshaw play in the overall transport spectrum of Dhaka?'; 'what are the problems and opportunities relevant to rickshaw as a mode of transport and regarding integration in the mixed traffic stream?'; and on the debate 'whether the existence of rickshaw is essential or detrimental in the transport system operation'?

The findings and analysis so far clearly indicate that rickshaws have a continuing and unique role to play in the Dhaka transport system, and can make an effective and functional contribution towards sustainable transport system development for Dhaka. The obvious questions that then arise are:

- if we accept that there is a future role of NMPT in the transport system of developing cities, what is that role?
- 'where is future place rickshaw might have in the mixed traffic environment of Dhaka'?
- 'how do we rationally attain that place?'
- what are the external factors to deal with while developing a mechanism, if applicable, for 'real' integration of the motorized and non-motorized modes?
- what technique(s) of such integration is rational while providing best functionality?
- what should be the modal priorities of the decision makers in the future transport system planning of developing cities?

No research has so far addressed these key issues in an integrated fashion. Our future research will therefore look into such unexplored attributes of this hotly contested issue, especially on developing a suitable mechanism for functional integration of NMPT (rickshaw) with motorized vehicles in the ever increasing traffic volume of Bangladesh with Dhaka as a central focus.

6. CONCLUDING REMARKS

This paper has delineated the directions in which the transport systems of many developing cities are heading, and has investigated the degrees and patterns of NMPT's contribution to the overall transport system of Bangladesh, with Dhaka as a central focus. Facts and figures have clearly demonstrated the crucial place rickshaw holds as a primary mode of travel for many citizens covering substantial market segments. As a result, and especially considering the travel utility, economic role, extent of workforce involvement, population dependence, eco-friendly nature, equity contribution and freight usage of rickshaws, it is clearly necessary to integrate MT-NMV policies and initiatives.

Having established the present contribution of NMPT and its integration with the overall transport system, future research on a number of highlighted issues will examine operational optimization of NMPT and development of a sustainable transport network for Dhaka. Such comprehensive attention to NMT as part of a national strategy, and local planning for implementation, are essential for reliable functioning of the existing transport system and to assist in reducing the non-equilibrium condition between motorized and non-motorized modes of transport in developing cities with similar traffic characteristics and composition.

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